RECIPE FOR RESILIENCE

for a sustainable agri-food sector in South Holland

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MSc1 Architecture, Urbanism and Building Sciences,
Track: Urbanism 2020/2021, Q3
AR2U086 R&D Studio: spatial Strategies for the Global Metropolis
AR2U088 R&D Methodology for Urbanism

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February-April 2021

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PREFACE

This report proposes a strategy to create a resilient agri-food sector in the province of South Holland, The Netherlands. It has been designed by five students at the Technical University of Delft of the track Urbanism, in the Master Architecture, Urbanism, and Building Sciences. This strategy is a result of the Research & Design courses from the third quarter of the first year: "R&D Studio: Spatial Strategies for the Global Metropolis" and "R&D Methodology for Urbanism". This project was completed over the course of nine weeks.

This strategy has been fully developed while working from home and with only online communication because of the measures against the pandemic. Despite this challenge, we are proud of what we have achieved in such a short period of time. This is mainly thanks to our tutors. We want to thank Daniele, Nikos, and Remon for giving us the right guidance and support through the development of our vision and our strategy, encouraging us to always go deeper and to push our ideas further. We also want to thank Roberto and Marcin for the inspiring lectures and for giving us a broader understanding of many crucial concepts and theories.

We hope you enjoy your reading,

Annam, Britt, Esmee, Oliwia & Patrick

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ABSTRACT

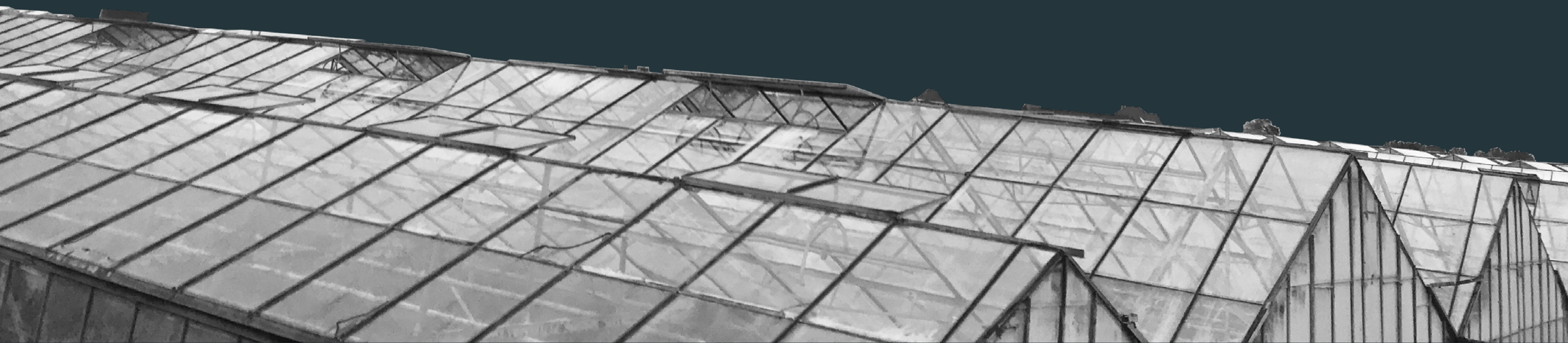
Our modern food structure is unsustainable and fragile. Changes like climate crises, rising food demand, biodiversity loss, and the technological revolution will radicalize how and what we eat and produce. Whichever changes will happen, they will have an effect on the food system. In South Holland, this will happen with the transition to a circular economy. In order to deal with the unpredictability of these changes, this report proposes to create a resilient system. The main question that will be answered is 'How can resilient food systems contribute to a circular agri-food sector in South Holland?'. In this context, resilience is the ability to ensure the provision of system functions in the face of increasingly complex and accumulating shocks and stresses.

Through capacities of robustness, adaptability, and transformability a just transformation to the circular food economy can be ensured. The strategy Recipe for Resilience derives from this definition. Based on a network of a mix of three types of hubs, the strategy calls for a more widespread and integrated distribution of knowledge about food and the food system. These hubs are the Seeds, where knowledge and food produce germinates, the Melting Pot, common interacting ground for all actors, and the Mixers, the in-between spaces that are not transparent. Together, they supply a network facilitating producers, distributors, and consumers. Thanks to this high-functioning network of knowledge, the main goals of the strategy can be achieved.

During and after implementation, there will be high stakeholder engagement through all layers of society, local food cycles with feedback loops to distribution centers and farmers, and the knowledge about it will be widespread throughout the South Holland population. The constant exchange of expertise will ensure feedback loops throughout all layers of the knowledge production. Through this constant adaptation and transformation, a resilient system can be achieved.

Keywords: resilience, knowledge, actor involvement, circular system, agri-food sector.

INTRODUCTION



INTRODUCTION

The current food system is not sustainable in the long term. Especially not with the many challenges that lie ahead in the near future. The world population may reach 9.7 billion by 2050 (United Nations Department of Economic and Social Affairs, 2015). Combined with increased incomes in developing countries, this will drive up the food demand; which is expected to increase by 59% - 98% (Elferink & Schierhorn, 2016).

However, in most countries, agricultural productivity has not increased in the 21st century. Globally, the arable land surface only increased by 9% since 1961. So, if we combine the rising demand for food with the rise of biomass energy demand, the pressure on this existing agricultural land to increase productivity will be enormous (Bommarco, Kleijn & Potts, 2013). This pressure threatens remaining natural ecosystems such as permanent grasslands and tropical forests and undermines their role in supporting biodiversity and storing CO2 (Bommarco, Kleijn & Potts, 2013). This pressure only gets higher when combined with the ever-expanding cities.

Thereby, big trading companies hold the power over food security. Only ten companies control almost every large food and beverage brand in the world (Oxfam, 2014). This distribution is not only unjust, it creates a great dependency on the actions of a few big corporations. Advanced logistics, transportation, storage, and processing should also be addressed as they are crucial for making sure that food goes from where it grows in abundance to where it doesn't in an equal way (Elferink, Schierhorn, 2016).

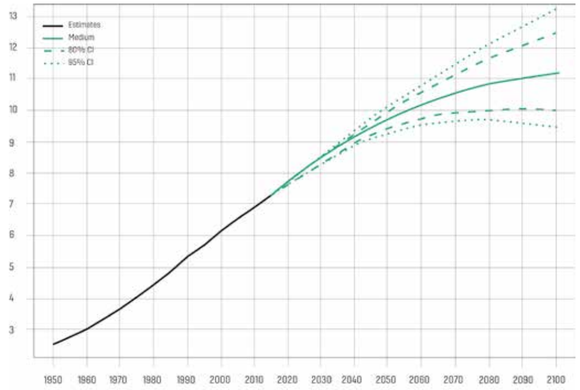
In the end, the earth has a limited surface for agriculture. The entire food system will have to rethink its ways to continue providing enough food. Thereby it also has to show initiative in face of the growing threat of climate change. As key actors, their time to change is now.

FIGURE 1: LARGE SCALE FARMING

Scientific relevance

The unsustainable practices of farming used today will cause problems in the long run (Poore & Nemecek, 2018). In the coming years and decades, it is important to shift these practices to more sustainable alternatives to ensure food security. The industrial form of modern agriculture tries to optimize the productivity of the crops by supplying copious amounts of water and nutrients, but also by using pesticides and genetic modification. On the one hand, this optimisation of the conditions has ensured that the productivity per area has gone up and that it was enough to face the increasing demand for food. On the other hand, the negative effects of intensive farming practices on biodiversity and the environment are unmistakable (Bommarco, Kleijn & Potts, 2013).

The current food industry is a driving factor for the degradation of the environment as it threatens ecosystems, uses up water resources, and is a driver for climate change. The current food supply chain is responsible for almost 13.7 billion metric tons of CO2, which comes down to 26% of the anthropogenic emissions of greenhouse gases. Thereby, food production is responsible for 32% of the acidification of the soil and 78% of the eutrophication. All these emissions menace the natural ecosystems (Poore & Nemecek, 2018). All in all, it becomes quite clear that a change in practices is urgent and necessary.



Population of the world: estimates, 1950-2015, medium-criant projection and 80 and 95 per cent confidence intervals, 2015-2100

FIGURE 2: POPULATON GROWTH PROJECTION

Societal relevance

The right to food is a human right. The United Nations defined four key elements to the right of food: availability, accessibility, adequacy, and sustainability (Office of the United Nations High Commissioner for Human Rights, 2006). These are defined in the General Comment no. 12 as such:

- Availability: Food should be obtainable from natural resources, either through the production of food, by cultivating land or animal husbandry, or through other ways like fishing, hunting, or gathering. Food should be on sale in markets and shops.

- Accessibility: Food must be affordable. Individuals should be able to have an adequate diet without compromising on other basic needs, such as school fees, medicines, or rent. Food should be accessible to the physically vulnerable, including children, sick people, people with disabilities, and the elderly. Food must also be available to people in remote areas, to victims of armed conflicts or natural disasters, and to prisoners.

- Adequacy: Food must satisfy dietary needs, taking into account a person's age, living conditions, health, occupation, sex, etc. Food should be safe for human consumption and free from adverse substances.

- Sustainability: Food should be accessible for both present and future generations.

While food seems to be generally abundant in The Netherlands, the fourth key element, sustainability, seems to be forgotten. It is important to work towards a system that is able to provide food now as well as in the future. A lot of farming practices that are used today exploit the available natural resources (Poore & Nemecek, 2018). A change in the system is highly needed to ensure food safety for future generations.

LOCATION

This project is set in South Holland, a province of The Netherlands. This region is unique because it combines high-density cities with highly productive farming. An example of this is Westland; an area covered in glass houses next to The Hague, that produces great amounts of flowers and vegetables and is known all over the world for its innovative farming practices. Here, high efficiency is practiced in small areas. This contributes greatly to the fact that The Netherlands is the second-largest exporter of agricultural products in the world (Rintoul, 2020). Thereby, the region also contains the Port of Rotterdam that functions as a gateway to the rest of Europe for transport over water.

The region also contains cities, some of which are almost interwoven with each other and are part of the 'Randstad'. Currently, the ever-expanding cities and farmlands have grown to each other's edges. And, with almost no remaining free space, the competition for land is at its highest.

FIGURE 3: SOUTH HOLLAND

METHODOLOGY

PROBLEM FIELD

FIGURE 4: PROBLEM STATEMENT

The current agri-food sector cannot be considered sustainable in terms of environmental and social aspects. The continuous shift to monocultural land use and the economically driven intensification of it has led to an exceedingly rigid structure. At present, quantity rules over quality. The consumer is the end destination of a linear chain while being progressively alienated further from the source. The rigidity of the sector causes the inability to withstand shocks and stresses such as climate change, disease outbreaks, or technological changes. phenomena that, scientists predict, will occur with higher frequency in the next decades. This means that there needs to be a significant change towards qualitative production and a shift from mistrust and disinformation to awareness and collaboration among consumers. There is a need for flexibility and resilience in the agri-food sector.

The fragility of the agri-food sector in South Holland can be categorised into four main trends:

Environmental problems
Intensification and the creation of monocultures have made farmland more efficient and easier to maintain. However, while it manages to bring food to the table, negative consequences are becoming more persistent. There are the issues of pollution and saturation of the soil and water elements due to excessive use of fertilisers, pesticides, and antibiotics. These affect and damage the surrounding environment. Another problem, but no less important, is the progressive loss of biodiversity in the farmland. This brings high risks with it in terms of resistance to disease outbreaks as many within the same species now share the same genes (Bommarco, Kleijn & Potts, 2013). There is also a growing disconnect between farmers and politics in The Netherlands, manifesting itself in recurring farmers' protests. This growing disconnect also influences farming as many farmers do not have a successor (NOS, 2020). The farming sector in The Netherlands is at a crucial tilting point that needs guidance.

Economic problems
Agriculture is a fundamental part of the regional economy. However, cultivation is currently driven by an export-import-based model that relies strongly on imported raw materials. The rise of intensive farming and import-based cheap food products makes it hard for small farmers that produce local and sustainable products to keep a competitive market price. Additionally, the province of South Holland wants to have a circular economy by 2050 with an in-between station of 50% less used materials in 2030 (Metabolic Drift, 2018). To achieve this, they want to focus on mixing bottom-up initiatives with top-down interventions, making it imperative to work through the layers.

Societal problems
Consumers in South Holland are quite aware consumers. They can recognise that their lifestyle is not the most sustainable and are often willing to make some changes. Nonetheless, there are still obstacles in changing consumer patterns. One obstacle is disinformation. The consumer wants to be more sustainable but does not know how, or worse, thinks to know how by relying on products labelled with different sustainable claims while actually contributing to greenwashing. Another obstacle is accessibility. Many suburban areas of South Holland do not have many small food-product shops that present a more sustainable alternative to big market chains, leaving them as the only accessible distributors. And this makes them dangerously powerful. As cause-effect supermarket chains can keep their prices at the lowest increasing the price gap towards small local stores. This way, the price can become not accessible for some consumers.

Political problems
Bad communication between the different stakeholders in the region and the competition for land have increased the hostility and caused the deterioration of relationships between producers and consumers, becoming more and more different realities with diverging interests. A big part of the responsibility for this problem can be attributed to the political decisions made from the 70' onwards where existing institutions promoted a change towards intensification without reacting to the negative effects in the following thirty years leading to a progressive "mistrust in the old institutions, which the public felt had denied the risks for too long" (Janse, 2018).

RESEARCH QUESTION

What makes a system resilient?

How does a resilient agri-food system benefit different actors?

What are the spatial implications of a resilient agri-food system?

How can a resilient agri-food system improve the transition to a circular agri-food sector in South Holland?

What is a circular economy?

How can the agri-food contribute to circularity?

What makes South Holland unique?

What are the ambitions of the province?

THEORETICAL FRAMEWORK

Circular Economy
The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. In practice, it implies reducing waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible. These can be productively used again and again, thereby creating further value. This is a departure from the traditional, linear economic model, which is based on a take-make-consume-throw away pattern (European Parliament, 2015).

On the one hand, the definition above might be easy to understand, on the other, it might be very difficult to imagine such a utopic future taking into account the complexity of the present linear economy, the different stakeholders that would have to take a step back and the number of needed investments to achieve higher circularity of the system.

That is why many are sceptical in using the definition of circular economy to define a strategy as they claim that the concept is too vague to be implementable (Kirchherr, Reike, & Hekkert, 2017). Nonetheless, many believe that the concept of circular economy can and has to be used as a framework in new strategies for economic development in order to think and produce more sustainable solutions for the future.

Spatial Justice
Spatial Justice is a relatively new concept that focuses on mainly two 'types' of justice: distributive justice and procedural justice. On one hand, distributive justice is sought through the creation, fair allocation of and access to public goods, resources and services throughout the city.

On the other hand, justice or injustice can also be found in how cities and communities are negotiated, planned, designed and managed. Justice or injustice can be found in the procedures of negotiation and decision-making. For example, planning processes that are transparent and allow some form of participation are bound to be more just than those which don't. This is because the incorporation of multiple voices in decision-making processes increases the chances that the wishes, needs and desires of those voices are integrated into decision-making (Rocco, 2021).

The topic of social justice becomes very important and very difficult to approach when it comes to a region as South Holland is, an area with a high scarcity of free land and where the multitude of different land uses bring with them a great number of different social groups that have different voices and different interests, especially if it comes t the agri-food sector in which everyone is more or less actively involved. In terms of distributive justice, the right balance between the strong need for expansion of the urban areas and the increasing request for more farming space has to be found. To achieve such a balance procedural justice has to play a big role in the project and has to be translated, not only into a transparent process but also into an active user engaging project that keeps evolving and developing depending on the feedback loop created by the observation of the outcomes.

Urban metabolism
The relationship between human and nature is extensively explored, as nutrients are essential for living organisms, and therefore determine the survival of humans (Gemeente Rotterdam et al., 2018). In modern society there is a strong distinction of society-nature opposition in the way that urban and rural areas are separated. This comes from early industrial capitalism, and in historical terms three ecologies can be distinguished. Human ecology of the Chicago School, which treated the city as an ecosystem in analogy to external, natural ecosystems. Industrial ecology treats materials flows of cities that only conceptualize nature as the place where resources for urban metabolism are derived from and as the dumpyard for city's wastes. And finally, the urban political ecology, which is a reimagining of the city as a product of more complex socio-natural flows, where humans and nature are part of the same system (Wachsmuth, 2012).

The ongoing separation of society from nature demonstrated injustices that are important to mention. It legitimised the human domination of nature in the name of progress, as well as reinforced the socially produced injustices such as inequality, racism, sexism, war and imperialism. The separation of the city from the rural area under 19th-century capitalism made these entities autonomous social realities, where the city dominated the decisive power. Urban political ecology, which is a hybrid field at the intersection of political ecology and urban geography, attempts the inclusion of nature and humans by renaming society and nature "socio-nature". This does not take away the spatial separation, but the struggle of creating the connection between society and nature is being reinforced (Wachsmuth, 2012).

Knowledge
This word can have many interpretations depending on the context or topic, in this case, the British version from the dictionary is quite accurate: "Knowledge is understanding of or information about a subject that you get by experience or study, either known by one person or by people generally" (Cambridge Dictionary, 1995). Knowledge is different to what many people think, not only collected through studies and research but also by experiencing something, especially in the agricultural sector, farmers might not have the same background knowledge as academics but compensate with a great amount of field knowledge collected over the years.

In terms of research and knowledge production the region is already one of the leading stakeholders in the industry, while it slowly flourishes as a producer of knowledge, it lacks in exchange of knowledge on a regional scale, the different small scale stakeholders don't communicate with each other. That is the reason why communication of knowledge within the society becomes the key to develop a resilient agri-food sector, only by creating a network of information between the different stakeholders (producers, consumers, institutions) it is possible to contrast the progressive isolation of them.

Resilience
In this project, the resilience of a food system is defined as its ability to ensure the provision of the system functions in face of increasingly complex and accumulating shocks and stresses. These can be economic, social, environmental, or institutional. Through capacities of robustness, adaptability, and transformability equal possibilities for all in terms of social justice and spatial justice should be ensured. (Meuwissen et al., 2019; John Hopkins University Center for a Livable Future, n.d.).

There are three response capacities a system can have to be resilient: robustness, adaptability and transformability (Meuwissen et al., 2019). In this project, these will be applied to the agri-food sector.

FIGURE 5: SHOCKS

Shocks are sudden unexpected changes. They are short-term external discrepancies that negatively affect the current conditions in terms of well-being, livelihood, resources, safety, or the capacity to cope with future shocks. Shocks can have different durations and times of appearance such as drought, flooding, or market fluctuations (Wiebe et al., 2015).

FIGURE6: STRESSES

Stresses are long term pressures on the system. They threaten the stability and increase the vulnerability of the system from within. Stresses are long-term making it possible to alter the system to counteract the threat. Stresses are however constant, making the threat ever-present. Some examples could be climate change, population fluctuations, or systemic social injustices (Wiebe et al., 2015).

Robustness is the capacity of a system to endure challenges, such as ongoing stresses and both abrupt and anticipated shocks (Meuwissen et al., 2019). Independent from the changing environment or any disruptions occurring around it, a robust system manages to sustain its form and desired productivity (W. H. Jonathan Maka , P. John Clarksona , 2017).

Adaptability is the capacity of a system to adjust and adapt its practices, but without altering the core structures of the system when responding to shocks and stresses (Meuwissen et al., 2019). With the use of an "internal change agent" the adjustments can be done from within the system, without the need for involvement of external actors in order to recover from challenges and sustain its performance (W. H. Jonathan Maka , P. John Clarksona , 2017).

Transformability is the capacity of a system to substantially alter the structure internally and externally, when responding to severe shocks or long-lasting stresses. Transformations can include long-term form or function shifts in the system (Meuwissen et al., 2019).

FIGURE 7 : RESILIIENT RESPONSES

CONCEPTUAL FRAMEWORK

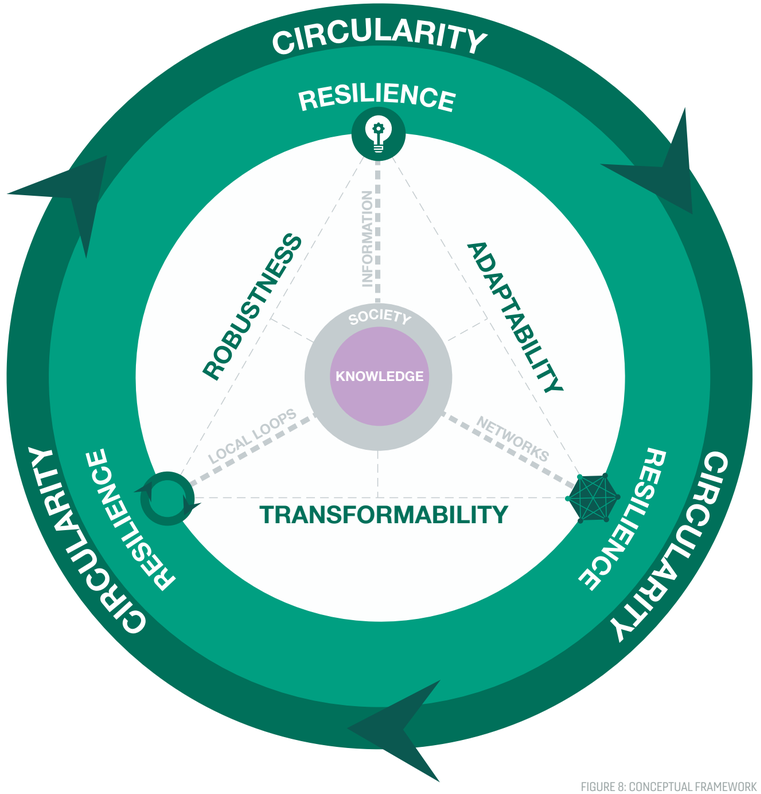


FIGURE 8: CONCEPTUAL FRAMEWORK

In the conceptual framework, knowledge occupies the core. Through knowledge, the different parts of society - that in the present are separate entities that work separately or even against each other - become a single entity. An informed and unified society that constantly improves and works on a common goal can be considered as a strong fundament for the development of a resilient agri-food sector, without it the system would collapse on itself. Finally, then the resilient agri-food sector can be an integrative part of the circular economy, capable of supporting the weight of change in structure caused by it.

METHODOLOGICAL FRAMEWORK

Methods
Since we are working towards resilience, the methods used need to be precise and rigorous, but leave enough space for the future shift of paradigm. In the exploration process, we use quantitative methods of data collection, and qualitative methods in the form of maps, photographs, drawings and articles. Alternative methods that are used include building future scenarios and testing them for resilience with stress and shock tests. The stress test is also used to evaluate the final strategy.

Methodological framework
The methodological framework begins with identifying the constants which are given by the assignments and includes the scale of the project, being the province of South Holland, the goal of circular economy, and the tool for achieving the goal, which is the agri-food sector.

With background research covering the existing situation (linear food systems, typologies of farms, urban and rural disconnect), as well as the future trends including increasing food waste, rising population, and climate change, the problem field is defined. The objectives, questions, and relevance of the challenges are then addressed in the research question. In an attempt to find answers, a toolkit of methods is used, including stakeholder and spatial analysis, data collection as well as future scenario building.

By exploring four extreme scenarios, we draw conclusions and identify that the changing landscape and social systems will need a system that is resilient to future challenges. Theoretical framework and further conceptual framework is then built on the concepts of resilience, circular food system, and spatial justice. Resilience is addressed in its three responses of robustness, adaptability and transformability.

This informs the vision, built upon the theoretical and conceptual frameworks, and the strategy is then developed. The strategy is later run through a stress and shock test, where aspects of the strategy are investigated. These are built upon the frameworks, as well as the background research of existing and future challenges. The test then leads to a reflection on the resilience of the strategy and can be then improved. The methods used in this project is not only applied to the design process but is a design framework. These methods can be used for designing resilient food systems in the future, where feedback loops happen at the strategy stage, to rephrase the research question, or when the problem field changes in the future and new challenges need to be addressed.

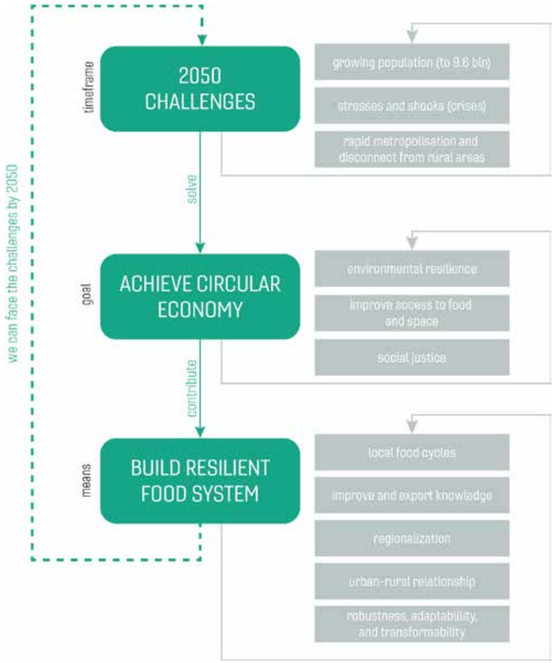


FIGURE 9: TOWARDS A RESILIENT FOOD SYSTEM

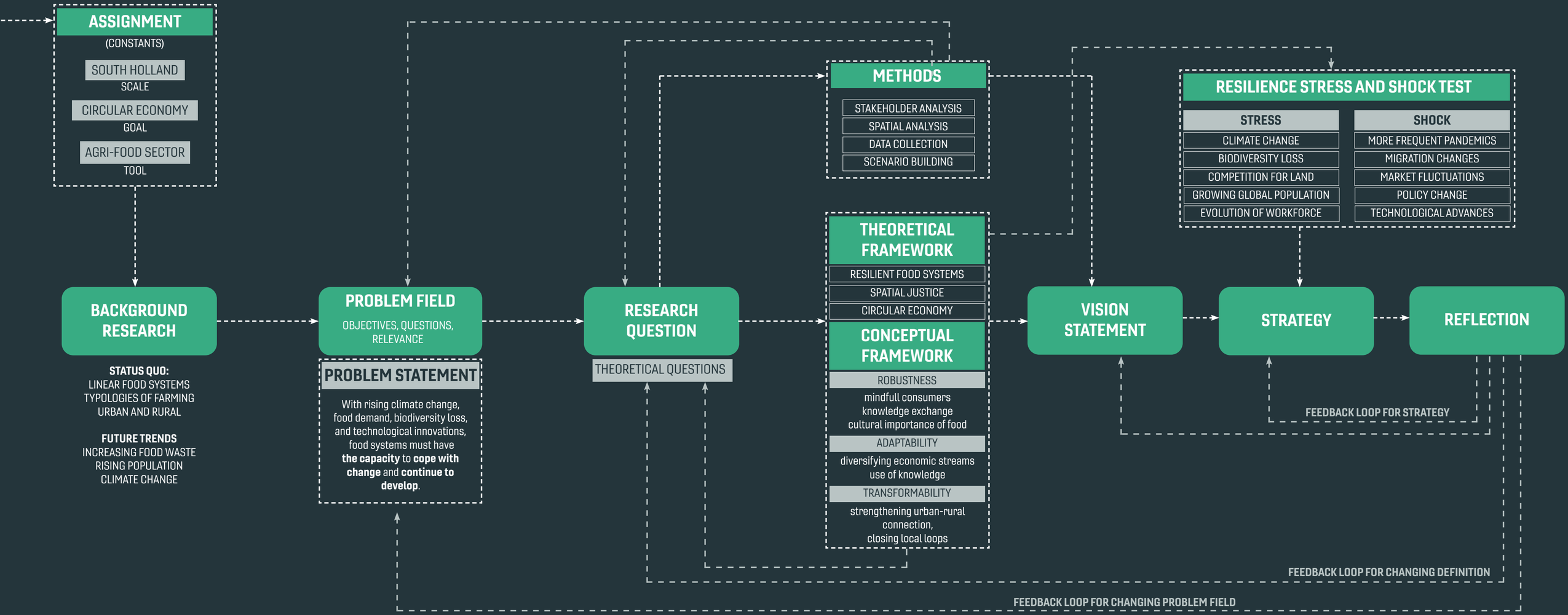


FIGURE 10: THEORETHICAL FRAMEWORK

MISE EN PLACE: ANALYSIS

CURRENT STATE OF THE AGRI-FOOD SECTOR

Over the last centuries, the landscape of South Holland has transformed a great deal, as can be seen from the timeline in figure 12. The province used to have small towns, in the midst of a peat landscape. However, this changed first with the polderisation of the landscape. In the century that followed, cities grew, reducing the amount of land that can be used for farming. New ways of farming were also making their way up. This can be seen in the Westland area, with the proliferation of glasshouses from 1950. In the current situation, it can be seen that cities are merging into each other and that the glasshouses have no way to grow in size in the area of Westland. Furthermore, the containment of the glasshouse area is also bound by land-use policies (Korthals Altes & van Rij, 2013).

Land is scarce, most of it is already used in a functional way. From the map and figure 11 of the land use, it becomes apparent that agricultural land is taking up almost half of the area in the province of South Holland. There is a high competition for land and, as cities want to expand into the landscape and the government wants more space for national areas, there is pressure on the containment of agricultural land. However, the land is of crucial importance if the province is to keep producing food over the next decades.

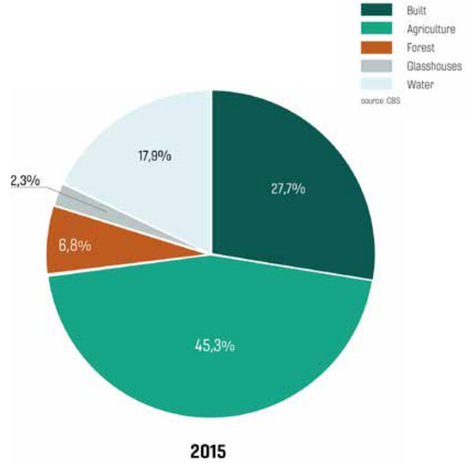


FIGURE 11: LAND USE IN SOUTH HOLLAND

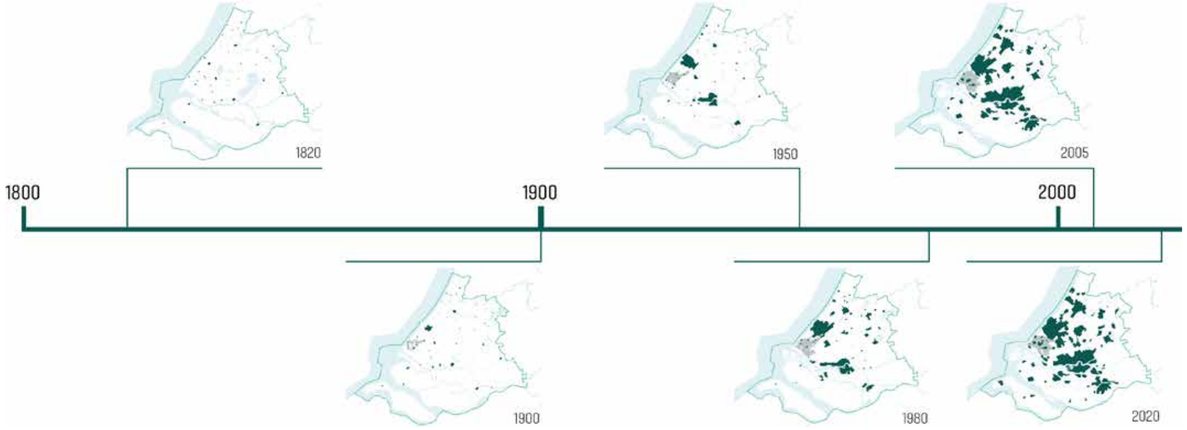


FIGURE 12: TIMELINE LAND USE

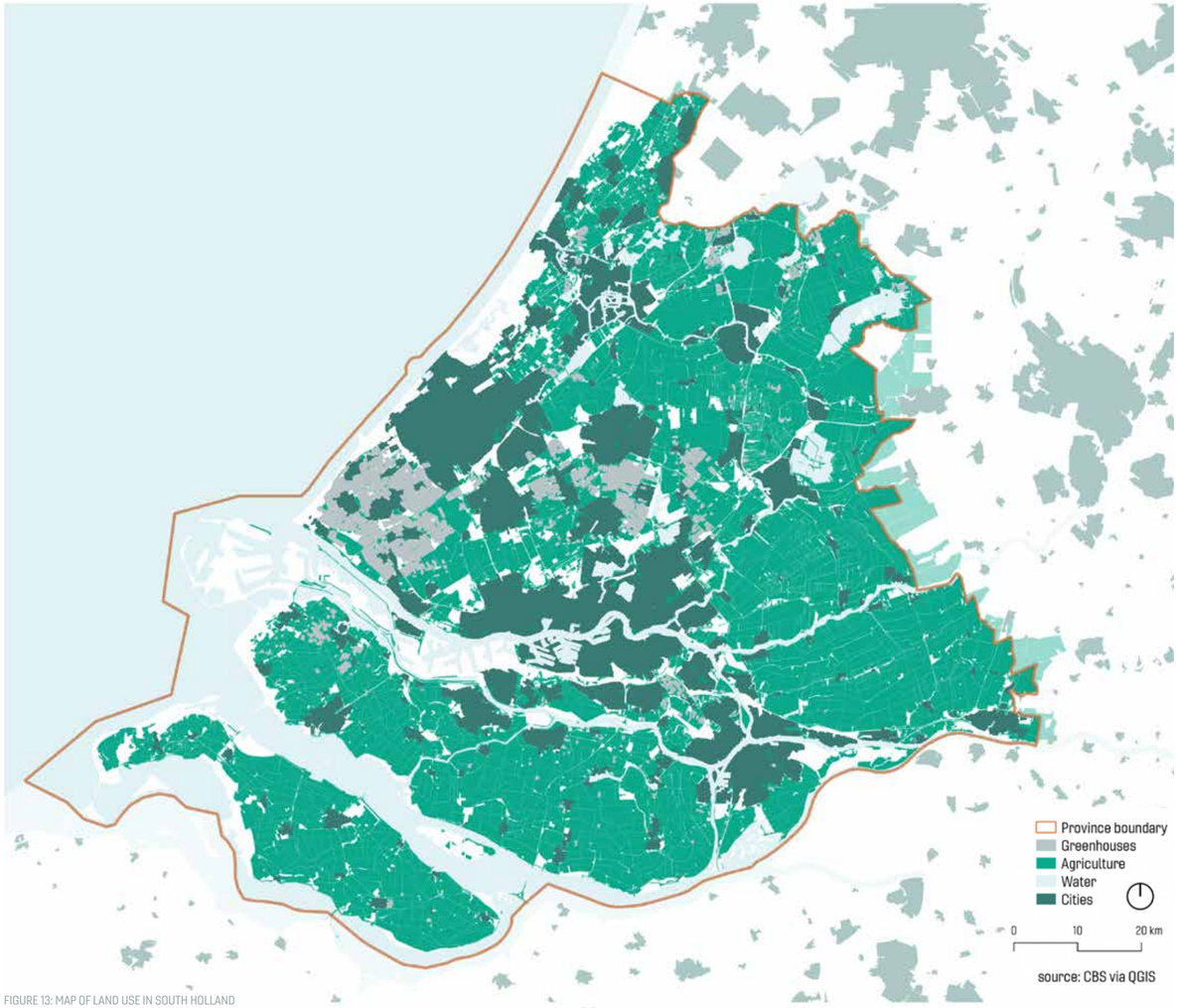


FIGURE 13: MAP OF LAND USE IN SOUTH HOLLAND

WHO RULES THE SYSTEM?

Before starting a project, it is important to know with which actors one has to work. Because this is a regional project, there are a large number of stakeholders that have to be dealt with. The stakeholders can be divided into seven different categories: governmental institutions, producers, distributors, consumers, educational, civil society, and voiceless actors.

Governmental institutions
These institutions range from very local to international, this includes municipalities, the provincial government, the port of Rotterdam, the National Government, as well as the European Union. These actors have a large interest in the circular economy because of all the goals that have been set. They also have high power, as these institutions make and implement rules and legislation. In addition, they hold the power to provide other actors with money. Their exact roles can be found in figure 14.

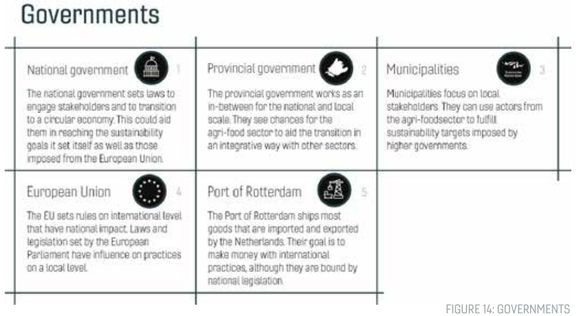


FIGURE 14: GOVERNMENTS

Producers
Actors in the production list are varied, and it includes greenhouse farmers, cattle farmers, the international market, producers of antibiotics and pesticides, and developers of land. The cattle farmers have been subdivided into conservative and progressive farmers. Conservative farmers are the ones that want to keep producing dairy and meat products in the way it has been done for years. They are against new legislation concerning the Nitrogen Cycle and do not see why it is their system that should change. Progressive farmers see that the system must change and that it is also their responsibility to do so. Because of this, governments are more inclined to listen to them and they have more power. Small farmers have also been added to the lists because their voices can be drowned out by average-sized farms. The producers' exact motives are discussed in figure 15.

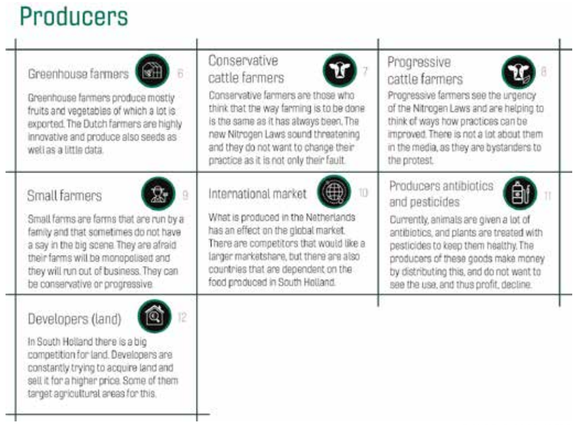


FIGURE 15: PRODUCERS

Educational
Educational facilities are of great importance for the distribution of knowledge throughout society. In the province, there are multiple universities (of applied science) that can be distinguished. However, as knowledge is easily distributed, it is also important to look at institutions outside of the province. Furthermore, knowledge distribution will also happen at a lower, more local scale; at elementary schools or high schools. This is why the educational system of the Netherlands has also been included. The exact roles of the educational institutions can be read in figure 16.

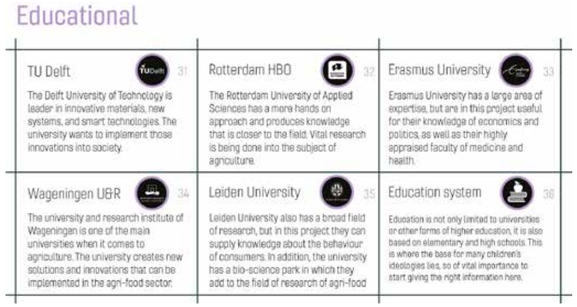


FIGURE 16: EDUCATIONAL

Distributors
The actors in the distribution section are very divergent. These actors encompass everything that happens with food before it gets to the consumer: from packaging to distributing, to the final selling of the product. The actors include business owners, waste disposal companies, local network corporations, farmer's market shareholders, supermarkets, local shops, restaurants, big traders, slaughterhouses, and packaging centres, and cold stores. The supermarkets have been subdivided into three categories. The first one is Albert Heijn, which is the largest shareholder in the supermarket business. The second category is supermarkets that have a Dutch origin but are smaller than Albert Heijn. These include Jumbo and Dirk. The last category covers supermarkets that are price competitors and have their origin in a country different from the Netherlands. These include Aldi and Lidl. The distributor's roles can be found in figure 17.

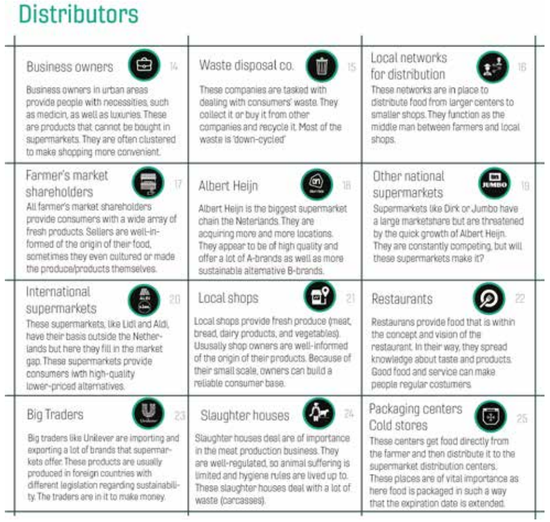


FIGURE 17: DISTRIBUTORS

Consumers
Consumers are vital for the system, as it essentially supplies what they feel they will need. The consumers have been subdivided into a wide mix so there is a clear reflection of the inhabitants of South Holland. The part they play can be found in the figure 18.

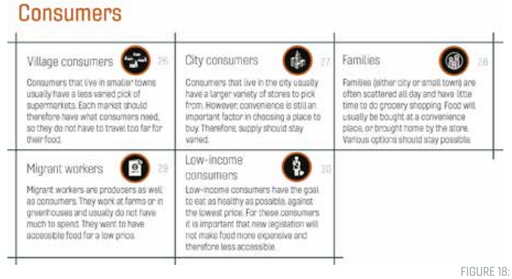


FIGURE 18: CONSUMERS

Civil society
Civil society is an important actor in making people more aware of problems or challenges but also of possible solutions. They can work with politicians or against them in order to create a support base within society. Their roles are discussed in figure 19.

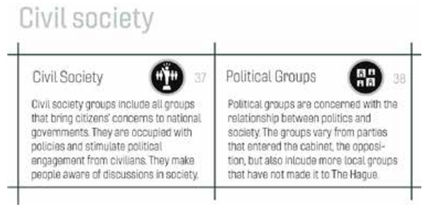
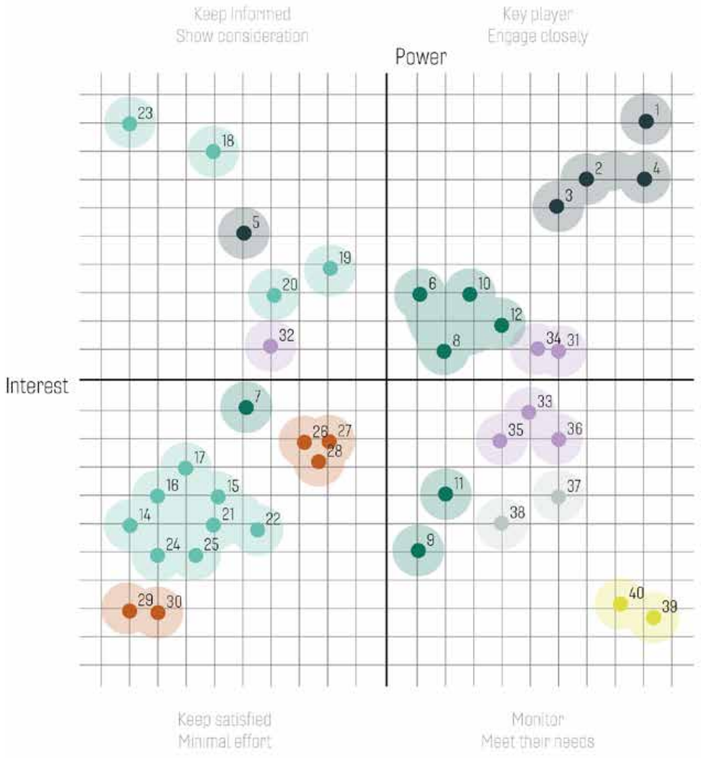


FIGURE 19: CIVIL SOCIETY

Voiceless
In the system, there are always actors that do not have a way to express their opinion. However, they should not be forgotten as they are a vital part of the system. In the case of this project, the main ones are nature and cattle. Their voice will have to be activated through knowledge and active engagement of actors that work with them. Their exact roles can be found in figure 20.

FIGURE 20: VOICELESS



Governments
1. National government
2. Provincial Government
3. Municipalities
4. EU
5. Port of Rotterdam

Producers
6. Greenhouse farmers
7. Cattle farmers (conservative)
8. Cattle farmers (progressive)
9. Small farmers
10. International market (impact on producers abroad)
11. Producers of antibiotics and pesticides
12. Developers (land)
13. New Producers of Knowledge

Distributors
14. Business owners (city)
15. Waste disposal companies
16. Local networks for distribution (cooperatives)
17. Farmer's market shareholders
18. Albert Heijn
19. Jumbo, Dirk etc (national)
20. Lidl, Aldi (international)
21. Local shops
22. Restaurants
23. Big Traders (Unilever)
24. Slaughter houses
25. Packaging center and cold stores

Consumers
26. Village consumers
27. City consumers
28. Families
29. Migrant workers
30. Low-income consumers

Educational
31. TU Delft
32. Rotterdam HBO
33. Erasmus University
34. Wageningen University
35. Leiden University
36. Educational system in NLs

Civil society
37. Political groups (opposition)
38. Civil society group

Voiceless
39. Nature - Meadow Birds and Biodiversity
40. Cattle

FIGURE 21: STAKEHOLDER POWER MATRIX

Power interest matrix

Whether the stakeholders are actively involved or passive bystanders depends on the power they have, as well as the interest they have in the project. In order to give insight into these relationships, the stakeholders have been placed on a power-interest matrix, this can be found in figure 21. What becomes clear at first sight, is that all the actors are very scattered around on the axes. There appears to be a large disconnect between all the different categories, which will be something that can be tackled with the project.

Not only is there a big disconnect between the power and interest of different actors, but there is also a large gap between where production takes place and where decisions are being made. By taking a look at the map in figure 22. one can see that most influential stakeholders are housed in the Randstad. The consumers and smaller suppliers can be found in the middle of this, as well as large amounts of meat and dairy farms.

Governments
1. National government
2. Provincial Government
3. Municipalities
4. EU
5. Port of Rotterdam

Producers
6. Greenhouse farmers
7. Cattle farmers (conservative)
8. Cattle farmers (progressive)
9. Small farmers
10. International market (impact on producers abroad)
11. Producers of antibiotics and pesticides
12. Developers (land)
13. New Producers of Knowledge

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17. Farmer's market shareholders
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Consumers
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30. Low-income consumers

Educational
31. TU Delft
32. Rotterdam HBO
33. Erasmus University
34. Wageningen University
35. Leiden University
36. Educational system in NLs

Civil society
37. Political groups (opposition)
38. Civil society group

Voiceless
39. Nature - Meadow Birds and Biodiversity
40. Cattle

FIGURE 22: MAP OF SAKEHOLDERS

Actor relationships

From the power interest and the list, it does not become evident how the actors are related to each other in the system. Figure 23 (adapted from Muilwijk et al, 2020), can give insight into how these relations currently function. The current system can be seen as a triangle, with its base at the physical environment and existing conditions. In this layer, one can find cities and resources such as water, plants, and soil. The second layer is the layer of food production. In this layer, one can find the producers of food and feed, but also of packaging. Between the actors in the food production layer, there are constant flows of finished products as well as waste products and supplies. These products are also imported and exported. From the food production, layer products are distributed to the retail layer. This layer includes supermarkets, farmer's markets, and restaurants. In this layer of the system, goods are imported from other countries as well. The retail section of the diagram is the most important supplier for consumers; almost no food comes directly from farm to table. As can be seen, the largest flow from retail to the consumer comes from the supermarket.

From this image, it becomes evident that the current food system is mostly linear. From smaller layers, there is almost no feedback into larger layers. Waste flows occur mostly towards the consumer end, and here lies an opportunity to close valuable nutrient cycles. This can be done by bringing the consumer and producer closer.

Supermarket shift

As previously mentioned, the largest flow from the retail layer to the consumer end comes from supermarkets. Supermarkets in the Netherlands sell just over half of all the food and drink consumed in the country. Per day 23.5% of the Dutch population (4 million people) visit the supermarket (Oxfam Novib, 2018). This is logical, as supermarkets are a big part of social-cultural routines (de Krom, Vonk & Muilwijk, 2020)

Research by Collier International shows that there were 6338 supermarket locations in the Netherlands in 2019. This number is expected to have grown and keep growing as well (RetailNews, 2019). The Dutch retail market Is considered an oligopoly: 'a market structure in which a small number of firms has the large majority of market share' (Oxfam Novib, 2018). The figure 24 shows that there are five main retailers that control over three-quarters of the market. However, there is one supermarket to rule them all. Albert Heijn has the largest market share and will continue to do so. However, Jumbo is continuing to grow as well. It is very possible that in the coming years the supermarket landscape will be mainly blue and yellow (Schelfaut, 2021).

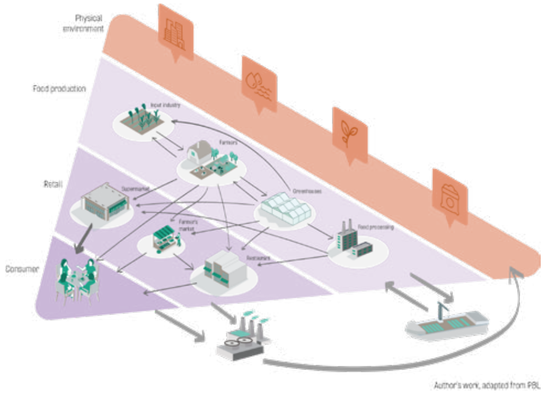


FIGURE 23: FOOD CHAIN TRANGLE

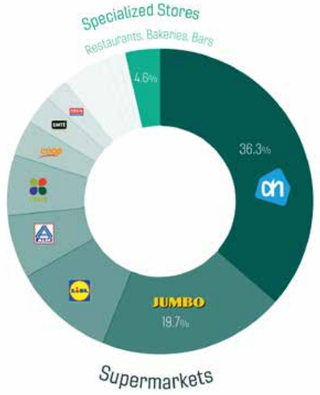


FIGURE 24: MARKET SHARE FOOD STORES

With products mainly being distributed to almost 17 million people through only 6000 places, there is a bottleneck to be found. This becomes clear in figure 25. As can be seen from the image, the retail giants have immense power as about 95% of the market belongs to them. The small businesses, although more in number, are only accounted for 5% of the share. the Netherlands Environmental Assessment Agency (PBL) calls for a new market with a new revenue model. This will be a complex task, as 'these changes call for new organisational forms within the food chain'. An example of such a change can be the direct supply of food from farmers to consumers. (Netherlands Environmental Assessment Agency, 2012).

Such a change will also have a positive effect on the position of farmers within the system. The current price competition is felt deeply by the producers of food. Supermarkets want to provide consumers products for the lowest price possible, which leaves the farmer with no choice to produce unsustainable if they want to make a profit from their goods. Oxfam quotes a farmer to illustrate this matter: 'Farmers pay the bill when supermarkets force lower prices on us. Together we want to produce and consume sustainable food, but that's not possible for lower prices.' (Oxfam Novib, 2018). The shift, as pictured in figure 26 from supermarkets to more local suppliers will therefore make the system more just as well as more sustainable.

However, consumer patterns are difficult to change. This is because the places people buy food are so much part of a daily system that it is hard to alter. These places are embedded in routes from school or work to home. In addition, there is an attitude behaviour gap between what people say they want to do and their actual actions (de Krom, Vonk & Muilwijk, 2020a).

Furthermore, not all consumers have equal accessibility to small shops. This can be seen on the maps of the small shop distribution, figures 30-31. Here it becomes evident that most people in the centre of the city have access to a large array of shops whereas people in the outskirts of the city have far more limited options. Also the shops in the outer neighbourhoods are less clustered, which means that in those places consumers there have to travel further to gather everything they need.

FIGURE 25: BOTTLENECK

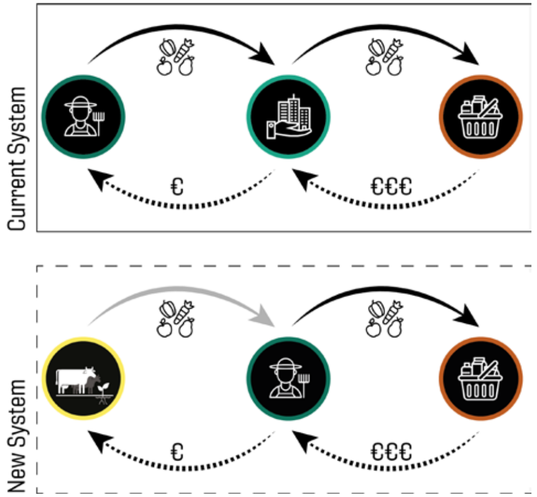


FIGURE 26: CHANGE OF SYSTEM

FIGURE 27: APPLIED RESEARCH

Potentials for a circular economy in the agri-food sector

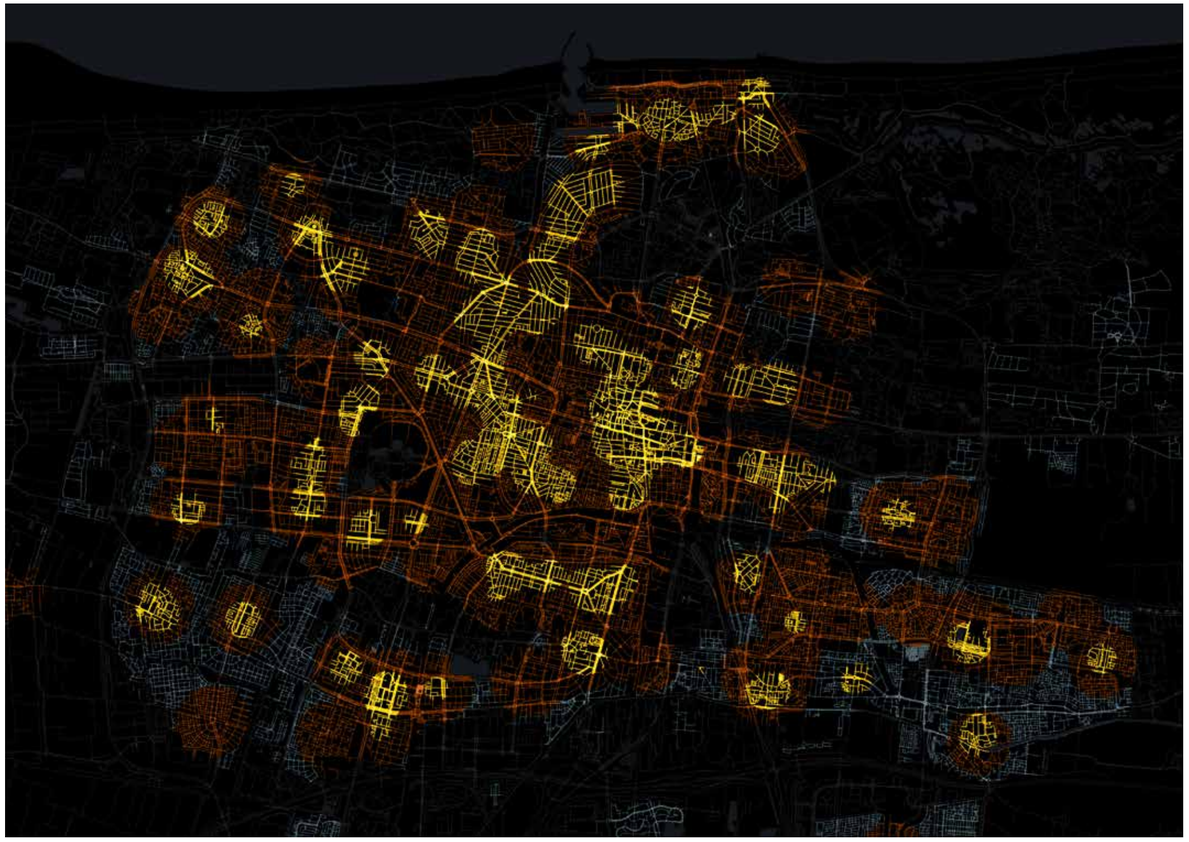
The current system does not solely exist of negative aspects. There are positive sides to the structure that makes it very well adapted to transition into a circular economy.

There is a large base of knowledge. One out of every six people is related to the agri-food sector (Aeres, 2016). This is also because there are many universities that work together. One of these is of major importance in the agriculture sector: the Wageningen University and Research Centre is one of the three best universities when it comes to agriculture. These students hold the future of agriculture in their hands. This is also made possible because the Netherlands has a big and innovative business sector (Oorsprong, 2018). Public-private initiatives ensure the constant investment in new innovations.

Lastly, the Netherlands is home to a well-informed and very engaged farmers' society. This base of passionate farmers ensures that consumers get to eat on a daily basis. Even though they are not always portrayed positively in the news, they are of vital importance to transition to a circular economy. They hold great potential.

FIGURE 29: FARMERS COMMUNITY

FIGURE 28: WUR IN THE GLOBAL TOP

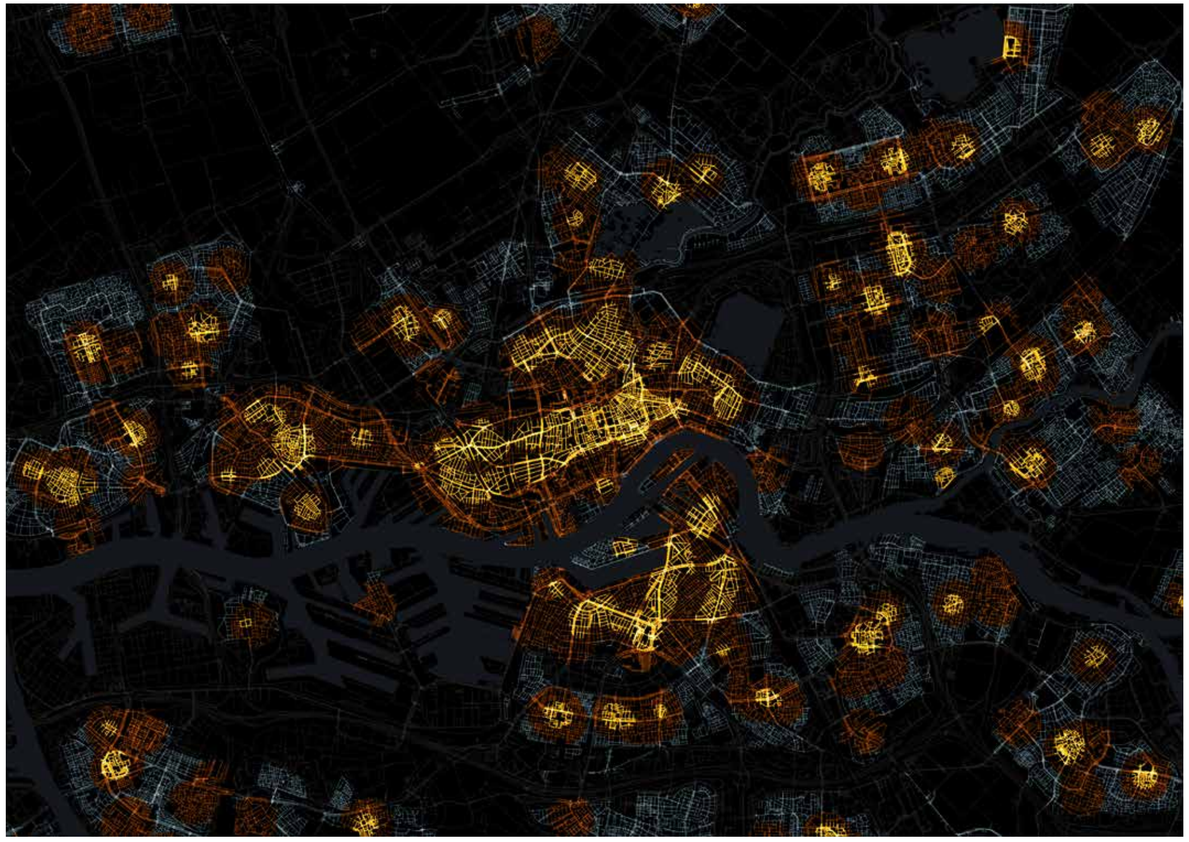


Accessibility to small grocery shops

Accessibility to supermarket clusters

Residential areas with low accessibility

FIGURE 30: ACCESSIBILITY SMALL SHOPS THE HAGUE



Accessibility to small grocery shops

Accessibility to supermarket clusters

Residential areas with low accessibility

FIGURE 31: ACCESSIBILITY SMALL SHOPS RTTERDAM

RESILIENCE IN THE AGRI-FOOD SECTOR

The basics of resilience in the agri-food sector

As it is difficult to define the challenges that will arise when transforming to a circular economy, an option is to create a resilient agri-food sector. In this way, the system will be adaptable or transformative in the case of different changes.

In literature, there are plenty of aspects that could make a system resilient. A few of those can be used in the vision's favour.

The first feature is diversification. Specialization and intensification have made the output of the system very high, however, it does mean that the system is vulnerable. The system is not potent enough in dealing with disease outbreak or resource availability, as all farms rely on the same animals with the same needs. Diversification of the system can 'mitigate vulnerability to variability (e.g., in climate, resource availability, or markets) and increase resilience in ranging from financial systems to natural ecosystems' (Schipanski et al., 2016).

The second aspect is the distribution of knowledge. In a way, knowledge production, distribution, and integration is a diversification of the system. There are two ways to incorporate knowledge: a knowledge network and knowledge export.

A knowledge network will facilitate farmer-researcher interaction. According to Dowd et al. (2014), information that is acquired by universities should be able to travel to other constituents of the network. This shared knowledge can add to practices and norms in farms and government respectively. The authors imply that 'each network member should hold the same information and enforce the group's norms — a state known as redundancy' (Dowd et al., 2014).

This knowledge does not only have to come from higher education institutions. In their paper, Taylor and Bhasme (2018) propose to create model farmers in order to extend new technologies and practices to smallholder farms. They argue that the extension of knowledge from model farm to farms is important, as farmers are then 'more likely to be able to adapt a technique or technology to local conditions than either extension agents or primary researchers.' Farmers learn from each other and can then translate it into processes that are more compliant to the local context, agricultural as well as cultural (Taylor & Bhasme, 2018).

The latter option, knowledge export, makes the global system more resilient. Knowledge export gives countries that rely mostly on food import the chance to produce their own food. In this way, those countries are less reliant on sources and this makes their system more resilient (Schipanski et al., 2016).

Lastly, regionalization is mentioned as a way to resilience in the food system. Schipanski et al. (2016) define regionalisation as 'the clustering of local food production and distribution activities to leverage greater access to infrastructure, resources, and/or markets' (Schipanski et al., 2016). By creating more clusters, more people will have access to fair resources, and if one location cannot supply there are more left that will be able to. Regionalisation can work out in local distribution networks to support smallholder farms.

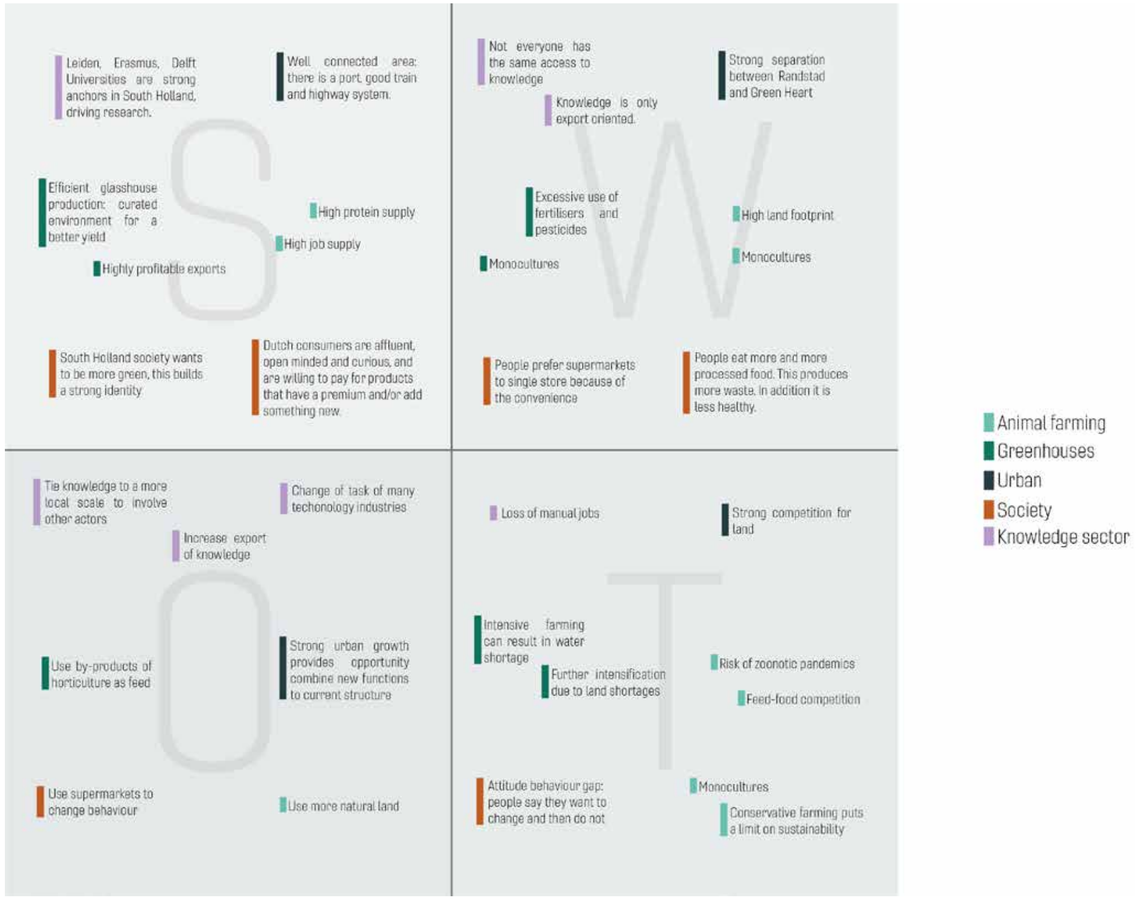


FIGURE 32: SWOT

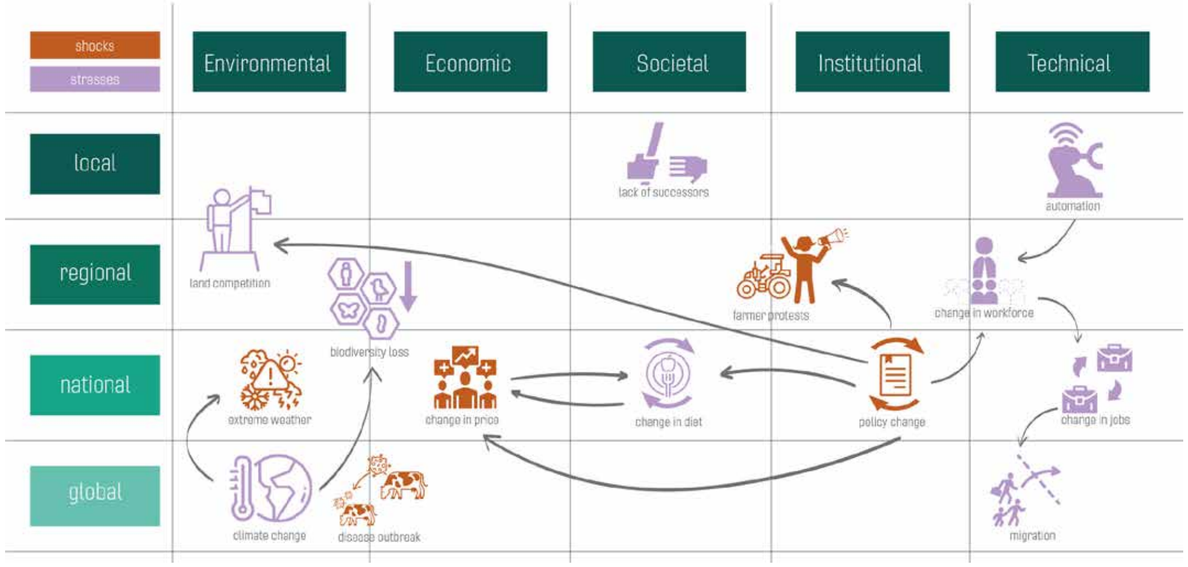


FIGURE 33: CHALLENGES TABLE

Challenges in transition

In order to define what challenges could be encountered in the transition, a table of challenges has been made. It can be found in figure 33. These distinguished challenges are specific for the province of South Holland. Some of them work on a global or national scale but do find their way into the regional system. The challenges that were discerned have been divided over different fields to see where they have a direct effect. In addition, the challenges have been divided into shocks and stresses. As mentioned earlier, shocks can be defined as external and short-term anomalies. Stresses on the other hand are long-term trends or pressures on a system.

Most of the challenges have been elaborated on earlier. One important stress to mention is the lack of successors. Most farmers above 55 do not have a successor lined up (van Rossum, 2021). Family members do not want to take over as they have other ambitions. Mostly this affects small-scale farms. This makes the future of agriculture hard to predict, as contenders for land can easily swoop in and add the land to their already large (dairy) farm. However, if this problem is tackled in the correct way, the system could be improved upon and made more sustainable by implementing new ways of farming.

To sum up the analysis, a SWOT analysis was done. The result can be found in figure 32. The Strengths, Weaknesses, Opportunities, and Threats were subdivided into different categories: animal farming, greenhouses, urban, society, and the knowledge sector.

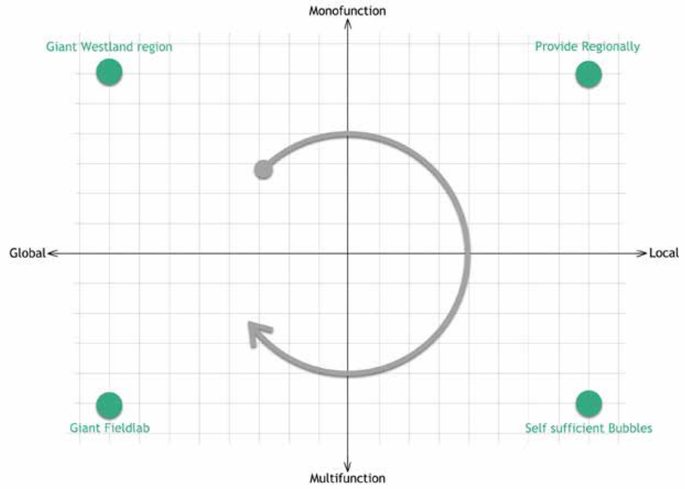


FIGURE 34: CARTESIAN PLANE OF SCENARIOS

The aforementioned challenges were tested on four different extreme scenarios. To determine these extremes, a cartesian plane with a production and a distribution axis was created. This can be found in figure 34. On the x-axis, one can find global distribution with local distribution as its counterpart. The y-axis represents the production axis and differentiates between monofunctional and multifunctional production. The situation as it is now can be placed in the global, monofunctional plane. The region currently exports a lot of goods and produces a limited amount of vegetable types.

As can be seen, the scenarios are all placed on the far extreme sides of both axes. The four scenarios, respectively called Giant Westland Region, Provide Regionally, Self-sufficient Bubbles, and Knowledge Network, will be discussed clockwise, starting on the monofunctional-global plane.

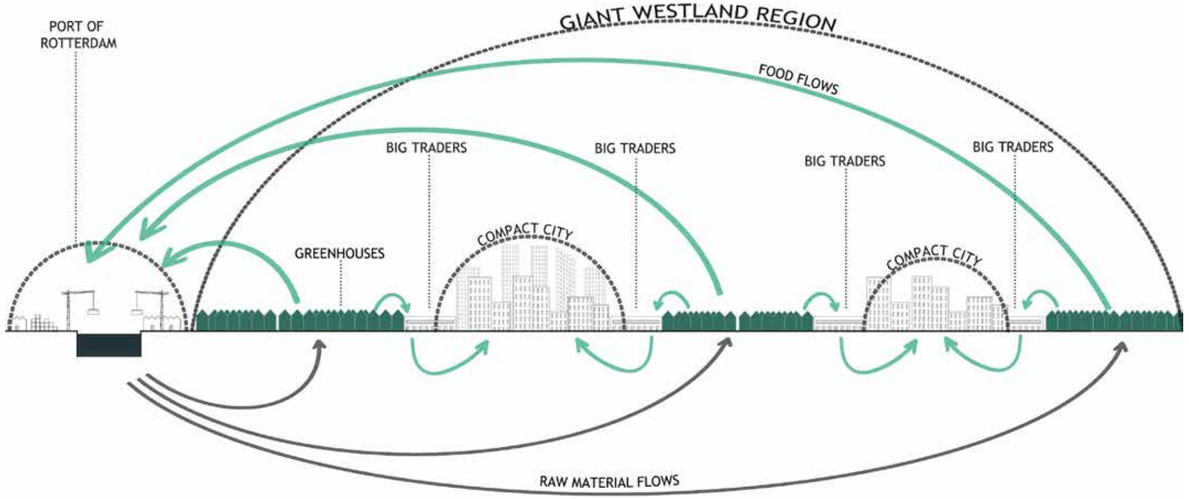


FIGURE 35: GIANT WESTLAND REGION, SYSTEMIC SECTION

Giant Westland Region

This scenario is based on a province that is filled with greenhouses, as can be seen from the map in figure 36. This will result in a monofunctional area with little room left for the growth of cities or industries. Natural areas will be diminished and throughout the whole province, cities will have a relationship with the greenhouses.

In this scenario, a lot of food is produced by greenhouse farmers. This means that the province will have an increase in global export. This becomes evident from the large orange arrows that can be found in the systemic section in figure 35. However, as can be seen from the section as well, there will still be large flows of imported goods to provide any foods that the province will not be able to produce. Produce flows from the greenhouses or the port to the compact city to reach the customer will in this scenario go through big traders, who are responsible for the distribution of goods.

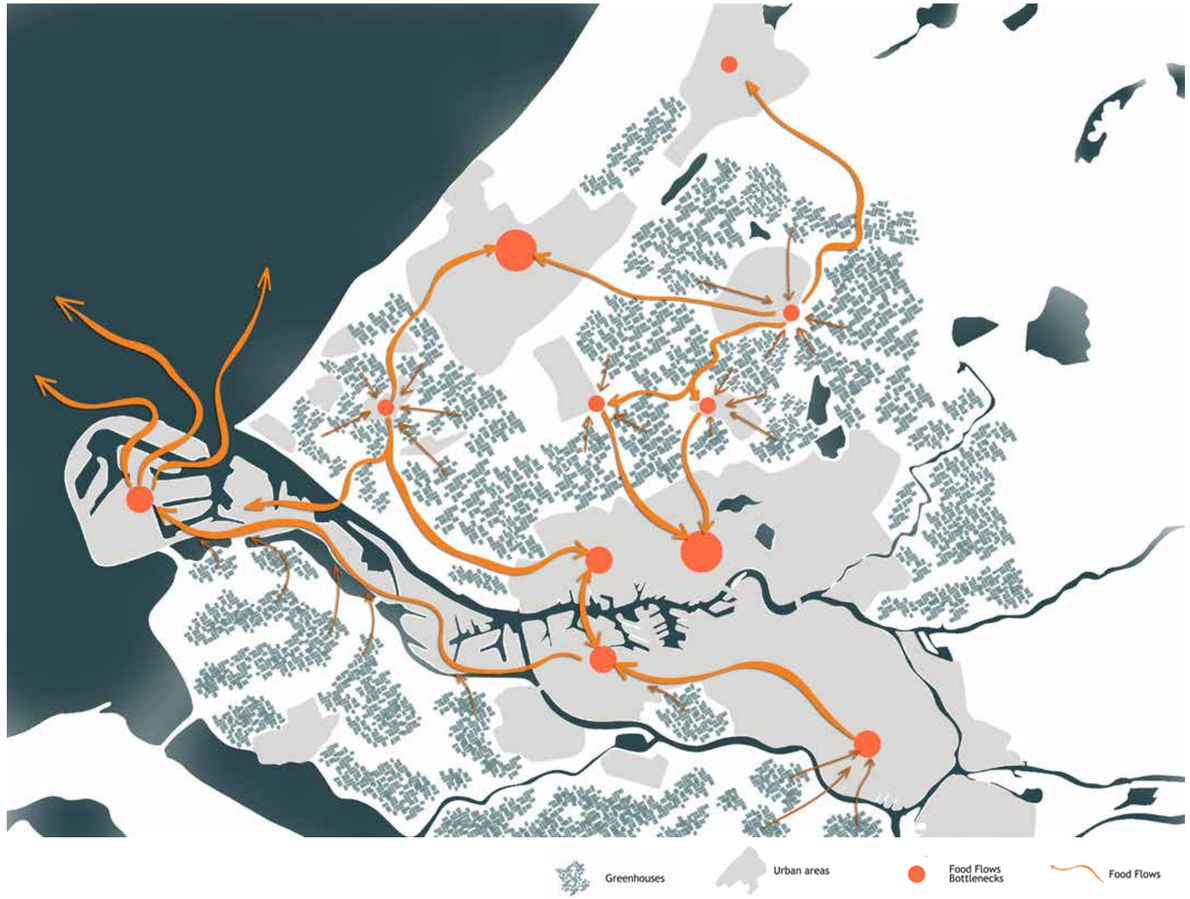


FIGURE 36: GIANT WESTLAND REGION, MAP

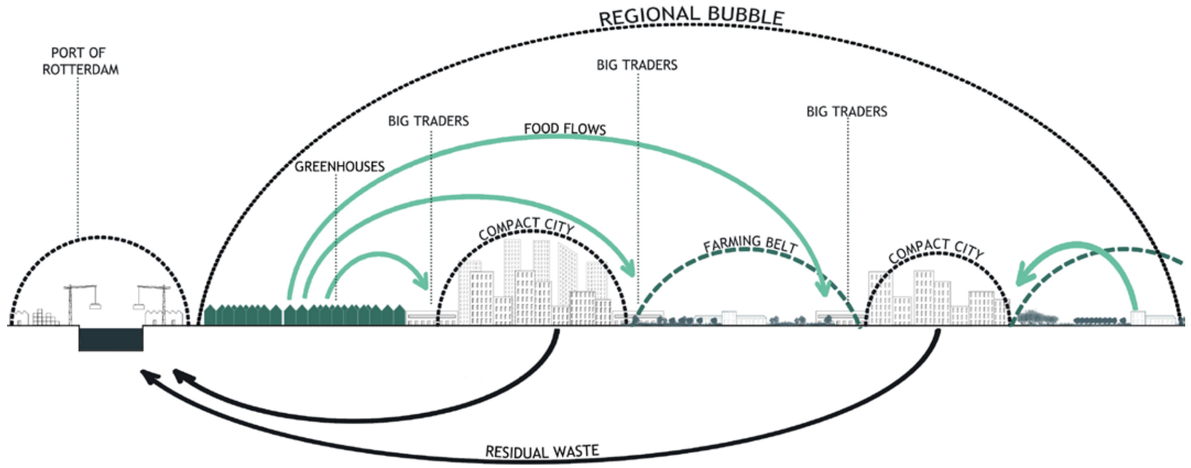


FIGURE 37: REGIONAL BUBBLE, SYSTEMIC SECTION

Provide Regionally

The starting point of this scenario is the provision of food for the whole province of South Holland. As can be seen on the map in figure 38, the current farming areas will stay the same in size. However, farming will become more intense. Most of the cities will be fully surrounded by agricultural land, which is mainly used for cattle farming. The greenhouse area will still be intensively used for the production of vegetables.

What is produced in the province, will stay in the province, unless there is a surplus of goods. Any foods that are leftover can be exported, but this will not be the main objective of this scenario. That is why, in the systemic section of figure 37, all food flows will first go into the city.

FIGURE 38: REGIONAL BUBBLE, MAP

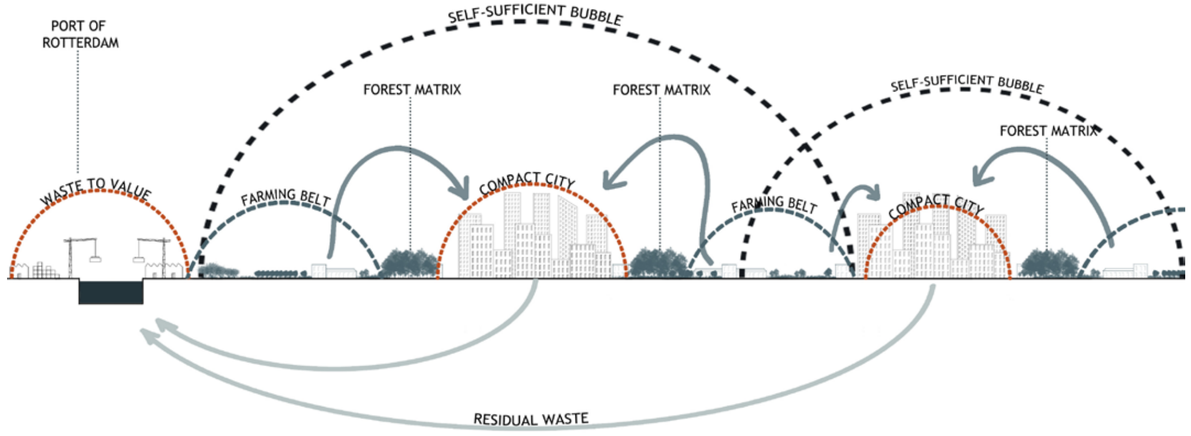


FIGURE 39: SELF-SUFFICIENT BUBBLES, SYSTEMIC SECTION

Self-Sufficient Bubbles

The basis for the third scenario is self-sufficient cities. The land use is more multifunctional because not all of it is used for the production of food. Some of the areas are used as a so-called forest matrix in order to create a transition zone between the city and the agricultural areas. The different zones will segregate cities that are now fused together. This can be seen in the map in figure 40 especially in the way that The Hague, Delft, and Rotterdam are now separate.

The cities that are formed can be seen as compact cities and are supplied with food from internal sources as well as the neighbouring farmland. These local flows can be seen in the systemic section in figure 39. The cities also take care of their own waste, some of which cannot be processed in the city boundaries. It is then their responsibility to get it to the port of Rotterdam where the waste is recycled in a high-quality manner.

FIGURE 40: SELF-SUFFICIENT BUBBLES, MAP

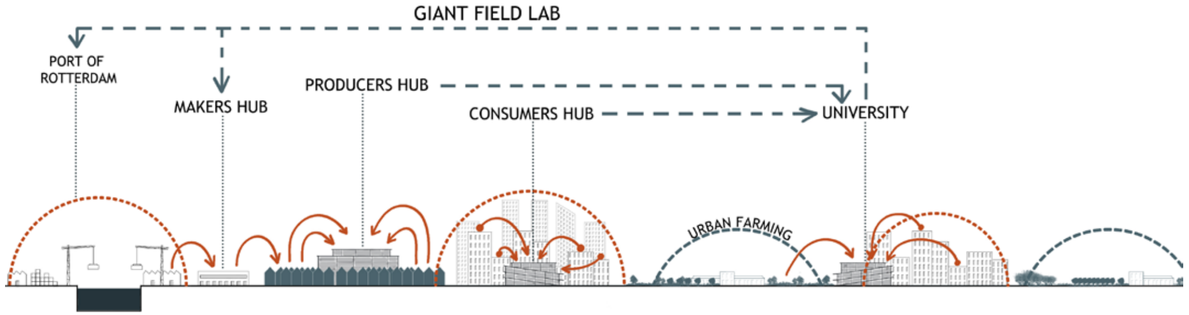


FIGURE 41: GIANT FIELDLAB, SYSTEMIC SECTION

Giant Fieldlab

This scenario is building on the knowledge that already has a base in the province of South Holland. On the map in figure 42 it can be seen that there will be knowledge flows between Leiden University, Den Haag University, Delft University of Technology, and Erasmus University. This theoretical knowledge can then be combined with the farmers in the area, as well as research facilities in the Westland. The result is a multi-level production. The production is not only limited to food but is extended also to include knowledge.

As becomes clear from the systemic section in figure 41, knowledge becomes the province's main export product. This can manifest itself as greenhouse farmers who modify seeds so they can thrive in different climates, analysis of data from clients all over the world, or the placing of greenhouses in foreign countries. Whereas the export of knowledge is very global, there will be more local feedback loops that inform the Makers Hub, Producers Hub, Consumers Hub, and universities on processes in society and farming.

FIGURE 42: GIANT FIELDLAB, MAP

Stress test

In order to have a value in doing these extreme scenarios, they were tested against the three qualities of resilience that were laid out in an earlier chapter of this report: robustness, adaptability, and transformability. In order to do this, one shock and stress were picked in order to score the scenarios in a system based on pluses and minuses. A scenario can score on a scale of 'non-resilient' (three minuses) to 'resilient' (three pluses). The scenario with the least negative score is the most promising in terms of providing a resilient system.

The shock that was used to judge the scenarios on the three qualities is 'disease outbreak'. The choice for this stress was made because it became apparent that this is something that can realistically happen in the near future. This can either be something zoological or vegetative, but it will throw the system out of balance. The results of this can be found in figure 44.

The stress that was picked to rate the scenarios was climate change. This stress has copiously been described as the most threatening stress to any system, so using this will be the ultimate test to see if the scenario is robust, adaptable, or transformable. The specific outcomes of this can be read in figure 45.

The results of the two stress tests are combined in a table to see which of the scenarios scores the best overall. The result of this can be found in the table figure 42. As can be seen, the knowledge network scores best in both dealing with stresses and shocks. However, the Knowledge Network scenario has fewer spatial outcomes than the other three scenarios. This is why the knowledge network will work as a framework that can assist the build-up of a more local system.

FIGURE 43: SCENARIOS STRESS TEST, CONCLUSION

	Giant Westland	Provide Regionally	Self-Sufficient Bubbles	Giant Fieldlab
Robustness	(+) The use of chemicals can be optimized.	(+) Diverse options of crops. (+) Diseases hit small portions of production.	(+) Diseases hit just one bubble. (+) Multifunctional farms are less affected.	(+) Biotechnologies help fight back diseases.
Adaptivity	(-) Monocultures will be strongly affected	It becomes easier to change a (-) production than to adapt on a short time base.	(-) Small farmers have less capacity to adapt. (-) If a big part of production falls out, no import of products provided	(+) Many options for change. (+) Awareness of the consumer. (+) Prevention with multifunctional farming options.
Transformability	(-) Times to change are long. (-) Change of crop is drastic change. (-) Diseases spread easily inside the microclimate of greenhouses.	(-) Multifunctional farmland improves transformability	The self-sufficient bubble needs (-) biodiversity in the farming belt and therefore is difficult to transform.	Transforming is possible but for a (-) longer period and makes it import-dependent.

FIGURE 44: SCENARIOS RESPONSES TO SHOCKS

	Giant Westland	Provide Regionally	Self-Sufficient Bubbles	Giant Fieldlab
Robustness	(+) Strong against water shortage. (+) Creates its microclimate.	(-) It has to rely on imported raw materials.	(+) Not dependent on imported goods. (+) Strong awareness of the consumer.	(-) Knowledge market unstable
Adaptivity	(-) High costs in money and time to change the structure. (-) Monoculture has to be eradicated.	Policymakers can easily make small (+) changes to adapt to certain conditions.	(-) Lost crops due to droughts, difficult to replace	(+) Research helps to find solutions for different crops. (+) Awareness of the consumer helps to adapt.
Transformability	(-) Export demands difficult to change. (-) Semi-built environment. (-) Strongly dependent on big infrastructure.	(-) Dependent on regional consumer habits. (-) Strongly dependent on big infrastructure.	(-) Strong dependency means a difficult transition	Knowledge hub is always open for (+) transitions even if this happens slowly

FIGURE 45: SCENARIOS RESPONSES TO STRESSES

FOOD FOR THOUHGHT: A CONCLUSION

At the beginning of the scenario building, a cartesian plane with the current location was shown. From all that was learned throughout the analyses and the scenarios, the location on the plane is updated. This new position can be found in the image 46. This is what the vision will work towards: a multifunctional and knowledge-based local network.

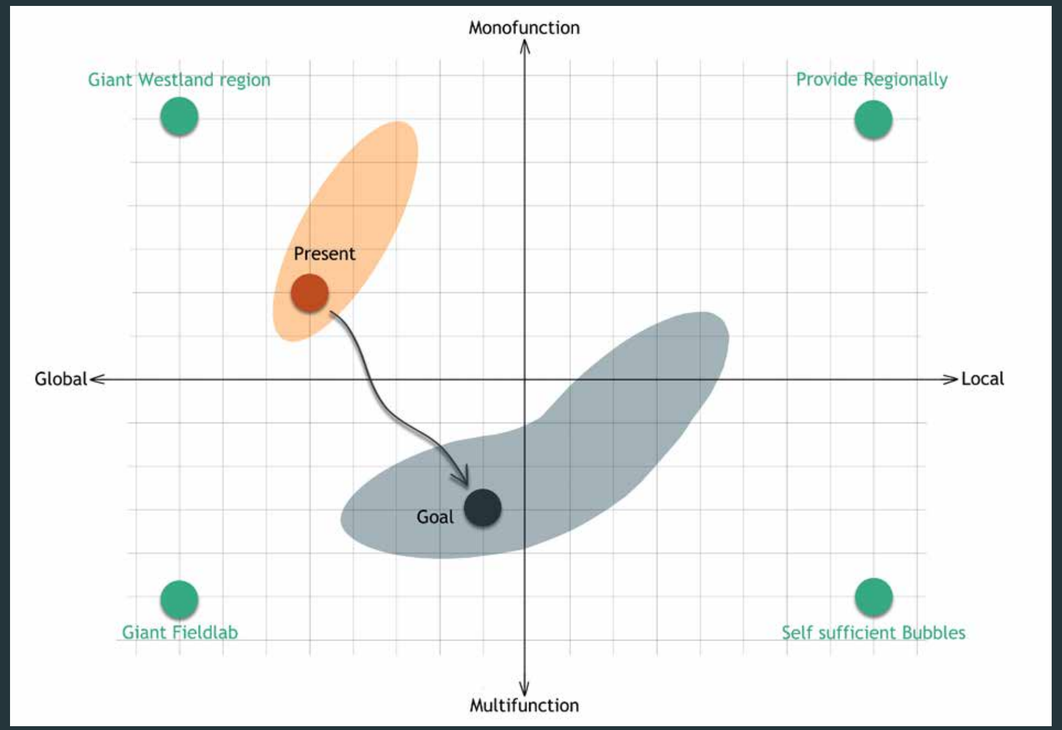


FIGURE 46: CARTESIAN PLANE SHIFT

RESILIENT SOUTH HOLLAND IN 2050

VISION

In order to combat the environmental and social challenges the world will be facing by 2050, the food system in South Holland must be resilient. By then, the province will have shifted to a circular economy, and our vision will ensure that the agri-food sector is robust, adaptive, and transformative in the new context of circularity through the creation and sharing of knowledge.

Imagine a world in which consumers are involved in the production process, and big retailers engage in responsible practices that are sustainable and fair. Local shops and small farmers are given support to grow their businesses, and stores are evenly distributed throughout different parts of South Holland. The network of universities provides a constant exchange of information and the feedback loop ensures the relevance of research to society, economy, and nature. Everyone in the food sector and beyond is interested, empowered and has a positive attitude. This is the vision for Resilient South Holland 2050.

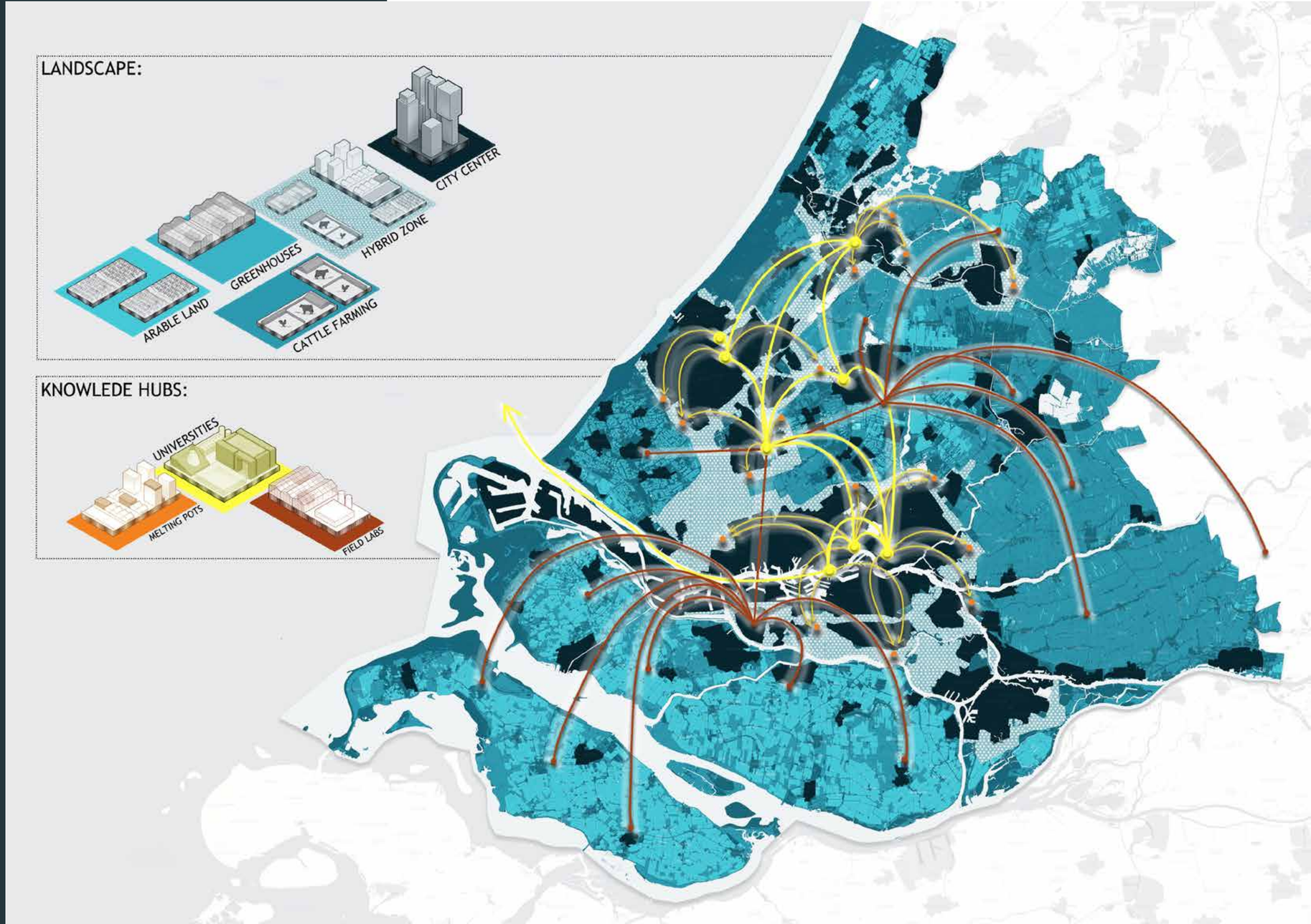


FIGURE 47: VISION MAP

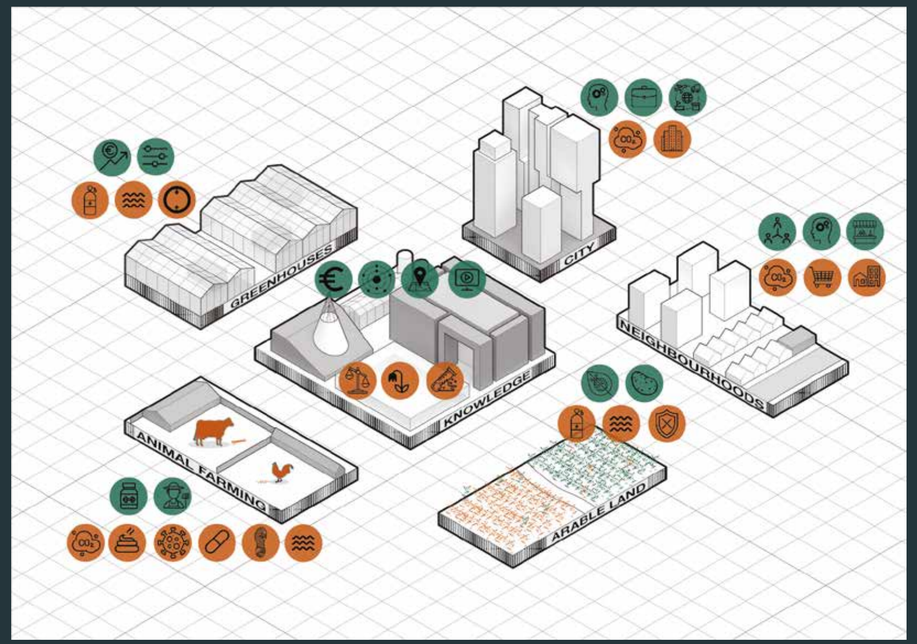


FIGURE 48: COMPONENTS OF THE NETWORK

In order to identify the roles of different landscapes, institutions, and regional areas, the strengths and weaknesses of existing spatial characteristics need to be identified.

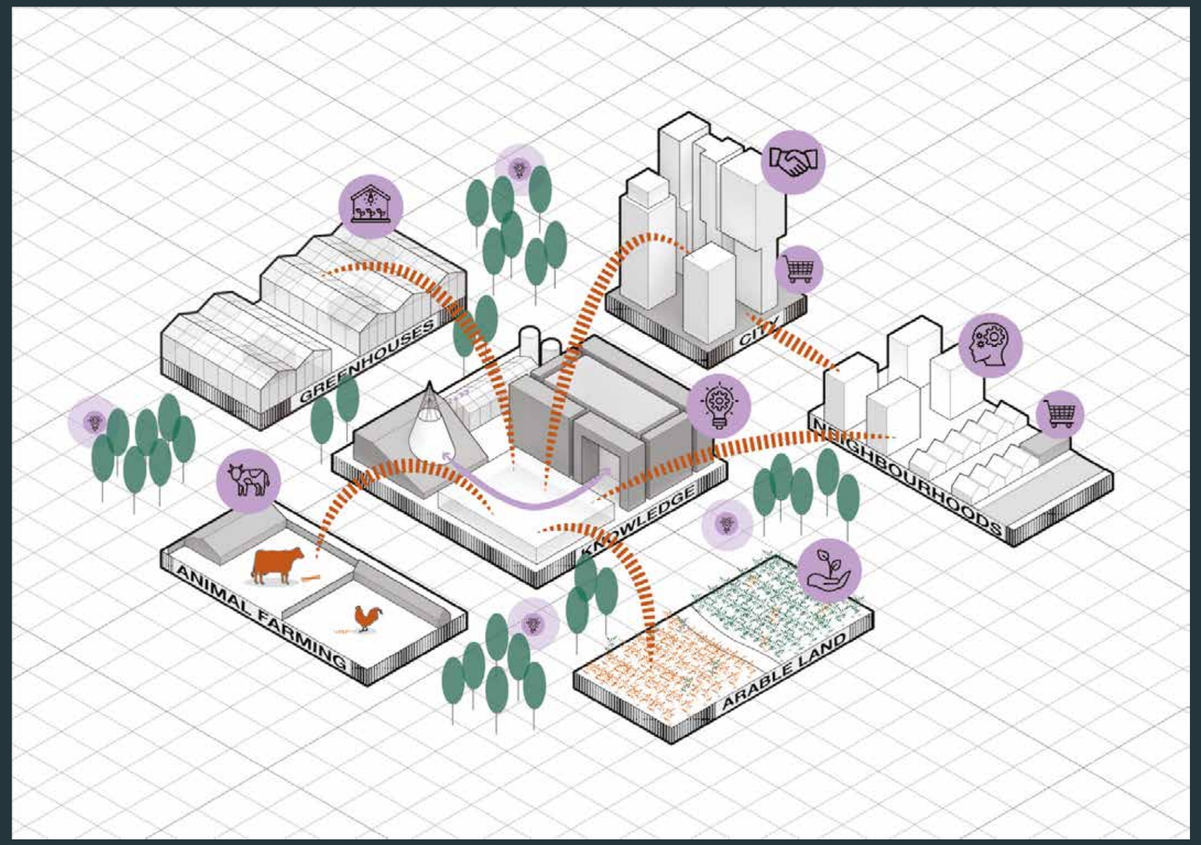
The greenhouses of Westland have the highest export profit and provide a controllable environment. On the other hand, the high use of pesticides enhances the nitrogen problem, extensive amounts of water are used, and they cause a rigid limitation of urban and rural growth.

Animal farming provides a high protein supply and enhances the important community of local farmers, but it is very unsustainable. High carbon and land footprint and manure waste cause a lot of regional pollution. On top of that, the reliance on antibiotics and the density of cattle can cause future disease outbreaks that will not be able to be contained.

Arable land has a lot of potential to improve biodiversity and the efficiency of products such as potatoes have strong cultural value in the Netherlands. However, the use of pesticides, high land footprint, extensive use of water, and lack of protection against extreme weather conditions are the weaknesses.

Local neighbourhoods often have a strong sense of community with a high level of access to local markets, especially with Dutch consumers who are generally very aware of their footprint. However, the still high emissions, and thus carbon footprint, of households and the growing dominance of supermarkets in densely populated areas pose risks to the sustainability and circularity of neighbourhoods.

The city centres offer a concentration of entrepreneurship and good logistics connectivity, which can be important in involving local business and consumers. However, high emissions (carbon footprint) of car traffic and built environment, as well as the dominance of large businesses pull the city centres back and need to be considered.



By considering the strengths and weaknesses of the spatial characteristics, flows of knowledge can be abstracted in collaboration between the elements. Innovation and engagement between institutions and hubs inform the improvement of the quality and quantity of food, as well as the health and awareness of the people in South Holland.

FIGURE 49: NETWORK IN CONCEPT

GOALS

The main goal of this project is to create a resilient food sector system in South Holland that can operate under shocks and stresses. It is impossible to create the perfect system or to anticipate all the challenges ahead. So, this project focuses on making a resilient system. Changing the system only becomes possible if the project is all encompassing. To truly create a change, producers, consumers, and distributors will have to change. Therefore, this project aims to:

LOCALISE THE FOOD CYCLE

STIMULATE INNOVATION

DEVELOP A STRONG RELATIONSHIP BETWEEN CITIES AND RURAL AREAS

CREATE INFORMED CONSUMERS

GUARANTEE ACCESS TO HEALTHY FOOD

The goals of this project fall in line with the Sustainable Development Goals of the United Nations (2015). The most applicable ones are:

No Hunger: End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
Aiming to improve food security in the long term by creating a more resilient system. Thereby, agricultural innovation is a driver of this strategy, placing the focus on sustainable agriculture.

Quality Education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
Including education as part of the process to create better informed consumers. Students will have more knowledge about food production and consumption all while participating in fun activities. There will also be workshops on different topics accessible for everyone.

Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient and sustainable.
Creating higher sustainability by using knowledge and resilience capacities to build local chains that are more sustainable. The existing communities will play a crucial part in collecting and sharing knowledge, placing them at the heart of the new developments.

Responsible consumption and production: ensure responsible consumption and production patterns.
Reducing nutrient loss by reducing food wastage at the consumer end but also all along the food chain, from producers to retailers. Informed and aware consumers that help support the new system in the long term.

Partnerships for the Goals: Strengthen the means of implementation and revitalize the global partnership for sustainable development
Looking for a way to find a common solution and partnerships between niches of farmers and citizens from urban environments. Building strong relationships between the local farmers and big distributors and supermarkets to work together on those partnerships and improve the practices on both ends.

FIGURE 50: GOALS

RECIPE FOR RESILIENCE

HOW DOES THE VISION UNFOLD?

Strategy principles
What are the guiding principles that lead to realizing the vision? The main objectives of the Vision for a 'Knowledge Network' 2050 are:

1. To build resilience in spaces and communities, this means robust, adaptive, and transformable food networks and realm;
2. To achieve circularity in the agri-food sector that contributes to a circular South Holland by 2050;
3. To use society and knowledge networks to shape better connections between production areas and cities;
4. To create a space for local food cycles - 'Regionalization' to an extent.

Stages of Knowledge
The stages to knowledge are identified with necessary actions at each step, as seen in figure 51. Data that is collected from the farms and at the universities needs analysis and organization to turn into fruitful information. For information to translate to synthesizing and decision-making, community networks need to interpret the information and adopt it as part of cultural practices. Cultural interpretation of knowledge is, therefore, a crucial step.

Knowledge creation is not a linear process but one that requires continuous learning by doing and experimentation, a 'data feedback loop'.

How do these manifest in space?
Currently, food policies do not put people at the centre. The current system is difficult to change given its large economic footprint. The import and export of food ensure that we have a guarantee of easily accessible and cheap food. Consumers are often not bothered by their easy access to supermarkets and are disconnected from local producers. As formal knowledge and traditional structures often clash, so do a rural and urban interpretation of sustainable agriculture, circularity, and other novel concepts.

A decisive strategy step would be to include people in policymaking and provide them with incentives to change and incorporate new routines. We imagine this by creating a common ground for these different actors to meet and share their interpretations of food, knowledge, and culture.

The retailer must be an active participant in our vision and sometimes the key driver or connector in the network. The strategy looks at ways in which producers - the farmers - are looked at along with the producers of knowledge - universities and schools. Consumers and retailers share an important role in knowledge dissemination and practice. So we ask the question: can retail be a facilitator to bring change to a certain extent and connect these players?

To achieve this would mean rethinking the role of existing structures, glasshouses, supermarkets, and neighbourhood cores.

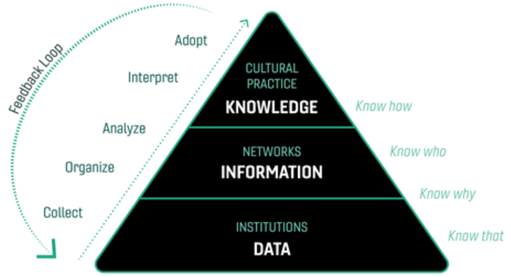


FIGURE 51: KNOWLEDGE PYRAMID

FIGURE 52: SPATIAL HUBS

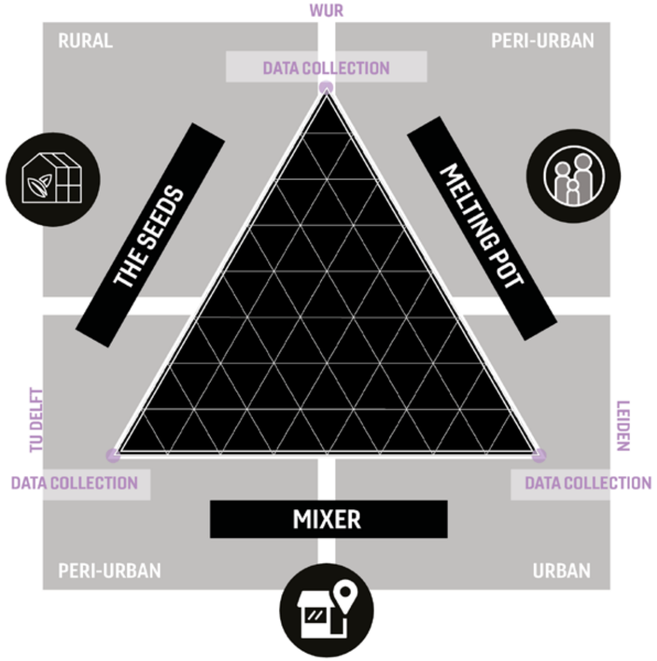


FIGURE 53: STRATEGY TRIANGLE MATRIX

The Seeds: are when knowledge and food produce germinates
Melting Pots: are the common ground where all actors can interact
Mixers: are the In between spaces that are hidden or not transparent

The Seeds are the place where both knowledge or food germinates
The Melting Pots create the common ground where all actors can meet
The Mixers function as the in-between spaces that involve food circulation

KNOWLEDGE NETWORK

The vision synthesizes strategies to build on landscapes specific to South Holland which are glasshouses in the Westland, cattle farms in the East, and arable farms in the South. The Randstad and hybrid R-urban zones are important ingredients as well. Key players in the Network map are the Social Interaction Network (in orange) and the Knowledge Belt (in blue).

The Knowledge Hubs are the strategic tools derived from the vision that act as nodes for the networks. The aim is to have a just space where universities govern the knowledge sphere, farmers and consumers contribute to building robustness and the retailers adapt to a transparent, inclusive realm. The Hubs, Nodes, and Network generated are less hierarchical and more collaborative. They are tied together with data feedback loops.

The orange network represents social interaction. The central Nodes in orange are the farmer and community hubs playing a pivotal role in creating common grounds for information to be shared. This is where sustainable practices can be cultivated to develop a culture of circularity. The network in blue is that of formal knowledge. This includes institutions and R&D labs. Field labs as experimental sites at glasshouses are a key element. Innovative ideas, experiments, and early prototypes are developed here.

FIGURE 54: KNOWLEDGE NETWORK MAP

Connecting
existing institutions

Universities and experimental
hubs / field labs

Connecting the producers
and distributors

Connecting farmer hubs in the
peri-urban area

Interactions between
the two realities

A knowledge network
interconnectin South Holland

1.

First Existing Universities and connections are mapped

2.

New production and experiment Hubs like field labs are set up. These collect and analyze information and send it back to Universities.

3.

The next step would be to identify local hubs that act as common ground for producers, distributors, and consumers.

4.

Peri-urban hubs are developed at the periphery of the city close to the borders of the farms. These need to be connected to the local hubs in the previous step.

5.

Interaction between two realities, this is where the community network of shared practices and the formal knowledge network needs to meet.

6.

Production, distribution, and sharing networks work in synergy. A resilient knowledge belt in south Holland emerges that is built on rigorous interactions between stakeholders.

FIGURE 55: STEPS TO THE KNOWLEDGE NETWORK

ACTORS & ROLES

The current system is unjust as retail has more power and nature is voiceless. In the vision building resilience through changes in power and interest of the stakeholders is essential. We map these changes for the seven categories of stakeholders mentioned earlier in the analysis chapter. The vision provides new roles for each player.

Governmental Institutions
The government needs to provide incentives for farmers to shift to more circular models of agriculture. Monetary stimulation is key to both producers and retailers to govern circularity across the food system. The institution must work with the universities to govern a new system of knowledge interaction so a just space is maintained. It needs to guide and supervise the transition to circularity across different spheres - food, energy and chemical sectors. Figure 56 explains how governments at different stages work towards the vision goals.

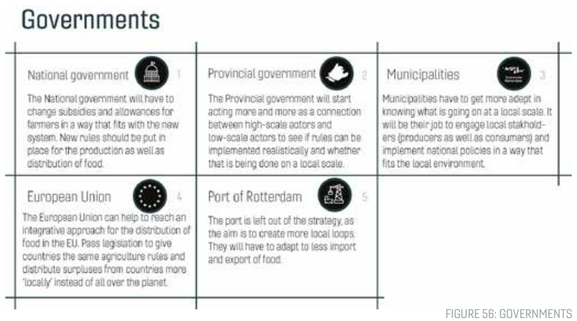


FIGURE 56: GOVERNMENTS

Producers
A change by adapting and listening is key. Producers need to be aided by government institutions in the form of the right knowledge. The producers of pesticides and antibiotics need to be given an alternate sustainable role. The new producers of knowledge are to be linked with other actors and subsidies for field labs and small food startups that utilize waste resources are to be provided for. These changes can be found in figure 57.

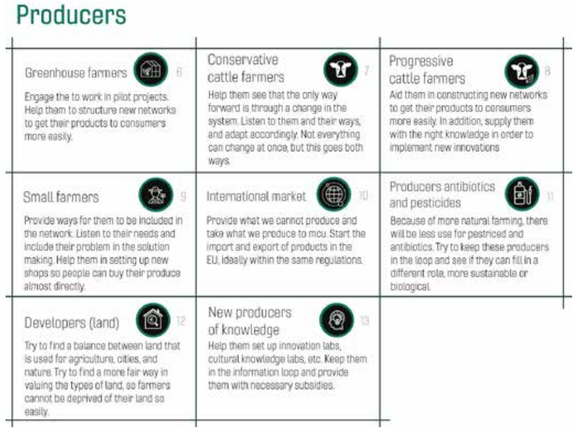


FIGURE 57: PRODCERS

Educational
Universities play a key role in conducting research for determining the roles of each and how an information campaign and a data feedback loop can tie them together. The role of supervision, as well as practical learning, is the responsibility of schools and universities. Further elaboration is found in figure 58.

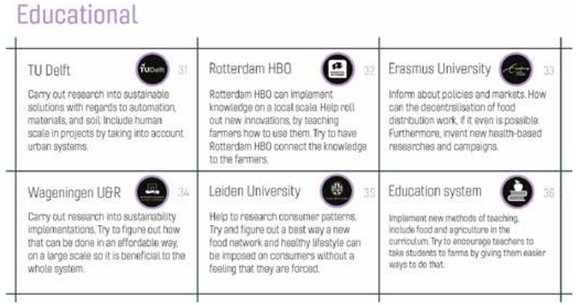


FIGURE 58: EDUCATIONAL

Distributors
The important step here is to incentivize clusters of small shops as an alternate sustainable option. These clusters must be fairly distributed in the cities. Waste streams need to be harnessed to avoid losing valuable resources like Phosphorous. The small startups from producers can be linked here. Encouraging local restaurant chains to utilize food seasonally and using better packaging are some of the steps advised as in figure 59.

FIGURE 59: DISTRIBUTOS

Consumers
Informing consumers and keeping an open dialogue is necessary. As examples in figure 60 mentions, educating the younger generation about food origins and adopting food as a greater part of the culture are crucial. It is important to start relooking what constitutes a healthy and affordable diet for low-income consumers is also essential.

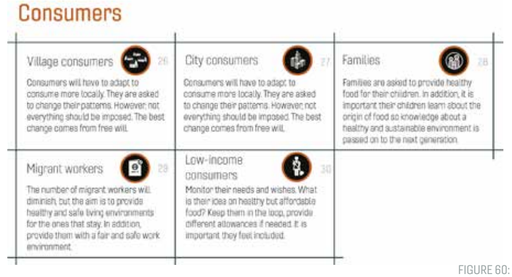


FIGURE 60: CONSUMERS

Civil society
Figure 61 discusses a new generation of stewards and important actors that will have stood up by 2050, so the issues of intergenerational justice and sustainability are ones that we hope are part of conversations encouraged by educational institutions.

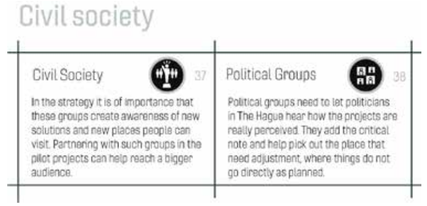


FIGURE 61: CIVIL SOCIETY

Voiceless
Figure 62 discusses the collection of data in order to empower the voiceless - cattle and nature. This can be done by making this data more accessible to the public. One way of doing so is by having interactive data museums.

FIGURE 62: VOICELESS

Stakeholder synergies
Knowledge at the core governs each actor as is evident from the figure 63. A data feedback loop ties them all together. Cultural interpretation of knowledge with shared practices means informing other stakeholders with networks. This can create resilience through adaptability and transformability for the various stakeholders involved.

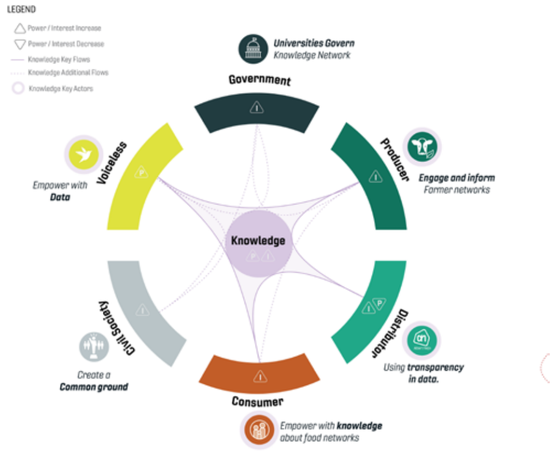


FIGURE 63: STAKEHOLDER SYNERGIES

In the analysis, it became evident that the actors on the power-interest matrix were very scattered around on the axes. It showed that there was a big disconnect between the power and interest of different actors as well as a large gap between where production takes place and where decisions are being made. This recap can be found in figure 64.

In figure 65 it is clear how the vision aims to empower the voiceless and make small distributors more interested in circularity. The least power is given to big traders even though they do have an important say. Knowledge institutions have a governing power and an authorizing power. Civil society and the voiceless - nature and cattle- are considered as the most interested players in the game.

Status Quo

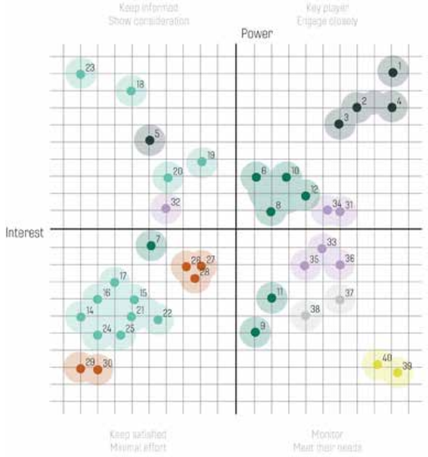
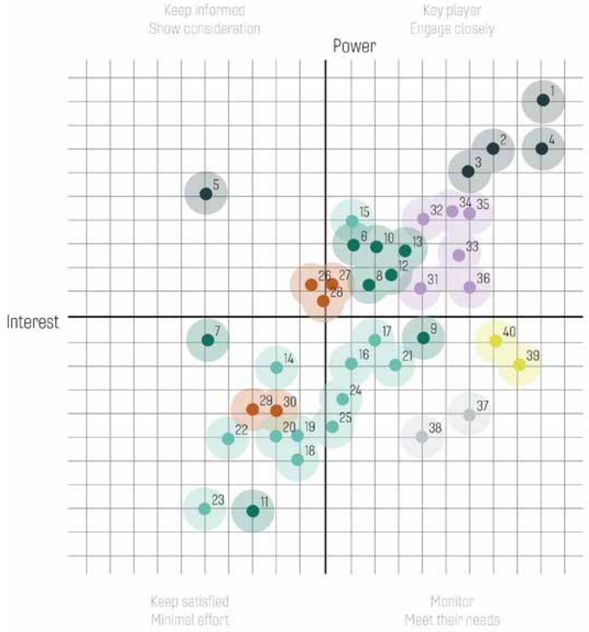


FIGURE 64: STATUS QUO STAKEHOLDERS POWER-INTEREST MATRIX

Who should rule the system?



Governments
1. National government
2. Provincial Government
3. Municipalities
4. EU
5. Port of Rotterdam

Producers
6. Greenhouse farmers
7. Cattle farmers (conservative)
8. Cattle farmers (progressive)
9. Small farmers
10. International market (impact on producers abroad)
11. Producers of antibiotics and pesticides
12. Developers (land)
13. New Producers of Knowledge

Distributors
14. Business owners (city)
15. Waste disposal companies
16. Local networks for distribution (cooperatives)
17. Farmer's market shareholders
18. Albert Heijn
19. Jumbo, Dirk etc.(national)
20. Lidl, Aldi (international)
21. Local shops
22. Restaurants
23. Big Traders (Unilever)
24. Slaughter houses
25. Packaging center and cold stores

Consumers
26. Village consumers
27. City consumers
28. Families
29. Migrant workers
30. Low-income consumers

Educational
31. TU Delft
32. Rotterdam HBO
33. Erasmus University
34. Wageningen University
35. Leiden University
36. Educational system in NL

Civil society
37. Political groups (opposition)
38. Civil society group

Voiceless
39. Nature - Meadow Birds and Biodiversity
40. Cattle

FIGURE 65: NEW STAKEHOLDERS POWER-INTEREST MATRIX

POLICIES

Planning Instruments
For the vision, capacity building is a crucial step towards resilience. This involves networking dialogues and public-private partnerships. Other planning instruments that are key to the strategy are:

- Scenarios to help construct images of the region that are comprehensible to all the public;
- An assessment test like the shocks and stresses test to gauge and regulate the resilience of the food system and space;
- A carbon tax and funds to stimulate both bigger retailers and smaller food startups to adapt to circularity.

Policy Framework
The three fields of farming, the knowledge networks, and consumption define the policy framework. The framework is then built on Funding and Taxing initiatives. The policy and spatial module are considered separately but are in a feedback loop - informing one another and working in sync. The table figure 66 elaborates this further.

Farming
In this sector, the focus is on biodiversity and soil erosion as these are the most pressing concerns. In terms of taxing a tariff on antibiotics and a tax to minimize the use of fossil fuels in the food systems can assist the farming sector towards circularity.

Knowledge Networks
The policy prescribes funding for a new generation of smart farmers and more sustainable local farms. Research centres into the rural landscape in the form of field labs should be encouraged. Spatially this results in a higher density of multifunctional farms and better connection between rural and city social networks.

Consuming
The policy framework defines better consumption habits by its information campaign and education programs conducted in schools. To emphasize the transparency of food data, a tax on non-labelled products is essential. A carbon tax that minimizes the carbon footprint of production and distribution can assist food consumption in the region to shift towards circularity. Spatially this results in Urban Farming programs that serve as meeting points for consumers and producers to learn from the other. Accessibility to small shop clusters in an equitable way is an important spatial outcome the policy framework would realize.

Policy translation
Policy transfer happens when a policy or strategy used in one geographical context is applied somewhere else, drawing the lessons from the original case studies. With growing urgencies and global problems, this happens across all scales (Dabrowski, 2021).
In the strategy, two types of potential translations of the policies can be identified - context-specific and applicable elsewhere. Amongst the specific policies there is the creation of the hybrid zone, using greenhouses as experimental labs, as well as the knowledge network, and connecting the universities in the region. This is a very specific arrangement for South Holland, where the focus on the link between farming practices and science is very strong. Also, the formal connections that already exist between the institutions, make it easier to create the network. However, if the strategies would be translated somewhere else, the establishment of stronger initial connections would have to be conducted.

Applicable policies include measures taken to reduce CO2 emissions, creating regulation trademark labels, as well as sharing knowledge between research centres and production areas, which could be applied more universally.

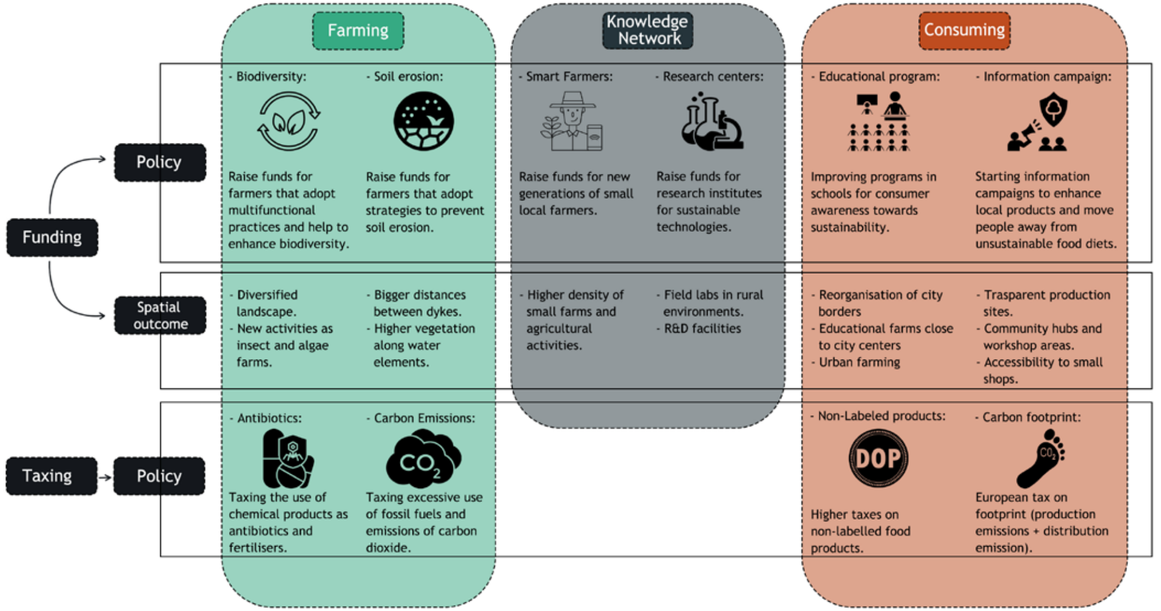


FIGURE 66: POLICY FRAMEWORK

TIMELINE

The timeline for achieving a circular food sector in South Holland by 2050 is built upon 4 stages. They are the exploration, implementation, monitoring and regulating, and achievement of circularity. They will be discussed one after the other.

1. Exploration
This is where funding and informing of nascent projects begin.
In terms of farming, it means monetary stimulation for better and circular farming practices, especially to prevent soil erosion. Capacity building is a necessary step from here onwards.

For consumers, an information campaign needs to be set up. This will include workshops as tools to have the diverse actors interact. This will then develop into the identification of nodes for the networks. For the knowledge network, the identification of key field labs is an important step. Before setting up knowledge nodes, preliminary research is set up by institutes to identify local locations as hubs for farmers and consumers. This is to be done with a data feedback loop from the workshops, consumer data from retail, and data collection points located at sharing and production hubs. Universities, therefore, play a key role in governing the network. The government needs to create space for the new role of this actor by shaping policies.

2. Implementation
After the first five years, the next stage from 2035 would be implementation. During this phase, new hubs are realised by introducing a Pilot project. Networks are made concrete and robust so common grounds can be more easily laid as an adaptable interaction space. Higher taxes on non-labelled products is a measure in regulating data, this includes taxes on footprints.

3. Monitoring and Regulating
The next step involves monitoring the outcomes of the pilot hub. This will happen ten years after phase two. This step needs strong collaboration between the different hubs of production, sharing and distribution. A resilience stress test should be conducted during this phase and changes suggested should be adapted.
Publications by community and farmer networks, regulating the use of antibiotics and fertilizers, and maintaining multifunctionality in farms is a crucial step here. During this phase, waste flows from one system are to be tied as resources to another system to make sure all systems are circular.

4. Circularity
The last step, circularity, would be the final transition to a circular economy. The collaboration of the circular agri-food sector with other spheres such as the chemical, building, and energy industries is a vital step that must be realized and completed here till 2050.

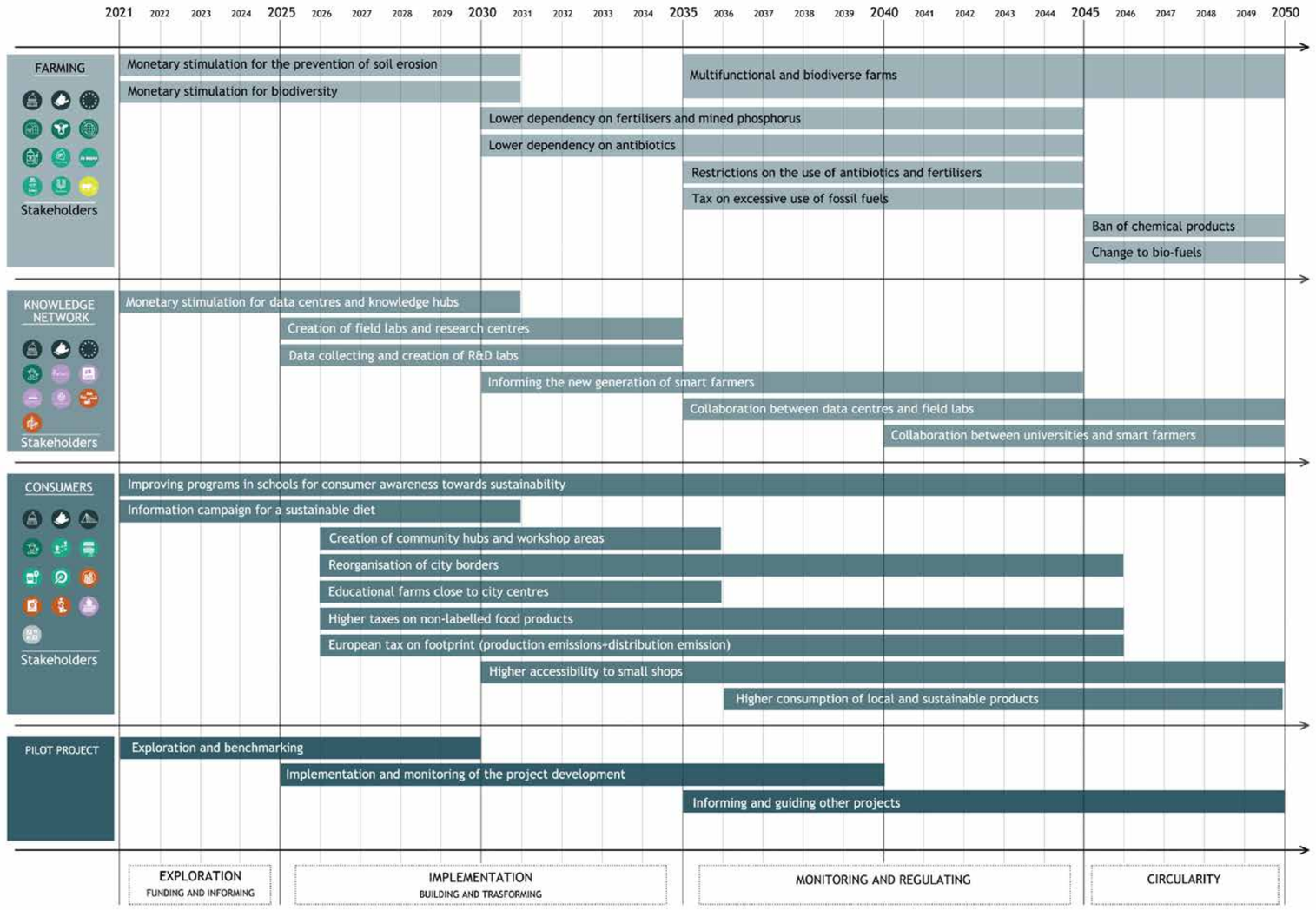


FIGURE 67: TIMELINE

STRATEGIC HUBS

The strategy introduces a knowledge network, where different nodes play their roles in communication and participation in learning. In order to implement the network, spatial elements are introduced, which involve stakeholders in various contexts. By distinguishing three stages of the food system in the current economy - production, distribution and consumption (waste accompanying all of the three - three types of strategic hubs are introduced. Their specificity and overlap informs the needs of local communities and connects to the general feedback loop.

The strategic Hubs are the key nodes where knowledge networks meet. These are:
1. The Seeds - INNOVATE - Production and Experimentation Hubs
2. The Melting Pots - SHARE - Knowledge sharing hubs.
3. The Mixers - CIRCULATE - Distribution Hubs.

Just as universities play a key role in data collection and analysis, Melting Pots are key nodes for interaction, and are the place where all the stakeholders meet. The strategic hubs presented on the map on the right side of the page, as well as the following pages, are abstracted and are to be used as guidance, rather than design. In reality (and this is explored in the pilot projects included at the end of this chapter), hubs located in the context of neighbourhoods, production areas or city centres would contain parts of all of them: The Seeds, The Melting Pots and The Mixers, with functions balanced accordingly to the location and its needs.

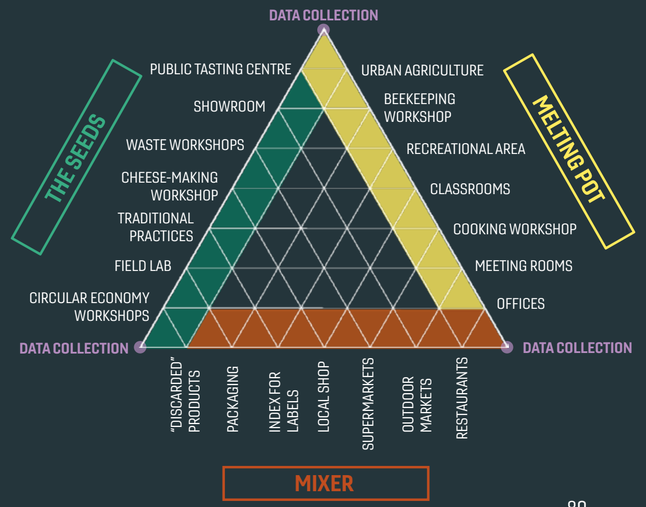


FIGURE 68: STRATEGIC HUBS SYNERGIES

The Seeds

Production/Experiment hub
These hubs are The Seeds, where knowledge germinates, data is quantified, collected, examined, and organized. The described knowledge can be sourced and examined within glasshouses, animal farming, arable land, or any other farming, including algae shore experiments. The data and qualitative input is then analysed by universities and circulated back to the feedback loop for further experimentation and examination of consumption patterns in the other hubs. The conceptual drawing of The Seeds represents the functions that are identified based on the existing case studies, but they put a lot more emphasis on the public interaction and the learning process of the new technologies, as well as the traditional farming techniques. Different types of land use (cattle farming, greenhouses etc.), and different geographical positions within the region, require varied forms and functions to be adjusted to each specific location. However, this general spatial composition serves as a toolkit for the projects that will follow.

The hubs introduce recreational functions next to experimental and purely production oriented ones. This comes from the overlap with the Melting Pot. A showroom and public tasting centre are introduced to examine the outcomes of the production research. For example: what does the public think of experimentally produced tomates? This gives a first step in verification of the production techniques with the consumers.

Case Example:
There is a WUR Field lab in South Holland that makes use of large glasshouse sites as testing grounds. Early prototypes are made here before they are introduced to the market. For this workspaces and startups, office spaces are involved. Different growing systems of produce are innovated. This is where potential for circularity in waste flows can be channelled. The space includes places for meetings, presentations, and exhibition space with taste panels for fruit and vegetables can also be included to keep a segment of it open to the public.

Spatial outcomes of strategy:
Data network between Universities, production sites
Start-up offices involving smaller business to innovate with waste flows and develop prototypes
Exhibition spaces, for school excursion, public tasting centre.

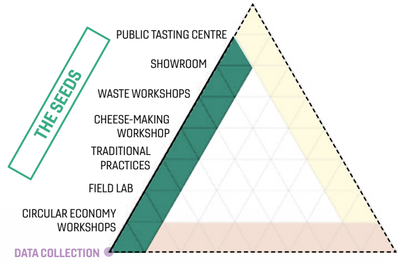


FIGURE 69: THE SEEDS IN THE TRIANGLE MATRIX

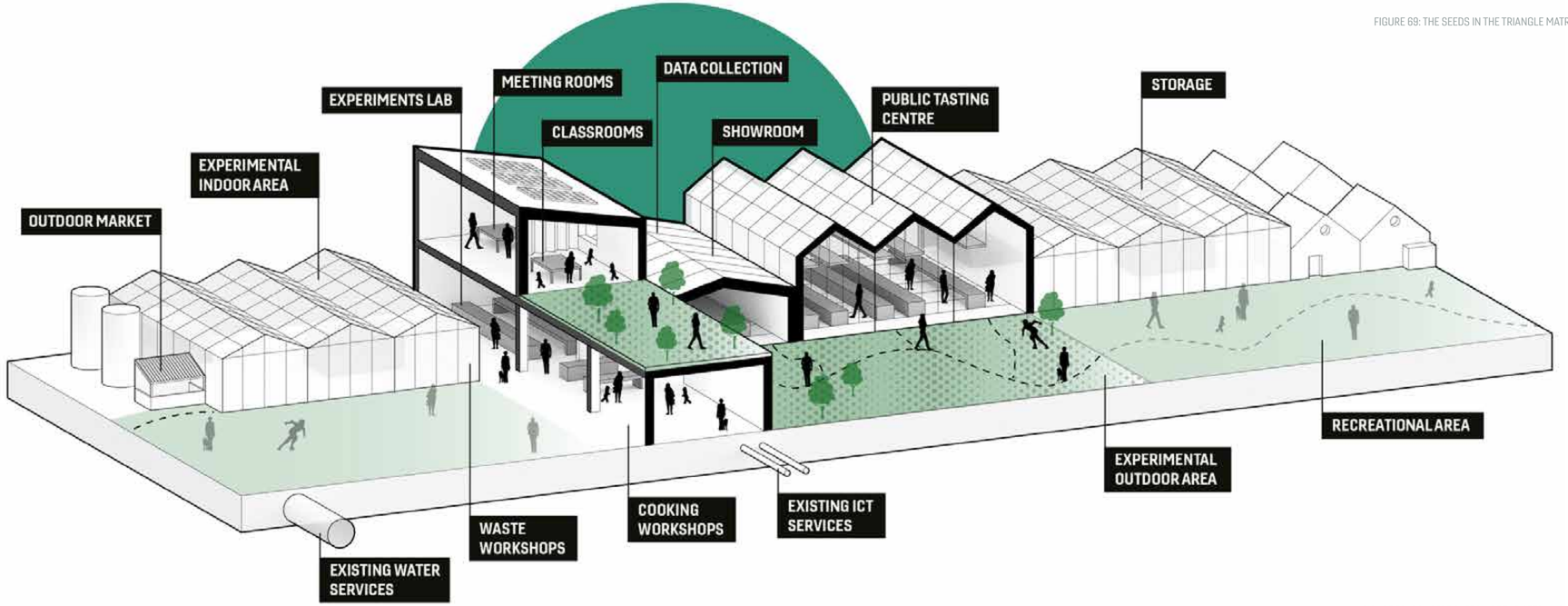


FIGURE 70: CONCEPT SKETCH OF THE SEED HUB

The Melting Pots

Knowledge sharing hub
This hub type and its network act as a common ground where all actors in the food realm can meet to share knowledge. The second step after collecting data is interpreting information and adopting it within cultural practices. This is where shared knowledge of communities comes into place. The Melting Pot is meant for knowledge dissemination and learning from each other. It can be well-implemented in an area lying in between the periphery of the city (R-urban zone) and farms. The hub can also be implemented in an urban neighbourhood, in order to strengthen the relationship between the urban environment and the places of food production. Villages located in the countryside also benefit from the hubs being implemented. The aforementioned typologies require careful consideration of needs when the toolkit is implemented at a specific location. Before the introduction of the Melting Pot, preliminary research ought to be conducted in the area to show what would be the most beneficial.

Even though the areas differ greatly, a toolkit for putting a community hub together includes a lot of inclusive activities, such as beekeeping, cooking, and waste workshops in order to root the idea of circularity in the way consumers prepare food and deal with the left-overs. Urban agriculture, classrooms, and the cafe open up opportunities for cooperation with local schools and other community organisations. Offices and data collection ensure that the lessons are learnt not only from the consumer patterns but also acquire the valuable and diverse knowledge consumers have about cooking and food.

Governing Actor - University
This preliminary research on the needs for the community hub is conducted by involved actors (province government, local council) and through the involvement of the local community (farmers, inhabitants). It is then supported and analysed by Wageningen, Delft, Leiden, and Erasmus Universities. After the assessment, a plan for functions can be drawn, and a location with the right size can fulfil the community interests and needs.

Spatial outcomes of strategy :
Using neighbourhood cores, such as nature parks, community centres, schools, libraries or religious buildings.
A strong relationship with food and its production is created through a number of workshops, urban agriculture, and the involvement of children in the learning process.

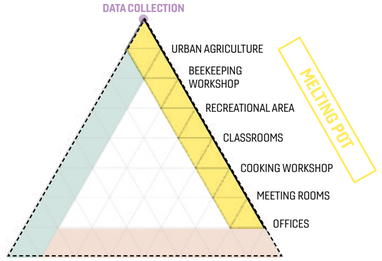


FIGURE 71: THE METING POT IN THE TRIANGLE MATRIX

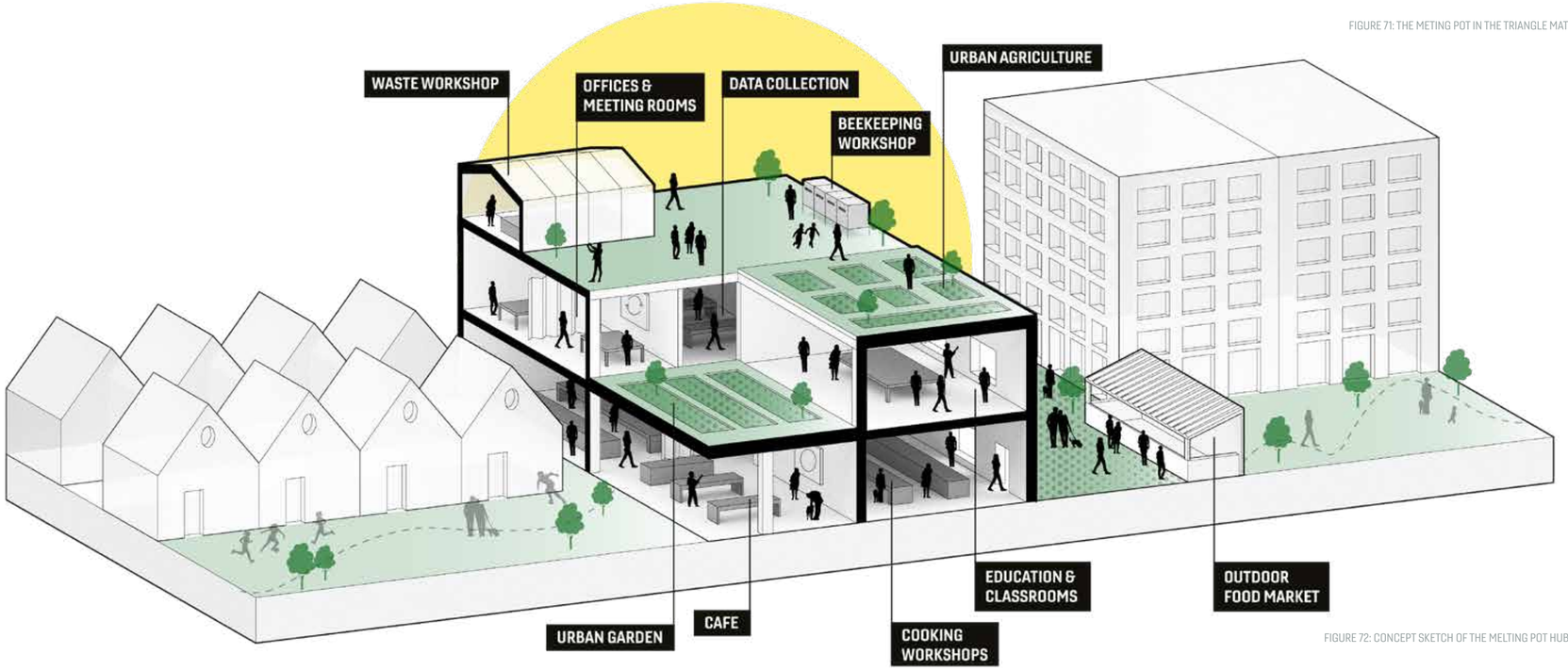


FIGURE 72: CONCEPT SKETCH OF THE MELTING POT HUB

The Mixers

Distribution Hub and Network
These hubs and the network is where the produce reaches the consumers. It also includes the intermediary stages that lead to the sellers, as these stages are often hidden from the consumer. Currently, space is primarily occupied by big retailers, which create a bottleneck in the food cycle, causing large amounts of pollution and waste. Involving them in sustainable practices leading to circularity is key in building a resilient food system. The same as the two previous types of hubs, the Mixer can vary largely depending on its location and focus.

They can be located within the existing retail centres to examine shopping and retail patterns and introduce a circular way of buying and selling. In this case, enhancing the role of the local stores and involving big supermarkets in meaningful activities is significant. The aspect of spatial justice in terms of the distribution of local stores should be further addressed in the creation of smaller hubs scattered around.

In the location of intermediary distribution stages, packaging services for more circular and sustainable materials are introduced, as well as research of developing an index for labels, in collaboration with the Seeds (production and experimentation hubs). This index, as one of the non-spatial strategies, ensures that the production and distribution techniques match the requirements for circularity and environmental protection.

This also applies to the space designated for discarded products. While in transit, storage or at the store products get thrown away for various reasons - the product might have gone off or it does not match the size, shape or any other required standards. This space is given for classifying them and verifying the correct destinations where they can be used in a meaningful way - either to the production hub or a different sector.

Spatial outcomes of strategy:
Packaging Centres
Data Centre
Discarded products Lab - New destinations
Local retailers

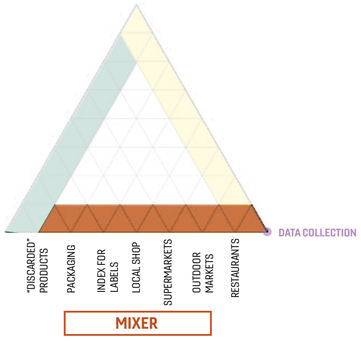


FIGURE 73: THE MIXER IN THE TRIANGLE MATRIX

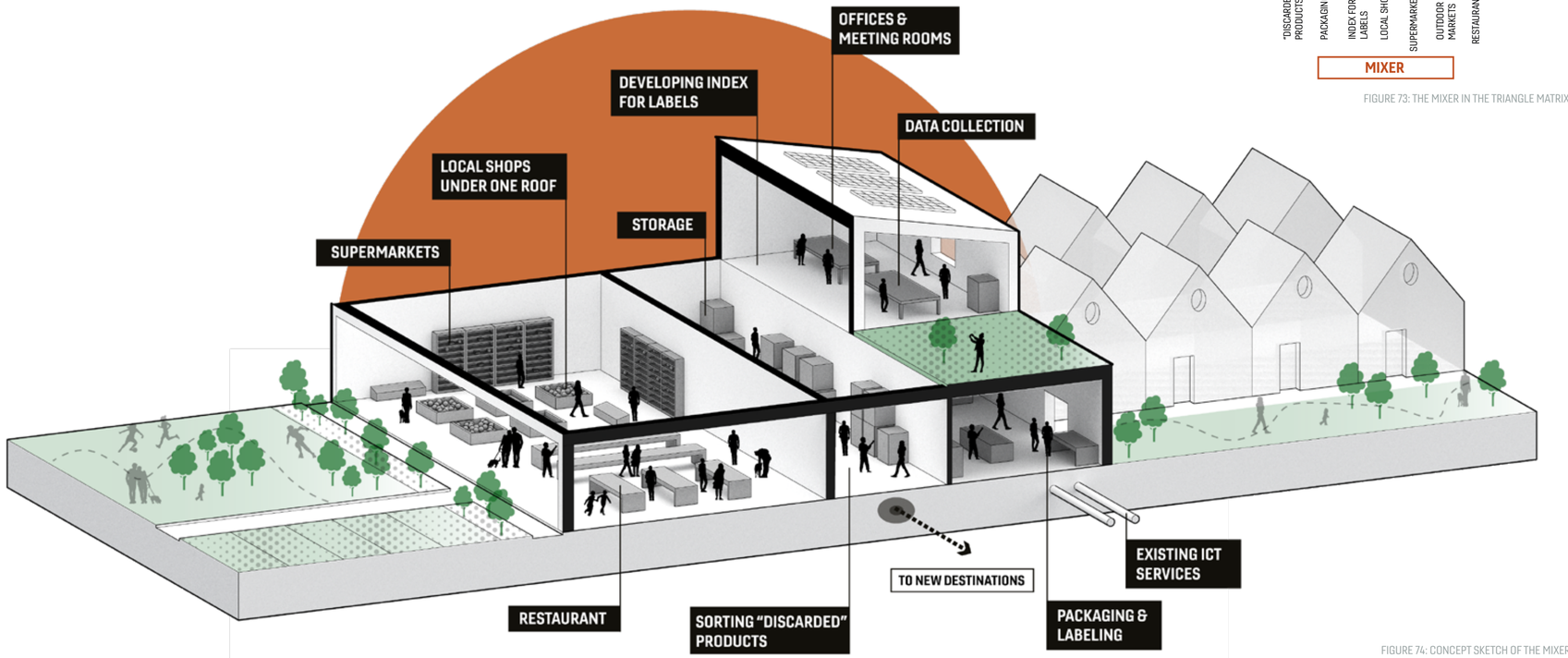


FIGURE 74: CONCEPT SKETCH OF THE MIXER

PILOT PROJECT

WESTLAND- THE HAGUE CLUSTER

The first implementation of the vision is through a pilot project at the junction where the sea of Westland glasshouses meets The Hague city. This strategic location is close to the University of Delft and is surrounded by mixed farms that rear cattle with glasshouses. The different landscape typologies that overlap here makes it interesting to see how knowledge networks might tie food spaces culturally.

A pilot project here is very context-specific to South Holland and can play an important role in informing other areas of the region. From the analysis on neighbourhood shops, it could be concluded that access to clusters of small shops is more scarce at the periphery of The Hague than in the city centre. Residents of the suburbs often rely on big supermarket chains. Working at this junction also opens an opportunity to tackle this challenge.

Finally, the border condition between the city and the experimental farming area is also one the most difficult conditions to work in within the area of South Holland. The hard edge of the production area with the street separating it from the outskirts of the city, provide little interaction between the producing and consuming. The local cluster of hubs will introduce new opportunities for interaction.

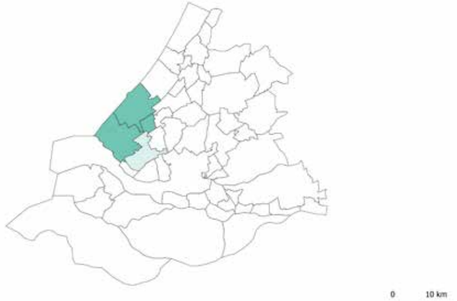


FIGURE 75: LOCATION OF THE PILOT PROJECT

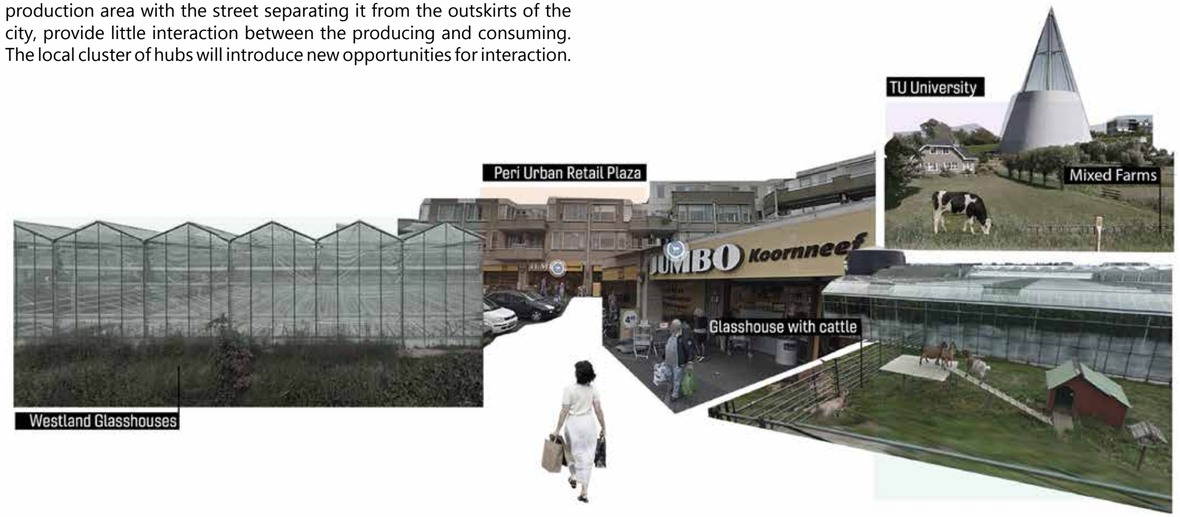


FIGURE 76: A NEW REALITY

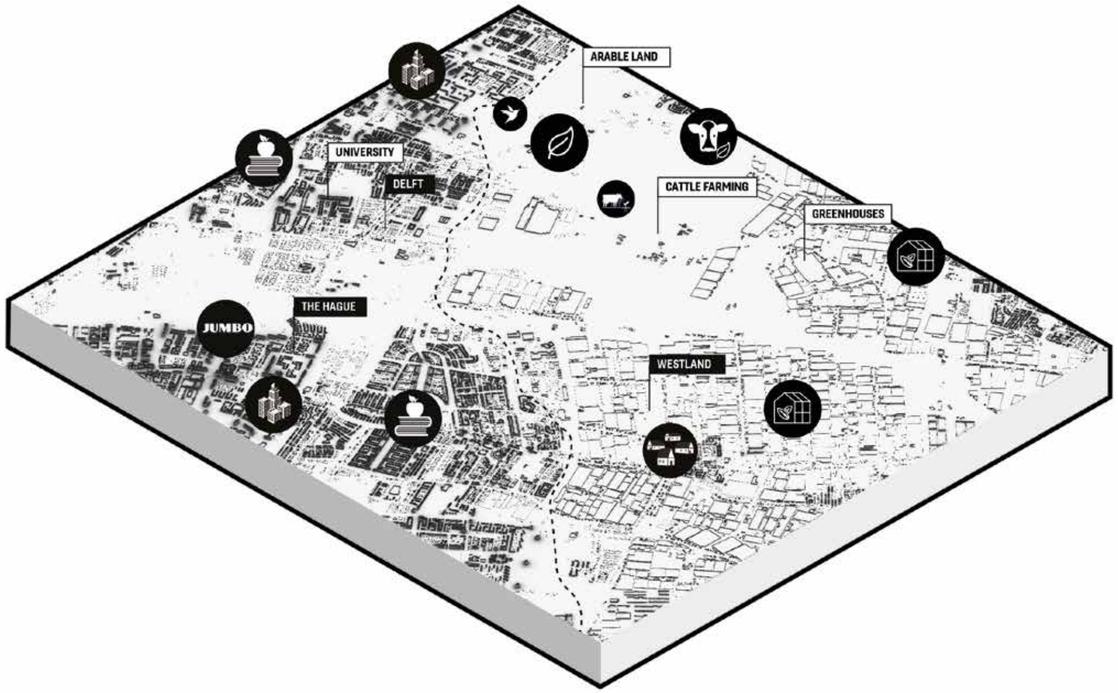


FIGURE 77: THE PILOT PROJECT

WATERINGEN

SHARING KNOWLEDGE NETWORK

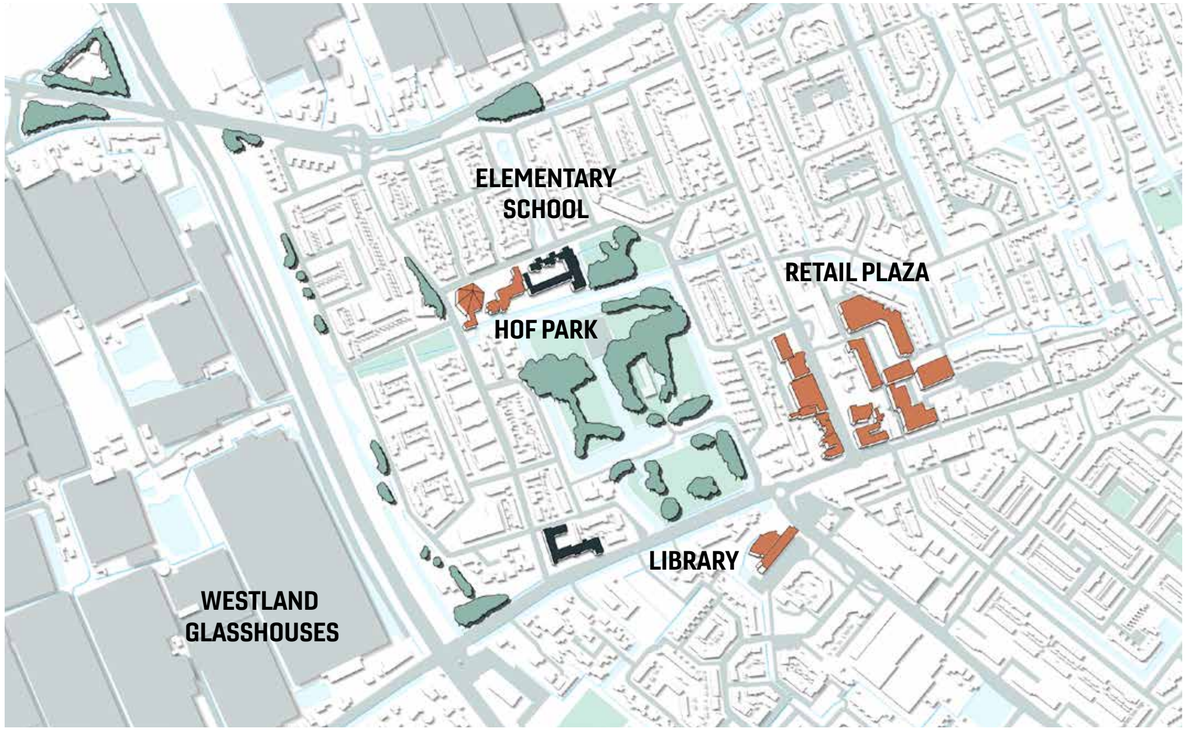


FIGURE 78: WATERINGEN

The area at the border of The Hague where glasshouses meet with the city is an ideal place to create a common ground for the producers, consumers, and retailers. The area has a housing typology and cultural demography that is different from the main areas of The Hague. The area of the strategy looks into the neighbourhood park in 't Hof that is surrounded by schools, libraries, and churches. The retail plaza also acts as an important node. This Hub further extends its connections to the glasshouses with field labs.

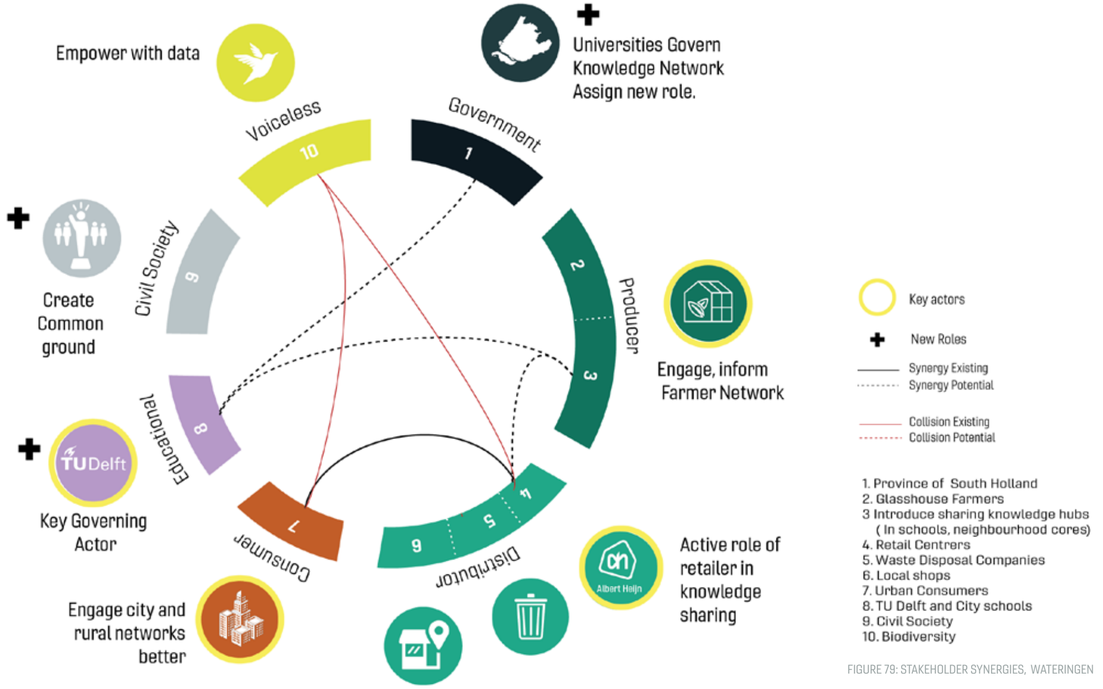


FIGURE 79: STAKEHOLDER SYNERGIES, WATERINGEN

Actors

The key actors in the Wateringen region are the residents of the Wateringen neighbourhood, producers living in the mixed farm and the Westland region nearby, and the retailers that bring these together. Specifically, this hub includes children, birds and biodiversity at the park and local shops and supermarket chains at the Retail Plaza. The retailers can play their part by organizing events to inform the consumer, keeping data transparent, and completing the data feedback loop.

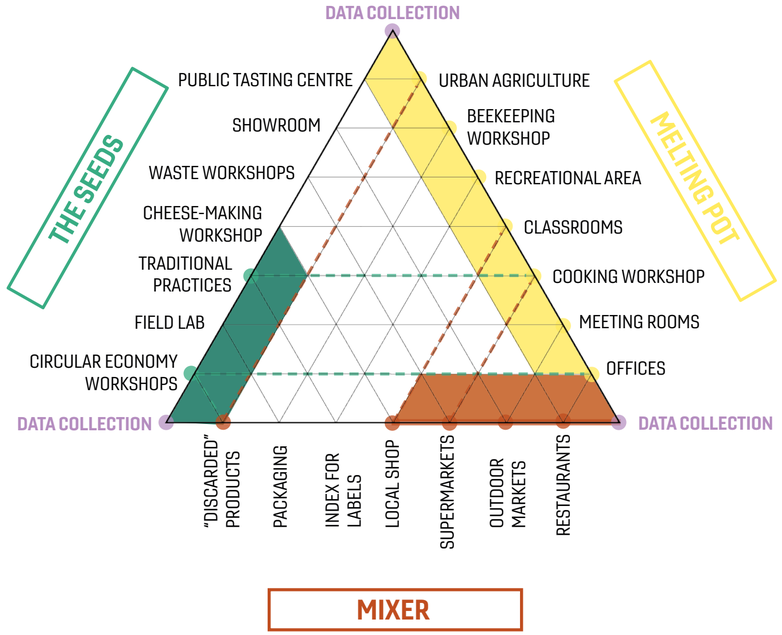


FIGURE 80

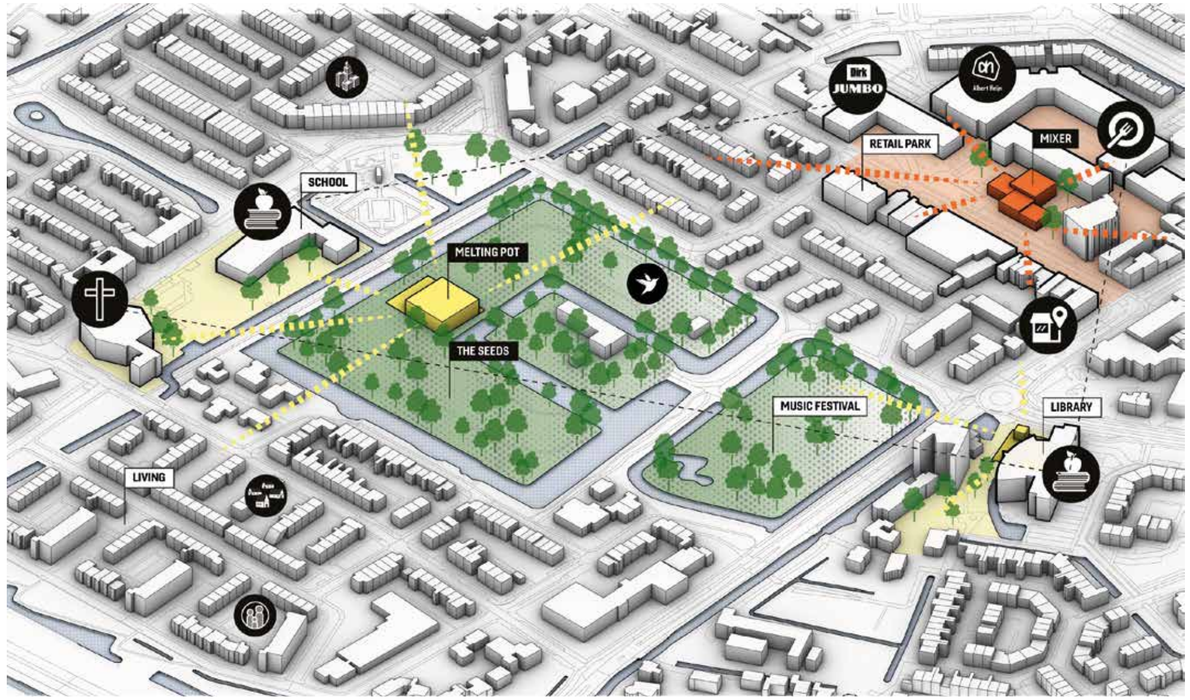


FIGURE 81: 3D SCHEME OF THE MELTING POTS IN WATERINGEN

Synergy and flows that can be created with the nodes. The new hubs are shown accordingly to the functions surrounding them. The new Melting Pot replaces the current parking lot located inside the park. With 't Hof Park being a focal point, the hubs can act as a meeting ground for the retail producers and citizens to interact through workshops together. The connection between the retail park and the library is established through overlapping functions and engagements.
In the park, there is also the Waterpop Festival - a music festival taking place every year in the summer. Working with the organisers and local producers, the food supply for the festival could be organised locally, as part of the promotion campaign.

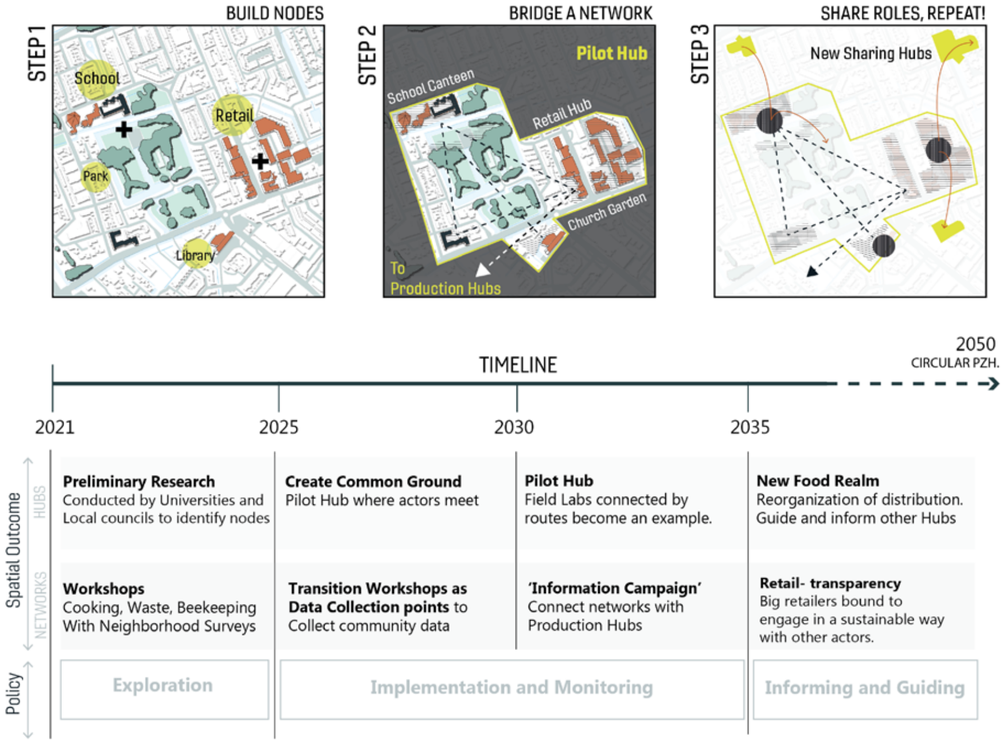


FIGURE 82: PHASING AND TIMELINE WATERINGEN

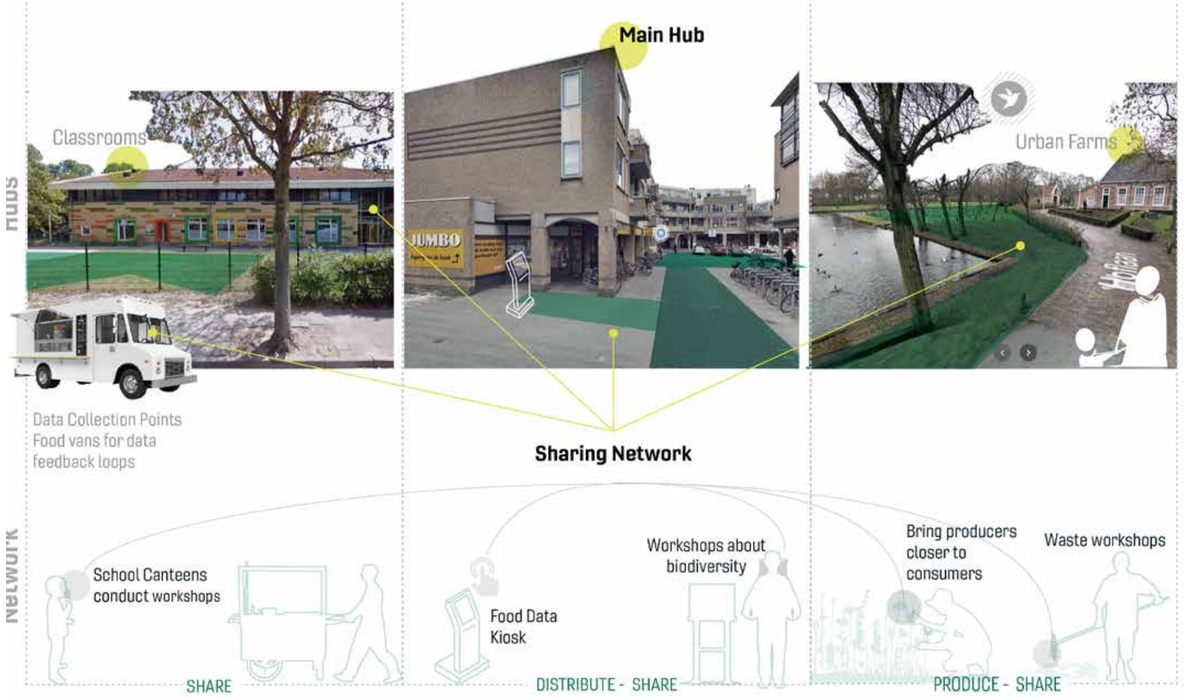


FIGURE 83: SPATIAL TRANSFORMATION WATERINGEN

Timeline

After first identifying the nodes where sharing networks meet, a Pilot Hub can be selected identifying its role and location. The choice comes from workshops and preliminary research conducted by the collaboration of universities, the neighbourhood residents and other actors involved. The final step is an emergence of new retail space and a better informed civil society and consumers that are working in synergy with producers. The new pilot Hub would serve as a model informing other hubs across the city. The timeline in figure 82 further elaborates the stages.

Spatial transformation

Networks and Hubs work in synergy connected to each other by the Information Campaign and data collection centres. These urge residents to be active participants in creating an informed food culture and space in this Peri-urban area.

WESTLAND

PRODUCTION HUB

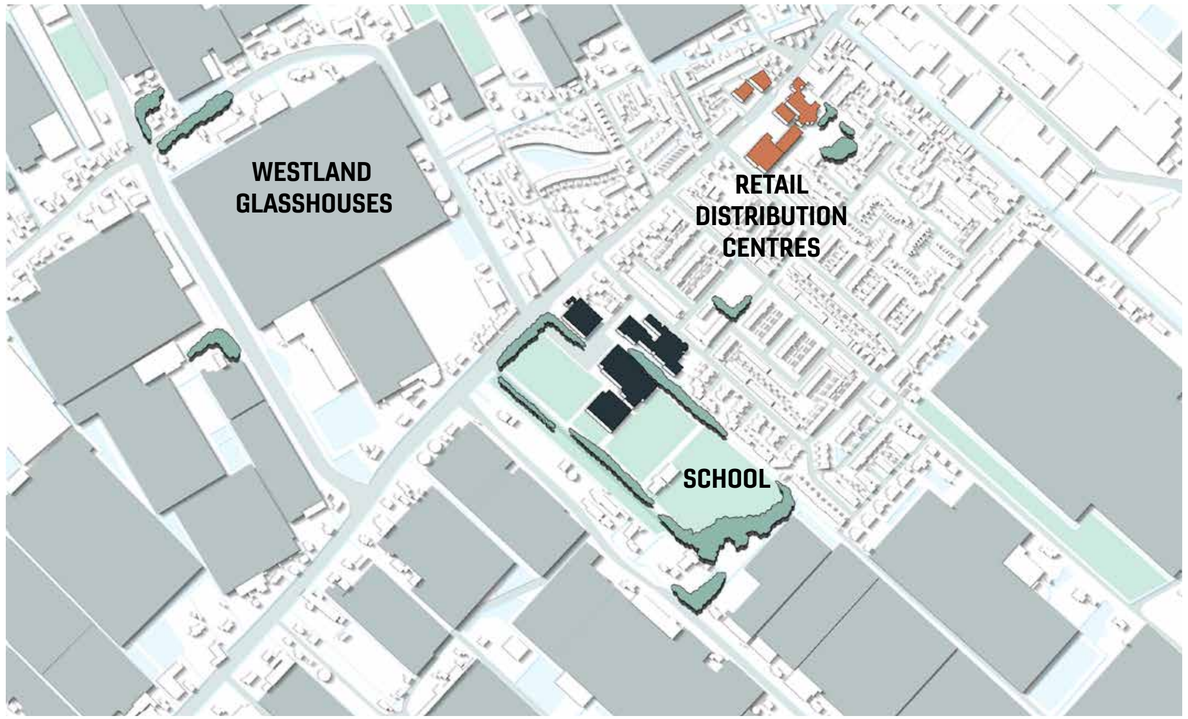


FIGURE 84: WESTLAND

The area of Westland has a specific landscape and functional typology of glasshouses for efficient agriculture production. These experiment labs are important data collection nodes in the knowledge network linked to the universities and distribution centres. However, these can also have a public element to them to conduct workshops or exhibitions. Office spaces for small startups can be provided to create a heterogeneous mix in a current monocultural landscape. These food startups can be involved in using waste flows from glasshouses as a resource for a new product. One such example is candlesticks from citrus rind.

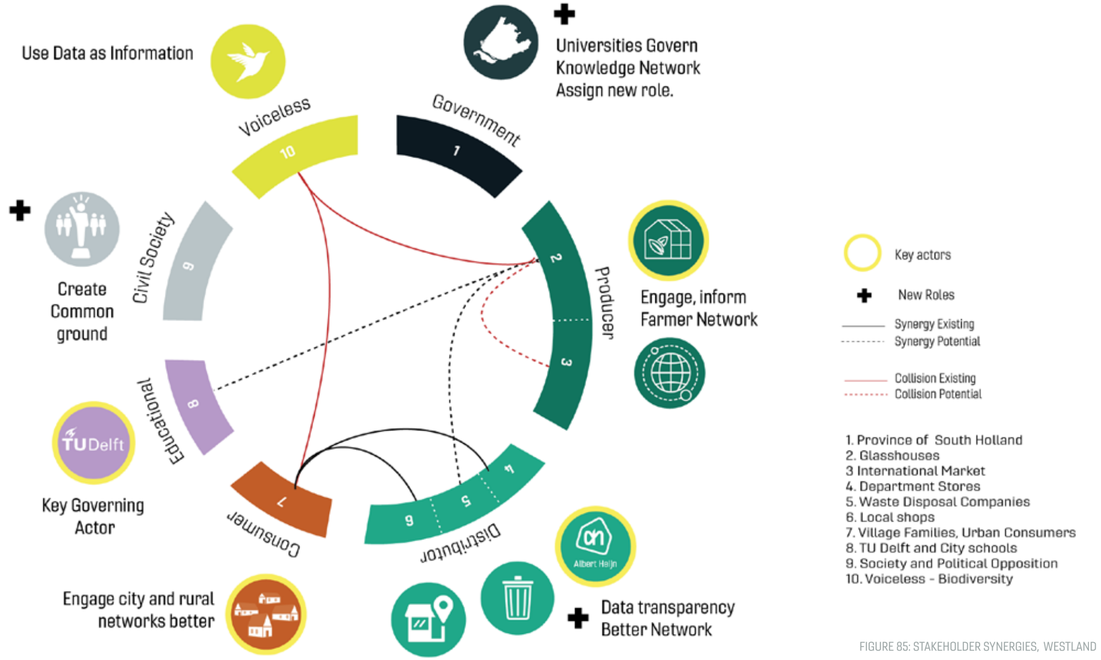


FIGURE 85: STAKEHOLDER SYNERGIES, WESTLAND

Actors

The key actors in the Westland region are the producers of Westland glasshouses, students and scientists working in field labs. The universities supervise this space and schools often hold excursions in field labs and event halls for workshops with producers. The retailer can too play their part here by organizing events to inform the consumer, keeping data transparent, and completing the data feedback loop.

A new actor from civil society is introduced in Westland to bridge the gap between farmers and producers. These are the small and medium businesses that work with waste circularity and food innovation. The distributors also would need to rethink the roles they play with the carbon footprint Tax. They must be kept in the loop as well.

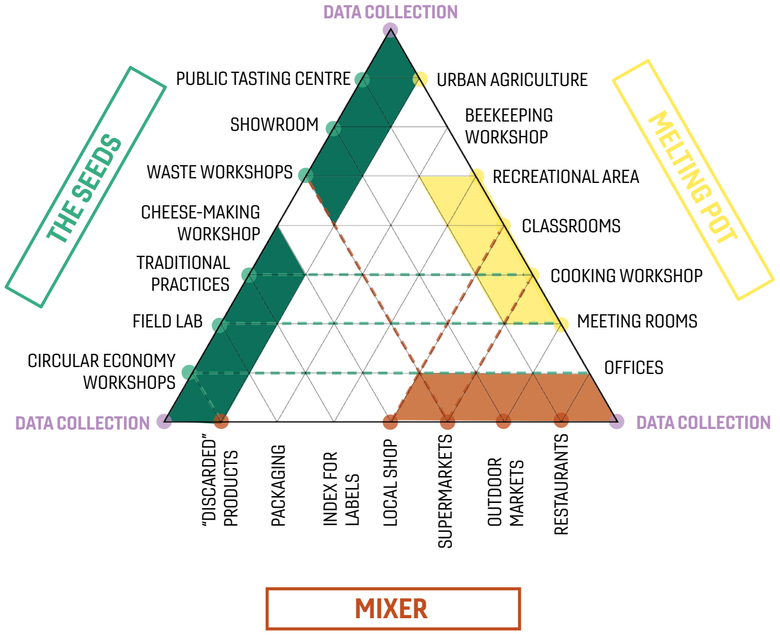


FIGURE 86

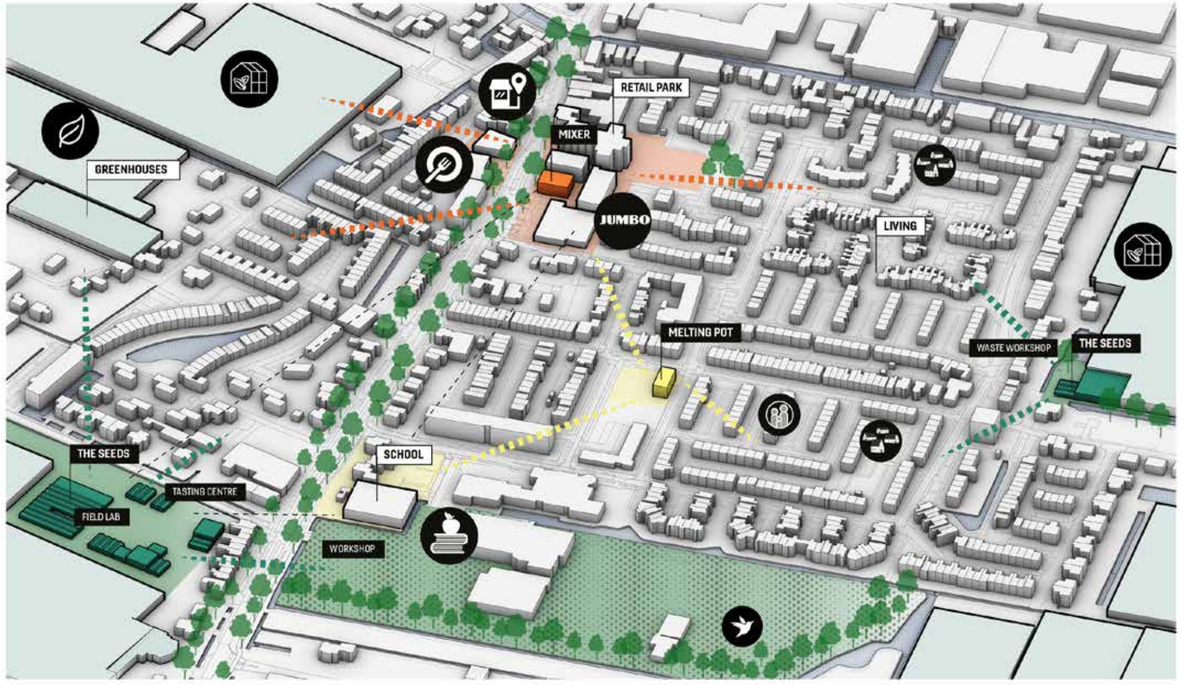


FIGURE 87: 3D SCHEME OF THE SEEDS IN WESTLAND

There are multiple synergies and flows that can be created with the nodes. The new hubs are shown accordingly to the functions surrounding them. The houses and residential buildings surrounded by large greenhouses, a retail park and a busy road are now engaged in the food cycle. The production area combined with the educational functions of the school creates a focal point for the area. The road becomes a green avenue connecting the Seeds and Melting Pot with the existing retail park, to create a full hub that is focused on production and experimentation. Additionally, the waste workshop can serve the producers, but also the residents and retailers nearby.

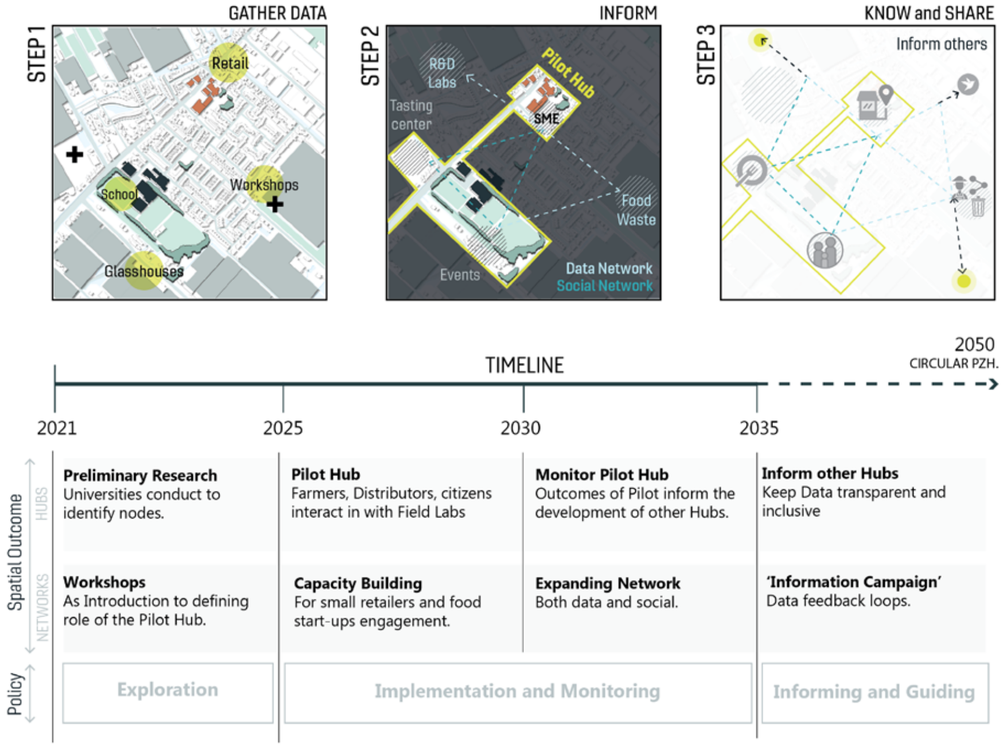


FIGURE 88: PHASING AND TIMELINE WESTLAND

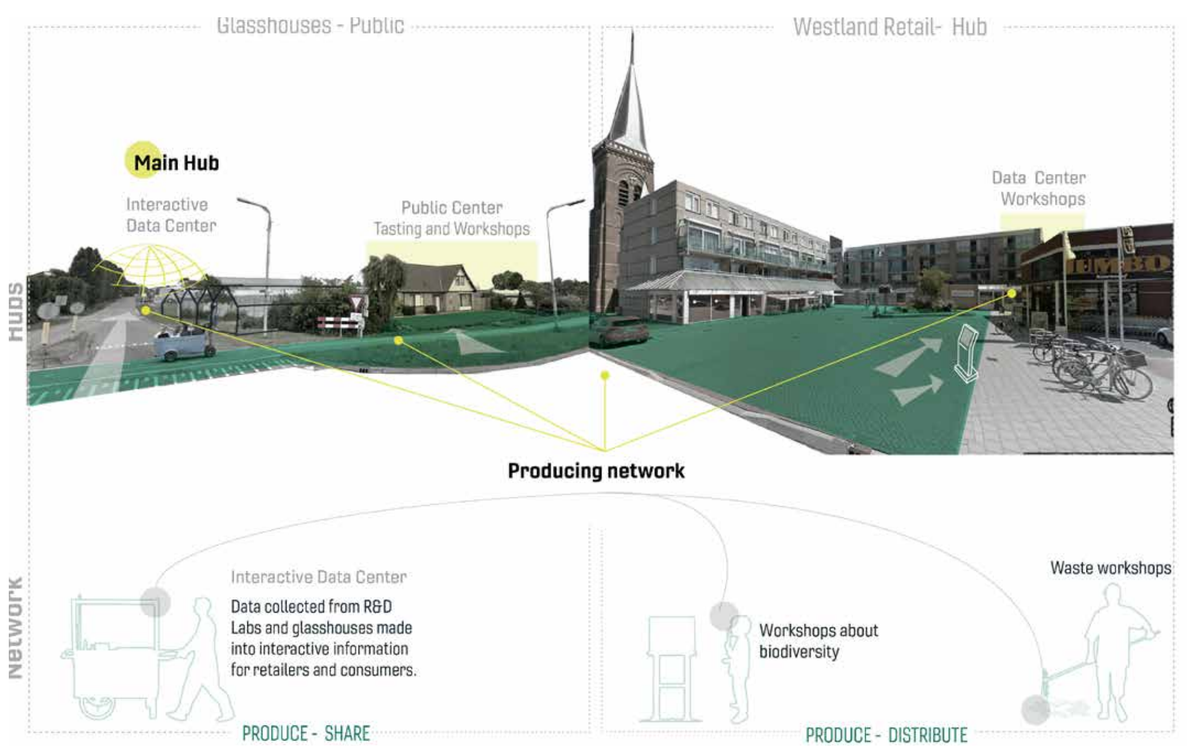


FIGURE 89: SPATIAL TRANSFORMATION WESTLAND

Timeline

Preliminary research for the identification of nodes and data and social networks help build a Pilot Hub. This Hub should be at a junction where R&D field labs and public event spaces meet. This step involves Capacity Building for the stakeholders involved. The next phase would be monitoring the Hub and informing other similar hubs. So the network expands further to create a robust experimental space in Westland. These then work with other hubs and networks in the surrounding cities to become resilient.

Spatial transformation

An interactive Data centre translates the innovative findings and advancements in technology for the public to understand and accept as part of food culture. Public tasting centres create an inviting space in a rather monotonous glasshouse landscape. Retailers conduct temporary information campaigns in the form of installations and workshops to inform both consumers, producers and emerging food start-ups.

‘T WOUDT

PRODUCTION HUB

FIGURE90: ‘T WOUDT

The area at the border of The Hague, ‘t Woudt comprises both glasshouses and cattle farms. This mixed typology is rare for this landscape that primarily is a monoculture of glasshouses. This makes it interesting to consider as part of the pilot project.

The village landscape has a church and some local shops as its neighbourhood core. There is potential for these elements to be used for the strategy. The clusters of small shops are an opportunity here for this strategic intervention. But here, the landscape has a rural undertone to it so it would be appropriate to combine these functions with recreation routes and biodiversity gardens. This part of the strategy is where we empower the voiceless - nature and cattle by recognizing them as key actors.

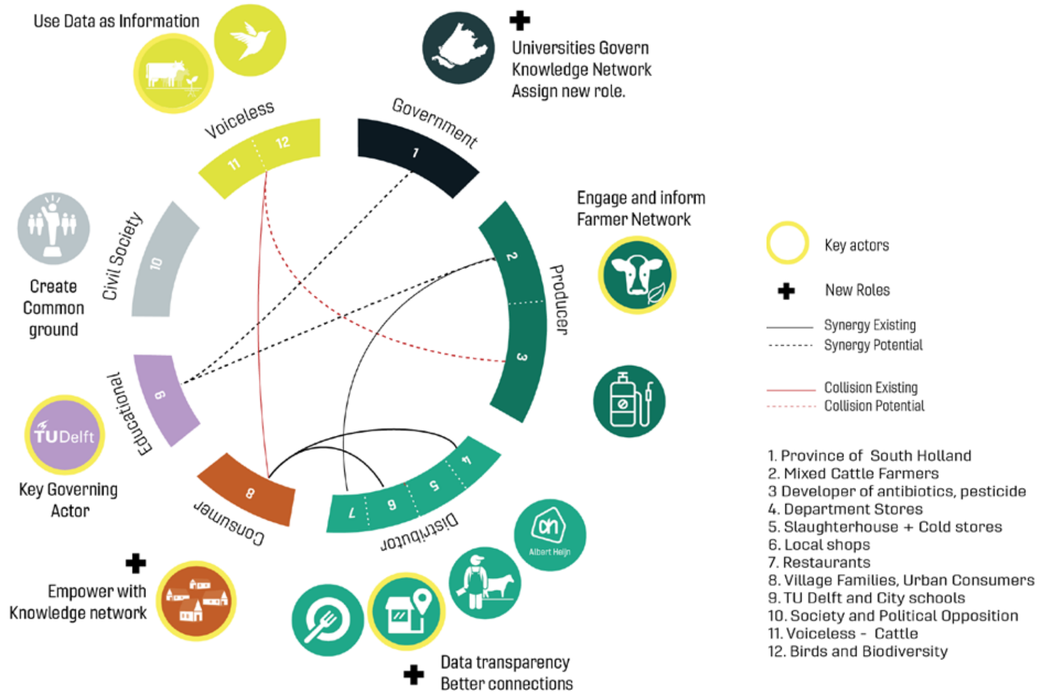


FIGURE 91: STAKEHOLDER SYNERGIES, ‘T WOUDT

Actors

The key actors here in this area are cattle farmers, some glasshouse farmers, and village residents. The voiceless, nature and cattle, are important bystanders to design with. The goal is to engage and inform small farmer networks here and have them collaborate with the glasshouse businesses. The farmers could conduct monthly ‘walk tours’ for city consumers and invite startups to invest in the space for a more circular model farm.

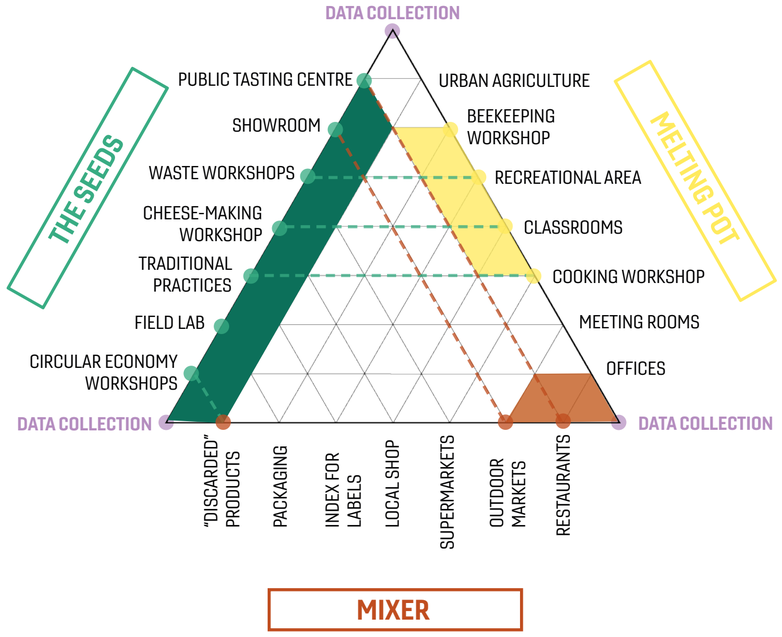


FIGURE 92

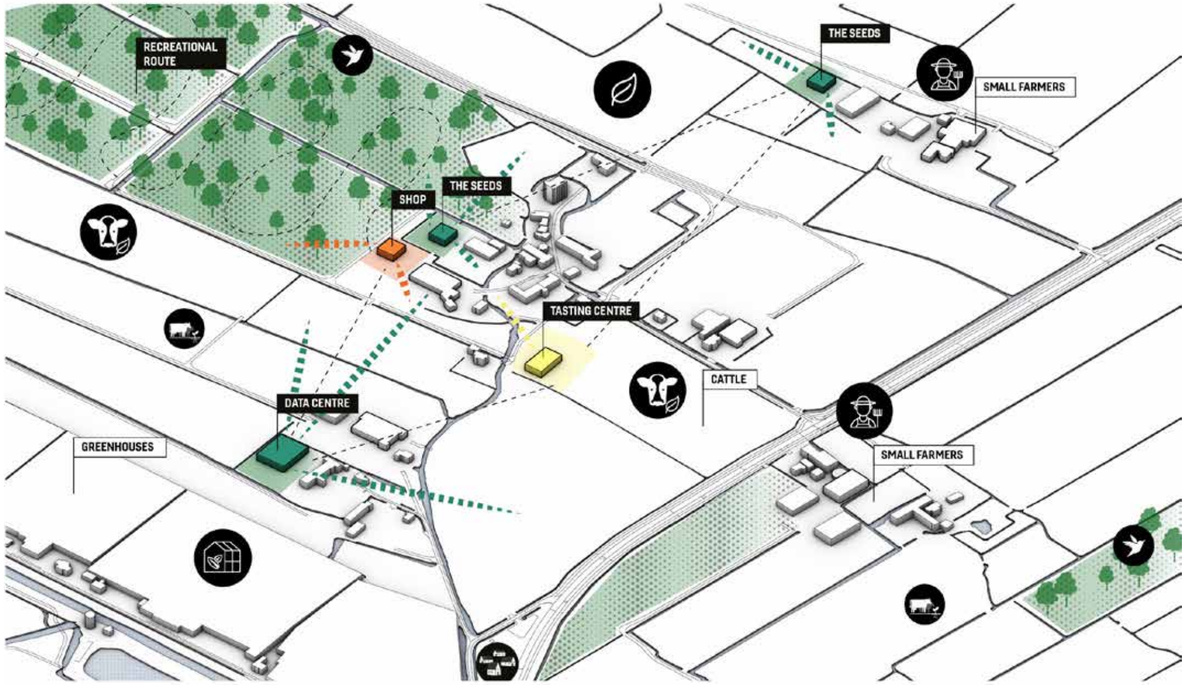


FIGURE 93: 3D SCHEME OF THE SEEDS IN 'T WOUDT

Synergy and flows

The new hubs are shown according to the functions surrounding them. A part of the cattle farm is replaced with a recreational route and more sustainable ways of farming. The connection to the farm from greenhouses and residential areas provides a new opportunity for the hub to grow. The data is collected and new ways of animal farming are investigated, while the local products are presented for tasting and sold at the local market, as part of the cluster. There are cheese-making workshops and waste workshops available for the farmers and the consumers.

Local shop clusters act as main hubs that connect the recreational route and data centres. The village farming network plays an important role as guardian of this area. In collaboration with 'Seeds' sites and food startups, the strategy works towards assembling a sustainable model farm that is completely circular. This farm can here onwards inform other areas to cause a ripple effect and transform the landscape.

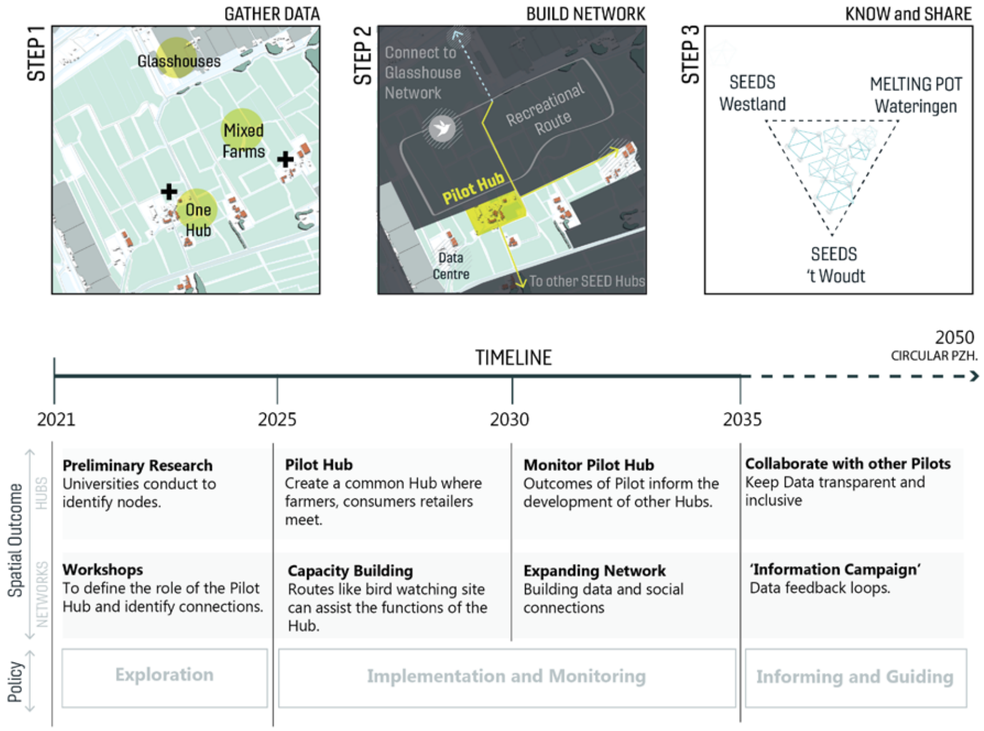


FIGURE 94: PHASING AND TIMELINE 'T WOUDT

Timeline

Similar to the timeline of the previous hubs, a Pilot hub needs to be identified in function and location. Workshops and information campaigns would help construct the necessary relationships to form data and social networks. The last step would be monitoring and other hubs. This would require closing all ends with other parts of the strategy to become a comprehensive whole. The successes and failures of the project can be tested with the stress test mentioned in the following chapter. Yearly journals can help the information campaign continue in assisting the networks till 2050.

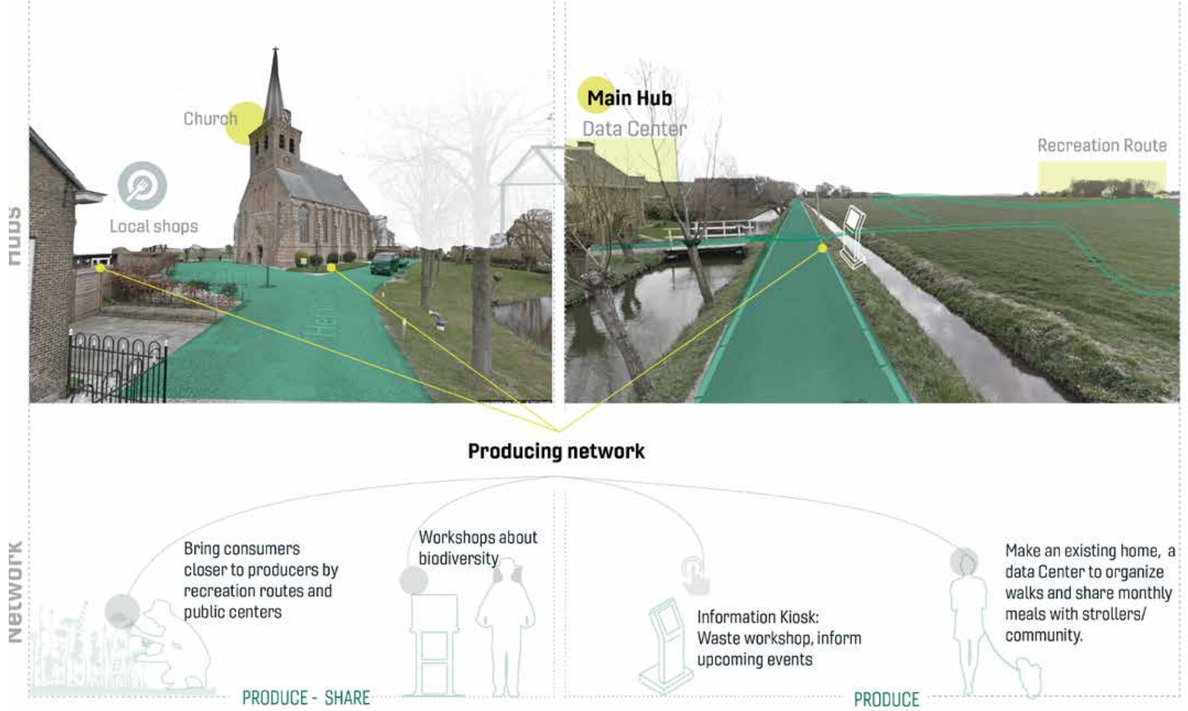


FIGURE 95: SPATIAL TRANSFORMATION 'T WOUDT

Spatial transformation

The rural element of the landscape is kept intact only strengthened with rigorous data and social networks. The clusters of small shops and small food companies make this a vibrant space for all.

SPATIAL OUTCOMES

The previous chapters explained the direct interventions that were done in the region. However, these interferences will lead to less direct outcomes in the landscape.

The polders become a more natural area, in which cows can graze and roam freely. People are allowed in the fields and can use the paths as a recreational area. This limits the pressure on national parks and beaches as more people have natural areas closer to home. Furthermore, the areas around the greenhouses will be transformed into an animal-friendly zone so cattle can graze there. It can also be included as a recreational path for people to walk. Lastly, areas in the city will be used in a more multi-functional way as the hubs provide space for more activities. Permanent urban farming and farmer' s markets could be implemented on squares and near churches and schools. As a result, cities will also become greener and more sustainable.

FIGURE 96: SPATIAL OUTCOME RURAL AREA

FIGURE 97: SPATIAL OUTCOME PERI-URBAN AREA

FIGURE 98: SPATIAL OUTCOME URBAN AREA

STRESS TEST 2050

ASSESSMENT

To test if the Knowledge Network is a resilient strategy or not, the same stress test proposed to evaluate the extreme scenarios in the analysis chapter was done. The test has been updated and further developed to include additional stresses and shocks that are already in place or have a high probability of developing at least one time over the next thirty years. The evaluation works in the same way as in the chapter discussing the analysis: the strategy is given a maximum value of three positive or negative scoring points for each character of resilience (robustness, adaptivity and transformability).

In order to test the strategy, three shocks and stresses were chosen, including the ones used to test the extreme scenarios. In this way, a comparison can be made between them.
The chosen stresses are climate change, change in the diet of consumers, and land competition while the shocks are the outbreak of diseases, extreme weather conditions, and drastic policy changes.
The choice in shocks and stresses touch on different topics (environmental, social, and political) as the stress test needs to be as extensive as possible. The test can be developed further in the future to test resilience against shock and stresses we cannot foresee.

The outcome of the stress test is positive and proves that the strategy is resilient enough to the stresses and shocks that have been tested. By analysing the result it is clear that it has to rely mainly on the attributes of robustness and adaptivity, as they score very high. However, there is still space for improvement when it comes to transformability. Oftentimes, the perfect score is unreachable because a transformable strategy has to be highly flexible and by being so it might lose some points in terms of robustness and the other way around. This is the reason that a feedback loop plays such an important role.

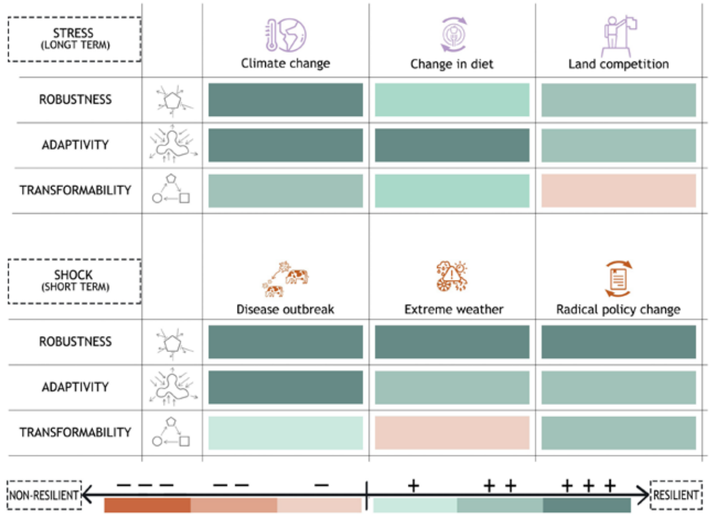


FIGURE 99: CONCLUSION STRESS TEST 2050

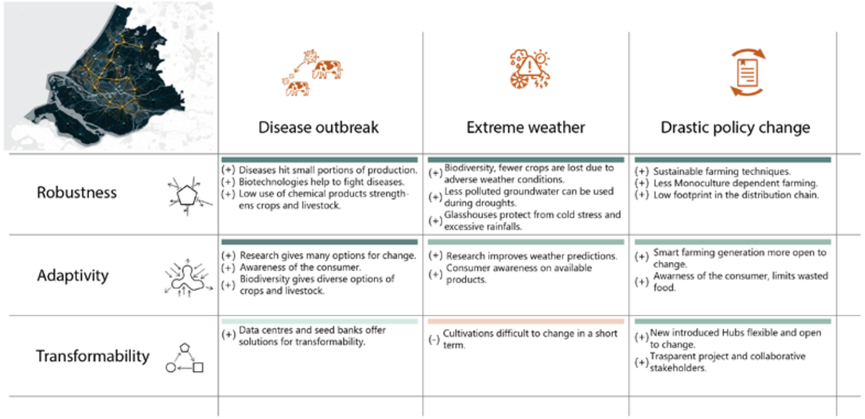


FIGURE 100: SHOCKS TEST 2050

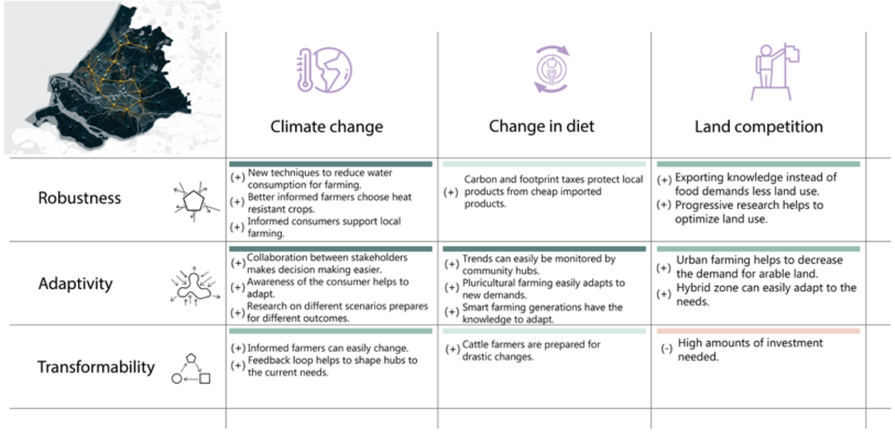


FIGURE 101: STRESSES TEST 2050

FEEDBACK LOOP

As it is impossible to structure a strategy that will work perfectly for the next thirty years, the realisation of the vision by 2050 is not the ultimate goal. The true goal is to start at a critical point, in this case from the pilot project, to monitor it. By observing what works and what not, the strategy concept can be continuously redeveloped over the years by incorporating the collected feedback. This is why data collection is so important for the strategic hubs: data on consumer, producer, and distributor patterns is constantly collected, compared, and examined. Thanks to this, the system can be ever-changing in order to reach its full potential.

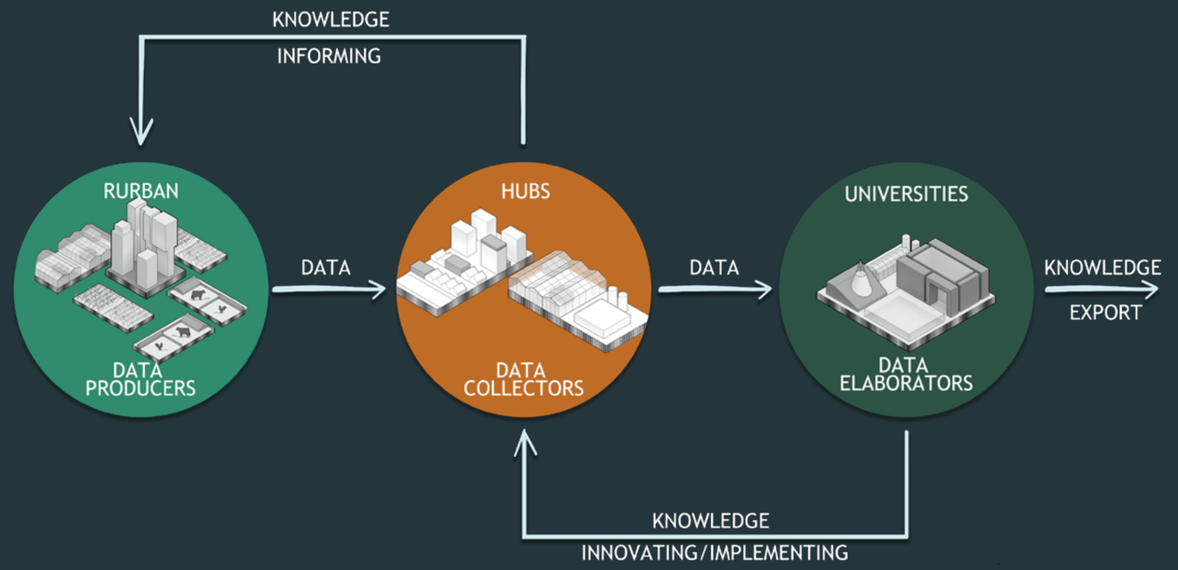


FIGURE 102: FEEDBACK LOOP

DISCUSSION & CONCLUSION

CONCLUSION

This report introduces the concept of resilience in the agrifood sector by creating an extensive network of theoretical and practical expertise. The need for a resilient system was based on the analysis of food production, distribution, and consumption in South Holland. Throughout the analysis, various challenges were discovered which may make the transition to a circular economy tough. Resilience was introduced because whereas it is impossible to create a perfect system, it is possible to make a system that can withstand all challenges. Through capabilities of robustness, adaptability, and transformability it is possible to create such a system.

To achieve this, this project proposes a vision for a knowledge network created in the province of South Holland. It calls for an integrated approach to knowledge collection, distribution, and implementation. The spatial outcomes are three types of hubs that introduce knowledge on a more local scale than higher education does currently. The hubs, the Seeds, the Melting Pot, and the Mixer, each have their own function. The Seeds are called into life to germinate knowledge and food products. The Melting Pot embodies the common ground where actors can meet and share. The Mixers are the in-between spaces that are used for distribution processes. Through a pilot project in the Wateringen-The Hague area, a possible configuration and functioning of those hubs have been shown.

Throughout the years, the knowledge hubs will be implemented on a wide scale and a high-functioning network is created. This facilitates producers, distributors, and consumers. Thanks to the network, there will be a constant exchange of expertise. This will ensure feedback loops throughout all layers of the knowledge production. Through this constant adaptation and transformation by means of the acquired knowledge, a resilient agri-food system can be achieved in South Holland. Because the system will then be able to withstand the shocks and stresses that are encountered, a more comfortable transition to a circular agri-food sector is ensured.

DISCUSSION

The project's main goal to create a resilient food system to operate under shocks and stresses has been proven successful. The subgoals that were formulated at the beginning of the vision are closely connected to the Sustainable Development Goals of the United Nation in the way they were defined in 2015. Integrative approaches were taken to connect the goals through different scales and to different actors. This is important, as the project should be all-encompassing. Knowledge and involvement of all actors into a common goal, as well as providing an overarching coordinating institutionalisation of knowledge sharing in a specific sector can create a resilient society and places that are transformable, adaptable, and robust.

This can be taken in any context, as knowledge exists everywhere. However, not all places can have as much technology and as many knowledge institutions that are as cooperative and interested as they are in South Holland. This coordination requires a lot of commitment from all actors, as well as a very strong relationship between different landscapes, and their close physical proximity.

The strategy addresses circularity by the fundamental aspect of change and society's resistance to adopt new systems unless compelled to. We sought to find ways for communities, farmers, consumers, and retailers to adapt gradually to more sustainable innovative ways to close the food chains. Rather than saying much about what it is they must do we create a platform for how they could achieve more circularity. By providing tools of stress tests and data feedback loops they can self assess.

The risk, however, is that certain parts of the vision must be, as planning instruments call them, 'hard steering'. We believe a balance with participation would need some direction in the form of concrete decisions in order to make the vision stick. Even though these instruments need to be implemented, it is hard to predict how people will perceive them.

Recommendations

This project could not tackle all issues that are forthcoming in the agri-food sector in South Holland. To show we are aware of that, a few recommendations for future projects have been made.

Also aimed to get a grip on the issue of spatial justice, the strategy implements participatory planning and provides inclusive spaces for different actors from the region to interact. However, it is hard to do justice to the whole province because the area is so varied. There are three main types of agriculture, but throughout the province, they are mixed to create diverse landscapes. This is exactly what makes the province of South Holland but this is also why it makes it harder to implement the hubs. Because it is impossible to create a blueprint that fits all locations, every potential hub should be thoroughly investigated to do justice to the landscape it is in and the actors it will serve. The strategy is therefore not a laid out plan for implementation but an idea on how to tackle the process.

Furthermore, this project focuses mostly on knowledge. Because of this focus, flows in the system were mostly left aside. Especially for the transition to a circular economy, it is of pivotal importance to also look closely at resource flows in the agri-food sector. These flows include an input for dairy, meat and vegetables, such as water, feed, and soil. It also included packaging, fuel for trucks, and waste flows at the consumer's end. To fully transition to a circular economy, all flows must be transferred back into the system to be used in a high-quality way. For instance, food waste can be used as animal feed, and manure can help fertilise crops. Knowledge can help to achieve smart ways to organise that.

With regards to waste flows, it is also important to look at relationships between sectors. These connections can help close loops that cannot be closed within one sector. The next step can be to build circularity and resilience across sectors. It is important to identify how these different function clusters can help each other be more circular and create synergy would be the way forward, especially for the stakeholders that are present within the sphere of agriculture and food.
Lastly, there should be a large focus on the value of both theoretical and practical knowledge to include all actors. Throughout the vision, it can sometimes seem as if universities are the predominant area of focus. However, this does not create a just system. In the vision, all forms of knowledge are therefore of equal importance and this could be made more explicit.

ETHICAL REFLECTION

In the roles of regional designers and planners, we found ourselves often unsure of the right decisions in the diverse context of South Holland. The scale of intervention is within the region border but contains the influences needed to be considered on a national, and even global level. The diverse groups involved in the food cycle have different backgrounds, power, interest, profit, and even spatial conditions associated with them. Tying the loose ends of the linear consumption and production patterns into a circular economy requires careful consideration of every single aspect of this complexity.

Facing (spatial) social injustices
We live in a world where social injustice is still strongly visible in the cities and areas surrounding them. People are still dependent on their ethnicity, gender, sexuality, income, or where they live for true equity. Nature and animals rely fully on human action to be protected and is often neglected.

"Recipe for Resilience" is an attempt on making everyone involved in the vision through participatory practices, and building a knowledge network. The constant feedback loop, as well as ensuring that everyone's input of data and knowledge is considered, supports the aim to improve spatial justice in South Holland. However, while new implementations are brought to life, another level of care to detail needs to be applied. For example, if a new type of protein is introduced to the market, there are some things to be considered that are not obvious at first. The affordability of such a new product is key, but gender equality also needs to be considered. According to a report released by The Netherlands Institute for Social Research (Sociaal en Cultureel Planbureau) women still do the majority - an average of 18 hours a week - of household work. Even though women work often in paid employment more and more often, the responsibility of the family, especially with children, is largely taken by women (Roeters, 2018). Therefore, a consideration of preparation time and effort needs to take place. If a product requires additional effort to prepare the same dishes, it is not a solution that will be successful, or in case it does help the environment it will increase gender inequalities even so slightly. The cooking workshops and classes proposed in our strategy ensure that these issues are taken into account since the knowledge is gained from traditional cooking practices, as well as new skills that can be acquired by consumers to ensure the involvement of everyone in everyday tasks.

Power-knowledge dilemma
As coined by Michel Foucault the term power-knowledge presents an object or source of information as a "node within a network" (Rocco, 2021). However, in neo-liberal reality, the term can be criticised for its exclusivity. Since knowledge and power are related, sharing knowledge through production processes, distribution, and consumption is a good step to give power to the stakeholders who are struggling. This empowerment through knowledge, as we learn from this project, is the most reliable way to build resilient systems and societies. Thanks to the ongoing exchange of information, a support system can be built and solutions can be found for arising future shocks and stresses while considering all possible angles and backgrounds.

However, considering the vast impact of globalisation on trade, economy and products, the negative outcomes of the knowledge network need to be considered. As South Holland, and the Netherlands, start to produce and export knowledge, instead of the products, the region becomes very powerful. Other countries can become reliant on the knowledge provided by the Netherlands, which makes them vulnerable if the knowledge is not shared in a sustainable and fair manner. The risk of "knowledge monopoly" is avoidable if other world organisations get involved (UNICEF, WHO etc.) and the knowledge is distributed fairly.

GROUP REFLECTION

A group of quite different backgrounds that could learn a lot from each other. Learning about theories and concepts but also learning how to work together on such a big project. Allowing each other to rest and not get burned out, to treat each other with compassion during some hard times. But also motivating and holding each other accountable to work towards the best possible project.

The butterfly effect
"The things that really change the world, according to Chaos theory, are the tiny things. A butterfly flaps its wings in the Amazonian jungle, and subsequently a storm ravages half of Europe."(Neil Gaiman)
That is why we think that a shift toward a more sustainable agri-food sector can happen only if we take into account also the small things on a top-down process, like the flaps of the butterfly, a higher awareness of the consumer on food consumption can break the chain of linear economy. Through capacity building and rather small and realizable interventions, we aim to develop a society that can maintain a healthy relationship with food that it eats and the places it belongs to.

But the vastness of the information in regional planning design and research projects collides with the infinity of digital space. To come to conclusions that are coherent and address the identified key issues is challenging and nearly impossible.

There will always be ideas, problems, issues that will stay left out. That is why we decided that, rather than giving concrete answers to stakeholders, we want to create a resilience recipe. We strengthen societal networks and give them a space to interact to create new solutions. It's a balance of giving definite direction but not too much so that the system is still adaptive and able to respond to any kind of caused effect.

Going back to the butterfly metaphor, a resilient system is not able to stop the butterfly from flapping its wings and so causing a storm on a larger scale, on the other hand, a resilient system is able to recognize where the storm will unleash its full potential and prepare for it.

Busy with the process rather than the solution
In the dynamics of group projects, working on abstract and often theoretical concepts is challenging, especially in an online environment. Having not met as a group in person, and conducting all the research, discussions, problem-solving sessions digitally, we all learnt something new about the capabilities to find solutions and defining new ways of communication depending on the circumstances.

In total, we completed around a hundred online meetings, exchanged around 2GB worth of WhatsApp messages, used 5GB of Google drive, and created just about 30 digital meters of pages pinned up on the Miro board. A lot of work has been produced and lost in the amount of information, but we learned to keep focused, evewn when the digital infinity of space seems overwhelming.

Regional Design is almost like playing God! One is to design for almost a generation ahead, a future and its denizens you haven't met, on an extensive scale that readily loses sight of the human. That makes it intimidating for me and I was skeptical of the abstract language used in this field. The language of both words and visuals painted a fantastical future that made the goals seem too ambitious. It would need imagination and the ability to listen to begin to piece together important ingredients.

To predict how territories may change and influence one another and steer the course of a future is a challenging yet necessary task. Such decisions would require collective action in the wake of climate stress. Collective decision-making then would require some leadership for steering and supervising.

Going over policy documents and research papers I realize there exists among academia an attempt to bridge the divide between formal and informal institutions. To communicate policies to investors and the public in a comprehensible manner easy to read diagrams are used. Sometimes pilot initiatives are also mentioned. But what seemed to be missing in the current narrative were the common grounds for social networks to interact and hard steering planning measures to supervise such interactions in the real world. It seemed to me that for a vision to actualize we would need "vision-masters" all over the region making sure each plays their part. Specifically, as circularity relies on a system that closes all loops, every actor has an important role to play and must be connected.

This process approach demanded a platform where actors could govern themselves. This also required a new set of rules to conform to and tests to measure the levels of success and failure for each endeavour. Our vision aims to realize this by implementing a resilient system of information loop. For hard steering Universities govern along with local farmer -retailer-consumer networks. This puts us in the role of process planning with strategic planning being an important tool as well.

Embracing circularity as part of the food culture, then becomes vital in order to adopt the concept in shared interpretations. So an interesting question for me as a way forward would be 'How can Circularity be integrated with cultural understandings of food?' It is more specific and built upon our research question but one that would ease implementation of new practices. What are the ways in which culture of food interprets society's goals and creates shared practices.
To conclude regional design needs to be a process rather than an answer that is rigid. It needs to accommodate for shocks and stresses just like our vision and have plenty of wiggle room. Some elements of it should be certain and compulsory like in our case the SDG Goals and Vision principles. As I've felt the ideals of sustainability and circularity far from reality, I learn that it's in the process of working towards them that we see some tangible change. So tying these to spaces we see in urban reality became critical for me. A limitation of our project I think would be while we encourage democratic participation and spatial justice we miss the digital space which is in many ways is more democratic and participatory. Resilience in an online world would be an interesting tangent to explore.

In this project we designed a strategy to make the agri-food sector in South Holland more resilient. After an extensive analysis of the current situation and the oncoming challenges, it became apparent to us that achieving the perfect system would never be possible. Therefore, we wanted to instead focus on a system that could adapt to the challenges. This brought us to adopt resilience as the main goal. Resilience is extremely complicated both in theory and in practice. To get a proper understanding of resilience, and especially its spatial implications, we read an extensive amount of literature to form our own definitions for this project. It was a considerable task as literature about resilience can be quite theoretical, even more so when applying it on a regional scale. It required a lot of conceptual thinking and constant restructuring of our thoughts to get to a clear narrative. Communication within the team became even more important to ensure that everyone was on the same page even though it was entirely online. This not only taught us how to apply theoretical concepts on a large scale, but also how to clearly communicate them.

To apply resilience in the region of South Holland, we looked at its opportunities. The high amount of knowledge and innovation in the agricultural sector quickly became apparent. Therefore, we wanted to strengthen this by designing an extensive knowledge network, where knowledge is not only created but also shared. Producers, consumers, and distributors need to work together to create a real shift in the current patterns. It is considered that all actors have different kinds of knowledge that can reinforce each other. We want to encourage both bottom-up initiatives and top-down interventions to achieve a resilient agri-food system by 2050. It is imperative to involve all stakeholders in the transition to a new system to ensure its success. Accordingly, the stakeholders hold a lot of weight in the project. This reflects the methodology course during which we were confronted with the power we have as designers and the consequences of our designs on different actors. This urged us to look critically at our own role in the process all through the project.

However, it is a big step to go from an abstract conceptual regional design to specific spatial interventions. Regional scale design is complex, layered and can be very visionary. This scale intimidated me as I have never encountered it much before. How does one ever feel qualified to design on such a large scale and, often, over such a long period of time? Nevertheless, I enjoyed working with the complex theoretical themes. It challenged me to get out of my comfort zone as a designer; this was reinforced by the highly motivated people in my team. This made it possible to undertake the challenge of translating our conceptual vision to a strategy. A strategy that considered many different actors, scales, and approaches. Considering that to exchange knowledge it is crucial that the different actors can interact, the need for physical spaces became apparent. We chose to create strategic hubs with different components. This way, it can be adapted to the needs and wishes of every location. It also makes it possible for the hubs to evolve over time, contributing to their long-term role.

In the end, the essence of this project is flexibility. It is important that regional design can adapt to different scales, to different landscapes and different trends. But it is also important that we are flexible as designers: to be eager to learn new things, to experiment but also to stay critical of ourselves. Because while the perfect design is not possible, you can always try your best.

During this subject, we designed a vision for the province of South Holland, accompanied by a strategic project as well as spatial outcomes. However easy this might seem, we had a long and complicated way of getting there. The first weeks consisted of an extensive analysis of the status quo and possible challenges. Soon, the proliferation of possible challenges got out of hand. It was then that we decided that there is no such thing as a perfect solution, as it is too hard to predict what the future will hold. The idea to use resilience as a solution was then adopted, but needed extensive research. The concept of resilience is widespread throughout literature, but we needed to create our own definitions of resilience and therefore we had to dig through a lot of that literature. This required a lot of time and effort, as well as a continuous reshuffling of our thoughts. However, all this work was not for nothing, as the conceptual framework that we have built around resilience did not only help us get through this project, it will also aid us throughout our whole career as an urban planner.

At the beginning of the course, I was curious to see how an urban planner might find a role in such a complicated subject. Over the course of this subject, I have gotten a lot more excited about being a spatial planner. Not only are designers the people that are able to make ideas visual, but it is also exactly because of this that designers can work through various scales and connect stakeholders. Spatial planners, in my opinion, are crucial in the process of translating the ideas that are floating around into concrete images. These images can then be used to enhance the communication between different stakeholders. In the case of our project, these were consumers, producers, distributors, and governments. Spatial planners can, in a sense, make all the actors speak the same language and bring a project to a new level.

In order to do so, a well-established knowledge about ethics is necessary. A designer should go into the project with basic knowledge about power relations between stakeholders as well as social and spatial injustice that arises in the system. The course and booklet serie of Roberto Rocco and Marcin Dabrowski did not just make me realize that, it also taught me a basic understanding of ethics as well as a way to communicate more effectively about issues relating to that.

Not only was I interested in experiencing how a designing regional would be executed, but I was also curious to see how this extreme group project would be carried out in a virtual world. This was not as difficult this time as in previous projects. During the beginning of the course, there were extensive calls, with long conversations about the vision. It was not for a lack of ideas but our vision came together very slowly because as a group we kept each other on our toes, discussing every move extensively. Because of this, the first part of the course sometimes felt exhaustive and unproductive. On the other hand, these long discussions got us on the same page as a group and then when we started the strategy, we got a clearer head and started to trust each other with doing separate tasks. It was during that last part that everyone's qualities showed so we could build upon them. This made the sprint towards the end a lot more bearable.

What I think is intriguing, is that even though none of us is yet professional urban or regional planners, we managed to pull off the creation of a vision and a strategy. It is great to see how five different people with a similar background have such varied interests and qualities. Even though all of us have lost our train of thought, individually as well as collectively, and we were all dragged out of our comfort zone more than once, we should never underestimate the power of group work. Our personal and group motivations did truly bear their fruit.

The great planning game - Which planner am I?
When playing the Great Planning Game by Roberto Rocco and Remon Rooij based on Sehested (2009), I identified myself as an Advocacy Planner as I feel that defending the rights of the dispossessed groups in society comes as an obligation when making spatial decisions on any scale. However, within the project we identified ourselves as Communicative Planners, whose knowledge sharing approach to democracy induces the real participation. However, even though my own focus steers away from the market desires or private investors, I realise that all types of planners are important, and in reality, we are required to be a little bit of each. It is not possible to build democracy and fair distribution without understanding the neo-liberal market system and its mechanisms.

Conclusions as an urbanist, urban planner, regional designer.
Following the SDS lectures, Capita Selecta, and Spatial Justice series, it is clear that regional design and spatial planning at the scale of a province is complex and abstract. This relates to the transcendental theme of the Recipe for Resilience project. The idealisation of knowledge and the benefits it brings is a good start for a strategy, but in reality, a lot more needs to be looked into at different scales and levels of participation. A top-down approach of the active universities is combined with bottom-up learning from the empowered inhabitants of South Holland. The variety of stakeholders involved in the project is reflected in the representation of different fields in the whole R&D Studio structure. From policy translation, transition management to geography, landscape design and political sociology the knowledge acquired to complete this project spanned across different disciplines.

Considering Randstad as a polycentric urban region, and the implications it brings proved essential in designing the strategy and distributing the power-knowledge weight across the province. In his lecture, Rodrigo Cardoso identified three dimensions of metropolisation: political-institutional, spatial-functional, and cultural-symbolic. When this transformation happens over time in cities, it equally affects the rural areas around it, and the competition for land continues, bringing hostility to city-rural-nature relationships (Janse, 2018). This antagonism of the landscapes and its characteristics is the cause of strong identity only applied to the most local context. The strategy of the knowledge network aims to mix different perspectives and build a local identity based on food, but also a collective perception of attachment to the province of South Holland.

Ethics
Discussions on spatial justice, responsibility for the environment and waste management sparked a lot of interesting thoughts and considerations. What are the ethics of decision making about processes and mechanisms that we do not know as much about as generational farmers, scientists or economists? How much can we talk about enhancing local stores and practices, while going for a weekend shopping to Albert Hejin ourselves, because it is more convenient? How much time can we dedicate for waste recycling while being busy with producing new strategies? These questions are difficult and uncomfortable, because as regional designers, we rarely consider ourselves as stakeholders in our own projects. With the design process now fully moved to the online and digital sphere, where even as the planners we rarely interact with public and outdoor spaces, the understanding of the process is even more abstracted than ever. However, the challenges of communication, information overload and lack of expertise, I have learnt that we can always find ways to adapt to the status quo, and transform our reality into a new better world.

Operating on the scale of a metropolitan area is, in my eyes, one of the bigger challenges an urban planner has to deal with. The main obstacle is to be able to get out of the comfort zone and work not only on multiple scales but also on multiple disciples.
Taking into account the multitude of factors and players affected by any kind of decision and actively involving them into a transparent procedure of empirical importance.
"Having an active civil society is very important for the achievement of good governance because civil society keeps the public sector and the private sector in check. In places where civil society is not active, there is an imbalance. Either the public sector is too authoritarian, and decisions are taken in an excessively hierarchic way, or the market is allowed to function unregulated, with dire consequences for society. Having all three sectors of society active and robust makes overall accountability more likely and avoids excesses". (Roberto Rocco)
It is a task, so broad, that a single person cannot tackle it on his own and so has to be a well-prepared team worker, able to create and participate actively in constructive discussions and to build on his capacities and ideas.

Going fully digital didn't make things easier when it comes to group work dynamics. Explaining thoughts to teammates, discussing methods and making decisions, all this takes more time than it would have taken in a pre covid environment. However, if we define a system as resilient when: "...it rapidly and effectively protects its critical capabilities from disruption caused by adverse events and conditions" (Donald Firesmith, 2019), then we can say that not only we tried to define a more resilient agri-food sector but we also managed to become a resilient system as a group. Without acknowledging it, we managed quite well to adapt to this stress situation and make the best out of it.

Personally, coming from a previous experience in the Italian school of thought, where analysis plays a major role and where design is just the end outcome of an exhaustive amount of investigation, I learned that integrating design during the research process can lead to a higher understanding of the area and so to a higher quality of the final research outcome.

Still, even with the help of the extreme scenarios, we formulated to get a better grip on the topic during the work on the analysis and vision chapter the broadness of the topic makes it very difficult to come to an end. Skimming down the load of information collected to the very necessary to make the step from research to the strategic part of the project remains the biggest challenge of them all.
In the end, I feel very satisfied with the resulting project and I'm convinced that working on it also contributed a lot to my personal growth and into opening my mind towards new techniques and approaches in regional planning. I conclude this quarter feeling even more stimulated to dig deeper into the subject than I was at the beginning of it, as many questions were being answered but more advanced during the procedure that I want and need to answer.

I would like to thank my colleagues Annam, Britt, Esmee and Oliwia for their dedication and passion to our project, to our tutors Daniele, Nikos and Rejmon for giving us always the right guidance and support and, at least but not last, to my fiancee Martina for her love and support.

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IMAGES

NO.	IMAGE TITLE	AUTHOR(S)	SOURCES
Fig. 1a	Large scale farming	Johny Goerend	https://unsplash.com/photos/xaSM1R157vI
Fig. 1b	Large scale farming	cloudvisual	https://unsplash.com/photos/x5BnT74sQx4
Fig. 1c	Large scale farming	Taylor Siebert	https://unsplash.com/photos/LkqmBbrvPZI
Fig. 1d	Large scale farming	Balla-Schottner	https://unsplash.com/photos/b1FS5jQrsLo
Fig. 2	Population growth projection	United Nations Department of Economic and Social Affairs	https://population.un.org/wpp/publications/files/key_findings_wpp_2015.pdf
Fig. 3	South Holland	Authors own	N/A
Fig. 4	Problem statement	Yoga Balaji, ALEXRATHS, Schroders, Rob Stothard	https://en.wikipedia.org/wiki/Ranganathan_Street https://www.berkeleywellness.com/healthy-eating/nutrition/article/10-day-sweet-spot-fruits-and-vegetables https://www.schroders.com/nl/nl/professionele/nieuws-
Fig. 5	Shocks	Authors own	N/A
Fig. 6	Stresses	Authors own	N/A
Fig. 7	Resilient responses	Authors own	N/A
Fig. 8	Conceptual framework	Authors own	N/A
Fig. 9	Towards a resilient food system	Authors own	N/A
Fig. 10	Methodological framework	Authors own	N/A
Fig. 11	Land use in South Holland	Bodemgebruik CBS	N/A
Fig. 12	Timeline land use	Topotijdreis via QGIS	N/A
Fig. 13	Map of land use in south holland	Bodemgebruik CBS via QGIA	N/A
Fig. 14	Governments	Authors own	N/A
Fig. 15	Producers	Authors own	N/A
Fig. 16	Educational	Authors own	N/A
Fig. 17	Distributors	Authors own	N/A
Fig. 18	Consumers	Authors own	N/A
Fig. 19	Civil society	Authors own	N/A
Fig. 20	Voiceless	Authors own	N/A
Fig. 21	Stakeholder power matrix	Authors own	N/A
Fig. 22	Map of stakeholders	Authors own	N/A
Fig. 23	Food chain triangle	Adapted from PBL	Muilwijk H. et al. (2020), Our Daily Diet. How governments, businesses and consumers can contribute to a sustainable food system. PBL Netherlands Environmental Assessment Agency, The Hague.
Fig. 24	Market share food stores	Adapted from Oxfam Novib	Oxfam Novib. (2018). Dutch Supermarket Supply Chains: Ending the human suffering behind our food. https://doi.org/10.21201/2017.1626
Fig. 25	Bottleneck	Adapted from PBL	Netherlands Environmental Assessment Agency, P. (2012). The Netherlands in 21 infographics. http://www.environmentaldata.nl/
Fig. 26	Change of system	Authors own	N/A
Fig. 27	Applied research	unknown	https://www.startup.org.ua/2018/04/Dutch-agriculture.html
Fig. 28	WUR in the global top	Biochemistry - College of Agricultural and Life Sciences	https://biochem.wisc.edu/highlights/2018/highlights-biochemists-study-plants-understand-agriculture-energy-cell-biology
Fig. 29	Farmers community	Kees torn	https://www.flickr.com/photos/68359921@N08/48826532952/in/photolist-2hoCKa3-2hoA2rJ-2hoBXab-2hoA2qM-2hoBX7A-2hoA2oN-2honxtx-2ho4T3p, CC BY-SA 2.0, https://commons.wikimedia.org/w/index.php?curid=82797749
Fig. 30	Cluster map	LISA data	N/A
Fig. 31	Cluster map	LISA data	N/A
Fig. 32	SWOT	Authors own	N/A
Fig. 33	Challenges table	Authors own	N/A
Fig. 34	Cartesian plane of Scenarios	Authors own	N/A
Fig. 35	Giant Westland Regions, Systemic Section	Authors own	N/A
Fig. 36	Giant Westland Regions, Map	Authors own	N/A
Fig. 37	Regional Bubbles, Systemic Section	Authors own	N/A
Fig. 38	Regional Bubbles, Map	Authors own	N/A
Fig. 39	Self-sufficient Bubbles, Systemic Section	Authors own	N/A
Fig. 40	Self-sufficient Bubbles, Map	Authors own	N/A
Fig. 41	Giant Fieldlab, Systemic Section	Authors own	N/A
Fig. 42	Giant Fieldlab, Map	Authors own	N/A
Fig. 43	Scenarios stress test, conclusion	Authors own	N/A
Fig. 44	Scenarios responses to shocks	Authors own	N/A
Fig. 45	Scenarios responses to stresses	Authors own	N/A
Fig. 46	Cartesian plane shift	Authors own	N/A
Fig. 47	Vision map	Authors own	N/A
Fig. 48	Spatial characteristics: strengths and weaknesses	Authors own	N/A
Fig. 49	Vision flows	Authors own	N/A
Fig. 50	Goals	Authors own	N/A
Fig. 51	Knowledge pyramid	Authors own	N/A
Fig. 52	Spatial hubs	Authors own	N/A
Fig. 53	Strategy triangle matrix	Authors own	N/A
Fig. 54	Knowledge network map	Authors own	N/A
Fig. 55	Steps to knowledge network	Authors own	N/A
Fig. 56	Stakeholders: Governments	Authors own	N/A
Fig. 57	Stakeholders: Producers	Authors own	N/A
Fig. 58	Stakeholders: Educational	Authors own	N/A
Fig. 59	Stakeholders: Distributors	Authors own	N/A
Fig. 60	Stakeholders: Consumers	Authors own	N/A
Fig. 61	Stakeholders: Civil society	Authors own	N/A
Fig. 62	Stakeholders: Voiceless	Authors own	N/A
Fig. 63	Stakeholder synergies	Authors own	N/A
Fig. 64	Status quo stakeholders power-interest matrix	Authors own	N/A
Fig. 65	New stakeholders power-interest matrix	Authors own	N/A
Fig. 66	Policy framework	Authors own	N/A
Fig. 67	Timeline - strategy	Authors own	N/A
Fig. 68	Strategic hubs synergies	Authors own	N/A
Fig. 69	The Seeds in the triangle matrix	Authors own	N/A
Fig. 70	Concept sketch of the Seeds hub	Authors own	N/A
Fig. 71	The Melting Pot in the triangle matrix	Authors own	N/A
Fig. 72	Concept sketch of the Melting Pot hub	Authors own	N/A
Fig. 73	The Mixer in the triangle matrix	Authors own	N/A
Fig. 74	Concept sketch of the Mixer hub	Authors own	N/A
Fig. 75	Location of the pilot project	Authors own	N/A
Fig. 76	A new reality	Collage by authors, images sourced from Google Maps	N/A
Fig. 77	The pilot projects	Authors own	N/A
Fig. 78	Wateringen	Authors own	N/A
Fig. 79	Stakeholder synergies, Wateringen	Authors own	N/A
Fig. 80	Triangle matrix	Authors own	N/A
Fig. 81	Scheme of the Spatial elements in Wateringen	Authors own	N/A
Fig. 82	Phasing and timeline, Wateringen	Authors own	N/A
Fig. 83	Spatial transformation, Wateringen	Collage by authors, images sourced from Google Maps	N/A
Fig. 84	Westland	Authors own	N/A
Fig. 85	Stakeholder synergies, Westland	Authors own	N/A
Fig. 86	Triangle matrix	Authors own	N/A
Fig. 87	Scheme of the Spatial elements in Westland	Authors own	N/A
Fig. 88	Phasing and timeline, Westland	Authors own	N/A
Fig. 89	Spatial transformation, Westland	Collage by authors, images sourced from Google Maps	N/A
Fig. 90	t Woudt	Authors own	N/A
Fig. 91	Stakeholder synergies, 't Woudt	Authors own	N/A
Fig. 92	Triangle matrix	Authors own	N/A
Fig. 93	Scheme of the Spatial elements in 't Woudt	Authors own	N/A

Fig. 94	Phasing and timeline, 't Woudt	Authors own	N/A
Fig. 95	Spatial transformation, 't Woudt	Collage by authors, images sourced from Google Maps	N/A
Fig. 96	Spatial outcome - rural area	Collage by authors, photos by authors and sourced from Google Maps	N/A
Fig. 97	Spatial outcome - peri-urban area	Collage by authors, photos by authors and sourced from Google Maps	N/A
Fig. 98	Spatial outcome - urban area	Collage by authors, photos by authors and sourced from Google Maps	N/A
Fig. 99	Conclusion stress test 2050	Authors own	N/A
Fig. 100	Shocks test 2050	Authors own	N/A
Fig. 101	Stresses test 2050	Authors own	N/A
Fig. 102	Feedback loop	Authors own	N/A
Fig. 103	Zoom, Google Drive and Miro icons		https://icon-icons.com/icon/zoom-black-logo/147040, https://www.iconfinder.com/search/?q=miro, https://imgbin.com/png/ba7Y9Yyw/google-drive-computer-icons-google-docs-logo-png

ICONS

AUTHOR	ICON	USED IN...
Gan Khoon Lay	*Butcher*	strategy
Made	*lady beetle*	vision
pongsakorn	*Knowledge*	analysis, strategy
ProSymbols	*Innvation*	goals
Fiona OM	*Consumer*	goals
Maria Kislitsina	*Healthy Food*	goals
Ladalle CS	*Local*	goals
mohkamil	*City*	goals
Ranah Pixel Studio	*Climate Change globe*	methodology
Nithinan Tatah	*Population growth*	methodology
Sebastian Adreasson	*Butterfly*	methodology
Adniraj Chatterji	*Cow*	methodology
Eucalyp	*Food*	methodology
Tomas Pasternack	*Bird*	strategy
Olena Panosovska	*Footprint*	vision
Pablo Rozenberg	*City*	analysis, strategy
Ben Davis	*Farmer*	analysis, strategy
Adrian Coquest	*Local shop*	analysis, strategy
Martina Krasnayova	*Village Homes*	analysis
Asif Shirazi	*sharing*	strategy
Brand Mania	*Biodiversity*	policy
Yu luck	*Soil Erosion*	policy
Chanut is Industries	*smart farmer*	policy
Lufti Gani al Achmad	*research*	policy
Glyph.faisalovers	*educational program*	policy
Nithianan Tatah	*information program*	policy
Lihum Studio	*antibiotics*	policy
ProSymbols	*co2 emissions*	policy
Hassan Khaled	*DOP*	policy
Baristalcon	*footprint*	policy
Valeriy	*Religion*	strategy
myiconfinder	*Tree*	strategy
Edwin PM	*nitrogen*	vision
Trevor Dsouza	*Water*	vision
Evgeny Filatov	*Antibiotics*	vision
ainul muttaqin	*Balance*	vision
Martin Markstein	*Loss*	vision
Gregor Cresnar	*Media player*	vision
arif fajar yulianto	*Market*	vision
Laurent Genereux	*mixed use*	vision
Birckhead Creative	*big business*	vision
Becris	*Logistics*	vision
Montatip	*Potato*	vision
Max Honcock	*Society*	analysis, strategy
StickPng	*white food truck*	strategy
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