The transition in the food sector of the Rotterdam region

Educational institutions preparing entrepreneurs and employees for the new economy
The transition in the food sector of the Rotterdam region

Educational institutions preparing entrepreneurs and employees for the new economy

Unique collaboration of Rotterdam educational institutions for education in the food sector

Information and communication technology has brought about a third industrial revolution. The business community as well as knowledge institutions and the government (the Triple Helix) must adapt in order to prevent themselves from becoming irrelevant in the Next Economy. The food sector will also go through this rapid transition. That is why it is necessary for the educational system – from preparatory vocational education (VMBO) to the university – to develop further and to deliver, as quickly as possible, the manpower and entrepreneurship that will make this transition possible. To do this, an institute for transition has been established in which Rotterdam Food Cluster, the Greenport and educational institutions Albeda College, Erasmus University Rotterdam, Rotterdam University of Applied Sciences, Inholland University of Applied Sciences, Wageningen University & Research, Welleant College and Zadkine will work together. The regional (vocational) education system has the financial clout, the room for experimentation, specific knowledge of the transition and an educational, commercial and governmental network at its disposal to make this a reality.
Foreword

Educating a new generation of employees to make the food sector transition possible
Maarten Struijvenberg, City of Rotterdam Alderman for Employment and Economy

Food for The Future as a building block for the Greenport
Adri Bom-Lemstra, Provincial Executive South Holland, Chairman Greenport Westland-Oostland

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The world economy is changing at a terrific pace, and it has become essential that governments, the business community and knowledge institutions collectively anticipate these changes. This shift is motivated by globalisation, technological developments, social trends and the need for increasing sustainability. One of the most important tasks associated with this is the modernisation of business cases—new types of business management require significant investments, on the one hand, and new revenue models on the other. Companies must be able to continue to earn their money, and a new generation of employees must be trained to perform within these innovations. Our region has defined the support and guidance of this transition to the Next Economy as a top priority.

The Dutch food sector leads the world and delivers decisive solutions for pressing food-related issues on a global scale. For Rotterdam, this food sector is one of its high-priority clusters. At the regional level, the Rotterdam Food Cluster consists of approximately 6100 companies, with a trade volume of 25 billion euros per year, and is good for 43,000 jobs at all educational levels. Our aim for the Rotterdam Food Cluster is to optimally serve the food sector throughout this transition by working on internationalisation, innovation and education.

Close cooperation with knowledge institutions has resulted in an agenda with concrete action points for in-depth, future-oriented research into the Food Cluster’s economic and social challenges. Here is an opportunity to use the regional Food Cluster to realise a successful transition.

Along with the changes in the market, the labour requirements and the skills needed by the business owners and employees of the future will also change. That is why it is necessary for the educational system—from preparatory vocational education (vmbo) to the university—to develop further in order to deliver, as quickly as possible, the manpower and entrepreneurship that will make this transition possible. Rotterdam, Greenport and the Erasmus, Hogeschool Rotterdam, Inholland, Albeda, Zadkine, Wellant and Lentiz educational institutions have defined a number of starting principles to prepare us, in close collaboration, for the future of Food.

What this collaboration needs in order to truly be successful is a dialogue with companies that are able and willing to face this challenge head-on and to guide and inspire the entrepreneurs and employees of the future.

Maarten Struijvenberg
Alderman for Employment and Economy, City of Rotterdam

Food for the Future as a building block for the Greenport

Faster alone, but further together. This wisdom applies especially well to the collaboration that we have created for the South Holland horticulture cluster. The list of developments and initiatives is enormous. As a result, educational institutions now better fulfil the needs in the field, scientific knowledge reaches entrepreneurs more rapidly and there is a robust triple-helix network in the areas of knowledge and innovation. The Greenport Westland-Oostland cooperative is a textbook example of this.

Furthermore, the region is strong in campus development. As a result, the Greenport Horti Campus will develop into an international knowledge, innovation and education centre. Commercial queries from business owners meet knowledge and talent from higher education (WO, HBO and MBO) in diverse organisations and associations such as the World of Westland, the Horti Science Park (Bleiswijk), the Innovatie Demonstratie Centrum (Innovation Demonstration Centre) (Barendrecht) and the Food Innovation Academy (Vlaardingen). From each of our different segments, we are increasingly better able to connect.

We also succeed in looking beyond the ‘traditional’ horticulture cluster. After all, this horticulture is part of a regional economy in transition. That is why the Greenport is involved in the Roadmap Next Economy, the initiative of the Metropolitan Region Rotterdam The Hague (MRDH) to facilitate the transition of the economy in the region.

All of this is needed for the horticulture sector to continue to excel, here and on the increasingly global market. With our high-quality food production and distribution systems, we have something to offer the world. That is why we, at the Greenport, are very busy not only continuing to improve our knowledge and technology but also selling it abroad. “Feeding the megacities” is what we call it. We are fully occupied with making this the guiding concept of our actions and with letting the world see that we are number 1 in the domain of innovation. And Food for the Future provides another nice, new building block to this end.

Adri Bom-Lemstra
Provincial Executive South Holland, Chairman Greenport Westland-Oostland
At the invitation of the City of Rotterdam, Erasmus University Rotterdam, Wageningen University and Inholland Research and Applied Sciences University have created a research agenda for in-depth, wide-scale and future-oriented research into the economic and social challenges facing the food cluster. In addition to the research agenda, an exploration was also carried out into action points for using the regional food cluster to realise a successful transition to a dynamic ecosystem in which innovative companies develop new, sustainable business models and in which economic growth and social goals are advanced.
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8 References

Food for the Future

Starting document for in-depth, wide-scale and future-oriented research into how the food cluster in the Rotterdam region can realise a successful transition

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Introduction
The rapid developments in communication, transport and energy will propel the Metropolitan Region Rotterdam The Hague to take steps toward the Next Economy. The Next Economy is a new phase in the economy which is primarily characterised by knowledge, innovation and entrepreneurship in a changing society. Erasmus University Rotterdam, Wageningen University & Research and Inholland University of Applied Sciences have drawn up a starting document. It describes how food-related organisations in the region (hereinafter referred to as the food cluster) can make a successful transition to a new, dynamic ecosystem. Within the context of this project, innovative companies and sustainable business models will be developed and economic growth and social goals will be advanced.

Social developments
According to the drafters of the starting document, the society will develop along five lines:

• From ownership to use: Future economic structures will be less focused on ownership and more focused on lending or using goods. Spotify and Airbnb are examples of this.

• New sectors and sector innovations: New sectors and applications arise alongside or in association with existing sectors. Consider, for example, how photography and telephony have come together in the smartphone.

• Inclusive society: The influx of people from other cultures means that the naturalisation process will continue unabated, the diversity of norms and values will grow and new needs will arise. The importance of empowerment, integration and solidarity are increasing.

• Quality of life: Besides the Gross National Product, a higher quality of life will be the ultimate indicator of progress. Included in this are also freedom, security and the reduction of poverty.

• Internationalisation and the accentuation of what is local: As borders become blurred, local communities attach greater value to their own cultures. The popularity of food from one's own region can attest to that. The challenge is to reconcile these apparently contradictory developments with one another and with the pursuit of a circular economy.

Research agenda
Based in part on these social developments, the drafters have formulated a research agenda. This agenda consists of seven domains:

1 Strategic value of the food cluster
The strategic value of the food cluster is not known. How much revenue, added value, jobs and food does the cluster produce, and how much does that contribute to the international competitiveness of the Netherlands? In addition, the business climate of the area for (new) food-related activities also deserves further investigation. Only then can the added value of the cooperation between the horticulture cluster (the Greenport) and the port cluster (the Mainport) be made more explicit, as can the way in which the strategic value of the cluster can be further increased in the near future.

2 Management of logistics and industrial networks
Cooperation between organisations results in innumerable benefits. Together, companies are better able to innovate, reduce costs, increase sustainability and compete. But many organisations have difficulty developing cooperative relationships. The food cluster consists of both horticultural and port-related companies and large, global bulk flows as well as regional and local flows in the metropolis. This makes the integration of logistics services difficult, but it also offers significant advantages. For example, this cooperation results in increased sustainability resulting from curtailed roadway traffic. Waste can also be reduced as a result of better harmonisation within the region.

3 Food and individualisation
Individualisation and other social developments have repercussions on food consumption. Consider, for example, the emergence of personalised food—food that is custom-produced for individuals and specific target groups, such as athletes and the care of the elderly. Other striking trends are personal service, smaller portions, convenience foods, urban agriculture and foods from various cultures. The individualisation of food influences neighbourhoods and companies and, therefore, the infrastructure. The challenges here include how to link individualisation with sustainability.

4 Food, health and well-being
Food has more than simply financial-economic value. Eating and drinking are also sources of happiness and social cohesion. These effects are often underestimated. Lifestyle, economic status and knowledge, but also the accessibility of food, all influence consumption. The lay-out of the city must encourage movement, interaction and activity. It is important that the trust in the food supply chain is rejuvenated. That means that unnecessary salt, sugar, fat and colouring are not added to foods but also that ingredient fraud and misleading statements are no longer committed or made.
5  Food and entrepreneurship
As cultures and sectors engage with and learn from one another, new business initiatives can take shape. This, in turn, can result in the consumer getting the food that he or she desires, and in the city getting new economic impulses. Besides food for the stomach, the new business owner also provides food for the soul, by telling the story of the food or by ‘greening’ the city, among other things. It is also important to partake in technological innovations such as the 3D printing of food, molecular improvement and food-related diagnostics. Taken together, all of these developments can have a far-reaching impact.

6  The dynamic of the food cluster
The food cluster is very diverse and has many different characteristics. Port operators are strongly focused on imports and distribution, while horticultural companies are focused on production and export. Far-reaching specialisation produces knowledge and cost benefits but also increased sensitivity to specific problems. Less specialisation results in higher costs but also in broader learning opportunities. The use of food and biomass from many countries in specific processing and market locations creates finely-woven networks. What does this food provision ecosystem look like, and what are the consequences of bio-based business, for example? What is the unifying principle around which this ecosystem develops as regards resilience, value creation and sustainability?

7  Disruptive innovations and entrepreneurs
Is there, in fact, a future laid out for this food cluster? New developments, such as the participation of consumers, may present opportunities but may also be threatening, since they erode existing facilities and systems. Disruptive innovations sometimes completely turn a sector on its head, as Google, Spotify, app stores and Airbnb have proven. But change is not always a bad thing. Silicon Valley, in fact, started out as a successful fruit cluster. Perhaps the economic future of the region lies outside the food sector?

Introduction
As a consequence of the third industrial revolution, the Metropolitan Region Rotterdam The Hague (MRDH) will have to make a transition to the Next Economy. Fundamental changes are taking place simultaneously in the areas of communication, transport and energy. These changes will have to include guarantees with respect to earning capacity, liveability and food provisions. The Triple Helix, consisting of the business community, knowledge institutions and local/regional governments, attempts to ensure that the food cluster (= food, flowers and green) recognises, engages with and realises new opportunities in this area in a timely fashion, both regionally as well as internationally. In this endeavour, new ways of producing, creating value and cooperating are of great importance.

This research agenda, formulated jointly by Erasmus University Rotterdam, Wageningen University and Inholland University of Applied Sciences, is a starting document for in-depth, wide-scale and future-oriented research into how the regional food cluster can make a successful transition to a dynamic ecosystem in which innovative companies develop new, sustainable business models and economic growth and social goals are advanced.

The Food Cluster in transition
The food cluster is strategically, economically and socially important for the metropolitan region. The strategic value of the food cluster for the Dutch economy is threefold and consists of: (1) derived economic activity for suppliers, (2) innovation by companies in the food cluster that drives innovation elsewhere in the logistical chain and (3) the international allure of the food cluster (in particular, that of horticulture) which contributes to the positive positioning of the Netherlands.

The retention of employment opportunities and the volume of trade, on one hand, and full commitment to suitable development opportunities, on the other, are of vital importance to a metropolitan region, and they have a direct effect on the well-being of its inhabitants. However, due to the current emphasis on mature sectors, this metropolis seems to have missed relatively significant potential opportunities for people and businesses (RNE, June 2016).

The economic importance of this food cluster is evident from its annual revenues, which are roughly estimated to be approximately 25 billion euros, with an added value estimated at 3 billion euros. In this region, the added value of agri-food companies per unit area is very high (based on Wageningen UR (2015), Benchmark Agrofood). See Figure 1.

The added value shown is the sum of the green food production (primary) and the chain-related industries of supply, processing, services and wholesale (secondary), excluding retail. Socially, the Rotterdam Food Cluster is extremely important, because it comprises more than 6000 companies which collectively provide 43,000 jobs as well as food security.
Within our society, we are already seeing the emergence of a lending culture, a broader circular economy (RNE, 2016; Rabobank, 2014) with the advance of new values and alternative governance structures. With this comes a relatively large number of SMEs which for the most part have an intensive relationship with local communities. Although we do not yet have a representation of the society of tomorrow, a few rough lines can already be sketched out along which this society will develop:

- From ownership to use: Future economic structures will be less focused on personal ownership and more focused on lending or on the functional use of goods which are owned by companies.
- New sectors and sector innovations: These innovations will occur alongside or in association with existing sectors, such as agriculture and horticulture linked to healthcare, regional adaptive energy networks, new applications for waste and by-products in the Rotterdam region.
- Inclusive society: Diversity of values and norms: The influx of people from other cultures means that the naturalisation process will continue unabated. The society will be more focused on the empowerment of workers and citizens, on the integration of different groups and on solidarity (for example, according to the spiral dynamics model). New needs will emerge.
- From Gross National Product to Quality of Life: Individual well-being should not be an obstacle along the path to freedom and quality of life. Poverty must be reduced.
- Internationalisation and integration (global + local): Borders become blurred, but local communities will attach greater value to their own cultures. We will have to connect the globalising world with the local4/local trend and with the circular economy.

Research agenda principles

The economic, strategic and social aspects of the importance of the food cluster all play a significant role in the formulation of the research agenda. This research agenda focuses on the strategic and tactical exploration of improvements which will be relevant in the future or which are now underexposed, with implications for education and valorisation in the short term. Technological developments, such as the heat network, are only studied from a business point of view, for example as part of Business Development.

Based on consultation sessions, internal idea generation and reflection on the Roadmap Next Economy and other research and innovation agendas, the research team made an inventory and a first selection of research domains that appear to be relevant and that can be studied by the members of the team, in particular by the managers.

With regard to other research and innovation agendas, we mention here the ambitions of Greenport Westland-Oostland, which are focused on increasing the earning capacity of companies. These ambitions target optimisation (strengthening production and the optimal use of space), the expansion of turntable functions at Mainports, greater contributions to health and well-being, continued innovation in the form of the development of the hub function and the establishment of an international knowledge centre. Cooperation, connection and facilitation (of entrepreneurship) must keep the greenhouse cultivation of this region at number 1 in the world.

We recognise this global ambition in the broader 10-point plan outlined by the LTO (Land- en Tuinbouw Organisatie Nederland - Agriculture and Horticulture Organisation of the Netherlands), the FNLI (Federatie Nederlandse Levensmiddelen Industrie - Federation of the Dutch Food Industry) and the 10-point plan for the food and agriculture sector. With this plan, it is hoped that the Netherlands will achieve its ambition of having a sustainable food system.

Research agenda

3 Factsheet Greenport Westland-Oostland, 2016. Website
Industry and the CBL (Centraal Bureau Levensmiddelhandel - Central Agency for Food Trade) for the purposes of the Dutch general election. Here, the ambition is elaborated as raising awareness of healthy lifestyles and of consumer waste, which, with the help of governments, (harmonised policy, raw materials’ security, uniform regulation, taxes, green education) makes room for companies to innovate in unique cooperative initiatives and circular agri-food chains.

The broader IFAMA Europe (2016) recently stated that the research and innovation themes for the Triple Helix entities are food security, the changing consumer, the role of food in a healthy lifestyle, the utilisation of big data and the realisation of sustainable/circular logistical chains and agri-food educational programmes. With these, Europe can contribute to world-wide challenges in a changing food landscape. The Roadmap Next Economy (June 2016 version) provides the most daring approach, which specifies five transition paths. Of these paths, Smart Energy, Digital Gateway and Circular Economy all focus on new (infra)structure.

The Entrepreneurial Region transition path, for new business creation, and the Next Society transition path, for an inclusive society, are primarily focused on entrepreneurs and citizens. These paths must ultimately produce new types of workers and entrepreneurs and facilitate new, cross-sectoral developments. This research agenda shall express, but not exclusively, address these last two transition paths.

For our research agenda, we chose the research domains below, each related to the food cluster. We chose these domains in light of what is currently happening in the food cluster, which makes repetition unnecessary, in view of the stated ambitions and various research and innovation agendas and with consideration of the themes articulated by companies. The food cluster benefits from knowledge of the strategic values behind current successes, logistical optimisation, maintaining a connection with developing societies and consumer demands, the stimulation of entrepreneurship and innovation, the rejuvenation of sectors by means of radically new collaborative initiatives and regional integration in an effective ecosystem.

The following research domains will be elaborated upon in greater depth in the ensuing chapters:

- Strategic value of the cluster and its business climate
- Management of logistics and industrial networks
- Food and individualisation
- Food, health and well-being

1. Research domain: Strategic value of the cluster and its business climate

The value of the food cluster in the MRDH region for the international competitive power of the Netherlands as a corporation – the so-called ‘strategic value’ of this cluster – can be expressed both quantitatively and qualitatively. In previous studies, the emphasis was placed on the static economic value of this cluster, on aspects such as employment and volume of trade. But there is more to it than that. The business climate of the area as a location for (new) food-related industry has not yet been thoroughly investigated.

1.1 Research sub-domain: Strategic value of the competitive strengths of the MRDH

What is the economic importance of the cluster in which Greenport and Mainport work together? There is a quantitative importance, in volume of trade, value-added jobs and food provision, and a qualitative importance, in terms of the contribution to (various core determining factors of) the international competitiveness of companies within and outside of the cluster, both in the region and beyond. In an advanced economy, such as that of the Netherlands, this is often related to its contribution to innovation (Schwab, 2015). Research into the strategic value of the cluster – in line with what has previously been studied, for example, the Rotterdam port and industrial complex (Van den Bosch et al., 2011) and the Port of Amsterdam (Kuipers et al., 2013) – is desirable, because this research sheds light on the magnitude of the value of the agri-food cluster and on the foundations of this value. This research also clarifies how the concerned parties can further increase the strategic value of the cluster in the near future.

Research questions:

- What is the state of the regional factor and demand conditions?
- To what extent is there a network of suppliers and related companies that facilitate innovation in the cluster?
- How is the food cluster in the region linked to similar clusters elsewhere and to other clusters in the Netherlands? To what extent and in which areas do these clusters reinforce one another in terms of innovation-driven competitiveness?
- And how, in particular, does the cluster contribute to the sustainable international competitiveness of companies in the MRDH and elsewhere in the Netherlands?

5 IFAMA Europe (2016): The European contribution to solving global challenges in a changing food landscape: a strategic Triple Helix research and innovation agenda.
Rotterdam Food Cluster: Trendsetter in the food industry

Port of Rotterdam: The world’s second largest importer of fresh food
1.2 Research sub-domain: Business climate of ports for food-related industry

The Port of Rotterdam and its surroundings are an important location for food-related companies. A great variety of food storage and transshipment services are on offer there, and a variety of leading production and commercial companies have their headquarters at the Port. This provides an attractive economic climate for the food industry, the animal feed industry and the biofuel industry. Entities engaged, for example, in the storage of grain, soy beans, rapeseed and other bulk agricultural products include ADM Terminal Europoort, Agro Delta, BSR van Uden Stevedoring, European Bulk Services, Marcor Stevedoring, Nieuwe Waterweg Silo, Rotterdam Bulk Terminal and ZHD Stevedoring. When it comes to value-added services and the processing of agricultural bulk, companies such as Cargill, Codrico, Meneba/Worldfour, IOI-Loders Croklaan, Provimi and Wilmar Edible Oils play an important role. In addition to these, other related enterprises, such as laboratories and providers of logistics services, for example, are also present. Many food-related companies are concentrated in the Stadshavens Rotterdam.

This research sub-domain focuses on how the business climate for food-related enterprises in the Port of Rotterdam complex – and in the Stadshavens, in particular – can be further improved. This research will also, in part, cover the business climate for (group or division) headquarters within the food cluster.

Research questions:

• What role can entities such as the Rotterdam Port Authority, the City of Rotterdam and entrepreneurs association Deltalinqs play in making the business climate more attractive?
• How can the innovation and modernisation of the established food companies in the Port be fostered?
• On the other hand, the business climate of the entire MRDH can also be studied. Is there a difference?
• How can impediments to the innovation and strategic modernisation process be removed?

2 Research domain: Management of logistics and industrial networks

Much is known in the business community and in the literature about the possible benefits of cooperative relationships between organisations. Consider, for example, the realisation of relatively complex innovations, cost reductions, increases in sustainability and the ability of the partners to strengthen their individual and collective competitiveness (Dougherty & Dunne, 2011; Parmigiani & Rivera-Stantos, 2011; Provan et al., 2007). Nonetheless, many organisations have difficulty initiating and further developing these cooperative relationships, especially in a multilateral context. These hindrances can stem, for example, from a lack of trust, difficulties with control and coordination, an aversion to new (inter)dependencies, obstructive internal processes and procedures and insufficient knowledge and information about the possibilities and uncertainties regarding the appropriation of potential new, (co-)created value (Dekker, 2004; Poppo et al., 2009; Ring & Van den Ven, 1994).

2.1 Research sub-domain: Optimisation through new developments in agri-logistics

The food cluster in the Rotterdam-The Hague region is a differentiated whole with a series of diverse developments and challenges. It is important to adequately map out how this diversity (from growers in the Westland to companies in the Port or (auction) activities around Barendrecht) affects the optimisation of the agri-food logistics in the metropolitan region. Food manufacturers in the region focus both on the international market and on the local/regional market. Providers of logistical services have a role to play in the distribution to the hinterland (outside of the region) of the agricultural and food products imported from the Port of Rotterdam as well as in the supply of agricultural and food products from growers and suppliers to the urban area (Rotterdam, The Hague). Bundling and cooperation play an important role in this to ensure that no more roadway traffic than is necessary enters the city. On the other hand, companies that export their products out of the metropolitan area are faced with the challenge of doing this in such a way that the burden (roadway overloading, nuisance, emissions) created for the urban area by doing so is kept to a minimum. The Metropolitan Region Rotterdam The Hague combines urban area with important ports and access routes. Several cities have a similar constellation. Comparisons of this region with comparable cities (e.g. Hamburg and Amsterdam) can lead to interesting ideas.

Research questions:

• How can food waste be reduced through better harmonisation of production and consumption within the region and through controlled transport in the logistical chain?
• How can food waste be reduced through the conversion of unutilised/unsold food into high-quality biomass applications (closing of food supply chains), and what opportunities exist for the utilisation of waste flows (in catering, retail, hospitals, care institutions, zoos etc.)?
• What are the logistical consequences of ‘closing the chain’ and of the supply and distribution, storage and extra processing activities in the region?

2.2 Research sub-domain: Alternative ways of organising cooperative relationships in networks

In order to strengthen the food cluster in the Rotterdam region and its surroundings by means of the development of new cooperative relationships as well as by the reinforcement of existing relationships, it is of great importance to perform research into how to achieve this by means of new methods of managing, organising and setting up these relationships. In this research, the network/logistical chain is the primary level of analysis, whereas in this research sub-domain the main focus is on collaborations aimed at the exchange of raw materials and by-products/residual products, or on ‘industrial ecosystems’ (Baaı & Huisingh, 2008; Esty & Porter, 1998; Hollen et al., 2015). Previous attempts to forge such cooperatives in the region, such as an extensive steam network in the Port of Rotterdam, prove that this type of multilateral cooperation can be difficult to realise. The reasons for this are often not technological in nature but instead relate to managerial and organisational issues.

A potentially interesting case, apart from the energy network that has already been studied, is the OCAP collaboration between Volker Wessels and Linde Gas, among others. This collaboration focuses on the capture of CO2 from industrial companies in the Port of Rotterdam and the Rotterdam Industrial Complex for the purpose of transporting this gas to growers in the Westland or to underground storage facilities. Growers use the CO2 in their greenhouses to stimulate the growth of plants and to improve their quality. Thanks to this project, the growers are able to reduce their gas consumption and, at the same time, to increase their own production due to the increased availability of CO2. Until recently, on the industrial side, there were two parties that supplied CO2 of sufficient quality (purity): Shell refinery Pernis (since the start of OCAP in the middle of 2005) and the Spanish bioenergy company Abengoa (since 2010). Abengoa, however, ran into difficulties, and at Shell, maintenance work was carried out at the expense of the CO2 supply. There are indications that the horticulture sector has an interest in the realisation of a more stable and more extensive CO2 distribution network between the Port and the Westland. The question here is how such an improved multilateral CO2 distribution network can be organised and managed.

Research questions:

- What are the important bottlenecks and implications at the level of the logistical chain? What role(s) can external parties, such as municipalities and the Port Authority, play in facilitation and coordination?

3 Research domain: Food and individualisation

Citizens/consumers want more and more individual and personalised food. We see this in the development of personalised food, in the individual choices that people make about the ways their food is delivered to them—local food, regional products, cultural foods, convenience foods and inexpensive foods—in the demands of single-person households and in the effects of the decentralisation of (elderly) care. This individualisation of food has an effect on (urban) logistics and has an impact on the infrastructure in the city. Consumers will bundle their demands via distributed IT systems. This makes it clear what must be where, and by when, and this demand can then be met efficiently and sustainably (without unnecessary transport movements). The direct connection with the food consumer creates a different revenue model for the farmer. It becomes ‘food with a story’. A new form of governance is needed to organise this balance between the free market system and these new, emergent structures. How will we link the need for individuality with the need for solidarity? This internal tension, which is present in every society, can now be technically and economically resolved on a large scale, but no one can, as yet, fully comprehend the social consequences of this change.

Research questions:

- What is the impact of the use of alternative proteins (insects, algae etc.) and the improved functionality of food crops on our own food and on animal feed, and to what extent do these contribute to more sustainable agriculture and a healthier society?

4 Research agenda

- How can the ‘last mile’ delivery to the city be improved? By fewer transport movements, less nuisance, fewer emissions? (See improved air quality in the Utrecht city centre after the implementation of environmental zones.)

- What is the (future) influence of the virtualisation of trade (uncoupling of information and physical availability)? What can be learned in the area of pattern recognition etc. from the enormous quantity of data that is made available as a result of this virtualisation (Big Data Analysis)?

- How can more (valuable) multilateral cooperation (i.e. within the context of the logistical chain) be achieved? How can reciprocal dependencies be better managed?

- What kinds of changes require possible new collaborations from the business models (Baden-Fuller & Mangematin, 2013; Zott & Amit, 2010) of the parties concerned?

- What is the effect of personalised food on the health and lifestyle of the inhabitants of Rotterdam? Target-group foods: personal food with respect to hereditary and metabolic aspects, product development, food choice and consumption behaviour/consumer taste experience; Ageing in relationship to health/disease; neurological, oncological and infections. Geriatric: effects of different
Personalised food: The consumer wants increasingly more individualized food.

Food and well-being: The impact of food on emotions and happiness is still too often underestimated.
lifestyles. Influence of food, heredity and exercise at a young age on health during ageing;

- How do we bundle long logistical chains with short chains? How do we effectively and efficiently connect the thick, bulk flows and thin flows from the port into the city? How can distribution software systems contribute to this?
- What do the sustainable chains look like (crop cultivation without sunlight, feeding and greening the city, green roofs, the capture of fine particulates, urban farming and food-cultivating neighbourhoods)?
- The existing logistics chains that supply the global market have already been organised, but the logistical chains for supplying local markets are still emerging and have not been fully developed into an efficient retail chain from producer to consumer. How do we organise an easy and efficient method to formulate the demand from the city and to have it arrive at the farmer in such a way that a new, direct production-consumption chain arises?

4 Research domain: Food, health and well-being

The value of food is many times broader and greater than its financial-economic value. The impact of food and eating on emotions, happiness and social cohesion in a living environment is often neglected or underestimated. Consider the healthy, socially active citizen versus the eating consumer who is less aware. Consumers can even benefit directly from foods with specific health-promoting effects.

4.1 Research sub-domain: Food and well-being

Social inequality in the city becomes evident when you consider lifestyle and healthy ageing, among other factors. There is a difference between the more wealthy, well-educated citizen and the poorer, less educated citizen when it comes to the number of years that he or she lives (in good health). Lifestyle, economic status and knowledge all play a role, but the accessibility of food is also a factor. The design and organisation of the spaces in a city must invite their inhabitants to move, to interact and to be active, so that citizens are and remain self-sufficient. An optimal mix must be created, where diversity and the group dynamic have their place. When relating the dynamic of urban development to the degree to which vulnerable groups in a city participate in this dynamic, food can play a significant role as a binding agent, so to speak, in the self-sufficiency of the neighbourhood inhabitants. The city must once again make room for citizens who are on the margins of society. The room that society has for its more troubled members continues to shrink, while their numbers continue to grow. In addition to ageing, stress and the pressure to perform also play a role in this. The impact of food on emotions, happiness and social cohesion is still too often negated or underestimated. By improving the organisation of the neighbourhoods, anonymity can be successfully combated.

Research questions:

- What is the impact of the arrangement of the neighbourhood on the lifestyles of its inhabitants (living labs)? And what is the impact of common, public spaces on the well-being of the inhabitants, and what form does the connection of the city with its surroundings take (for example, multifunctional agriculture)?
- What kind of control and coordination is needed to make a success of vegetable gardens, picking gardens, forest pastures for pigs, chicken runs etc. and to shift from ownership to use (car sharing, fewer parking places, joint use of car batteries for energy storage) and space for “greening the city”?
- To what extent can new social connections, such as cooperatives, participatory planning/social innovations and expanded agriculture, contribute positively to this shift?

4.2 Research sub-domain: Food and ethics

The value of food is many times broader and greater than its financial-economic value. As long it remains possible for producers to add salt, sugar, fat and colouring to our processed foods and as long as fraud is committed with ingredients and false, misleading assertions are made, the food chain will be insufficiently reliable, and the consumer will remain wary of the health and food advice proffered. The costs of healthcare rise because too many people do not eat healthily or even know what healthy is, because undernourishment as a result of isolation (particularly in the elderly) is growing and because the number of vulnerable citizens is growing due to reduced self-sufficiency and the alienation of certain groups. Health claims about foods and the number of products on offer...
is increasing. Foods with health claims may contribute to a reversal in the overall disease burden. The consumer may benefit from consuming foods with specific health-promoting effects. Yet, the claims are often misunderstood, and it becomes a question of the reliability of the message versus being misled and safety. The shift from curative healthcare to preventive healthcare—care for each other or ‘social cohesion’—is an important item for cities. Participatory thinking and acting and being taken into account are repaid in other areas (including health, safety and capability). High-quality food in care institutions leads to healthier residents (and the potentially higher cost of the vegetables is compensated by lower costs for care).

Research questions

- How do we reduce the vulnerability of specific groups?
- How can we limit food waste while taking into account the sustainability of the total food network?
- Should it be compulsory to add health-promoting substances to foods in order to realise equal access to these substances? (Or can the citizen make this choice him- or herself?) (Are additives really needed/desired?)
- Are we morally obligated to eat well (= healthily) and to exercise? Or are eating well and exercising a personal choice?

5 Research domain: Food and entrepreneurship

New entrepreneurship in a city can give the city an economic boost. Entrepreneurship is related to culture. The connection between cultures and learning from our fellow citizens can strengthen new entrepreneurship, which in turn gives the city a new dynamic and allows it to align with the wishes of the new consumer who wants healthy, convenient, local and sustainable food. The new entrepreneur offers convenience (Markthal 2.0), health (eating more fruits and vegetables), local products (products from the area/Greenland Westland–Oostland) and sustainability (sustainably grown, transported and processed and with no food waste). Besides the food he or she provides for the stomach, the new entrepreneur also provides ‘food for the soul’ by ‘greening the city’.

Research agenda

• What are the opportunities for short-chain entrepreneurs in relation to the circular economy?
• Can experimental gardens or living labs be created to stimulate and facilitate the start-up of social and/or sustainable enterprises and the generation of alternative collaborations?
• To what extent do distribution software systems (for example, bitcoins) contribute to the innovativeness and development of food sector SME’s?
• To what extent can plants contribute to a healthy living climate in the city?

5.1 Examples of successful entrepreneurship and effective cooperation: The Rotterdam Markthal, the Westland horticultural cluster and the Schiedam jenever industry

Rotterdam’s food cluster is relatively unknown outside its own borders. However, the cluster has three icons of successful innovative entrepreneurship and effective cooperation. These icons are the world-renown Schiedam jenever distilleries, the Westland horticultural cluster and, more recently, the Rotterdam Markthal. These old and new icons of the Greater Rotterdam Food Cluster are not only showcases of successful industry for the general public, but they can also be seen as ‘best in class’, as so-called benchmarks or best practices, which require further study. To start with, three good case descriptions should be formulated. These cases should include analyses of the emergence, growth and successes of alternative collaborations? New entrepreneurship and effective cooperation. These icons are the world-renown Schiedam jenever distilleries, the Westland horticultural cluster and, more recently, the Rotterdam Markthal. These old and new icons of the Greater Rotterdam Food Cluster are not only showcases of successful industry for the general public, but they can also be seen as ‘best in class’, 3 as so-called benchmarks or best practices, which require further study. To start with, three good case descriptions should be formulated. These cases should include analyses of the emergence, growth and successes of alternative collaborations? New entrepreneurship and effective cooperation. These icons are the world-renown Schiedam jenever distilleries, the Westland horticultural cluster and, more recently, the Rotterdam Markthal. These old and new icons of the Greater Rotterdam Food Cluster are not only showcases of successful industry for the general public, but they can also be seen as ‘best in class’, as so-called benchmarks or best practices, which require further study. To start with, three good case descriptions should be formulated. These cases should include analyses of the emergence, growth and successes of alternative collaborations? New entrepreneurship and effective cooperation. These icons are the world-renown Schiedam jenever distilleries, the Westland horticultural cluster and, more recently, the Rotterdam Markthal. These old and new icons of the Greater Rotterdam Food Cluster are not only showcases of successful industry for the general public, but they can also be seen as ‘best in class’, as so-called benchmarks or best practices, which...
Greening the City

The Dakakker (Rooftop Farm) on the Schieblok in Rotterdam
also benefit from a detailed analysis of the aforementioned cases. This way (starting) entrepreneurs, innovation managers, business developers and policy-makers in local governments can learn from successful entrepreneurship and effective cooperation at the Schiedam jenever distilleries, the Rotterdam Markthal and the Westland horticultural cluster so they can help further develop other (mini-)clusters.

**The most important questions in this research sub-domain are:**

- What is the allure and social-economic impact of the Rotterdam Markthal, the Schiedam jenever industry and the Westland horticultural cluster on the entrepreneurial climate in the region?
- To what extent can the best practices of these three regional ‘icons’ contribute to a more successful and dynamic local/regional ‘food ecosystem’?

### 6 Research domain: The dynamic of the agri-food cluster

The growing specialisation in the agri-food sectors in the MRDH shows strongly segmented, professional and personnel networks, arising from a focus on import and distribution in the Port of Rotterdam and the cities and from a focus on production and export in the horticulture surrounding the cities. The significant cost benefits of specialisation can lead to an excessive narrowing of the range of activities, with increased sensitivity for specific problems as a result. This contrasts with the significant learning opportunities and the increase in costs in the case of low levels of specialisation of the sectors. The complexity that has developed in order to supply the widely varying demand requires (fine-meshed) networks of product flows, cash flows, information flows and companies which routinely or intensively, and oftentimes competitively, cooperate with others, create value and try to appropriate a share of this value. What does that food provision ecosystem look like, now and in the future? What is the unifying principle around which the structures of the agri-food sector are developing?

The networks in the food cluster are very heterogeneous, as are the links between the network parties. Large and small companies can be found in virtually all of these links. At the point of end sales, starting and stopping small companies is quite easy; in production, this has become more difficult. As a rule, the directors of the food sector are the highly consolidated and European supermarket conglomerates. As a result, companies show extremely varying degrees of involvement in the sector, others, create value and try to appropriate a share of this value. What does that food provision ecosystem look like, now and in the future? What is the unifying principle around which the structures of the agri-food sector are developing?

### 6.1 Research sub-domain: The dynamic in the population of agri-food companies in the MRDH

Thorough research into the competitiveness, innovation and modernisation of the agri-food cluster in the Rotterdam-Rijnmond region and its surroundings – as well as the factors which influence these – requires better insights into the dynamic of the population of companies in this cluster. This research sub-domain intends to map out this dynamic in the period 1990–2016 on the basis of various sources and, in addition, to provide insight into the dynamic expected in the near future. The focus of this, in particular, will be on the following aspects:

- The arrival of new agri-food companies and the exit of established companies; the growth of the cluster
- Fusions and takeovers in the agri-food cluster
- Internationalisation of the agri-food cluster
- Bilateral and multilateral strategic alliances between companies within the agri-food cluster in the Rotterdam-Rijnmond region and its surroundings and companies outside the region (national and international).

#### Research questions

- How does the agri-food ecosystem develop here?
- How does the network develop within the force field of transaction costs, competencies and learning curves?28
- What are the crossovers with other sectors (weak ties, bridging ties)?29 What do other sectors in transition teach us

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about the dynamic we can expect in agri-food? What can flower/plant chains and food chains learn from each other?

- What does the literature say about limiting or preventing food deserts and the further shifting of food preparation to ready-to-eat convenience stores? Will supermarkets disappear due to online ordering and home delivery (Hanos and Van Gelder or HelloFresh or DHL)?
- Which relocations of activities can be expected, pushed further to the margins and contracted out, and what types will come to the fore?
- How does a sector successfully transform itself?
- How do we draw more researchers and marketeers from the food industry, for example, to agriculture and horticulture?
- What is the source of the biochemical and biomedical knowledge that is needed to correctly evaluate knowledge and opportunities?
- How do sectors consisting of mainly smaller, family-owned companies professionalise into successful clusters with new managers, successors and owners of agri-food SME’s?

6.2 Research sub-domain: Resilience of food systems

As evidenced by the relatively few incidents with fresh products like fish or eggs, food safety here in the Netherlands is a matter of course. For food safety incidents, scalable systems have been set up here and there to intervene in the form of quickly deployable groups of experts. ALOP (appropriate level of protection) and FSO (food safety objective) are terms that are used in this field (WUR websites). Research into the resilience of the supply networks focuses on the use of technology and knowledge in production and distribution systems, on the informal and formal organisation of the supply networks and on the applications of information and communication technology (IT). Food systems here and further afoot differ greatly when it comes to adaptability and resilience. Can our safety system be exported, or can we realise better physical food buffers?

System dynamics can be used to analyse the dynamics of agri-food networks and urban food systems with respect to resilience, food safety and sustainability. This approach applies to dynamic problems arising from a complex social, business, economic and ecological system characterised by interdependences and feedback loops. Perhaps FOODMETRES reports, developed instruments and (data) networks may be used.

6.3 Research sub-domain: Emergence of bio-based/circular sectors

There is a great deal of activity around finding added value for old, established biomass flows. In the Westland, Biobase Westland is working on doing more with biomass, on upcycling waste into paper and food compounds etc. Diverse research is being done into antioxidants, colourant alternatives and biopharmaceuticals. Soon, vanilla will probably come out of (closed) greenhouses, as will several medicines. The Kenniscentrum Plantenstoffen (Centre of Expertise for Plant Compounds) is very advanced, with its library of plant-based food extracts and initial research into commercial applications. In the Port, large quantities of bioethanol and biodiesel are produced, and biorefineries are being developed. New relationships with companies whose work focusses on grains, soy beans, rapeseed and other agricultural commodities will probably be formed, as will relationships with value-added companies like Cargill, IOI-Loders Croklaan and Willmar Edible Oils Edible Oils. At the same time, the trend is to expand circular or open networks, such as the heat and CO2 networks; they impact the waste flows from urban environments and private and public investment decisions. Of the 30% of wasted biomass, roughly 40% of it is lost by the producer, 30% by the consumer and some 10% during processing, logistics and retail.

Research questions:

- What steps are needed and should be expected from the ecosystem to strengthen the bond between ports and their surroundings so that the bio-based economy is strengthened?
- Which new circular chains, between commodities, horticulture and paper, for example, must be investigated?
- What kind of commercial potential is there in the MRDH for setting up new networks for replacing chemical food compounds with plant-based food compounds, green pesticides, health-promoting substances and algae?
7 Research domain: Disruptive innovations and entrepreneurs

“It’s tough to make predictions, especially about the future.” That most certainly also applies to the future of the Dutch and - more specifically - to the Rotterdam Food Cluster. What will it look like in 10-15 years? And even more dramatically: Does the Greater Rotterdam Food Cluster have a future at all?

7.1 Research sub-domain: New agri-food business and business models

In order to gain insight into this sector and region, policy-makers within organisations and governments can use two ideal-typical methods: (1) They can extrapolate into the future from current trends and developments or (2) they can allow themselves to be surprised by emergent opportunities and unexpected occurrences.36 In the first approach, the future is malleable and can be exploited. In the second approach, the future can be extrapolated and anticipated somewhat, at the most, from a real options approach.

Along the second of these lines of inquiry, the accent lies on the surprising and unexpected elements of that which will unfold in coming decennia in the Dutch and Rotterdam food sectors. On one hand, this can be enriching, with better quality, more attention to sustainability and greater participation from newer and older groups of producers and consumers in our food industry of the future (“creative reconstruction”). However, this can also be threatening when it takes the form of the creative destruction of existing facilities and systems by disruptive innovations (Bower & Christensen, 1995; Christensen et al., 2015), which for the time being are still in the margins and are being tolerated, at the most, by the established powers that be. Koppert Biological Systems, now a large company decorated with awards, was left in a corner in 1970’s and 1980’s. In the (mid to) long-term, these new industry actors may turn the sector on its head with their radical innovations; consider, for example, Spotify, Uber, Airbnb and Coolblue. When it comes to the food sector, the following innovations should be considered:

- New food ingredients and alternatives to meat (inspired by the coming protein crisis): think of insects, cultured meat, algae and lupins.
- Personalised food and meal replacements (Rotterdam start-up Queal).
- Alternative production and distribution concepts: innovative distribution for the supermarket (e.g. PicNic, Hello Fresh); decentralised, small-scale production (urban farming, such as BlueCity/Tropicana); large-scale, alternative production in building cellars (e.g. PlantLab and their Plantparadise); decentralised production and processing by means of the use of 3D food printing, for example (e.g. Food Creators).
- Disruptive business concepts and models pioneered by incubators and accelerators (such as those from the Port XL Innovation Lab) which will not only have an impact on the large, dynamic Port of Rotterdam (and its suppliers and supporting industries) but will also have a direct or indirect effect on the Rotterdam Food Cluster.

This research sub-domain focuses on the selection, exploration and analysis of disruptive innovations and on the activities of disruptive (start-up) entrepreneurs as well as on the identification of their impact on segments of the Rotterdam Food Cluster.

Research questions:

- Who are the ‘Teslas of agri-food’ in this region, and will they stay in the region?
- What are the new, winning business models, value propositions, earnings models and consortia in the mid to long-term?
- What are the new food ingredients, innovative production/distribution concepts and disruptive business models, and what are their social, economic and societal impacts?
- What is needed to support the new entrepreneur so that he or she can formulate a good proposition?

7.2 Research sub-domain: An alternative future for the Rotterdam Food Cluster?

Surprisingly and paradoxically, the future of the Rotterdam Food Cluster could lie outside the food industry. Although it might not seem obvious that this cluster could disappear from the Rotterdam metropolitan region landscape in the mid to long-term, this eventuality cannot be entirely ruled out. No one within the extraordinarily successful fruit cluster nearby San Jose in Northern California, nicknamed The Valley of the Heart’s Delight (1930-1970), saw the developments in microchips and computers coming in the new Silicon Valley either. What can we in the West Netherlands learn from the transition of the fruit cluster in the United States during the 1970’s to the Silicon Valley of today (Malone, 2002)? This research sub-domain covers a ‘what if’ (counter-factual) exploration of the chances of possible de-location of agri-food activities to other regions in the Netherlands, Europe and beyond. In concrete terms, what would the relocation of Unilever from Rotterdam and Vlaardingen to Wageningen and Amsterdam or Utrecht mean? To what extent is the Westland horticulture cluster already hollowed out by growers departing for other parts of the Netherlands, Southern Europe, Northern Africa and the rest of the world and by the acquisition or bundling of companies? What are the most important motivations for leaving and relocating production facilities

36 Several intermediate forms are mixed scanning (Etzioni, 1967), ambidexterity (O’Reilly & Tushman, 2013) and discovery-driven planning (McGrath & MacMillan, 1995).
or for staying in the Westland, and how can this potential embeddedness be exploited by the local/regional or national governments? Further diversification and upgrading of the port (away from bulk and toward a bio-based economy) could also have a disastrous effect on the Rotterdam Food Cluster. This research sub-domain focuses on the degree to which this food cluster is anchored in the Greater Rotterdam and Dutch ecosystems.

Research questions:
• What exactly is it that anchors the industries in the Greater Rotterdam food sectors to their home bases, and what are possible motivations for the de-location of economic activities to other regions and clusters?
• What are the critical interdependencies of the Rotterdam Food Cluster, and how can these be best managed with a view to (further) anchoring in the region?
• What is the significance of the potential departure of leading food and horticultural companies from Greater Rotterdam to other locations and clusters? Is there a Plan B, and what are the chances for new, up-and-coming sectors?

8 References


### Food for the Future

An investigation of the action points for the transition of the MRDH food cluster to the Next Economy

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#### Realisation plan

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The Roadmap Next Economy (RNE) is an investment program for the Metropolitan Region Rotterdam The Hague (MRDH). The region uses this program to capitalise on global trends, such as climate change, raw materials scarcity and urbanisation, and on technological developments in communication, transport and energy. These trends and developments also touch on the food-related business in the region (hereinafter referred to as the food cluster).

The food cluster is comprised of companies that produce, trade in and/or distribute food within the Wassenaar, Ridderkerk and Westvoorne triangle. This cluster is of great economic and strategic importance to the region. The volume of trade alone of the more than 6000 companies making up the Rotterdam food cluster is estimated to be 25 billion euros per year. Together, they provide 43,000 jobs. In addition to that, the cluster has a significant social role. It ensures that the inhabitants of this metropolitan area have access to healthy food while helping to resolve social issues on a global scale.

In practice, the food cluster consists of various business clusters, such as the horticultural companies in the Westland and the distributors in the vicinity of Ridderkerk. Each business cluster, in turn, operates within an industrial ecosystem which also includes suppliers and customers, for example.

Industrial ecosystems have various functions:

- The production and provision of goods and services (the primary ecosystem)
- A supporting function for the knowledge and labour ecosystems, which also include research and educational institutions
- A renewal function for the innovation ecosystem

A dynamic innovation ecosystem is needed for the transition to the Next Economy. This innovation ecosystem is an aggregate of companies, governments and institutions that bring about change but which can also undergo change themselves. Within these systems, companies realise their innovation agendas, new activities emerge and knowledge institutions and governments act as innovation catalysts.

Analogous to biological ecosystems, the food cluster ecosystem should resemble a tropical rain forest: a large diversity of life forms and a rich breeding ground lead to the continuous emergence of new life in the space that falls vacant as the ‘old’ dies off.

Challenges at the local, international and industrial levels

The process of metropolisation, the advancing individualisation and the attention to health and responsible food bring along with them new challenges for the food cluster. These are challenges that individual companies acting alone can only meet to a certain extent. Cooperation in innovation ecosystems is needed to continue to feed the urban region.

The feeding of the world’s population is another, much greater challenge. The potential economic and social gains that smart solutions can deliver are enormous. In addition to cooperation within the food cluster, an international orientation and the capacity to quickly scale up are also needed.

At the industrial level, the food cluster is faced with two challenges. On the one hand are the disruptive forces of innovation technologies and new business models that replace the existing production techniques and market positions of companies and business clusters. On the other hand is the ongoing distribution of knowledge which results in the shift of ‘old’ production to countries where land and labour are cheap.

Ambition: The MRDH as a trendsetter in the Next Economy

In order to be a match for the challenges mentioned, the food cluster should have three ambitions:

- To provide high-quality food to the metropolitan region in a safe and sustainable manner.
- To make a substantial contribution to the resolution of global food issues.
- To form a robust and innovative food cluster, with an attractive business climate which offers (new) employment opportunities and which is of added strategic value for the region and the country.
3 Principles for the development of dynamic ecosystems

For the development of a cohesive, dynamic structure of innovative ecosystems in the region, a unique approach is needed. This approach rests on four principles:

- cooperation in the Triple Helix
- an attractive business climate
- the leverage of investments among the Triple Helix partners
- continuous capitalisation of the dynamic.

Form and structure are not fixed, and they continue to emerge throughout the course of time. The form must be able to absorb changes, to be aligned with regional developments and to make it possible for the ecosystem actors to learn from and react to one another. A robust organisational structure and form of cooperation provide resilience and a future-proof RNE investment.

This results in the manifestation of three types of connection:

- connections between organisations and people on the regional, national and international levels
- virtual connections between materials, knowledge, information and capital
- crossovers between disciplines and domains.

4 Transition tasks

There is already a lot going on in the region. There are a wide variety of innovation projects and relationships between companies and knowledge institutions, collaborations that have often existed for years. Not only will this cooperation have to be brought to a higher level, but these relatively small ecosystems will also have to be linked with one another and with the RNE transition paths. Possible reasons for participating in this cooperation are the resolution of shared problems, the lowering of costs, the improvement of business processes and the ability to capitalise on opportunities.

We take, as our point of departure, the Rhineland cooperation model. This model includes the decentralisation of tasks and authorities to the ecosystems and self-organisation, which results in the emergence of collective ownership. The City of Rotterdam can then exchange the role of booster for that of facilitator. This involves harmonising internal municipal processes and instruments with the demand. And that requires made-to-measure solutions and the ability to handle diversity. It is also necessary to organise opportunities for the participants to meet one another and to strengthen their competencies. The diversity of the organisations involved requires a flexible incentive framework.

5 Organisation of the coordinating function

We advise organising the coordinating function on the basis of collective ownership. This may, for example, take the form of a city cooperative in which the Triple Helix parties participate. Creating a city cooperative requires the necessary preparation time. By setting up pilots which already operate according to the desired cooperation model, it becomes easier for the new partners/followers to participate in the cooperation after 2017.

Activities

There are diverse activities within the Triple Helix that can support and accelerate the transition. In the area of research, this includes formulating research questions and finding financing together with the business community. To disseminate knowledge to the companies, research findings must be ‘translated’. Examples of innovation can be presented via a knowledge bank. International conferences and smaller scale gatherings stimulate the mutual exchange of knowledge between scientists and with the business community. Participatory research, involving lecturers, students and employees, provides a knowledge impulse from the bottom up and promotes the dissemination of knowledge to the workfloor.

In the area of education, food-related questions can be included in programmes which do not normally focus on such topics. Educational programmes that are already concerned with food-related topics can increase their focus on innovation, and courses can be developed specifically for companies from the food cluster. New forms of education and the principle of ‘lifelong learning’ can contribute to the development of professional expertise.

Valorisation is the capitalisation of academic knowledge by incorporating this knowledge into the real economy. This can be achieved by allowing academics to bring the fruits of their research work, such as databases, concepts and innovative ingredients, to market and by opening a service point where entrepreneurs can come with requests for advice.

Finally, the coordinating and facilitating activities must link the existing (innovation) ecosystems, further stimulate entrepreneurship and promote innovation. This is possible by linking up existing innovative initiatives and by organising opportunities for starters, innovators and established companies to come together. Other facilities which can make innovation easier are living labs and digital platforms, such as the Digital Gateway to Europe from the RNE. And, better than anyone, the government could facilitate innovation and meeting places, make data accessible and deploy financing and legislative instruments. Moreover, the government can act as a trust broker and disseminate the ideas of the RNE and the food transition.
Foreword

Information and communication technology has brought about a third industrial revolution. The business community as well as knowledge institutions and the government (the Triple Helix) will have to adapt in order to prevent themselves from becoming irrelevant in the Next Economy, where knowledge, innovation and globalisation are at the fore.

The City of Rotterdam recognises that the food cluster in the Metropolitan Region Rotterdam The Hague is faced with the task of transitioning. That is why a consortium of knowledge institutions (Erasmus University Rotterdam, Wageningen University and Inholland University of Applied Sciences) was tasked with drafting an agenda for scientific research and with exploring the (im)possibilities of a transition policy.

You are now reading the result of that collaboration. Researchers and valorisation managers from the three knowledge institutions have formulated a research agenda and a realisation plan. The realisation plan explores the action points which can bring about the transition of the food cluster to the Next Economy. First, the ambitions and challenges on the local, international and industrial levels are described. After that, the plan identifies the principles and leverage for the transition to the Next Economy. Then, the specific transition tasks for the food cluster are elaborated. And finally, the development of a dynamic innovation ecosystem is given a practical dimension.

With the report, the three knowledge institutions provide both a panoramic view as well as concrete tools for research and policy implementation. The researchers recognise the need to mobilise the business community. After all, this mobilisation will have to actualise the transition in the real economy. It is for this reason that the report tries to align itself as closely as possible with the issues at hand and with the horizon of companies in the food cluster.

The researchers are pleased to take the next steps together with the partners in the Triple Helix—steps that help to create a food cluster which, due to its innovative capacity, can be a leader in the resolution of global food-related issues.

1 Introduction

Importance of the food cluster for the MRDH makes the strategic transition agenda urgent

Roadmap Next Economy

- Capitalising on climate change, the scarcity of raw materials and urbanisation
- Industrial revolution: communication, transport and energy

MRDH food cluster

- Economic and strategic importance
- Social role

Rotterdam Food Cluster

- €25 billion volume of trade
- €2.4 billion in added value
- > 6000 companies
- > 43,000 jobs
1.1 The Roadmap Next Economy and the MRDH food cluster

The Roadmap Next Economy (RNE) is an investment programme with which the Metropolitan Region Rotterdam The Hague can optimally anticipate global trends, such as climate change, the scarcity of raw materials and urbanisation.

Global trends, such as climate change, the scarcity of raw materials and urbanisation, change our society and our economy. Under the influence of technological innovations, an economic transition is now taking place which is being characterised as an industrial revolution. In the areas of communication, transport and energy, interrelated, simultaneous changes are occurring which collectively lead to what is called the Next Economy (Rifkin, 2016).

The MRDH food cluster will also be obliged to develop a strategic agenda and to organise itself in such a way that it can keep pace with this transition and even, by assuming a trendsetter’s role, to direct and accelerate this transition.

The food cluster is of economic and strategic importance for the metropolitan region and also plays a significant social role. However, the metropolitan region is also vulnerable (OECD, 2007). The transition to the Next Economy brings with it great challenges with respect to local and global food provisioning and the economic activity of the food cluster.

Economic and strategic importance and the social role of the food cluster

The annual volume of trade alone in the Rotterdam Food Cluster is estimated at 25 billion euros. The added value that this generates is estimated at some 2.4 billion euros. Given this, a sum can be made of the strategic value of the food cluster for the Dutch economy. This strategic value is threefold: (1) derived economic activity for suppliers, (2) innovation by companies in the food cluster drives innovation elsewhere in the logistical chain and (3) the international allure of the food cluster (in particular, that of horticulture) contributes to the positive positioning of the Netherlands.

The social role of the food cluster relates to its role as a source of employment opportunities and local food provisioning. The Rotterdam Food Cluster consists of more than 6000 active companies, which collectively provide for 43,000 jobs. These companies include a relatively large number of SME’s. As a rule, SME’s have a intensive relationships with local communities, as opposed to the relationships that large commercial groups have with them. The preservation of opportunities for employment and development, as well as the quality of labour, is of vital importance for a metropolitan area. Unemployment, despair and bleak and unhealthy working conditions have a direct effect on the well-being of the inhabitants of a metropolis.
1.2 EUR/WUR/IH starting memorandum

Ambition of the client
- dynamic, food cluster ecosystem
  - development of a new, sustainable business models
  - the advancement of economic growth and social goals

Task: starting memorandum
- exploration of innovation and valorisation agendas
- possibilities for realising the initiative in the Triple Helix

Two workflows

Workflow A: Research agenda
Erasmus University Rotterdam:
- Dr. W. (Wim) Hulsink (RSM)
- Dr. R.M.A. (Rick) Hollen (INSOPE / ERBS)

Wageningen University:
- Prof. Dr. J.M. (Jacqueline) Bloemhof
- Dr. E.F.M. (Emiel) Wubben

Inholland University of Applied Science:
- Prof. Dr. O. (Ola) van Kooten
- G. (Gerry) Kouwenhoven, MBA

Workflow B: Realisation plan
- Drs. W. (Woody) Maijers (Inholland)
- Dr. Ir. V.P.P. (Guust) Swarte (WUR)
- Dr. N.P. (Niels) van der Weerdt (EUR)

1.3 Definitions: clusters and ecosystems

The MRDH food cluster, in essence, is comprised of companies that produce, trade in and/or distribute food within the Wassenaar, Ridderkerk and Westvoorne geographic triangle.

This broadly defined ‘food cluster’ consists of various business clusters with a specific combination of economic activity and location. Horticulture in the Westland, transport companies in Ridderkerk, storage and transshipment companies around the Port of Rotterdam and the commercial enterprises in Spaanse Polder are a few examples of these business clusters.

In addition to these, various industrial ecosystems, which usually cross sectoral and regional borders, are also part of the MRDH food cluster. An industrial ecosystem is a community of organisations and individuals (with a certain local bond) that develops, produces and consumes goods and services (Jackson, 2015). Users and consumers are therefore part of the ecosystem, as are suppliers, lead producers, or ‘keystone firms’, competitors, knowledge institutions and other stakeholders.

In a broad sense, the entire MRDH is one, large ecosystem made up of diverse business clusters. In the strict sense, an industrial ecosystem is the network of suppliers, consumers and complementary companies situated around one focal enterprise. In that sense, the metropolitan region contains a large number of interrelated ecosystems.

An ecosystem has three functions: the primary function (production, trade and distribution of goods and services), the provision of knowledge and labour (the supporting process) and innovation. Within an ecosystem, cooperative partnerships may be focus on one function only, or they may comprise several functions at once. Although we consider the Rotterdam The Hague Metropolitan Region specifically in the case of the food cluster, the industrial ecosystem is not by definition limited to the region or to food-related commercial activities.

When we speak in this report about a dynamic innovation ecosystem for the food cluster, we are speaking of an organic whole of diverse, innovation-oriented, Triple Helix collaborations in which one or more food-related company is central.

- Although the focus in this definition is on companies, this does not exclude governmental institutions, knowledge institutions or other organisations from playing a leading role in these ecosystems. The realisation of (new forms of) economic added value, however, belongs to the domain of the commercial business community, and so we make it our focus here.
- With the phrase ‘organic whole’, we make clear that an ecosystem is not a static system. Ecosystems can develop spontaneously or in accordance with policy, and they grow and evolve along with (co-evolution) the companies, institutions and consumers that belong to the system and along with other ecosystems. An ecosystem can also ‘dissolve’ or cease to exist.
- The focus here lies specifically on a dynamic, innovative ecosystem: dynamic in the sense that the goal is to develop lively ecosystems with a great deal of activity, and specifically, an innovation ecosystem—an ecosystem in which existing enterprises develop and realise (at an accelerated tempo) their innovation agendas and in which new companies can arise and reach maturity. An ecosystem in which knowledge institutions bring forth knowledge that is state-of-the-art and which answers the fundamental questions that the transition to the Next Economy presents to them. An ecosystem that provides employees who have the knowledge necessary to allow innovation to happen. And an ecosystem in which the government removes barriers to innovation and can act as a catalyst.
The food sector: Abundant career opportunities

Research: For high-quality and safe food
The analogy with a biological ecosystem
A biological ecosystem is a system in which all of the living organisms in an area as well as all of the physical elements in that area act together as one unit. The system is characterised by one or more states of equilibrium. A state of equilibrium can be defined as a relatively stable set of conditions that maintains the exchange of nutrients. In this ‘exchange’, energy is transferred from one element to the other: calories are burned when predators digest their prey, and when plants die and decompose, their energy is transferred to the earth where it is taken up again by other plants.

In an industrial ecosystem, it is not biological energy, but economic value, that is exchanged. The goal of an innovative ecosystem is to facilitate technological innovation and the development of new business models. An innovative ecosystem has two, more or less distinct ‘economies’. On the one hand, there is the research economy, which is focussed on fundamental research and, on the other hand, there is the commercial economy, which concentrates on market transactions. The designs of these economies are often weakly linked. It is true that the research economy receives its funds (directly or indirectly) from the commercial economy, but it must also be able to freely operate in order to be able to make innovative discoveries (Jackson, 2015).

2 Challenges and Ambitions

Challenges
- The new needs and values of consumers
- Scarcity on a global scale
- The revolution and evolution of industries
  - Creative destruction leads to new technological applications and new business models
  - New production techniques preserve production capacity for the Netherlands

2.1 Challenges at the local, international and industrial levels

The new needs and values of consumers
The process of metropolisation itself is accompanied by a logistical challenge (see research domain 2). Coupled to the changing needs (domain 3) and values of consumers (domain 4), this challenge grows to reach enormous proportions. Up to a certain extent, individual companies and start-ups can provide solutions to these challenges. However, the mutual dependencies within and between process chains are so significant that the solutions must arise, in large part, from within the ecosystem. That is why cooperation in innovation is essential more than ever before.

Scarcity on a global scale
Feeding the world’s population is another, even greater challenge. Solutions that are developed within the food cluster can have a worldwide impact. This applies not only to the potential profits which can be generated by these solutions but also to social profits. Solutions like this require not only cooperation within the food cluster, but they also require an international orientation and the capacity to scale up.

The revolution and evolution of industries
An industrial revolution radically changes our society. Revolutionary new manufacturing, communication and transportation methods initiate a sweeping process of creative destruction. The profits and market shares of companies and sectors based on ‘old’ techniques are eroded as soon as the society adopts new value propositions which have been made possible due to innovative techniques (Schumpeter, 1942). These new value propositions are generated by new and by existing enterprises. In the latter case, these established companies ‘cannibalise’ their traditional sources of income and that makes the challenge for them extraordinarily difficult (Christensen, 2001). The impact of an industrial revolution can reach even further and make entire business clusters disappear and others arise (Malone, 2002).

Parallel to the transition to the Next Economy, the continuous diffusion of knowledge will also lead to those production processes that are based on fully mature technologies moving to countries with lower factor costs (especially, labour and land). That process is already occurring and is, to some extent, inevitable. Besides the risk of being surpassed by new technologies and business models, the region also runs the risk of being ‘hollowed out’. The margins on products decline once the industry enters maturity, and ultimately production, in its entirety, will relocate. New production techniques can keep the production in the region or call it back from outside the region, since these new techniques reduce the relevance of the cost of the labour and land production factors.
2.2 Ambition: The MRDH as a trendsetter in the Next Economy

- Safe and secure food provision for the MRDH
- High-quality food and sustainability
- Substantial contribution to global food-related issues
- Robust and innovative food cluster

Many of the global goals for sustainable development are agri-food-related. As the second largest exporter in the world, the Netherlands, with its substantial knowledge and expertise, can contribute significantly to achieving these goals. At the fore, of course, is the realisation of these goals within the metropolitan area.

The ambitions of the metropolitan region, as a trendsetter, to give shape to and accelerate the development of the Next Economy has an effect on the metropolis itself but also on global issues. That is why a robust and innovating food cluster is essential.

Safe and sustainable provision of high-quality food for the metropolitan area

Of primary concern are food safety and security. The challenges of providing a growing and ever more complex metropolis with safe food have been adequately resolved. Besides that, new solutions are continuously being presented for the purpose of fulfilling specific consumer needs related to convenience and experience, price and availability.

High-quality food provision stands for sustainability and the quality of the food.

Substantial contribution to the resolution of global food issues

Resource productivity and the export of solutions are areas in which a small country can act big.

Food-producing companies are achieving increasingly higher production levels per unit of consumed resource (minerals, water, energy, labour and land) and are increasing the added value of food. This, in turn, contributes substantially to global food production, despite limited acreage.

The production, processing and distribution of food occur more and more efficiently, which means that resources are being utilised with maximum sustainability. At the same time, the food cluster is becoming increasingly more knowledge-intensive and requires more and more high-quality labour.

As the Netherlands is now known for the export of its knowledge about water management and the management of airports, the Netherlands of the future will also be (better) known as a source of knowledge and concepts related to food, food-related industry and the development, for example, of circular ecosystems.

A robust and innovating food cluster with an attractive business climate which offers (new) employment opportunities and which is of added strategic value for the region and the country

Robust: The cluster has at its disposal specific resources (knowledge, networks, reputation) which are not easy to imitate and which are capable of absorbing social, market and technological changes.

Innovating: The cluster is capable of repeatedly (partially) rediscovering itself, assuming a new role, developing new value propositions and generating and valorising new knowledge.
Attractive business climate:
New employment opportunities: low-quality jobs will partially be replaced by robots or will be relocated to countries where wages are lower.
- The innovative dynamic in the food cluster continuously generates new types of jobs for which people are quickly and effectively trained;
- The food cluster has the capacity to meet the need for (continuing) education in a timely manner. This need arises because the work in existing jobs is becoming increasingly more knowledge-intensive and, along with that, of a higher quality;
- A constructive dialogue between partners on the labour market leads to the modernisation of labour organisations and relations (social innovation).

Added strategic value: The direct and indirect contribution to the competitiveness of the Netherlands grows because
- the transition of the food cluster to the Next Economy provides an impulse to the transition of other sectors (co-evolution);
- innovations are valorised on the international market (export of knowledge and concepts);
- supply companies ride along in the slipstream of the international network of the food cluster and realise growth in exports, and the appeal of the region increases for international businesses and knowledge worker.

3 Principles and Leverage

Principles and Leverage

Principles
- Cooperation in the Triple Helix
- Business climate that cultivates diversity
- Leverage: one investment invites the next (international) investment
- Dynamic process: embrace uncertainty for a durable future

Leverage
- Local position of the cluster is valuable
- Virtual cluster: utilise the international network of companies
- Crossovers: synergy between disciplines and sectors

3.1 Four principles for the development of dynamic, innovative ecosystems

There are four principles which are of interest to the food cluster in the transition to the Next Economy.

1 The principle of cooperation: In a complex society, cooperation is essential. First and foremost is the Triple Helix of companies, education, research and government. In addition to the Triple Helix, cooperation between sectors which stimulate each other to innovate is also important. Where different disciplines meet, the necessary innovation arises.

2 The principle of an attractive business climate: The interdependencies that arise are also called ecosystems. Vital ecosystems need a favourable environment to thrive. In this region, these conditions can be compared with a favourable business climate, not only for companies in the sector but also for research and educational institutions and crossovers with other sectors. Relying on a single ecosystem is a significant risk when unexpected developments arise. Therefore, diversity and respect are needed for the sustainability of vital ecosystems in the region.

3 The principle of leverage: Every investment must be an impetus for another entity to also invest and to join in. The Metropolitan Region Rotterdam The Hague is a “global player”. Ensure ecosystems that have world-wide relationships and participants, including international companies and collaborations with international networks of universities and research centres.

4 The principle of dynamic processes: The future is uncertain. In the course of time, adjustments will be made to any agenda. There are various entities which are important in turns and at different stages. They have an influence on the agenda. Credibility is a priority when setting the agenda, as are support and the necessary motivation for working together toward a durable future in the Next Economy.

Foundations

Much research has been done into the success of clusters, their origins and the extent to which clusters can be forced to develop in regions. Clustering appears to be one of the keys to economic growth. Cluster development is a dynamic process that is influenced by a number of internal and external factors. Examples of these factors include the presence of qualified personnel, the presence of well-functioning networks and the presence of competition. These are the same factors that play a role in business location policies.
Innovation: Vertical farming

Innovation: Use of drone in agriculture
Most clusters are not anticipated or planned. From the perspective of regional planning, it does not appear to be possible to build up a cluster from its inception. This accentuates the need to work in cooperation with established networks. Various studies indicate that governmental policy can positively stimulate existing clusters.

Well-functioning networks and competition are indicative of a dynamic balance and a continual process. At that point, we no longer speak of clusters but of ecosystems. Studies also show that building clusters is not so much a construction process as it is a people project. The building and nurturing of relationships and trust are essential in this.

Clusters arise from various considerations, but they always have an economic basis. Without this basis, clusters cannot long maintain the rationale for their existence.

There are clusters that come into being due to the increased transaction costs and efficiency of an organisation when this organisation cooperates and works in the immediate vicinity of one or more other companies. (Marshallian clusters)

Other clusters arise because the provision of all kinds of goods and services comes into being around one dominant party. These clusters are highly dependent on the welfare of the dominant party. During times of transition, the region where the cluster is located is very vulnerable. (Hub and Spoke clusters)

Yet another type of cluster arises where the business climate is favourable. Non-native companies establish a branch within these regions. They bring with them prosperity and attract other companies. (Satellite clusters)

In practice, these types of clusters will overlap. What is notable is that, counted over the years, companies in a cluster region continue to exist longer than isolated companies.

In the long-term, these clusters only remain successful if the public structure in the region is sufficient and if the region is sufficiently capable of allowing innovation by means of start-up companies and entrepreneurship.

In fact, the region must be able to transform itself into a more dynamic and diversified regional economy. The latter is also a pre-condition for a region developing sufficient resilience to successfully handle changes in the society and in the world around us.

The resilience of clusters is related to:
- the degree to which changes can be absorbed, while the structure and functions within the region remain intact;
- the degree to which the region can reorganise itself;
- the degree to which the region can learn and the degree to which it possesses the capability to adapt itself.

Resilience is one answer to the uncertainty and risks involved in the future and the capacity to adapt to new situations. Resilience is developed by strengthening the innovative power in the region, by permanent learning and trade and by having a modern and productive infrastructure, a diversified palette of branches within the region and qualified personnel.
3.2 Three levers for the successful development of the cluster

In studies into the success factors of regional clusters, possession of a strong current position and possible leverage effects are almost never mentioned. There are several examples of clusters, such as Emilia Romana (clothing), Idar Oberstein (semiprecious gems), Aalsmeer (flowers), the Bollenstreek and the Westland, that have acquired a certain position and for which this position alone continues to exercise an enormous power of attraction. (This is the place to be.) The sustainable success factor here is that both demand and supply are greatly benefited by concentration.

In various sub-domains, the Metropolitan Region Rotterdam The Hague already has a clear-cut international dimension, with its world-class port, world-class politics and world-class commerce. It is interesting to take this position as a point of departure for cluster formation, with all of its associations that are now active.

In order to utilise these active associations, the enduring question is whether or not they have sufficient resilience and adaptability to be able to handle transitions.

A second aspect of leverage is that clusters and regions can also be virtual. Just like an international company with branches all over the world, a cluster can have an outspoken international dimension and connections all over the world. If the trade flow and the knowledge flow go hand-in-hand in these connections, then a strong synergy is created.

A third aspect of leverage is the synergy that arises with crossovers. Various disciplines that reinforce one another, such as logistics and ICT, can have a positive influence on the productivity and volume of the food sector. And, in the opposite direction, logistical challenges and tasks from the food sector attract innovative applications and new markets for logistics and ICT.

4 Transition tasks

Transition versus control

A transition

- is the shift from an initial dynamic equilibrium to a new dynamic equilibrium.
- is characterised by fast and slow developments as a result of interacting processes.
- involves innovation in an important part of a societal subsystem.
- can be evolutionary, meaning the outcome is not planned to any significant extent.
- can be goal-oriented (teleological), meaning that (diffuse) goals or visions of the end state are guiding public actors and orienting the strategic decisions of private actors (Kemp and Rotmans, 2001) (Loorbach, 2006).
4.1 Transition versus control

Transition processes, by definition, cannot be managed, but preferred orientations can be fostered (Kemp and Rotmans, 2001), taking into account the 4 development principles.

Growth of cooperation from plateau one to plateau three of four is a process that takes several years and one which requires having several different irons in the fire at the same time. Therefore, several areas of special interest are essential (Ten Have, 2015):

1 Rationale: What are the motivations for the change? The dot on the horizon with shared values within the ecosystem.

2 Effect: What is the (intended or possible) effect of the change on the various involved parties, in the short- and long-term? Displaying what has been achieved is stimulating and attractive.

3 Focus: How (and to what extent) can and should behavioural frameworks, circumstances or stimulus conditions be designed in order to control and achieve change? Adaptive utilisation. Aligning with the change.

4 Energy: How (and to what extent) can and should inspiration, knowledge and skills, commitment and resources be brought to a level such that the change can and will be realised? Bringing together energies is stimulating.

5 Alignment: In what way can the first four core elements, with the questions stated explicitly, be optimally or productively linked to one another (alignment)? This relates to the way in which (and the extent to which) alignment with and control of the change process can be shaped.

Alignment of the aforementioned areas of special interest among the Triple Helix partners is very important, not only substantively but also with regard to time (companies work with a 3 to 5-year horizon, governments with a 5 to 10-year horizon and the RNE with a horizon > 10 years). How can the larger narrative be aligned with a company or with an employee?

4.2 Adaptivity: After step 1 comes step 1

- The ambition of cooperation in the ecosystem is situated on plateau 3 or 4.
- The current cooperation in the food network is situated on plateau 1 and in the Greenport on plateau 2.
- There is no definitive starting point or ending point, no beginning and no end.
- Each action leads to another change or to adjustments to the areas of special interest; in other words, after step 1 comes step 1.
- There is no project or programme.
- But instead, there is an alignment of energy (resources) based on shared values and shared constraints.
- The actors work autonomously and seek each other out where value is to be gained from such interaction.

Continuous adjustment and mutual influence are the notions behind the lemniscate. There is no beginning and no end. Each action leads to another change or to adjustments to the areas of special interest. The organic growth and change occurring within the network challenges the lead partners to continuously change their approach—after step 1 comes step 1. And, as a result, there is no mention of a project or a programme but of an alignment of energy based on shared values and limiting conditions. Within this, the actors work autonomously and seek each other out where value is to be gained from such interaction. Each actor acts from his or her own position and engagement to the ambitions, and through these actions stimulates the development of the ecosystem. Actors who do not remain engaged will no longer have a rationale for their existence, because alone they cannot survive or start a new innovative ecosystem. This occurs autonomously.
Ambition and cooperation on plateau three or four means that the strategy of the actor is aligned with that of the ecosystem. The cluster strategy is in line with one’s own strategy (and vice versa). The cluster-supporting systems are integrated. Shared services are established for the provision of supporting services. The performance of one’s own company (network) is demonstrably improved. Personnel are exchanged with the goal of knowledge development within the chain. Core competencies are well-known throughout the chain. Investments are made in shared services and systems (information, money, knowledge, hardware and resources). The performance of the cluster is benchmarked with other clusters throughout the world. The cooperation in the cluster can take place in conjunction with all company processes: R&D, purchasing, production, marketing, distribution, finance, HR etc.

Where do we stand now? The food clusters now work together on plateau 1 and in the Greenport on plateau 2. The characteristics of this include (INK- Instituut voor Nederlandse Kwaliteit - Dutch Quality Institute) that there is not yet a director active in the cluster. Themes for cooperation are based on opportunism. Personal contacts play an important role in the engagement with problematic issues. Talents or qualities of other actors are not utilised for achieving a good result. Knowledge, technology, information and money target the optimisation of the actors’ own performance. One’s own contribution to the cluster is not evident in the total result. Little is learned within the network, and the wheel is often reinvented. In cooperation on plateau 2 (for example, the Greenport Westland-Oostland and the Food Inspiration Academy (FIA)), structural-operational consultation takes place between the links in the chain. Some industry actors make agreements with one another about cooperation in the long-term. Greenport Westland-Oostland has done so with the following ambition: “To be the pre-eminent international horticulture cluster in the world, the Greenport aims to be the international interchange for technological and business innovation.” (Vision statement Greenport Westland-Oostland, 2015). The actors have been identified, and the added value of the actors has been mapped out. When setting strategy, information originating from the cluster is utilised. Contact persons are identified for the purpose of exchanging information about the partners’ choices and business processes, and the first exchange of knowledge occurs. An example of this is the FIA, where food companies and the Lentiz Educational Group have taken the initiative together to create an operator training programme.

Possible growth scenarios in which companies can take the lead include the following:
• Solving shared problems which fall outside of the cluster
• Shared cost savings and efficiency improvements
• Improvements in the quality of business processes
• Capitalising together on opportunities in the market

There are various imaginable growth scenarios in which the energy from companies is the guiding principle:
1 The resolution of shared problems which lie outside the cluster (rules, business location policies and infrastructure (transport and communication)). For example, regulations related to the exchange of information between devices, or the Internet of Things.
2 Shared cost savings and efficiency improvements. For example, logistics, information exchange, shared services and the collective purchase of sustainable energy.
3 Improvements in the quality of business processes. For example, R&D processes and the quality of labour/talent.
4 Capitalising together on opportunities in the market for sales and purchasing and the attraction of knowledge, talent and capital. For example, trade missions and the development of the Lely Campus for start-ups.
The complexity increases from plateaus 1 to 4. The sustainability of the connections in the ecosystem also increases. A good example tends to be followed. In ecosystems, real life examples are important. Principles from the Rhineland cooperative model can be applied by the City of Rotterdam to stimulate development. For example, tasks and authority can be decentralised to give committed civil servants the space to be able to act entrepreneurially and to assume leadership roles focussed on facilitation and inspiration, and primary processes can be organised in such a way that they support the strengthening of the cluster.

That means that from the perspective of the innovation of a company and cooperation in the cluster, the primary processes of the municipality and other supporting actors, such as the MRDH, education and research, are focused on the demand from the cluster. This requires a reversal of the internal processes so that they are aligned with the demand. Consider the following example. When the innovation line (see Figure 6, Valley of Death) is followed, various demands and needs arise: knowledge, talent development, financing, locations, adaptation of regulations during implementation etc. Policy instruments are made available and utilised at the moment that the need arises. So, not the traditional opening of a subsidy scheme in which the optimisation flows forth from the instrument and/or from the organisation but an opening (made-to-measure) when it becomes necessary. This made-to-measure opening may include a cascade of instruments (subsidies, permits, network meetings, knowledge agendas, trade missions etc.) which are attuned to the specific development stages of the ecosystem. Given that several ecosystems in the region are developing simultaneously, this requires employees that are in direct contact with one another and that have the authorities to act (within frameworks, of course) which extend throughout the cooperating departments.

The snowball effect principle can work well. By facilitating the right nucleus in the ecosystems, the nucleus with the capacity to unite others, other actors can also grow within the cooperation. This can occur if the municipality commits to the dot on the horizon and commits temporarily to the leader with an eye for the dynamic (leaders come and go). After all, the ecosystem is continuously developing, and new leaders come forward with new demands, but also with a view to new, developing ecosystems which require support.

5 Transition agenda

5.1 Development of a dynamic innovation ecosystem

The Rotterdam Next Economy has identified five transition paths:

1 Toward zero marginal cost
2 Toward zero carbon
3 Toward zero waste
4 Toward greater economic productivity
5 Toward an inclusive economy

All of these paths are relevant to the food cluster and are high priorities on the agendas of the companies and the consumers. Lifting the cooperation in the innovation ecosystem to a higher level (plateau) is necessary in order to realise the ambitions in the paths. The Triple Helix partners are working on solutions in an integrated fashion. No one can do this alone. Because many Triple Helix partners work every day on parts of the agenda, raising awareness of the need for this work is often unnecessary. Although facilitation of the process to remove those bottlenecks which the parties cannot resolve, either by themselves or bilaterally, is necessary. The complexity of our society requires forms of ‘self-organisation’ (Eijnatten, 1998).

Self-organisation is the spontaneous emergence of new structures and new behaviours. These forms of organisation develop quickly and have internal feedback loops which provoke reactions. In this ecosystem, the actors have a high degree of consciousness and connectivity, but there is also a high degree of network disintegration and dissipation. Another characteristic is that the outcomes are not known in advance (‘indeterminacy’) and that surprises are constantly occurring (‘emergence’) (Eijnatten, 2003).

For the development of a higher level of cooperation in the innovation ecosystem, it is important that:

• spontaneous (organisation of coincidence) introductions arise based on the alignment of ideas (idea sex (Homan, 2005)).
• successful solutions are copied in quickly changing external circumstances and that improvements are implemented incrementally. (The horticultural cluster has grown based on this.)
• competency (fitness) is developed in order to remain competitive.

Facilitation of the capacity for self-organisation leads to the sustainable acceleration of innovations. The dot on the horizon helps with this but also requires the actors (and their personnel) to let go and trust.
5.2 Incentives for the Triple Helix partners

The participation and commitment of the business community are essential for the development of an innovation ecosystem. However, the motivation to invest will be different for each company. Knowledge institutions, on the other hand, have completely different interests, and diverse organisations at the sector level and local governments will need separate incentives. In particular, the coupling between the research economy and the commercial economy requires a targeted and flexible incentive policy, so that innovative technologies and ideas are able to flow from knowledge institutions to the business community.

Start-ups: opportunities to bridge the ‘Valley of death’

Economic transitions, by definition, provide opportunities for new companies. The transition to the Next Economy exerts an exceptional power of attraction on many young entrepreneurs. In that sense, incentives for start-ups are not needed. Although the chances of success for these companies are increased with the right support. Financing and practical support for making it through the ‘Valley of death’ are especially important. Various incubators already provide sufficient practical facilities for starting enterprises. A specific network of food-related start-ups which populate these incubators can reinforce the mutual synergy. More importantly, though, are the opportunities to make use of research and development facilities.

The government can also play a role by making accessible as much data as possible. This allows opportunities to arise for new companies that realise new solutions and productivity improvements by means of the Internet of Things. Another role—that of customer—is reserved for the government. If governmental organisations are willing to take risks and to purchase products and services from new businesses, these companies can more rapidly achieve the scale needed to pass successfully through the start-up phase.

Small and medium-sized enterprises: development and facilitation of innovation agendas

For the most part, the capacity to independently carry out large R&D projects is lacking. Perspectives on various innovative ecosystems, such as the start-up community and the research institutions, are often limited. For these companies, innovation subsidies and the possibility to participate in research projects are interesting. This can be achieved by means of low-threshold access to the knowledge institutions and opportunities to network with innovative parties. The development of an innovation agenda and support for realising this agenda adds value in that SMEs can connect with one or more ecosystems and, in a broader sense, with the transition movement.

Large companies: acceleration of innovation agendas

Large, international enterprises have the internal capacity to develop and realise their own innovation agendas. If their presence in the region and their participation in the transition movement or in specific innovation ecosystems results in the acceleration of the realisation of their innovation agendas, this can be of great value. An attractive business climate is conditional, though, and the presence of or the power to attract highly qualified employees, in particular, is essential.

Knowledge institutions: the power to attract students and researchers

Knowledge institutions can be discussed in light of their twofold objectives: the gathering of knowledge and its dissemination. If participation in one or more innovative ecosystem means that these institutions gain access to unique data and insights, on the one hand, and that it makes them more attractive to students and talented researchers, on the other, then this participation is especially valuable for these institutions. Of course, money flows also play a role. More students mean larger education budgets and access to data, and the presence of prominent researchers will lead to more publications and greater opportunities for research subsidies.

5.3 Organisation of the coordinating function

The coordinating function in the transition process ought to be limited. Such processes can only be controlled with very large investments. And even when such investments are made, the sustainability of the innovation system remains to be seen. A few scenarios for network organisation are shown in Figure 7 (Folkerts, 2014).

1 Doing nothing: Doing nothing leads to competition and will only allow the parties to surpass their current capacities to a limited extent. The ambitions of the RNE transition agenda are not realised within the stated time frame.

2 Harmonisation: Harmonisation is the first step in the development of the partnership (not an end but a means). The coordinating function can perfectly well remain in the hands of the City of Rotterdam and the MRDH in the form of regular gatherings, master classes etc. In existing ecosystems, further coordination can support the resolution of urgent bottlenecks and the attainment of efficiency. Low-hanging fruit can be plucked without much effort.

3 Cooperation: Cooperation in the sense that a facilitating body (institute) actively brings parties together. This option is best combined with collective ownership (option 5). Examples of this include lobbies for specific issues, knowledge agendas translated into actions, the attraction of investors, CEO network events, HR research, political networks (regional and national) etc. There are various such structures active in our region (the MRDH, the Greenport Westland-Oostland, the FIA, ...).
4 **Contract:** A contract or public-private covenant can be created within which a common action and result agenda is agreed upon. This agenda is created with the input of each party and is aligned with their own core values. SMART objectives can be formulated for periods of 4 to 6 years, for example, with the option to extend the covenant. The benefit to the participants is long-term and stable, with clear-cut results. Cooperation occurs via naming and shaming. The disadvantage here is that the dynamic is significantly reduced, The focus is shifted to the agreed upon agenda (a sort of freezing of the development for a period) until the negotiations start for the next time period.

5 **Ownership:** Ownership entails the organisation of a PPP implementation organisation. All parties outsource, so to speak, the RNE ambitions to an organisation and invest X amount (proportional to the turnover, X euros per inhabitant etc.) in it. The responsibility is taken away from the actors, and large steps forward can be made with a targeted agenda. The literature shows that the sustainability of this type of network organisation is limited in the long-term and that it requires large investments.

**Preferred options for the coordinating function**

It is advisable to choose option 3 above:

**Cooperation.** Cooperation is defined by a facilitating body (institute) that actively brings parties together. This option is best combined with collective ownership (option 5). An example of this would be a municipal cooperative of which private and public parties can become members. A real-life example of this can be found in Groningen at www.gebiedscooperatie.info. There, 450 entrepreneurs, educational institutions, municipalities and NGO’s are members of this cooperative, and together they invest in a multi-annual agenda with the following goals:

- to increase and share the available knowledge from and amongst the members, to improve the quality of the management of the surrounding areas through a collective approach, to more (cost) effectively implement this management by means of a collective approach and to increase access to those (financial) resources which are available for the collective but not for individual members and which are needed to reach these goals.

The coordinating function is also broken down into several time frames:

1 **2016-2017:** Agenda creation and the evolution of the ecosystem to plateau 3. This can be achieved by means of targeted pilots which incorporate the ideas and inspire others to organise.

2 **After 2017:** Municipal cooperation takes the lead, and the municipality is an equal partner and makes appropriate investments in its own core values.

The mission of the coordinating function is to realise the RNE agenda by stimulating innovative ecosystems. It is an social enterprise, which begins as an activity and transforms into a legal entity whose profits are reinvested in the ecosystems.

The director does not sit in the individual members’ directors’ chairs but works for a forward leap in scale/plateau of and for the entrepreneurs and the city.

5.4 **Overview of activities**

**Research**

The relevant research themes are defined in Workflow A and are summarised elsewhere in this report. The organisation of the demand toward the research community and the dissemination of research findings to the business community is essential for a robust coupling between the research economy and the commercial economy.

**Articulation of research questions and financing**

Entrepreneurs from SME’s, in particular, receive support in formulating research questions that are relevant to them. They also receive guidance in searching for the correct (party within a) knowledge institution or in joining up with existing consortia of entrepreneurs and researchers. The possibility for collective financing of applied research (crowdfunding) and for participation in the acquisition of research subsidies is also in keeping with this activity flow.
Dissemination of academic knowledge
Research findings which are relevant to companies in the food cluster must be made available in comprehensible language and in an easily accessible manner. This refers to a translation to the practical sphere of literature and insights that are already available, as well as to the translation of new findings. The development of a knowledge bank with relevant case studies about innovation in food-related sectors (inspiring examples) can also function as a useful handgrip for entrepreneurs. The way in which knowledge is best presented is highly dependent on the type of company. Taking ‘entrepreneurial’ action is essential in this (find out what works well and what doesn’t).

The organisation of exchange
An active exchange of research questions and knowledge amongst scientists and with the business community requires organisation. To that end, existing international conferences (for example, the IFAMA World Conference) can be brought to the metropolitan region, and recurring, smaller-scale gatherings can also be organised. These gatherings can take the form, for example, of a symposium series (as a stand-alone event) or as a science café incorporated into larger meetings of the business community.

However, exchange does not only refer to exchange between researchers. Participatory research, which actively involves not only researchers but also lecturers and practitioners in the resolution of practical problems (applied research), not only provides an impulse of knowledge from the bottom up but also reinforces the direct dissemination of knowledge. Those who must use the knowledge which is acquired by research are then involved in the production of this knowledge. This results in that knowledge becoming more rapidly and more effectively internalised and valorised in the commercial economy.

Education: ‘Innovation in food’
In addition to the regular need for qualified personnel, special attention will have to be paid to the subject of ‘innovation’ within the educational system. This can refer to innovation of marketing concepts and business models, to social or organisational innovation and, of course, to technological innovation in various disciplines. In the cooperation between various knowledge institutions, such as the EUR, WUR and Inholland, there is a chance to utilise competencies and contacts which would otherwise not be available.

General educational programmes which do not normally focus on food
Existing educational programmes in which no attention is currently being paid to food-related industry or to specific issues in the food cluster can be stimulated to include these topics in the curricula of specific subjects. This can be achieved, for example, by offering case studies as teaching aids and by organising guest lectures (bring the food cluster to the college lecture hall) or by arranging for internships and study projects within the food cluster (bring the student to the food cluster).

Strengthen food-oriented education with a focus on innovation
Within the existing, food sector-oriented educational programmes, the curricula can be further reinforced with specific innovation themes. The transition to the Next Economy can serve as a guideline for this. In addition to substantive knowledge of innovation processes and the most innovative technologies, specific innovation and entrepreneurial skills can also be addressed.

Courses specifically for the food cluster
To convey state-of-the-art knowledge to employees and managers of companies in the food cluster, specific, open programmes can be designed. Programmes like these can target specific audiences within these companies and can focus on themes that are highly relevant to the food cluster. And, a course of instruction in applied business administration, in which general business knowledge is made specific for the food cluster, can be an impetus to innovative entrepreneurship.

Developing new forms of education
In addition to initial education, new forms of education are being developed in which institutions play an active role in innovation and in the teaching of innovation. In doing so, they contribute to the principle of lifelong learning and the continuous development of professional expertise.

Valorisation
Valorisation is the capitalisation of academic knowledge by incorporating this knowledge into the commercial economy. Valorisation can occur, on the one hand, by means of spin-offs from knowledge institutions – in those cases the institutions themselves use their knowledge to create enterprises – and, on the other hand, by having academics provide consultancy services.

Spin-offs from knowledge institutions
Spin-offs from knowledge institutions may be started up by academics or by students. Generally speaking, students will start a company based on an idea they have had during the course of their studies, while academics can also market a database, a model or concept, a technique or, for example, an ingredient. In doing so, they commercialise the fruits of their research work.

To stimulate spin-offs by academics, various barriers will have to be removed and specific facilities will have to be made available within the knowledge institutions, to the extent that these are not already available there. Barriers to this are predominantly situated in the space for entrepreneurship in employment contracts and in assessment systems.
The facilities referred to above relate to the provision of incubator services and investment capital (as is provided by Erasmus Research & Business Support, for example).

Consultancy services provided by academics
Academics – including lecturers and researchers at university colleges – are primarily focused on performing fundamental or applied research and on educating. The provision of consultancy services to the business community is underdeveloped. As a result, the knowledge, analytical skills and creativity of academics are not being optimally utilised by the business community. Besides this, entrepreneurs do not have a clear idea of what knowledge is available and where this knowledge is located.

A great deal of knowledge can be made accessible by setting up a service point for entrepreneurs where they can come with requests for advice and where consultancy trajectories can be supported. The service point functions as a first and last point of contact for entrepreneurs and oversees several knowledge institutions in order to bring the right researchers together.

The service point fulfils the following functions:
• The articulation of the question (What is the problem or the opportunity?)
• The recruitment of knowledge bearers (Who can solve it?)
• The making of contracts and project management (How are the interests of the client optimally served?)
• Support in knowledge delivery and transfer (How is the answer understood by the client?)

The costs of the service point are counteracted by the fees paid by companies for the consultancy services. The institutions supplying the knowledge receive the remainder of this fee (as an hourly rate, as a fixed payment per project or possibly on the basis of the results achieved).

Coordinating and facilitating
The coordinating function must consist of at least three elements: integration by connecting existing ecosystems, the stimulation of entrepreneurship and the facilitation of innovation.

Integration
A multitude of smaller ecosystems and incubators exist within the MRDH. By making an inventory of these local initiatives, by making them visible and by linking them to one another, where necessary, cross-pollination can occur and scale can be achieved (more impact).

Entrepreneurship
Facilities for starting companies that have added value for the food cluster can be strengthened. This can occur by developing new facilities or by organising specific space for food start-ups within existing incubators. This also applies to the ‘accelerator’ facilities which target the acceleration of the growth of start-ups that have proven themselves in the market. Either create new facilities or strengthen the focus on food business within existing ‘general’ facilities. Besides this, entrepreneurship is benefited by the exchange of ideas and contacts. Organise meet-ups where starters and innovators can present themselves to larger, established companies. Organise ‘idea challenges’ (such as the Rotterdam100, for example) where specific issues from the food cluster can be presented to a large group of potential issue-resolvers.

Facilitation
Facilitation here refers to the obvious activities such as the development of physical facilities for companies, in general, and for innovation, in particular. Examples of these physical facilities include company terrains, living labs, campuses etc. Facilitation also refers to the facilitation of digital platforms. In the Roadmap Next Economy, our region is referred to as the Digital Gateway to Europe. The transition of the food cluster will benefit from various sources of data being made available. This data can be used to develop new services for increasing productivity.

An exceptional role for the local government
The (local) government is not obliged, by definition, to assume the coordinating role. Although it can play a special role in various domains, for example:
• Facilitator of physical meeting places and places reserved for innovation (living labs)
• Trust broker (guaranteeing that parties act with integrity)
• Evangelist, by sharing best practices and successes
• By making data accessible by developing data repositories
• By making financing instruments available and adapting legislation

6 Summary of research agenda
6.1 Value of the cluster and its business climate

Strategic value and competitiveness

The economic importance of the cluster in which the Greenport and the Mainport work together has a quantitative aspect (volume of trade, jobs and food provision) and a qualitative aspect (contribution to the competitiveness of companies and the region and innovation).

- The regional factor and demand conditions?
- Quality network innovation-facilitating companies?
- Connection with clusters elsewhere and their added value?
- Contribution of cluster to international competitiveness?

Business climate of ports

The Port of Rotterdam and its surroundings are an important location for food-related companies. Consider the large variety of storage and transshipment services, production and commercial companies and (division) headquarters located there.

- What role do parties like Deltalinqs play in the business climate?
- How can innovation and modernisation of the food companies be advanced?
- What are the differences when compared to the business climate of the entire MRDH?
- How can obstacles to modernisation processes be removed?

6.2 Management of logistics and industrial networks

Optimisation through agri-logistical developments

The food cluster differentiates itself in the areas of links in the chain and in (international) market orientation. The metropolitan region combines manufacturing areas and urban areas with important ports and access routes, all of which are girded by strict requirements.

- What are the impacts of better harmonisation of production and consumption and controlled transport on waste?
- What are the logistical consequences of ‘closing the chain’?
- How can problems in the ‘last mile’ of delivery be reduced?
- What is the (future) effect of virtualisation and big data on trade?

Alternative ways of organising cooperative relationships

Multilateral cooperation is often difficult to achieve. It is difficult to expand, manage and organise distribution networks (CO2, heat) like these.

- How can multilateral cooperations and, therefore, mutual dependencies be better managed?

6.3 Food and individualisation

Citizens/consumers want more and more individual and personalised food. Consider, for example, single-person households, convenience foods, inexpensive foods, regional products, local foods and cultural foods. This shift has an effect on logistics and on the infrastructure in the city.

The consequences of this shift range from the bundling of demand by distributed IT systems to ‘food with a story’ from the farmer. The social consequences of the need for individuality versus the need for solidarity have not yet been fully comprehended.

- What is the effect of personalised food and target-group foods on the health and lifestyle of the inhabitants of Rotterdam?
- What are the contributions of alternative proteins (insects, algae etc.) and improved food crops to animal feed and other foods, to more sustainable agriculture and to a healthier society?
- How do we bundle long logistical chains with short chains? How do we effectively and efficiently couple the thick, bulk flows and thin flows from the Port into the city?
- What do the sustainable chains look like (crop cultivation without sunlight, feeding and greening the city, green roofs, the capture of fine particulates, urban farming and food-cultivating neighbourhoods)?
- How can the demand from the city be organised to have it arrive at the farmer in such a way that a new, direct production-consumption chain arises?

6.4 Food, health and well-being

The impact of food and eating on the happiness of the (un)healthy, socially (in)active citizen is significantly underestimated.

Food and well-being

Lifestyle, economic status and knowledge all play a role in this, but the accessibility of food is also a factor. Food activates and connects people.

- What is the impact of the arrangement of the neighbourhood on the lifestyles and well-being of its inhabitants (living labs)?
- What kind of nudging is needed to advance, for example, vegetable gardens and picking gardens and the idea of use over ownership (‘greening the city’)?
- Can cooperatives, expanded agriculture etc. contribute to this?
Food and ethics
The costs of healthcare rise because too many people do not eat healthily, or even know what healthy is, or are undernourished as a result of isolation. The foods with health claims may reverse the overall disease burden.

- What is an optimal food system (combi care, local producers, food awareness, healthy ageing in nursing homes)?
- How do we use food to reduce the vulnerability of specific groups?
- Should it be obligatory to add health-promoting substances to foods?
- Are we morally obligated to eat healthily and to exercise?

6.5 Food and entrepreneurship
The new entrepreneur offers convenience (Markthal 2.0), health (eating more fruits and vegetables), local products (products from the area/Greenport Westland-Oostland) and sustainability (sustainably grown, transported and processed, without waste). Greening the City tempts young people to once again fill the gardens with green. Animals in neighbourhoods stimulate activity, participation and a connection with nature.

- What opportunities are there for entrepreneurs in the circular economy?
- Can experimental gardens or living labs stimulate the start-up of social and/or sustainable enterprises and new, alternative logistical chains?
- To what extent do distributed IT systems (e.g. bitcoins) contribute to the innovation and development of food companies?
- How can plants contribute to a healthy living climate in the city?

Icons of successful entrepreneurship and cooperation
No less than three icons in this cluster radiate successful innovative entrepreneurship and effective cooperation: the Rotterdam Markthal, the Schiedam jenever industry and the horticultural cluster in the Greenport-WO.

- What is the allure and socio-economic impact of each of these icons on the entrepreneurial climate in the region?
- To what extent can their best practices contribute to a more successful and dynamic local/regional ‘food ecosystem’?

6.6 The dynamic of the agri-food ecosystem
As a result of increased specialisation (horticulture, commerce, ports, cities), we see highly segmented business and personnel networks. The networks in the food cluster are very heterogeneous when it comes to their size and independence.

- Is this sector truly innovative and robust enough to continue to provide the region and Northwest Europe with sufficient, reliable and affordable food?

The dynamic in the population of agri-food companies
Research into the competitiveness, innovation and modernisation of the agri-food cluster provides better insights into the dynamic of the population of companies in this cluster.

- How does our agri-food ecosystem develop?
- What is the impact of transaction costs, competencies and learning curves?
- What are the crossovers with other sectors, and what do they teach us?
- Will supermarkets survive online ordering and home delivery?
- Which relocations of critical activities can be expected?
- How do we shift more marketing, biochemical and biomedical knowledge to agriculture and horticulture?
- How do sectors consisting of mainly smaller, family-owned companies become more professional, with successors and new owners?

Resilience of food systems
Food safety here in the Netherlands is a matter of course. Food systems here and further afield differ greatly when it comes to adaptability and resilience in the face of food incidents.

- Which agri-food and healthcare policies (Healthy food) and which investments in food provision and infrastructure maximise the resilience of food safety systems?
- What are the benefits of the application of risk management models with respect to food for this region, and how could these models scan for and improve food risks throughout the world?

Emergence of bio-based/circular sectors
There is a great deal of activity around finding added value for old, established biomass flows; consider, for example, the upcycling of waste, colourant alternatives, biopharmaceuticals and biofuels. New physical and enterprise networks are needed.

- What aspect of the ecosystem can strengthen the bond between ports and their surroundings for the benefit of the bio-based economy?
- What are the next (circular) networks between commodity trading, horticulture, paper and the food industry?
- What kind of commercial potential is there in the MRDH for new networks for vegetable-based food components, green pesticides, health-promoting substances etc.?
6.7 Disruptive innovations and entrepreneurs

New agri-food business and business models

The creative destruction of existing facilities by disruptive innovations can also be seen in the food cluster. Consider, for example, meat alternatives, urban farming, 3D food printing and meal boxes.

- Who are the Teslas of agri-food in this region?
- In the mid- to long-term, what seem to be the winning business models, value propositions, earnings models and consortia?
- What are the social, economic and societal impacts of new food ingredients and disruptive business models?
- What is needed to support the new entrepreneur so that he or she can formulate a good proposition?

An alternative future for the food cluster?

Imagine that this cluster would disappear from this region in the same way that San Jose’s successful fruit cluster was replaced by Silicon Valley. This evolution could also happen to the horticulture industry, business headquarters and commerce and to the transshipment industry.

- What is it that anchors the industries to their home bases, and what are possible motivations for their de-location to other regions?
- How should the critical interdependencies of the food cluster be managed?
- What is Plan B for the new, up-and-coming sectors?

7 References

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A cooperation for the future of education in the food sector in the Rotterdam region—that is what was passed by Mayor Aboutaleb, the Provincial Executive of the Province of South Holland, and by representatives of Albeda, Erasmus University, Inholland University of Applied Sciences, Rotterdam University of Applied Sciences, Lentiz Educational Group, Wellant College and Zadkine at the signing of a collaboration agreement on 21 September 2016. As a result of new technological advancements and the desire to produce food more sustainably, the labour requirements of companies in the food sector are changing. With this new cooperation, the educational institutions are preparing for the future, so that educational programmes are aligned with the changing labour needs of the businesses in the food sector. This large-scale form of collaboration is unique to the Netherlands and Europe.
The signing of these five principles initiate a legally appropriate partnership:
The 21st of September 2016, Rotterdam

Cooperation for educational transition - Principles

With the signing of these 5 principles, the initial impetus was given to create an appropriate, legal partnership:

1. The focus of the partnership is a cooperation between knowledge institutions (secondary and higher education), companies and government agencies, and takes the form of an institute. Each knowledge institution contributes knowledge based on its existing identity and licences. Based on the stated objectives, the parties will further elaborate which form of cooperation is most effective for realising these objectives, both now and in the future, by means of research, education and valorisation. The institute contributes to the ambitions of existing regional collaborations, such as the Greenport, amongst others.

2. The “Food for the Future” research agenda and the realisation plan are the impetus for new business cases in the food sector.

3. The Metropolitan Region Rotterdam The Hague is the obvious region in which to implement the transition paths of Next Education (Roadmap Next Economy) for the food sector in the Greenport through the institute referred to in Article 1.

4. Research results and educational experiences collected in this collaboration are shared with the parties that signed the principles.

5. Innovation takes place on sectoral crossovers and within networks, to which knowledge institutions, companies and governments are invited to connect.
Ladies and Gentlemen,

On behalf of all of the research and educational institutions concerned, I would like to thank the mayor of Rotterdam for the invitation to present the start of our unique partnership for the food cluster, the entire seed and plant cultivation chain, from logistics, through packaging and storage. The food cluster is a key figure in the global market for the production and transport of food.

There was once a valley in Northern California called the Valley of the Heart’s Delight. The economy in this valley was blossoming—literally. Thanks to the many orchards there, this valley employed many people. Business was going well. Up until the 1960’s, more fruit was produced and packaged in this area than in any other region of the world. Nowadays, you probably couldn’t find any more fruit to pick from these trees, unless it was from the trees in the neighbourhood’s backyards. The food cluster in the valley has, for all intents and purposes, completely disappeared. And yet, you don’t hear anyone complaining. Because since the 1970’s, the valley has been transformed into America’s largest computer and Internet cluster, and probably the most innovative hot-spot on the planet. What was once called the Valley of the Heart’s Delight is now called Silicon Valley.

What can we learn from this story about regional economic transition? We, in this region, which is known, in part, for its food cluster with our world renown greenhouses and the Port of Rotterdam, can learn many lessons, in fact. One important lesson, for example, is that the future of every business cluster can bring with it dramatic changes but that these changes can also mean many economic benefits. I don’t think that we would find it so bad if the Rotterdam Food Cluster would transform into the new Silicon Valley. And yet, you don’t hear anyone complaining. Because since the 1970’s, the valley has been transformed into America’s largest computer and Internet cluster, and probably the most innovative hot-spot on the planet. What was once called the Valley of the Heart’s Delight is now called Silicon Valley.

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The research agenda states that we no longer focus solely on food technology but also on social and economic topics. We recommend researching the consequences of the increasing individualisation of food. For example, are there opportunities in the area of personalised food? We want to explore the non-financial value of food, such as the effects of eating and drinking on health, well-being and even on social cohesion. And, just as importantly, how can we repair the trust in the global food chain or develop alternative local chains with a smaller footprint? We recommend researching the dynamic of regional business clusters and disruptive innovation in general, and, more specifically, to look at the management of new types of logistical and industrial networks. Together, these types of research will lend us the insight we need to make new business propositions, which will allow us to stimulate the transition process on the regional level.

The innovation agenda revolves around the interplay of research, education and valorisation for converting new knowledge into value for the food cluster, as well as for the society as a whole. For this interplay, we must link people and organisations to one another, both locally as well as internationally. To do this, we need government and various knowledge centres and institutions are brought together.

An ecosystem with a rich, fertile breeding ground, where small-scale initiatives can grow and develop and which provides established companies with the opportunity to develop new technologies and to globally market new products and services.

The development of an innovation ecosystem like this in our food cluster requires initiative. And we must be grateful to the City of Rotterdam for taking that initiative and for bringing together these institutions. With our combined knowledge of food and entrepreneurship, we have created an agenda for research and innovation. This agenda is a first step toward a true transformation. I am happy to share with you a few of the points on this agenda.

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The innovation agenda revolves around the interplay of research, education and valorisation for converting new knowledge into value for the food cluster, as well as for the society as a whole. For this interplay, we must link people and organisations to one another, both locally as well as internationally. To do this, we need
virtual connections and connections between companies. But, above all, we must link the various smaller ecosystems that are already established with one another, thereby creating something that is greater than the sum of its individual parts.

This requires organisation and facilitation and, most importantly, an entrepreneurial spirit. An entrepreneurial spirit in companies, but also in policy-makers, academics and educators. In signing this declaration of intent here today, these seven research and educational partners demonstrate just such an entrepreneurial spirit. And with this entrepreneurial spirit, we also aim to inspire the students.

To return for just a moment to the lessons we can learn from the Valley of the Heart’s Delight, which is now called Silicon Valley—we must be prepared for change. Change on a regional, industrial level. Within our business clusters, we must develop a climate and infrastructure that offers support for innovation and growth. We must equip our students with the competencies that they will need tomorrow. Because we know for certain that the skills that were so important for the success of the current food cluster will remain valuable, but they will not be enough. Not enough for the new ideas that we need or for the way in which we cooperate, which are so characteristic of the new economy. We need 21st-century skills.

Erasmus University and the unique consortium of partners gathered here today are ready for the next step, ready to set all of this in motion. We will mobilise our common resources and our international network of experts. Because together, we can create the right climate for innovations and plant the seed of innovation in the heads of our students. In fact, we will begin immediately, this afternoon, with a master class here in this hall for the students of all the participating institutions. And now I would like to invite my co-signatories to sign the declaration of intent, together with me, to authenticate our partnership.

Speech delivered by Drs. B.J.H. Straatman
Erasmus University Rotterdam
Signing in the historical Burgerzaal at the Rotterdam Town Hall

The signing of the collaboration agreement took place on 21 September 2016 during the Eurocities Directors’ Conference in the presence of various officials from the EU, the Dutch National Government and the Metropolitan Region Rotterdam The Hague.

150 students participate in the ‘Food for the Future’ lecture: abundant career opportunities in the food sector

The ‘Food for the Future’ lecture took place on the occasion of the signing of the collaboration agreement on 21 September 2016. The lecture was held in the historic Burgerzaal in the Rotterdam Town Hall. Led by Honorary Chairperson Marijn Frank, TV presenter of Keuringsdienst van Waarde, students of the participating educational institutions were taken on a trip to the future of the food sector.

Prominent speakers from the sector invited the students to join in their endeavours in the food sector to make the difference in global food-related issues. The food sector is interesting for the students because of its international character and the career perspectives for professionals within all disciplines. After the lecture, the students were given the opportunity to become acquainted with the entrepreneurs in attendance to discuss their individual career opportunities.
Albeda has signed the agreement and by doing so acknowledges the strategic and economic value of the food cluster in the Rotterdam-Rijnmond region. The food cluster also provides an experience, a feeling of happiness and social cohesion. Our educational programme in Catering & Tourism (Horeca & Toerisme) trains students in the area of Bread & Pastry (Brood & Banket) and various other professions in Catering and focuses on these experiential aspects. But there are also interesting links to the food sector within the Healthcare, Welfare and Retail programmes. We are going to contribute to the realisation of this agreement within all these sectors.

Food for thought! Good food is essential for the healthy future of the urban environment in which we live here in the Randstad. But also internationally, it is one of the most important food-related issues. With applied research and good educational programmes, the educational system can contribute to these issues. With these programmes, we can ensure a vital region and the strengthening of our export position. Cooperation between companies, knowledge institutions and the government is needed to be able to invest in these issues. Inholland continues to make contributions to this ambition.

All signs point to the fact that we are headed toward a new phase in our history. This offers opportunities for the Netherlands and for our region. We add value to large, global issues, such as food scarcity which results from the enormous growth of the world population in coming years. The requirement is that we respond on time to this new economy. And… that governments, companies and knowledge institutions can look beyond the borders of their own capabilities and come together in collective action. Companies play a crucial role in this—they are closest to the demand from the market.

The secondary vocational education system can only function optimally with good input from the business community and from the government. Working together on the social issues of today and those of the future is decisive for the education of our students. After all, they are the next generation who will come face-to-face with the challenges of the Next Society and the Next Economy.

Zadkine makes great efforts in connecting with the business community. That is why, in addition to education, we organise a separate primary process called “Connecting”. In a quickly changing world where traditional business models are no longer the standard and where the market requires flexibility and creative employees, it is essential that, together, we provide direction when it comes to the developments that are taking place in the region. To be able, together with the business community and the education partners, to fulfill the demands of tomorrow is a fantastic challenge!
Do you have any questions, comments or suggestions about the contents of this book? Would you like to remain informed about the progress of this initiative? Would you like to contribute to the consideration of the lines of research or their implementation? Do you have a case study in your company that can be tackled by a team of students? If so, please contact Sharon Janmaat at sj.janmaat@rotterdam.nl.

www.rotterdamfoodcluster.com