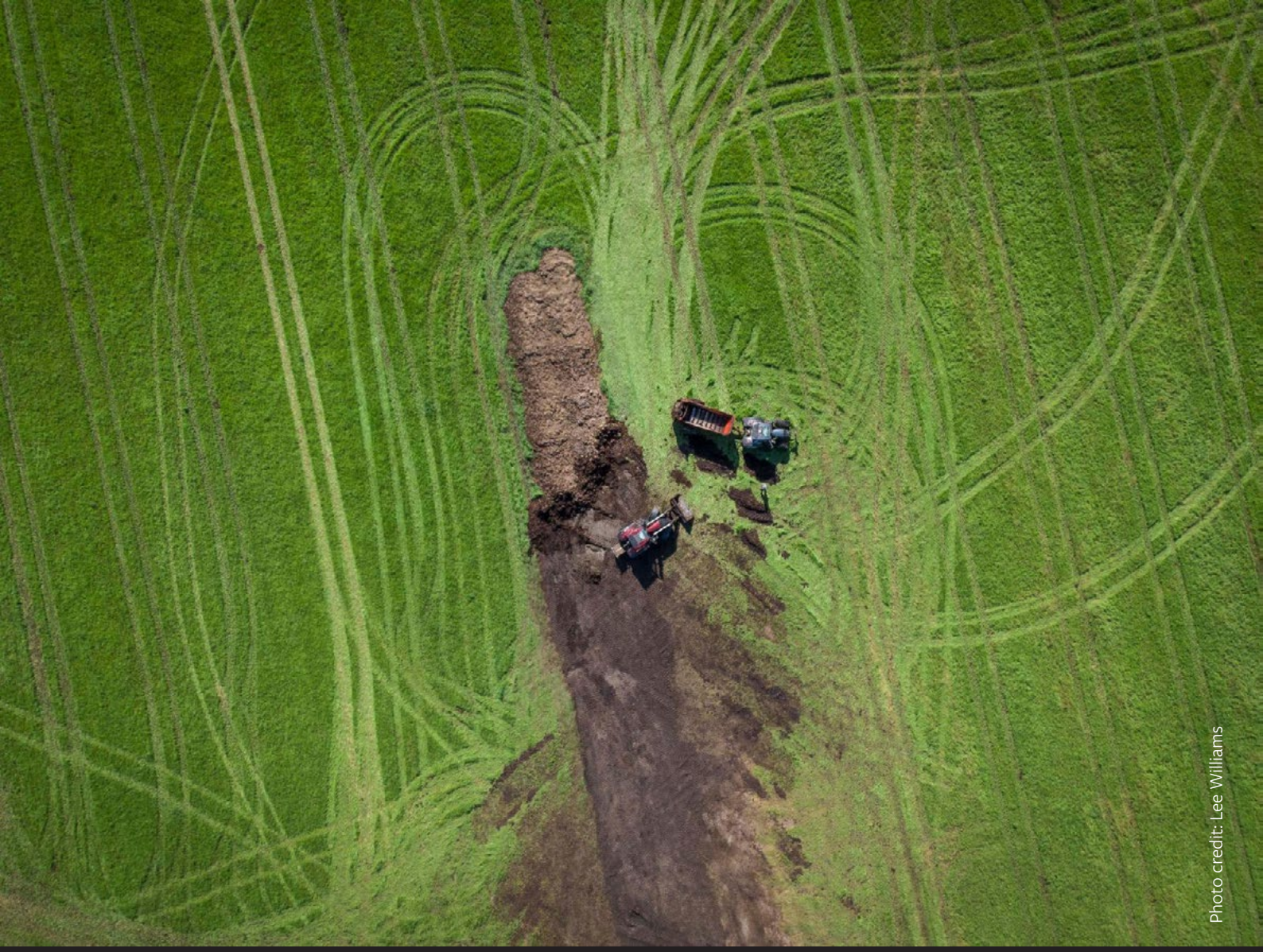

Photo credit: Lee Williams

18/01/2021

Comparing pathways towards sustainability:

Lessons on transformative agency from three pioneering farms in Europe

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THANK YOU

This thesis would not have been possible without the unconditional support of the farmers that play center stage here. My sincere gratitude for their generosity in welcoming me to their farms and lending me part of their valuable time cannot be expressed enough. Thank you!

The fact that I would now ask completely different questions than those posed in this research indicates that I too have undergone a transformation. By no means did this thesis follow the trajectory of a normal timeline. Going through Covid-19 and a personal quest for purpose, the process as a whole has been an important chapter of a larger pathway. For this I would like to thank Eddie, whose expertise with graphic design and whose endless supply of cookies and chocolate have helped me through the last few miles. A diet is in place now. And finally I am exceptionally thankful to Dirk Roep and Blair van Pelt for their expertise, quick responses, and quite literally, endless support and patience.

PHOTOGRAPHY CREDITS

Please note that every photograph not credited was taken by the author

ABSTRACT

This thesis offers lessons on the transformative agency of the farmers behind three pioneering farms. This is done by comparing the transformative strategies they applied in relation to the three-fold embedding of their farms, throughout their pathways towards more sustainable farming systems. To reconstruct these pathways semi-structured interviews and pathway mapping exercises were conducted with the main actors on each farm. This data was then coded, categorized and grouped in dimensions that allowed for a comparison of the interplay between strategies and embedding.

The resulting 8 lessons show that these farmers persevered in developing, adapting, and moving towards their dreams and visions, despite many critical moments, by applying a range of transformative strategies. Through these strategies they managed to transform their farms in terms of its practices and relations. Throughout this process of transformation, the farmers continuously moved through a learning process, and as such also personally transformed in terms of thinking and doing, which in turn further enhanced their transformative capacities and strategies. Finally, the lessons show that these farmers have managed to create and navigate complex sustainable farming systems by tapping into the knowledge, skills, and resources of others. This shows the significance of the co-creation of contextual knowledge and the capacities to apply it in the transformation towards sustainable food systems.

For future research it is recommended to test to what extent these lessons resonate with other pioneering farms, but also with conventional farms. In addition, it is worth comparing family farms with non-family farms in their transformations towards sustainable farming systems, with a focus on intergenerational differences. In doing so, the frameworks of resilience of social-ecological systems and the adaptive cycle of transformations could be highly useful. Lastly, future research into transformations should also include the role of the relations to non-humans.

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Photo credit: Lee Williams

1.

Introduction

The pioneering farm: a champion among antagonists?

Food systems are at the center of many social and environmental emergencies (Stringer et al. 2020; Reisman & Fairbairn 2020; El Bilali et al. 2019). Buying something as mundane as a bar of chocolate or a packet of rice is likely to be closely linked to an array of social and environmental issues, possibly on the other side of the globe, ranging from child-labour, slavery, and social inequality to water and air pollution, soil degradation, and deforestation (Willett et al. 2019; Thorlakson 2018; IPES-Food 2016). As such it becomes clear that it is not sustainable to maintain the status quo (Hölscher, Wittmayer & Loorbach 2018; FAO 2017; Tittonell et al. 2016).

However, it is important to note here that because food systems are at the center of many such issues, they by definition are also at the center of the solutions to those very issues (Stringer et al. 2020; El Bilali et al. 2019; IPES-Food 2016). The need, but also the possibility to transform our food systems towards sustainability becomes very clear (Bilali et al. 2019; Gaitán - Cremaschi et al. 2019; IPES-Food 2016). Transformations of the wider food system are necessary, but that means also when we zoom in on the farms that stand at the cradle of food production.

> **//QUOTE//**
>
> *"Why do we talk about soil, why is it important to us? Because - and that's my idea - it's not about soil, it's about life on planet earth. If we want to sustain the life on the planet - if you want to have the planet running and if you want to have generations of humans living on the planet that stays in the same fertility and health - then we have to talk about soil."*
>
> **(*ALFRED GRAND*)**

Alfred showing wormholes of a different kind

Thankfully, there are increasingly more examples of sustainability pioneers trying to make such a transformation happen: from community seed banks and food sovereignty advocates to the farmers and organizations behind the fair trade certification scheme and the fake meat industry - all actors involved are working towards their own vision of a more sustainable food system (Rossi 2017; IPES-Food 2016). Indeed, even though many farms are unsustainable at this point in time, there are also many examples of farms that have transformed their farm systems towards sustainability - albeit founded in industrial technology, agroecology, or both combined. It is these farms that this thesis will focus on: the pioneering farms that in terms of sustainability are ahead of most others.

Problem definition

When we are faced with the examples of such pioneering farms, the question immediately becomes: why has the rest of the agricultural sector not yet followed suit? The answer is simple: complexity. Despite having taken away ecological complexity, industrial farming in itself is still quite complex: the farmer not only has to deal with a variety of production methods, they also have to deal with a variety of contexts, such as the economy and politics (Calo 2018; Tittonell 2016). In addition, sustainability is complex: sustainability touches on many interrelated issues crossing all domains of society and the environment. Sustainable farming then, is even more so complex, as it is much more grounded in the local context and has to deal with the complexity of sustainability (Caniglia et al. 2020; Norström et al. 2020; Tittonell 2016). Finally, the transformations towards sustainable farming systems in themselves as journeys or pathways, are also highly complex (Stringer et al. 2020).

> **//QUOTE//**
>
> *"In normal farming if you have a little mistake – if you till too deep or too narrow, or you left something uncultivated – you could just spray it. But in organic farming it stays there and it's a couple of years ahead."*
>
> **(*MARKUS LUSUA*)**

Upon this realisation, the question turns to: how have those pioneering farms then navigated such complexity? When looking at the farm level, what drives this complex process of transformation is the farmer: in the first place they need the ambition and motivation to move towards a sustainable farming system (Avelino et al. 2019; de Lauwere et al. 2006). When the desire to farm more sustainably exists, those farms are faced and challenged with the existing (and sometimes very rigid) social, market, and institutional structures in which they are embedded, in addition to their existing resource investments, and a canyon of to-be-bridged knowledge and skill gaps (de Lauwere et al. 2006; Avelino & Wittmayer 2016; Cofre-Bravo, Klerkx & Engler 2019). In addition, every farm is different, and every context in which a farm is entangled is also a unique configuration of relations, resourc-

es and opportunities (Methorst et al. 2017). This means that each farm, to a certain extent, has to assess for their own context and status how to achieve their ideas of sustainability. As such it is fair to say that there is no silver bullet, or one general pathway that can be followed to transform towards sustainability - there are always personal and contextual complications (Stringer et al. 2020; de Lauwere et al. 2006).

> //QUOTE//
>
> *"Many farmers say: 'I would like to change, but it is not possible'. I think you always have a choice. Try to see the challenges. They will be there, but then think of: 'what can I do to work on them?'"*
>
> **(*ROY MICHIELSEN, TRANSLATED FROM DUTCH*)**

Nonetheless it is still valuable to construct generalized lessons that could be of major help to farms with a vision of sustainability in mind. The farms that have succeeded in transforming their farming systems and their context are truly pioneers in the sense that they have laid a path that is worth tracking and studying. Many studies have analysed how transformations can gain speed, how they can be managed, and what strategies should be applied to support and anchor them. However, many of these studies are at system-level, and miss the actor and agency perspective (Farla et al. 2012; Westley et al. 2013). As such, this study will contribute to the ongoing research on food system transformations by offering empirical insights into the dynamics of the transformative pathways of pioneering farms so that others may follow their lead. It is important to note that the term 'pioneering farm' is chosen to indicate that this research does not only entail the transformational work of individuals. The transformation of farms, organizations or systems is rarely, if ever, achieved by individuals alone (de Lauwere et al. 2006; Farla et al. 2012).

The 3 pioneering farms that this thesis will focus on have all been selected from the Lighthouse Farm Network. This network was set up by the Farming Systems Ecology group from Wageningen University & Research to create an outdoor classroom and living laboratory, and showcase the work of pioneering farms. The network connects farms from all over the world that have been specifically selected for their proven viability and successes in sustainable farming. However, too little still is known of how those farms actually managed to become such pioneers in sustainability. As such this research contributes both to the exemplary position that the Lighthouse Farm Network has, as well as to the wider, more general question on the transformative pathways of pioneering farms towards sustainability.

Objective

By reconstructing the pathways of these pioneering farms, the aim is to get insight into the skills, strategies, characteristics, socio-material contexts, and their interplay, that both hindered and enabled the farms in transforming towards sustainability. Since these are highly personal and contextual insights, they will have to be compared to reach the core components that all three pathways have in common. Seeing that each farm is very different from each other, the commonalities resulting from this comparison could be highly interesting and hopefully more widely applicable. In other words, the lessons gained from this research could help other farms in different contexts, along with all actors involved in the transformation of our food systems to gain a better image of the obstacles, opportunities, strategies, skills, and knowledge involved. As such, the main objective of this thesis is:

1. **To integrate the pathways towards sustainability of three pioneering farms into a set of general lessons on transformative agency.**

It is important to note that by lessons, what is meant here are not 'passages from sacred writing' - even though there is always hope that there are some who might consider the lessons formulated in this research as sacred - but instead: 'an instructive example' (Merriam-Webster, n.d.). The focus here is also on the transformative agency of the farmers behind these farms. As such, these lessons are meant to inform farmers and other actors involved in food systems transformations by example.

> //QUOTE//
>
> *"We are continuously developing and find it important that the knowledge that we acquire is shared. And thus making that knowledge available to other people - both for education / research, but also the entrepreneurs - and that we also receive feedback on this ourselves. That's why we want to have these conversations - we see that there is something in it for ourselves, but also to help the entire sector, perhaps the whole of society, a little further."*
>
> **(*JACO BURGERS, TRANSLATED FROM DUTCH*)**

Research questions

The main research question then becomes:

> *Which lessons on transformative agency can be deducted by reconstructing and comparing the pathways that three pioneering farms have journeyed in order to become agricultural pioneers?*

In order to answer the main research question, the following sub-questions must be answered first:

Q1. *What is the current configuration [practices and embeddings] of the 3 pioneering farms?*

Q2. *What do the transformative pathways of the three pioneering farms towards their current configurations look like?*

Q3. *What are the main similarities and differences between the transformative pathways?*

2.

Theoretical & Analytical Framework

Theoretical Framework

As we have just discussed, the change needed to deal with our sustainability issues should not be incremental or gradual, but transformational (Grenni et al. 2020). Many studies have been conducted into the dynamics and processes of transformations, but the consensus generally is that transformations deal with fundamental and radical changes that occur across multiple scales and phases (Moriggi et al. 2020; Hölscher, Wittmayer & Loorbach 2018). As such, the systems that are transformed are by definition not improved versions of themselves, but rather completely different in many ways (Lund & Vestøl 2020). Transformations are complex processes, "opening up avenues to drastically different futures", and involve paradigm shifts (Grenni et al. 2020, p. 413). Of course, in the context of this study, the transformations discussed are not at a societal level, but rather at the level of farms and organisations.

These transformations are for a very large part shaped by the agency of the actors involved - in this case the farmers and the people they work with (Moriggi et al. 2020; Hölscher, Wittmayer and Loorbach 2018). There are multiple theories on change agents in transformations (Westley et al. 2013). For example, transformative leadership is described as necessary for tackling 'wicked' - highly complex, multi-scale and multi-actor - problems. It is described by actions such as: reframing the discourse, creating a shared vision, and unleashing human skills and capacities (Ardoin et al. 2015; Grin et al. 2018). Although such actions could provide a useful tool to study the transformative pathways of the pioneering farms, Westley et al. (2013) have justly pointed out that 'leadership' might not be the best word to describe the (collective) actions of the many actors involved in such a transformation.

Instead, transformative agency is a much more open concept when investigating the transformation of social-ecological systems (Westley et al. 2013). To further grasp this concept, it is worth taking a closer look at agency on its own. Agency allows actors to transform their environments, albeit always influenced by their past - e.g. their habits - future - e.g. their hopes, dreams, fears, and imagination of alternative realities - and present - their judgement of current pathways, opportunities and possibilities (Emirbayer & Mische 1998). However, "transformative agency does not stop at general decision-making" (Lund & Vestøl 2020, p. 2). Instead, the context that the change agents find themselves in are experienced as troublesome or conflicting in some way, which inevitably means that they start envisioning other possibilities. As such, transformative agency very much deals with fundamental dilemma's, risks, personal investment, and (the perception of) future uncertainties, which leads to the change agents exerting their agency (Lund & Vestøl 2020). It comes as no surprise then that within the concept of transformative agency, "intrinsic motivation, cognition, emotions and values" play center stage (Hölscher, Wittmayer and Loorbach 2018, p. 2). In short, transformative agency in the context of this research is understood as having the capacity to transform the practices and relations of a certain system - in this case the farm.

This very closely resembles Westley et al.'s (2013) definition of transformative agency, where they posit the institutional entrepreneur in relation to their context: their strategies, choices, and actions are adapted to the socio-material context - or in fact, institutional embedding - they are in. Entrepreneurship is understood as a core component of a business and its development, where the entrepreneur identifies and acts on opportunities that are worth pursuing (Methorst 2016). The institutional part can be understood as relating to our economic and political system, but also to our value system (Westley et al. 2013). In the context of this research, the institutional part therefore is understood as our ways of doing and thinking, i.e. our values and norms. Institutional entrepreneurship in this research then, is seen as a relatively broad category of change agency: "whether organizations or individuals, [they] are agents who initiate, and actively participate in the implementation of, changes that diverge from existing institutions, independent of whether the initial intent was to change the institutional environment and whether the changes were successfully implemented" (Battilana, Leca & Boxenbaum 2009, p. 72). In short, institutional entrepreneurship here is understood as changing the institutional embedding in terms of how one thinks and does.

Westley et al. (2013) also make it clear that these institutional entrepreneurs need to be alert to opportunities and grasp them when they occur, along with mobilizing those resources that are required to move towards their visions. The explicit addition in this research however, is that these change agents do not merely spot and respond to opportunities - they create them if necessary (Garud, Hardy & Maguire 2007).

So basically, the institutional entrepreneur exerts transformative agency by continuously adapting to, influencing, and being influenced by the social-ecological system, or context, they are in. This in itself is a very helpful concept for studying the pathways of the pioneering farms. However, it is also still too conceptual in the sense that there are currently no handles to actually study the pathways. For this, Westley et al. (2013) discern 9 different strategies, attitudes, and skills from their literature review, with which change agents navigate their complex contexts and accomplish change:

1. *Acquiring & building (local) knowledge, ideas, viewpoints, and solutions. This also includes conducting experiments and research.*

2. *Building visions, and making sure that there is a common, or shared vision that attracts other actors. As such this also creates social cohesion.*

3. *Building social networks, through which support and (social) resources can be acquired. This can be done through bonding with similar others, bridging with similar groups to generate momentum, or linking with crucial individuals in specialized sectors.*

4. *Building trust, legitimacy, and social capital*

5. *Developing and facilitating innovations by identifying and*

introducing alternative ways of doing

6. *Mobilizing and preparing for change by raising awareness of resource challenges, searching for new funding sources, and influencing policy decisions*

7. *Recognizing or creating and capturing windows of opportunity by correctly timing the linking of resources and chances. This includes taking risks and convincing others to do the same.*

8. *Identifying and reconceptualizing issues and opportunities in order to get all actors involved in 'small win' projects.*

9. *Negotiating and conflict resolution*

In this research this list is expanded by the work of De Lauwere et al. (2006) to explicitly include:

10. *A certain amount of nerve, courage, and openness to risks and failure*

11. *The role of serendipity. Skill, experience, and knowledge can however make serendipity less coincidental in the sense that the change agent can turn moments of serendipity into opportunities by recognizing and playing in on them more efficiently. Serendipity is here understood as an unplanned but fortunate discovery (Merriam-Webster, n.d.).*

This list of attitudes, strategies, and skills forms a useful basis for the reconstruction and comparison of the pathways in this research. However, to complete their theory, Westley et al. (2013) also describe how social-ecological systems go through several phases of transformation - the so-called adaptive cycle, which they overlay with opportunity contexts that institutional entrepreneurs have to navigate and adapt their strategies to. In this way they group the different skills and strategies to each phase of transformation where they are applied. However, in this research the pathways of the pioneering farms will not be placed in the context of a wider system transformation and its phases. In addition, the adaptive cycle in itself is deemed too constrictive of the possibilities and random events that can occur within the transformative pathway of a farm.

Instead, the changing context, or social-ecological system with which these farms are continuously in conversation, is grounded in the theory of three-fold embedding. Three-fold embedding is not restricted by phases and allows for a wider interpretation of both internal and external contextual elements that influence the transformative pathways. Hess (2004) describes how 'actors' are continuously embedding in three dimensions:

1. *The Societal dimension: the societal - i.e. cultural, political, historical etc. - background of an actor or organization. In this thesis this is interpreted as both the internal and external societal aspects, including its institutions. As such this links directly to the notion of institutional entrepreneurship, as this dimension concerns those factors that define how an actor or group of actors think and do, such as (collective) values and norms.*

2. *The Network dimension: the networks that an actor or organization is involved in. Here it is taken to include the relations to all actors in the food system, including those in the market, politics, research, and those in the farm.*

3. *The Territorial dimension: "the extent to which an actor is 'anchored' in particular territories or places (Hess, 2004, p. 177). In this thesis this spatial dimension is reconceptualized into one that centers around natural, ecological, but also personal resources such as time, and thus becomes the Resource dimension (Methorst, Roep, Verstegen & Wiskerke, 2017).*

It is worth noting that 'embedding' is the preferred term over embeddedness, as "the embedding of a farm in the relations with the socio-material context is an active and evolving process, and not a static state of being" (Methorst, Roep, Verstegen & Wiskerke, 2017, p. 3). This term also fits better with the theory of transformative agency as it allows for the interpretation that the actors involved in fact have a certain agency and can make choices that in turn affect their context. Darnhofer et al. (2016) justly point out that "the structures - both on- and off-farm, material and social - constrain choices. But their influence is mediated by farmer's beliefs, and the potentials farmers perceive in a dynamically changing context" (p. 116).

Indeed, not only is this theory helpful in analyzing the context of, and its influences on the farm: it also helps to see that this relation between farm and context is bilateral. In other words, the farm practices are influenced by their context - hindered or enabled - but the farm practices also influence their context and thus create opportunities, or barriers. As such it is an extremely helpful theory to reconstruct how these pioneering farms transformed their own farming systems and also their context in order to do so. When three-fold embedding is coupled with the transformative agency strategies of the institutional entrepreneur, it becomes clear that "embedding structures do not simply generate constraints on agency but, instead, provide a platform for the unfolding of entrepreneurial activities" (Garud, Hardy & Maguire, 2007, p. 961). It enables us to see the institutional entrepreneur being influenced by, responding to, and (actively) changing the context of their farms, and thus embodying transformative agency as Westly et al. (2013) describe it.

In short, this research will draw upon 2 theories:

1. *The transformative strategies of institutional entrepreneurs, while they are placed in relation to their*

2. *three-fold embedding.*

Analytical Framework

This research is divided into two parts: a descriptive, and a comparative analysis. The descriptive analysis centers on reconstructing the transformative pathways of the pioneering

farms. In order to start this reconstruction we first need to understand what the status quo is, or in other words: what the current farming system looks like (Q1). Only then can we go back in time and investigate what and how these pioneering farms have done to become what they are now (Q2). The pathways are seen as learning journeys in which change agents use their transformative agency in response to, and to shape their embedding continuously (see figure 1).

The pathways themselves (see figure 2) are seen as the accumulation of steps, events, actions, and choices, each leading to a new configuration of practices and embeddings through time. These pathways likely include challenges, obstacles, or even dead-ends. This also means that the pathway is not linear, because certain gaps may not be overcome, and visions can change over time, resulting in different directions of action and choice. In sum, the pathway represents a learning journey, where the actors involved make choices and perform actions as they see fit and as their embeddings allow them, in order to work towards dynamic visions.

The second part of this research comprises the qualitative comparative analysis. Once the pathways have been reconstructed for each pioneering farm, they will be compared to deduct the main differences and similarities in terms of their strategies and how they relate to their embeddings (Q3). The theories provide the structures and vocabulary required for the comparison, and fulfill a more closed part of the analysis. At the same time, a more open analysis is used, as this allows for the comparison of any themes that come up from the data. The similarities and differences will be synthesized into more general lessons, and thus answer the main research question.

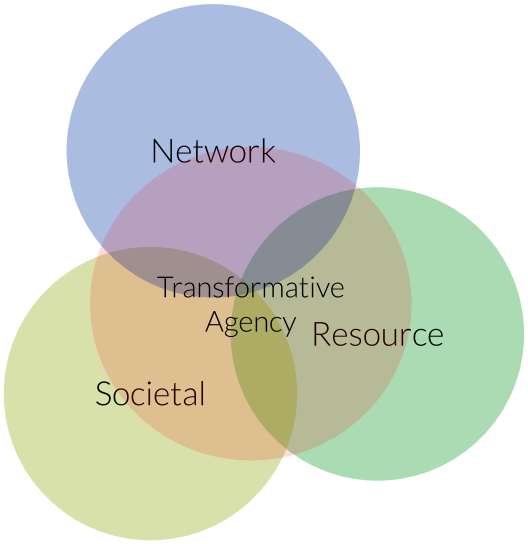

Figure 1: The transformative agency of the farmers is always placed in relation to their societal, network and resource embedding, and as such shows that they are continuously affecting each other.

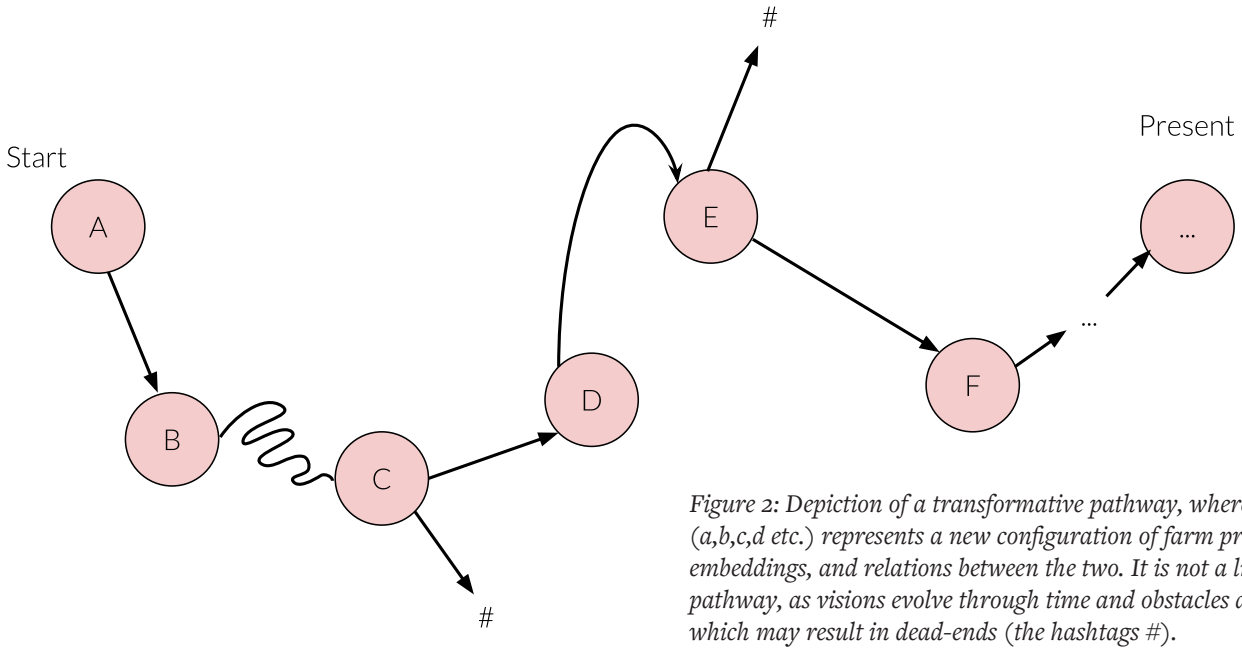

Figure 2: Depiction of a transformative pathway, where each step (a,b,c,d etc.) represents a new configuration of farm practices, embeddings, and relations between the two. It is not a linear pathway, as visions evolve through time and obstacles are met which may result in dead-ends (the hashtags #).

3.

Methods

The methodology of this thesis is structured into two main parts. In the first part the data on the current configuration of the farms (Q1) and their transformative pathways (Q2) was collected. The second part comprises the data analysis and contains both a descriptive analysis (Q1 & Q2) and a comparative analysis of the pathways to find the main similarities and differences (Q3) and synthesize those in more general lessons learnt in order to to answer the overarching research question. This chapter further describes the exact methods that were used during this research.

Part One - Data Collection

To answer Q1 and Q2 I conducted background research and traveled to 3 Lighthouse Farms, where I interviewed the main actors and mapped their pathways in relation to the farm.

Study sites

For this thesis 3 study sites were selected - 3, because that number would provide a more solid base for comparison (Q3) and not more than 3 because it would allow for more detail while still fitting within the scope of the thesis fieldwork. For the selection of farms I used the Lighthouse Farm Network. This network had already made a selection of farms that are open to researchers, significantly innovating in some form of sustainability, while at the same time also financially self-sustaining through the sales of farm products. All these factors were important to the main purpose of this research: to study the learning journeys of pioneering farms. The network is spread all over the world, however I chose to focus on those that were situated in Europe to limit the amount of travelling during my fieldwork. In consultation with Rogier Schulte, the director of the network, I had decided to study the farms in Austria, Finland, and Latvia. These were selected because relatively little was known about their personal stories, backgrounds, and journeys.

However, as my fieldwork drew closer a Dutch Lighthouse farm had been added to the network. To visit that farm seemed like a logical choice as it would significantly reduce the travelling and related costs of the fieldwork. The question then became: which of these intriguing farms do I drop off my list? I decided to abandon the idea of studying the Latvian farm, for the simple and practical reason that it was the only farm I could not reach by public transport, further driving up the expenses.

The farms in short:

Grand Farm

At first sight, Grand Farm in Lower Austria may seem like yet another 90 hectare organic arable farm. However, when looking more closely we can see that the farm houses many research projects, and is part of worldwide research networks. Recently Grand Garten was added to the repertoire: the CSA part of the farm that seeks a more direct link with the consumer. However, what makes its story even more unique is the combination with Vermigrand: Europe's first vermicomposting company, specialised in creating healthy compost through earthworms.

Palopuro Symbiosis

Just outside of Helsinki, Finland, when your car has run low on gas, you can fill it up at the biogas pumping station that is part of the Palopuro Symbiosis farming system. Here, a 400 hectare organic arable farm cooperates closely with a biogas company, a chicken farm, and a vegetable farm to close the nutrient cycle. Does that sound like no fun to you? Then you can also visit the farm on one of its market days, dine at their restaurant, and finish off with a theatre show housed in one of their barns.

ERF

Though exceptionally flat, the lands governed by ERF in the Flevopolder, The Netherlands, are everything except boring. Six meter wide strips of different crops render the landscape in diverse colours and textures. Just to be clear, these are not niche products: these are the organic potatoes, peas and beets you buy at your local supermarket, like Albert Heijn and Jumbo. What's more: the lands aren't technically theirs. They rent them from the local municipalities and sustainably govern them until, quite suddenly, those municipalities can claim them for city or infrastructure expansion.

Grain harvest at Palopuro Symbiosis. Photo credit: Helena Eslon

Sampling

When confronted with the matter of 'who to interview', the counter-question that inevitably comes up is: 'who not to interview, and why?'. When studying the journeys of these pioneering farms there is a large network of actors involved, with some playing more crucial roles than others, but each with a fresh and intrinsically interesting perspective on the matter. There were however two factors that I had to take into account for the selection of interviewees:

1. The limitations of my fieldwork

I visited each farm for a few days, in which I had to conduct the interviews and map the pathways with the actors present. This meant that the pool of actors was relatively limited to those present at the farms. In relation to this, I wanted to cap the amount of respondents per farm to a maximum of 3, in order to allow for time and attention for each respondent while limiting the amount of analysis needed.

2. Their perspective and involvement

I wanted to get an insider perspective on the pathways of these Lighthouse farms. This insider perspective is most suited to reconstruct the farms' pathways simply because they are so actively involved and also because they are likely to be involved the longest - they are the managers and/or owners of the farm. In addition, the framework used for the analysis of the pathways of these farms is centered on the transformative agency of the people behind these pathways: the farmers and the people they work most closely with. As such, in the context of this research there is no need to gain the perspectives of the processors, politicians, or any of the other actors involved in the transformative pathways that these farms went through.

Given these two factors, the study sample automatically included the owner/manager of the farm. The rest of the sample was determined prior to my visit, in consultation with the owner/manager, taking into account their availability and relevance within my research as described above. The respondents that were finally included were:

Grand Farm:

- *Alfred Grand*
- *Livia Klenkhart*

Palopuro Symbiosis:

- *Kari Koppelmäki*
- *Markus Lusua*
- *Markus Eerola*

ERF:

- *Jaco Burgers*
- *Theo Heijboer*
- *Roy Michielsen*

Background research

Prior to my visits I conducted background research on each of the farms, in order to make sure that I had at least some material to 'start the conversation with' and to make sure I could discuss the most obvious topics. This included talks with the team behind the Lighthouse Network, but also online research, starting from the websites of each farm.

Semi-structured interviews

The interviews were semi-structured and conducted with the help of an interview guide (appendix 1). They consisted of 2 parts:

1. Focussed on answering Q1: painting the picture of the farm as it is now

This concerned questions about their current practices and embeddings. As such we discussed their networks, sales, products, innovative aspects, personal values etc.

2. Focussed on answering Q2: the pathway

When and how did the journey begin towards more sustainable agriculture? What were the steps taken, what were obstacles, challenges, lessons learnt, who were crucial actors, etc. This part of the interview was informed by the theory on transformative strategies and how they interact with embedding, and as such also contained questions regarding (lack of) knowledge, networking, visions, trust, etc. This part of the interview also required some flexibility, as for some participants the starting point of the journey was quite clear (i.e. when they joined the farm), and for others their personal backgrounds and upbringings were of much greater importance to the journey, seeing that they grew up on the farm in question. In addition, the 'boundaries' of the farms do not stop at the farm gates, and are as such hazy. By this I mean that the relations in their pathways spread far beyond the biophysical farm itself, which begs the question: what to discuss? For this too, flexibility was needed and the general way to stay within the context of the pathways was to always relate to the events that occur there. In other words, the boundaries of our discussions were created around those entities and events that could be connected back to the farm through a 'how'.

The interview guide was constructed and tested in advance on a young, first generation farmer from my personal network, in order to determine the length of the interview, but also further refine the questions. The interview guide was constructed to take about 1.5 hours. The shortest interview lasted 30 minutes - this person had only been on the farm for 6 months - whereas the longest took over 4 hours and was spread over 2 days. They were recorded on film and separately also on audio, to be able to analyse them in greater detail later on. The audio was absolutely necessary for the transcribing and coding, whereas the film enriched the story-telling formatting used throughout this thesis.

> //QUOTE//
> *"I think its a kind of responsibility to serve the information I have about the project because its not only that our project is for the businesses, but also its been a model for other farmers and food producers how to work."*
>
> **(*KARI KOPPELMÄKI*)**

Finally, where I stated in my proposal that I would use think-do-gaps as also seen in O-Sullivan et al. (2018), in reality I did not use that concept when reconstructing the pathways. The idea of the think-do gap is a useful tool to structure challenges or obstacles that stand in the way of a vision or goal. These 'gaps' in the road can then be overcome by building bridges, for example in the form of knowledge or technology that was previously missing. However, the issue I found with this concept is that it first of all does not allow for random occurrences, and secondly that it is dependent on there being a goal or vision. In other words, for a think-do-gap to exist there must always first be a 'think'. As such this concept was deemed too closed for the construction of the pathways. Instead we would discuss how a certain event or development came to be, and why, and so also what the motivations were if they were there at all. This was a much more open method of discussing the progress of the pathways, being receptive to the complex relations and occurences of events therein.

Pathway mapping

Apart from conducting interviews, the transformative pathways (Q2) were reconstructed by visualising them through a collaborative mapping exercise. The motivation behind this additional step was to gain an extra layer of details, an enrichment of the data so to speak. In addition, the pathway mapping was conducted on a separate day from the interviews, to allow for rest and reflection on behalf of the participants, but also on behalf of myself as researcher. Initially the idea was to map the pathways with all actors at the same time, but this proved to be impossible during my visits - the actors were either not in the country at the same time, or simply too busy when the other was not. As such I adapted that part of the methodology so that I would map pathways with actor 1, to then review and enrich that pathway with actor 2, and so on.

However, due to the logistics of farm life and the boundaries of my field work, I was unable to conduct the pathway mapping with all the actors that I conducted interviews with. Firstly, in the case of Grand Farm, Alfred Grand was the only participant capable of mapping the complete pathway seeing that the other participant, Livia Klenkhart, had only joined the farm 6 months prior to my visit. In the case of Palopuro Symbiosis the pathway was firstly mapped together with Markus Eerola, and afterwards with Kari Koppelmäki when I was back in The Netherlands - he was staying there during the fieldwork period. Apart from the interview, I was unable to get a hold on Markus Lusua to participate in his version of the pathway mapping exercise, as he was very busy with farm work. In the case of ERF the pathway was mapped together with Roy Michielsen only, because the other participants were unable to allocate more time outside of the interviews. Furthermore, the pathway mapping with Roy had to be done online, due to the outbreak of Covid-19.

In the first place the mapping exercise was informed by the data from the interviews. As such the interviews gave clear 'hooks' to start the mapping with, such as specific events or developments. With each participant, the mapping started on blank paper, from where we started to set up a timeline with major events, achievements, challenges, dead-ends, etc. For each marked event on the map, the standard questions were along the lines of: 'how was that achieved, why, and what was the result?'. This would then lead to a further enrichment of the pathways, with more and more details being added. The pathway mapping conducted with Roy Michielsen from ERF was the only exception, as we had to perform it online. As such I had prepared a digital pathway based on the interviews, which I then discussed with him, and further enriched through questions.

Technical apparatus inside one of the tractors at Palopuro Symbiosis. Photo credit: Helena Eslon

Part Two: Data Analysis

The data analysis consisted of a descriptive and a comparative stage. In the descriptive stage I transcribed the interviews, coded them first inductively, and then categorised those codes according to categories derived from the literature. During this stage I also digitised the pathways and coded each of the events based on the categories as used in the interviews. During the second, comparative stage, new dimensions were induced that housed several code categories and thus allowed for better comparison. At this stage, sections within pathways were compared to each other, as well as to sections across the pathways of the different farms.

Transcribing & coding the interviews

The interviews were first transcribed digitally in excel, where my questions would be noted in column A, together with the timestamps corresponding to the audio recordings. This made it possible to go back to specific parts of the recording when needed, either for storytelling purposes or to solve any ambiguities. In another column the answers of the participant would be transcribed. Certain answers were very long, and had to be divided into smaller parts, each describing a topic of their own. Once the transcribing was finished, several summaries per piece of transcription were created in a separate column, and each in a separate row, while still corresponding to the row of the transcribed original text. After that, another layer of refinement and summarization took place by coding these summaries inductively. For this, codes were created based on their ability to summarize the parts of the interview they were attached to. Afterwards these codes were grouped deductively in categories, which were based on the transformative strategies and three-fold embedding theory. The reason to use the strategies from the literature for this was because they stemmed from a literature review: so already a rather large collection of work had culminated in these strategies. This resulted in 14 categories:

Westley et al. (2013):

1. *Looking for new knowledge & solutions*
2. *Visioning*
3. *Social Networking*
4. *Building trust & legitimacy*
5. *Innovating*
6. *Mobilizing for change: Funding, Awareness, Policy*
7. *Creating & seeing opportunities*
8. *Reconceptualizing*
9. *Negotiating*

De Lauwere et al. (2006):

10. *Taking risks*
11. *Serendipity*

Hess (2004) and Methorst et al. (2017):

12. *Societal context*
13. *Network context*
14. *Resource context*

These categories were noted in a separate column. Generally speaking it was impossible to assign a single category per piece of text, as multiple categories applied at once to the same pieces of text. As such multiple categories were given to every piece of transcription, with every category in a separate row. The definitions of these categories in the literature were rather short and limited, so expanding them with the induced codes and findings in the interviews deepened the understanding of these categories. In short, the reasoning behind all these summaries, codes, and categories was to make the large set of data accessible and navigable. The categories would later on also be used for the refinement of the pathways (Q2) and their comparison (Q3). During this entire process of transcribing and coding, any remarkable story-telling quotes were highlighted.

Refining and coding the pathways

After transcribing and coding the interviews I digitized the pathways in excel and expanded them, based on any additional data found in the interviews. Afterwards every event was coded, using the 14 categories from the interviews. To do so the pathways were vigorously re-constructed in the Miro application, categorising and expanding them simultaneously. The use of Miro allowed for a very flexible and relatively easy workflow, whilst also providing many tools for the visualization of the pathways. In addition, Miro is saved on its private online environment continuously, so data loss is next to impossible. For the purpose of visually keeping the categories apart, they were divided into 3 visually different groups: Embedding, Ways of looking and thinking, and Doing. This provided a visual and detailed overview of the pathways (Q2) and allowed for a (visual) comparison of them (Q3) (see appendix 2).

Inducing dimensions & comparing pathways

After having coded the pathways in Miro, 3 very detailed, quite large and complex pathways were the result. Much like during the categorization of the interviews, I noticed that it was at times complicated to determine which category applied when and in what order, due to the overlap that the categories had within events and the ambiguities in the pathways. In order to properly answer Q3 I felt the need to inductively create fewer new dimensions that were distinct

enough so that there would be less overlap, while also still clear enough so that applying them throughout these pathways would make sense and that they would allow for a meaningful comparison. To create these dimensions I visually grouped the existing categories together by shuffling them around, and by splitting some of them up to make their parts fit across dimensions. The initial 'groups' I created as discussed above were part of this shuffling process, but were at the time of categorisation mostly meant as a method to keep the categories visually apart in the pathways. Based on a preliminary analysis of the pathways and the emergence and use of the categories, I created 4 new dimensions:

1. Embedding

This dimension was the most straightforward and contains the three embedding categories: network, societal, and resource.

2. Developing

This dimension in essence carries the notion of the 'just do it' feeling. It contains (parts of) the categories 'innovating', 'doing experiments', 'taking risks', and finally it also includes 'taking opportunities'. This category also often deals with creating legitimacy, which is part of the 'trust' category. All in all it is a dimension that applies to most events in the pathway that relate to personal or farm development.

Tractor at work at Palopuro Symbiosis.
Photo credit: Helena Eslon

3. Connecting

'Reaching out' was the working title for this dimension. Networking was another potential title for this dimension, but that term was judged to be too sterile and sober, whereas 'connecting' also included the sense of personal connection between people. This dimension describes mostly social moments in which the farmers reach out to others to find and create support in some form. As such it contains the categories 'social networking', 'looking for new information and knowledge', and 'mobilizing for change'. However, it made sense to also group parts of the 'visioning' and 'risk taking' categories in this dimension, with a focus on sharing those ideas and visions, and the nerve and courage to do so. This last part is one of the main reasons for the choice for the term 'connecting' over e.g. 'networking'. Lastly, the 'negotiating' category was also a logical addition to this dimension, seeing that it relates so strongly to the social aspect of this dimension.

4. Sensemaking

This dimension describes how the farmers create new visions, and reconceptualize their problems into solutions and opportunities. As such it contains the categories 'reconceptualizating', 'visioning' and 'seeing opportunities'. It made sense to split up the 'opportunities' categories into the 'seeing' part and the actionable 'taking' part, which is part of the 'developing' dimension above. The 'trust' category was also split up in the legitimacy part, falling under the 'developing' dimension, and the self-confidence part which fits nicely here.

These dimensions all had their own distinct shape in the pathways, which made comparison more manageable. In addition to these dimensions, I visualised the pathways further by highlighting critical moments, achievements, and serendipity. These were not considered to be part of a single dimension, but instead belonging to any, under the right circumstances. As such it became possible for me to highlight e.g. serendipity as a context, but also as a moment in sensemaking, connecting, or developing. By constructing these dimensions I was able to significantly reduce the amount of different 'moments' within each pathway, while still being grounded in the theoretical categories and also being open for newly found similarities.

The newly constructed pathways that were structured according to the inductive dimensions could be compared very well due to their simplicity and little overlap (appendix 3). During the comparison the attention was focussed on the order in which the dimensions occurred, and as such on the relations between the dimensions, criss-crossing across the board. In doing so, the previously categorised version of the pathway offered more detailed and nuanced insights. Based on these comparisons similarities and differences (Q3) could be extracted, from which general lessons could be induced, thus answering the main research question.

Ethical remarks

There were a number of ethical risks that should be taken into account concerning this research:

- *Bias on behalf of myself as researcher and/or my methodology*
- *The dealing with personal and at times sensitive information of the participants*
- *And finally the time commitment asked from the participants, while not giving enough in return.*

To reduce these risks, a variety of measures were taken. Prior to every interview the participants would be asked permission to record the session both on audio and film. Once the recording had started they would be informed about the purpose of the research, how their data would be used, who it would be processed by, where and how long their data would be stored, how it would be published, and that there would be a chance for them to review the draft of the research to inspect the exact formatting and use of their data. All of this was to make clear what expectations they could and should have of this research, and also how their personal data would be handled. Also included here was the estimation for the length of the interview, so that they knew what to expect roughly, in terms of time commitment. Once all this had been explained they were explicitly asked to give their consent to proceed with the interview and collection of data.

There was no financial reward for the participation in this research. As such, the final version of this thesis would be sent to them digitally, in which their personal and their farms' journeys were both visually and textually reconstructed. In addition, I wanted to offer them the most flexibility as possible concerning the timing and location of the interviews.

> //QUOTE//
>
> *"It helps me to analyze and see the meaning of things. And also there come some points that are quite uncomfortable if you go back. But to go through this whole system helps me to draw a map. And if I have a good map it helps me to know where I am."*
>
> (***MARKUS EEROLA***)

Storytelling is central to the formatting of this research, which meant a further inclusion of personal details, quotes and pictures. To ensure that the participants all agreed with how their data was finally used and formatted, the draft of the thesis was sent to their emails for them to review. For this review they were given a period of 2 weeks.

To mitigate researcher and methodology bias, the questions asked during the interviews and pathway mapping exercises were kept open. Leading questions were avoided and the interview was structured in such a way that priming of the participants towards certain answers was reduced as much as possible. Though informed by literature, it was important to keep an open mind to any emerging data and themes.

4.

Painting the farms

The results of the thesis are divided into 4 chapters. The first three chapters each correspond with answering research questions Q1 to Q3. The fourth chapter is the synthesis of those results into more general lessons learnt, and aimed at answering the overarching research question.

Based on the data from my visits, the interviews, and the mapping exercises, this first result chapter provides an introduction to each farm, painting a picture of their current practices and embeddings. As such, this chapter answers Q1:

Q1. *What is the current configuration [practices and embeddings] of the three pioneering farms?*

Grand Farm

Grand Farm is a family farm situated in the countryside municipality of Absdorf, Lower Austria, at about a 1 hour train ride away from Vienna. The 90 hectares are farmed organically, with minimal tillage, and they produce arable crops such as lucerne, wheat, maize, soybeans, and alfalfa. These products are sold through a distributor, and their exact distribution is unknown. Alfred Grand is the main person running the farm. However, the farm is also a research and demonstration farm, housing roughly 15 (international) research projects per year. In that regard it brings together many international actors, and connects the farming and scientific perspectives and ways of thinking. The research projects focus mostly on three topics: soil health, agroforestry, and market gardening.

Soil health is an important topic on this farm, as Vermigrand, the vermicomposting business, is run side by side with the farm. Farm waste, together with external materials, are composted using earthworms in large, heated soil beds inside one of the barns. Lush and nutrient rich soil substrate is the result, with the main feature being that it is more sustainable than the peat-based standard. Their product is sold both directly from the farm, but mostly through supermarkets or directly to commercial buyers such as golf courses. Within VermiGrand, Alfred has taken on the research and development aspect, whereas his business partner Leopold Fischer is responsible for the financial and marketing aspects.

Until recently Alfred was the main person running the farm, which at times would be a lonely task. However, with the addition of Grand Garten, their 1 hectare market garden, the team has expanded with young and bright people with know-how of vegetable production and marketing. The vegetables are sold in a box scheme, for which their main distribution point is at the farm. During the fieldwork of this thesis Livia Klenkhart was in charge of the vegetable production, but by the time of this writing she had left the farm, opening up her position at Grand Garten.

Alfred himself is part of the EU Mission Board for Soil Health and Food and the Regenerative Organic Certification Board. Through these contexts he works hard to incorporate the farmer's perspective into policy and research. At the same time it offers him a place to network and get his answers about innovative farming practices answered through research projects.

Alfred in front of the vermicomposting facility.

Palopuro Symbiosis

What happens when you combine a 380 hectare organic arable family farm, an organic chicken farm, a theatre, restaurant, a 3 hectare organic vegetable farm, and a biogas plant? Palopuro symbiosis, an hour's train ride outside of Helsinki, Finland, is not just about connecting nutrient flows, it is as much about connecting people, and connecting the urban with the rural.

Markus Eerola is the head of the 380 hectare family farm called Knehtilä, which produces mostly organic arable crops such as oats, barley, and buckwheat. Most of these products are sold through commercial distributors, with the exact distribution not known. However, part of some products, such as oats and buckwheat, end up in the product line called Knehtiän Pienipuro. Products include oatmeal, granola, and buckwheat crisps, and are sold in supermarkets throughout Finland. Markus is supported on the farm by Markus Lusua, a young farmer whose own organic farm is situated not far away from Knehtilä. Markus Lusua is of invaluable help to Markus Eerola, as he knows and understands how organic farming works and can repair a great deal when it comes to farm machinery.

When looking at the social aspects of Knehtilä farm, the restaurant is center stage, run by Minna, Markus' wife. Attached to the restaurant is a farm store, where their product line and the honey from the neighbouring farm are featured. The restaurant is the gathering space for (international) tours and visits from farmers and researchers. It is also home to weddings or other celebrations on the weekends. On market days, a few times a year, other food producers and processors come together to sell their products to those from the local communities. For the families that visit the farm with their children there is a special section in which a woman has created a small petting zoo, with rabbits and horses. Towards the other side of the farm a wooden barn stands tall, and houses the amateur theatre group which performs there during the summer months.

The neighbouring 3 hectare organic vegetable farm belongs to Kari Koppelmäki and Päivi, his wife. Their products are sold mostly directly to consumers, through markets or the REKO concept: a self-organised platform for producers to sell their products directly to consumers through facebook and set locations. Apart from running his own farm, family, and doing a PhD, Kari assists Markus Eerola with nutrient use and crop rotation planning.

For the nutrient cycling within the Palopuro Symbiosis system, Markus and Kari work together with the neighbouring organic chicken farm which produces organic eggs and chicken broth. Markus rents their lands to grow grains, and he in turn supplies the organic feed for the chickens. It is mainly a physical collaboration, as the owners of the chicken farm are not socially connected to Palopuro Symbiosis. The chicken manure goes back to Knehtilä farm, where it is used in the biogas station. This biogas station is run by Finnish energy company Nivos, and runs on farm waste. The biogas created can be collected at the pumping station next to the farm. The digestate that is left over is used on Markus' farm fields.

Finally, Markus is vice president of MTK, the Finnish farmers' union. Through that position he can monitor closely what is going on at the European Union, and he can influence policy decisions by representing farmers. Markus and Kari both have strong connections to the Helsinki University, through which many research projects take place on the farm.

The main farm houses at Knehtilä Farm, Palopuro Symbiosis.

ERF

In the desolate flat plains of the Flevopolder, The Netherlands, roughly 1450 hectares are farmed organically by ERF. Most of those lands are on the border of the cities Almere, Zeewolde, and Lelystad. ERF is not a family farm. Instead it is owned by the ERF foundation. This is because ERF's main purpose is to sustainably govern the lands close to the city, to create healthy soils, and to hand over parts of their lands whenever the municipalities need them for city and infrastructure expansion.

Jaco Burgers is the manager at ERF, and he is responsible for keeping a close eye on the sales and distribution channels and opportunities. He also consults the board of the ERF foundation, which is in charge of the supervision of the company ERF. Theo Heijboer is practical manager and is concerned with the day to day management of the field work. Roy Michielsen is in charge of bookkeeping, and of communicating about the lands that transition from agriculture to housing development. He is also in charge of being on the lookout for innovative sustainable farming methods, and thus visits such conferences from time to time.

Much of their produce is sold through distributor Bakker Barendrecht, and ends up at large supermarket chains like Albert Heijn and Jumbo. However, roughly 60% of what they produce eventually is exported abroad. Some of their produce, such as red beets and turnips, is processed by Biobrass, a processing company they own together with 4 other farmers. For the production of quite a number of crops they collaborate closely with growers who have the know-how. They do this for example with brussels sprouts and parsnips.

Of all their fields, one plot stands out the most: a 40 hectare field with a rich diversity of colours and textures. In this field ERF is testing large scale strip cropping, under surveillance of WUR and Louis Bolk Institute. The largest strips are 48 meters wide, with the smallest being 6 meters wide. This form of nature-inclusive farming is part of a larger project that ERF has set up together with nature organisation Flevolandschap. Within this project, ERF and Flevolandschap are in the process of realizing new nature, and a form of nature- and people-inclusive farming. By now ERF has passed on this initial 40 hectare strip cropping field to sister company Hemus, which is set up as a research and innovation farm with a focus on agroforestry. ERF is also currently conducting experiments with growing soy, as part of the Dutch Edamame project and in collaboration with distributor Green Organics and province Flevoland.

Synthesis

This chapter has provided a brief introduction to, and overview of the current practices and embeddings of Grand Farm, Palopuro Symbiosis, and ERF. The main actors, products, activities, sales channels, and collaborations have been highlighted. As such, this forms the basis for the next chapter, where we investigate how these farms as they are now came to be.

Strip cropping at ERF. Photo credit: Klaas Eissens

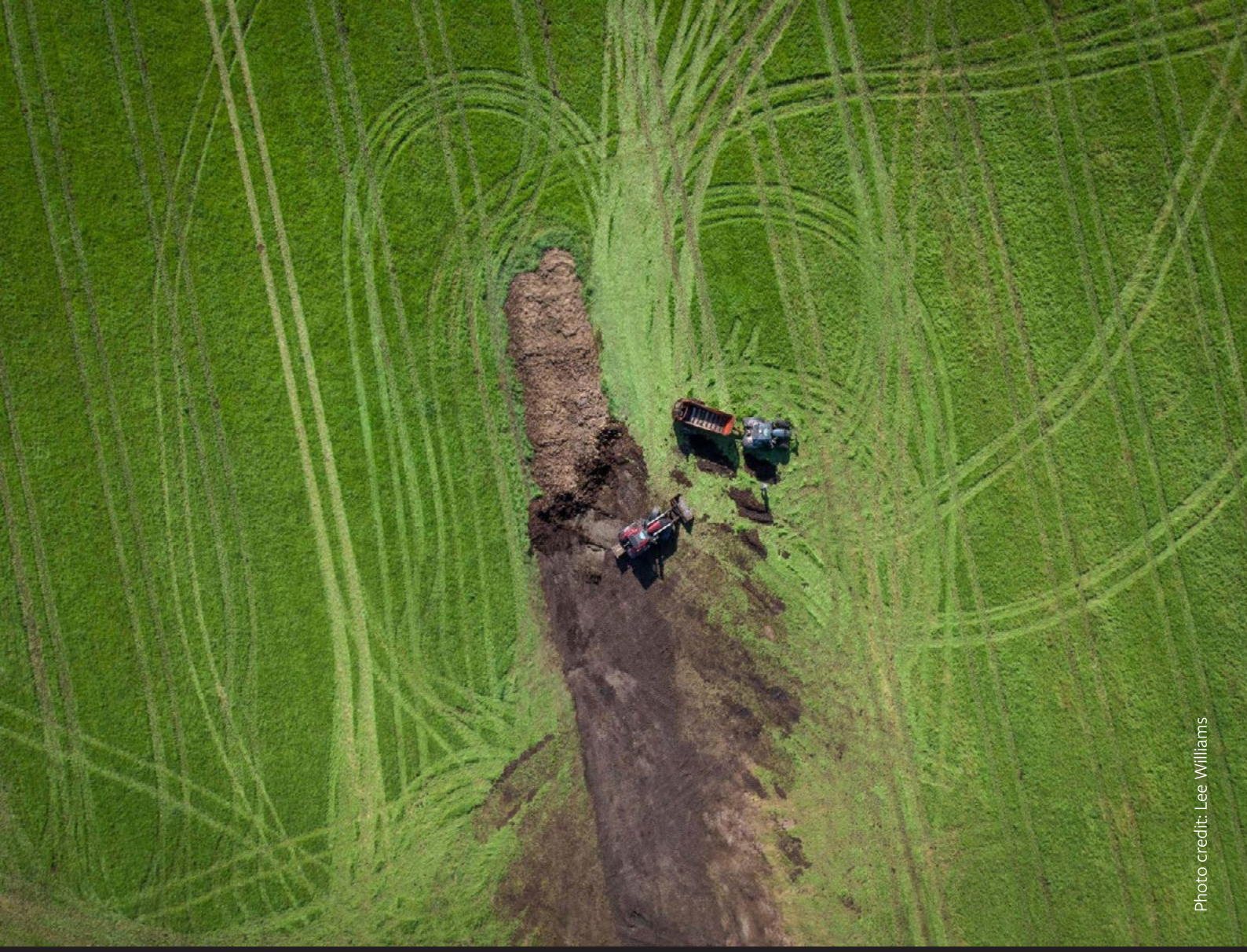

Photo credit: Lee Williams

5.

Walking the walk

In this chapter the pathways of the farms are reconstructed based on the interviews and mapping exercises, and they are simultaneously analysed in relation to the transformative strategies of the actors involved. The aim here is to answer:

Q2. *What do the transformative pathways of the three pioneering farms towards their current configurations look like?*

The chapter is divided in three main parts, each dealing with the pathway of a farm. For each farm their changing practices and embeddings are investigated, along with the accompanying transformative strategies that were applied. Each pathway is a complex, and at times random collection of events, with connections criss-crossing time and space. In order to make these large pathways more comprehensible they are told from the perspective of a variety of themes, or narratives, that contain the most important details related to the transformative aspect of the pathways and the agency of the actors involved. Although these narratives help in making these pathways more apprehensible, it is important to note that the narratives cannot be seen as separate developments within the pathways: they are very much connected and intertwined with each other.

The categories that were used in the analysis of the transformative agency within these pathways are summarized in figure 3. They can be seen 'in action' in the visualised and categorised pathways (appendix 2).

This chapter concludes with a short synthesis, summarising in what ways these pathways have been transformative and the role of the agency of the actors involved in this process.

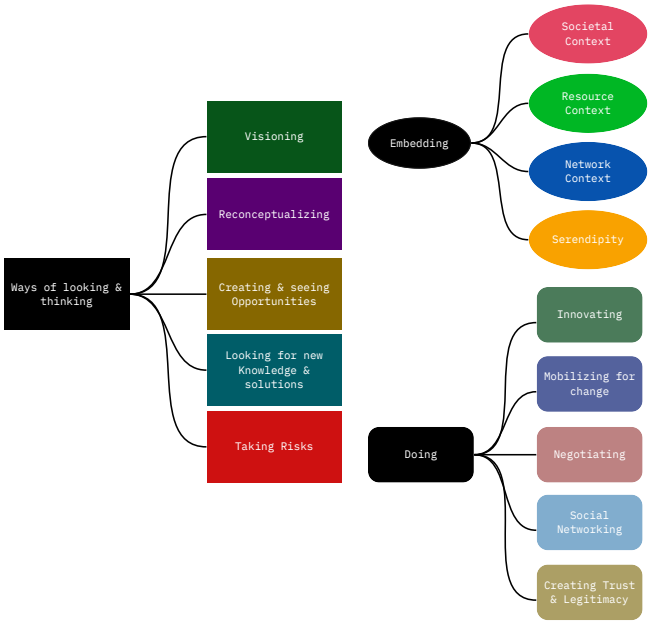

Figure 3: The categories that were used for the first round of analysis as seen in this chapter. In order to visually keep them apart in the visualized pathway (appendix 2) they were split up among three visually different shaped groups: Embedding, Ways of looking and thinking, and Doing.

Alfred inspecting the earthworms at the vermicomposting facility.

Grand Farm

Seeing Grand Farm in its current state as an organic research and demonstration farm, in which a market garden and vermicomposting business are closely integrated, it is hard to imagine that less than 15 years ago it was still a conventional arable farm with wine production. However, the seeds for that transformation can be found already before Alfred Grand took over the farm from his parents in 2001.

Healthy soils, healthy earthworms: VermiGrand

Around 1995 Alfred's parents first reduced ploughing the soil, and finally stopped ploughing altogether, signaling that care for the soil was already a topic in those days. However, Alfred's interest in soil and composting started even before that time, during his composting classes in farming school. It was also in school where he learned how to read, write and speak English, which allowed him later on to make international contacts. In 1997, after the internet had become available, Alfred built a device to log onto the internet. As a world of new information opened up to him, he discovered vermicomposting, which fascinated him from the start. Most universities were already on the internet, and Alfred's knowledge of the English language came in useful when he ordered vermicomposting books online from the USA. This was still at a time without google, so finding his way around the internet was quite a challenge. Based on these books Alfred started conducting vermicomposting trials: he grabbed a couple of earthworms from a nearby grassland, and placed them in a self-made wooden box.

> //QUOTE//
>
> *"When we started vermicomposting the first disaster happened already when I ordered some books from the USA and tried to read the books and figure out how to do vermicomposting. Then I made a wooden box, threw some of the earthworms in which I found on the grassland, put some grass and hay in and after 3 weeks all worms died. So everything was dead. It was too dry, the wrong type of worms. So these are just little things where I had to start from scratch again."*
>
> **(*ALFRED GRAND*)**

Long story short, the experiment failed. Yet, that did not stop his drive for vermicomposting, and it was around that time in 1998 that he reached out to Berkeley University in California, USA. Online he had found one of their studies on vermicomposting, and he asked them if he could come visit and see the facilities. In 1999 he visited the university with a friend - they intended to go into vermicomposting together. Once there, all that the professor could show them was an empty wooden box: the experiment had finished, so there were no earthworms to be seen. To make up for this, the professor took time to explain whatever the two friends wanted to know about vermicomposting and how to use it for composting organic waste. After their lunch, to their surprise they discovered that there was no waste separation in California. For Alfred this was a critical lightbulb moment: he realised he could take the vermicomposting technology home to Austria, where organic waste was very much separated.

> **//QUOTE//**
>
> *"The decision was at that second when he said: 'we developed all the technology but we cant put it into practice'. And I thought: 'oh, but we can!' We have the separation of organic waste already installed in Austria. And they have the technology, the methods and the research, and we can put it into practice. So that was *ping*: let's do it."*
>
> **(*ALFRED GRAND*)**

Around this same time in 1999 Alfred started a vermicomposting business. The friend that joined him to Berkeley University ended up not joining him in this venture: for him the risk of giving up his job was too great. Coming back from the USA and starting his new business, Alfred realised he still needed a lot more information on vermicomposting. He met Erwin Szlezak, who worked at the regional government of Lower Austria, and who was at that time responsible for the compost registry in that area. Erwin supported Alfred by providing him with a network of research and government contacts, through which Alfred received one of his bigger first assignments: the Lower Austrian Worm Composting System for Schools and Kindergartens. At this time Alfred also got in contact with the BOKU, the University of Natural Resources and Life Sciences in Vienna. They collaborated on vermicomposting research projects on the farm.

However, at the start of 2000 they encountered another failure: cold winter temperatures had diminished their earthworm populations, setting their results back to zero. In his search for a solution to this newly found challenge, Alfred reached out to Portland, Oregon USA, where continuous flow systems promised un-interrupted results. In 2000 Alfred visited an earthworm conference in Portland, from where he took home licenced continuous flow technology. For a period of half a year he prepared the system at his farm. However, all of a sudden the people from Portland doubled the price of the license. Alfred decided to not continue with this version of the licensed system, but instead develop his own continuous flow system from 2001 onwards. Alfred had strategically incorporated the vermicomposting business under the wings of the farm, meaning that the farm supported that business financially.

> **//QUOTE//**
>
> *"It's very difficult to have a company running without any profit. So you go bankrupt. Most of the companies stop production after 2 years. And that was the good luck with our vermicomposting. It was a side business of the farm so it didn't necessarily have to be profitable right from the beginning."*
>
> **(*ALFRED GRAND*)**

Alfred Grand

After much testing, he finally reached a functional prototype in 2005. Two years later, in 2007, the prototype was more or less perfected for the conditions on his farm. Now Alfred was faced with the more daunting task of actually managing, marketing and selling the vermicomposting product. Up to 2009 he struggled with this to such an extent that he started doubting whether vermicomposting actually offered a viable way of doing business. Coming from a long tradition of winemaking, and being schooled as a winemaker, Alfred was torn by the choice between winemaking or vermicomposting - both together, in combination with running the farm, would be too much work. Alfred's way out was to ask an old acquaintance of his, Leopold Fischer, who also grew up in Absdorf, to take a look at his vermicomposting products and business. Leopold had experience as a consultant for business development. He reassured Alfred that the vermicomposting products have potential, and they decided to start a new company with the two of them one year later in 2010. Leopold focused on the marketing, sales, bookkeeping, and management, whereas Alfred took care of the production, research, and development. VermiGrand was born, and developed over the following years until it was

more or less stable in 2014, with a solid customer base and production of a variety of products.

A farmer by origin

One would almost forget that Alfred Grand is not only a vermicomposting innovator and entrepreneur: he is at his roots and education a farmer. In fact, he was also educated as a winemaker, which was a tradition in his family and part of the farm's identity. In fact, it was his failure in winemaking school around 1985 that Alfred now looks back on as something life-shaping. Like a fear of failure, or rather a drive, always in the back of his mind, to not give up and try again. The wine they produced on the farm was mostly sold through their family restaurant, his mother's dream. Alfred helped her out on the weekends, which was very tiring with a farming job during the rest of the week.

Flash forward to 1997, while Alfred was discovering the online environment of vermicomposting: Alfred's wife was pregnant. Whenever Alfred worked with pesticides on the farm - which at that time still belonged to his parents - she insisted on him doing that outside of the farmhouse, and she would close the windows. In 1998 their daughter was born, together with the initial thoughts of transitioning to organic agriculture, where pesticides are less prominent.

Now flash forward again to 2001, skipping a lot of developments in the vermicomposting corner of Alfred's life: his parents retired and Alfred officially became farm owner. With the retirement of his parents, the restaurant was also closed - Alfred was busy enough with his vermicomposting and had no desire to run a restaurant on the weekends. For the farm wine their sales grew smaller. Upon taking over the farm, Alfred also took the opportunity to incorporate his vermicomposting business into it. This then allowed for Alfred to develop his own version of continuous flow technology. As Alfred moved forward with his vermicomposting business, the work with earthworms inspired him: he gained an increasingly bigger understanding of soil health, the importance of its organisms, and the effects on agriculture. However, at his own farm he was still using artificial fertilizers. This did not do on two accounts: first of all it opposed his newly found knowledge of soil health, and secondly it worked directly against the marketing story of the organic and natural fertilizers and soil substrates he was trying to sell under the same roof as his conventional farm. As such he made the decision to transition towards organic agriculture.

> **//QUOTE//**
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> *"With me finding my side business in vermicomposting I got interested in soil and soil health. That was more or less the reason why I converted to organic farming because I learnt to understand - to get a feeling - for what the soil would need and what is important for soil health."*
>
> **(*ALFRED GRAND*)**

Unfortunately there were two main challenges. Even though his parents were no longer living on the farm, they still helped out with farm work, and his father clearly opposed the idea of going organic. This led to a number of arguments, which Alfred tried to avoid and sit out as much as possible. However, there was also a financial lock-in. The conventional sugar beets on which the farm relied heavily for its income did not have a replacing market in the organic sector. These factors made the move to organic very difficult, and Alfred decided to put it on hold. In the years that followed, the price of sugar beets dropped gradually, making the farm less dependent on that specific crop. In 2006 Alfred took the plunge and converted the farm to organic. Within one or two years his father had completely changed sides, and became a fervent organic enthusiast.

Alfred converted to organic however without ploughing, as that was introduced by his parents back in 1995 and he did not want to diminish their work for the soil. Needing more information on organic agriculture and doing so without ploughing, Alfred sought contact with Fibl and Bio Forschung Austria. He was brought in contact with both research institutes through Erwin Szlezak, Alfred's contact at the regional government of Lower Austria. Through Bio Forschung Alfred took Soil Practitioner courses. Weeds were a big challenge in organic agriculture where ploughing is avoided, and so through trial and error Alfred and the research institutes developed farming methods that worked on his farm.

Moving forward to 2009 we hit a critical moment: Alfred was torn between winemaking and vermicomposting. His vermicomposting techniques had been perfected, but the business was underdeveloped, and he was missing the right tools and knowledge to develop it himself. His father did not want to give up winemaking, however Alfred had a different vision. Alfred decided to cut the vines, and focus on vermicomposting.

> **//QUOTE//**
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> *"Either I focus on vermicomposting where I was nearly the only one in the EU or I would focus on wine making and that was a big decision. Wine was a tradition for the farm and so my father was complaining. But by that time my mother was retired and nobody wanted to take over the restaurant. Because we worked for 10-12 years there and nobody wanted to do that any longer. We stopped the restaurant and didn't have any sales for the wine because we focused all of our sales there. So I had to decide what to do and I said ok, forget about wine making because I am one out of 20-30.000 wine makers in Austria and I never wanted to go in a restaurant and say 'ok: buy my wine it's better, cheaper etc'. I never wanted to compete with anyone and I didn't want to throw any other farmer out. I hated that and refused to do that. And so it was perfect for me to say 'I'm out' and I focussed on something that no other guys were doing so I had no competitor."*
>
> **(*ALFRED GRAND*)**

In fact, when he started VermiGrand with Leopold Fischer,

he diverted most of his energy away from the farm towards their new venture. For the years to come, farm development was put on hold. In this period the farm formed a financial back-up for Alfred: it allowed them to develop VermiGrand, even though the revenue was comparatively small, or even negative. Around 2014, when VermiGrand was relatively well established, Alfred diverted his focus back on the farm through the lens of research.

Grand Farm: Research & Innovation

Already before Alfred took over the farm, his parents wanted their farm to stand out by using the latest techniques and inviting industry consultants to give advice. As for Alfred's journey into vermicomposting and his transition towards organic agriculture, he has continuously reached out by looking for new information and connecting to new people. However, the experimentation and research that meanders through Grand Farm's pathway gained critical mass when Alfred received an open call to apply for a position in the organic agriculture focus group under the agricultural European Innovation Partnership, EIP Agri. In 2014 through one of his email newsletters, Alfred received an open call for applications for EIP Agri. Seeing the opportunity in that moment of serendipity, he quickly wrote a letter, applied, and was accepted. As a result of that focus group he then was invited to join the Landmark Project in 2015. His enthusiastic participation and exposition of his visions and ideas saw him being invited to a variety of events in the years to come: Best4Soil in 2015, the Carbon Sequestration focus group in 2016, and the EU AgriResearch Conference in 2018, through which he was invited to speak at the FAO Global Soil Erosion Symposium in 2019, and to join the EU Mission Board for Soil Health and Food. Taking a small step back to Alfred's participation in the Landmark project in 2015 - this is also where he by chance met Rogier Schulte from Wageningen University & Research. This meeting led to Alfred being invited to join the Lighthouse Farm Network, of which Rogier Schulte is the director.

Wheelbarrow and tools at Grand Garten

> **//QUOTE//**
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> *"So I met 60 people from all over the EU. And from there I was invited to join all kinds of research projects because they saw: ok that guy is interested and fun enough to never say no."*
>
> **(*ALFRED GRAND*)**

At around the same time as the Landmark Project, in 2015, Alfred also got in touch with a USA conservation group. He had followed their work for a while on twitter and decided to introduce himself as an organic farmer. What followed was a whirl of negative tweets, denouncing organic agriculture because of its soil damaging practices such as ploughing and tilling against weeds. Alfred could not stand this, and suddenly remembered the work of the Rodale Institute on no-till organic agriculture. He contacted Jeff Moyer, who is at the head of Rodale, but without much success. Alfred pressed on, and after about 4 calls he finally reached Jeff and within the span of a 20 minute call convinced him to conduct organic no-till experiments on Alfred's farm. After their trials in 2016, Alfred then organised and hosted an organic no-till conference in Absdorf, in 2017. Later that year Alfred also visited the Rodale Institute in Pennsylvania, USA. All of this caused Jeff, who also happened to be chair of the board of Regenerative Organic Certified, to invite Alfred to join that same board. Because of all these research projects and focus group meetings with researchers, Alfred understood the need for a research and demonstration farm. The idea for Grand Farm was born, and in 2019 it was launched as a concept that could be copied by others as well.

Grand Garten: Market Gardening

> **//QUOTE//**
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> *"What am I most happy with? Short answer: with the one hectare. Not with the 89. It's really fascinating to see what you can achieve on a small size. And that is really difficult for a farmer to understand."*
>
> **(*ALFRED GRAND*)**

A more recent development in the pathway of Grand Farm, is its market garden. Going back to the trusted internet, Alfred discovered the concept of market gardening around 2015. Two years later, that discovery had turned into a vision. Despite Alfred's enthusiasm, the project kept being postponed. Application after application for funding was rejected, until also Alfred's last resort at the Austrian ministry of agriculture rejected his application for funding in 2018. However, because of this rejection, Alfred reconceptualized and could finally accept the risk of investing his own money

into the project. There would be no other alternative source of funding, so it was now or never.

> //QUOTE//
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> *"We were going to the ministry and the lower austrian government. And they rejected the project several times. And with the last one, I can still remember, it was the ministry of agriculture. I went back from Vienna and they said: it's such a nice project but unfortunately we cant help you. And then I was really... for me it was like: ok now I don't have to wait to apply another time and wait 3 months for the next rejection. I can do it now because I don't have to wait for anything. So it was so easy. Just do it. I think that's when we started to really put it into practice. At the end I said: ok I've tried everything and at the end nothing worked out so I can start. Let's do it ourselves, don't wait for the politicians."*
>
> (***ALFRED GRAND***)

In addition to that, Alfred had in the meantime gathered the right people around him to help set up the market garden. During a research project by the BOKU, the University in Vienna, on Alfred's farm, Alfred by chance met Livia Klenkhart, who was working on an experiment. When they started talking in spring 2019, Alfred shared his vision about starting a market garden. By chance, Livia had worked on a market garden in the USA the year before, and by chance she was about to graduate from the BOKU. Alfred took this moment of serendipity and asked Livia to join his project. With her experience in vegetable growing, she was the last key to the puzzle: Grand Garten was born.

Restaurant at Palopuro Symbiosis

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> *"I had a tour last week from german no-tillers.* [...] *And then I showed them the market garden concept and they said: you're not a farmer, you're a hobby gardener. And I told them: you can make 200 times more turnover with that small garden than with a conventional wheat field. They completely ignored that info. They said it's just a hobby, just playing around with hand tools."*
>
> (***ALFRED GRAND***)

As Alfred and his newly found team started rolling out the marketing and business strategy, they found that the farm already enjoyed quite some reputation from the many research projects, tours, and vermicomposting business in the village of Absdorf and surrounding region. Their box scheme was fully booked quickly, with the help of a few flyers in local stores. Alfred noticed also how society was ripe for such a form of agriculture, where the consumer is in close contact with the producer. In November 2019 the first boxes were sold to their customers.

During my visit to the farm, the polytunnels of the market garden had been blown to bits by a heavy storm. As Alfred and Livia were picking up the pieces across the field, I asked Alfred what they were going to do now. His reply was short:

> //QUOTE//
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> *"Yeah we find another solution* [*laughs*]. *We already talked this morning: how can we figure out a work around?"*
>
> (***ALFRED GRAND***)

As short as his answer was, it was also highly symbolic for the mindset and attitude woven throughout this pathway: to not give up, and try and try again, often by connecting to others for help in the form of skills or knowledge.

Palopuro Symbiosis

Before Palopuro Symbiosis existed as a biophysical and social collaboration between farmers, energy producers, restaurateurs, theatremakers, and citizen-consumers, there was at the very base a conventional, 88 hectare, arable family farm.

An artist at heart

Markus Eerola grew up on his parents' farm, called Knehtilä, about a 1 hour's drive away from Helsinki. Despite the fact

that his sister had an interest in farming, it was tradition for the male descendent of the family to take over the farm. Due to this societal embedding, from 1982 onwards Markus went into farming school: first in Mustiala, and later in Tampere.

Upon returning home after having served the mandatory year in the Finnish army, Markus realised that it would be best for him and his parents to go their separate ways for a time due to intergenerational differences. They had different opinions, and Markus felt the need to do something else before going into farming.

> **//QUOTE //**
> *"I thought I had to do something else and go somewhere else because if we live all together as a family on the farm that would be problematic because there's also a difference between generations and it's gonna be that way. We have different opinions."*
>
> **(*MARKUS EEROLA*)**

Markus was very interested in arts, specifically art objects. Without his parents knowing, he applied to the Helsinki University of Art & Design, and was accepted into the ceramics and glass design department. Bringing this news he was confronted with misunderstanding and doubt: the people around him, including his parents, didn't see the need to study for a different profession when you have a very large farm at your disposal.

> **//QUOTE//**
> *"I wanted to do something else before I went to the farm. But in the first year I thought I would never come back here. Actually, I didn't say to my parents that I went to exams, because in that time - it was before EU time - so when I got in it was quite a silent moment, with the parents. And so I said, 'no, I'm gonna be here in summer times'. But also our neighbour said: 'your father has good work and good machines and why are you going to Helsinki? What for?' But that was my interest. But he didn't understand because we had 50 hectares."*
>
> **(*MARKUS EEROLA*)**

Markus Eerola (left) and Markus Lusua (right). Photo credit: Helena Eslon

Despite all of this, he convinced his parents and started studying at the department of ceramics and glass design in 1988, where he specialised in glass design the year after. What happened next was that his world opened up both in terms of social contacts and perspective. His network expanded greatly, and he travelled the world to visit ceramic and glass studios. During his travels he also visited and experienced farms and agriculture in other countries. He started to see his family farm out of its own context, with a globalized perspective. In 1992 he finished his Bachelor of Art, and 2 years later in 1994 his Master of Art. During his studies, he spent the agricultural quiet winters at the university, and the summers working at the farm. In 1995 he took his art education to another level by starting his licentiate of art (certificate of competence). Four years later however, in 1999, he quit the licentiate to focus on farming instead.

A farmer after all

One would almost forget that Markus is also a farmer. During his education at the farming school in Tampere, he started renting land in Hyvinkää, the municipality of his parents' farm. Also during his glass design studies he farmed these lands in the summertime, when he was helping out his parents on their farm Knehtilä. At the time he started his licentiate of art in 1995, Markus also became more responsible for Knehtilä farm. This led him to more actively engage with the farmers' union MTK. His father had been a very prominent board member of that union, and so that was part of his network embedding. All Markus remembered was how long and hard his father had to work in that position, and as such he told himself never to become a board member. At that time however, Markus became involved simply as a member farmer.

At around that same time he also joined several meetings of the local arable unions. There he found himself in the middle of a clash between environmentalists and farmers, who were arguing about the sustainability of Finnish agriculture. Markus intervened and shared his globalized perspective on farming and agriculture. He had visited and experienced farms and farming in other countries, including Canada, compared to which Finnish farmers were actually performing quite well. His reconceptualization of the matter, and sharing of his vision on agriculture got him noticed by the head of the region department of arable unions. This man recommended Markus to apply for the call for farmers to join the ministry talks on agricultural subsidies. In that moment of serendipity, Markus saw the opportunity and joined the talks at the ministry. Once there, Markus quickly noticed that there were no scientists to support the farmers - a thought that was informed by his own background as an artist and researcher. He asked the farmers' union MTK to provide scientists that could join the ministry talks in order to represent their

interests. A few years later in 2003 Markus applied for the position of Vice President of the Delegation at MTK, and was elected.

Moving back to 1995, when Markus started his licentiate of art and became more responsible on the farm, Finland joined the EU. As a result the grain prices dropped overnight. Naturally there were subsidies in place to cover the blow, but it was highly demotivating for farmers to be dependent on subsidies, and not get paid the actual value of their products. Nonetheless, Markus and his father continued farming. They saw the opportunities in moving to organic agriculture, but especially for Markus' father this was all too early, and too new. They did however also see an opportunity in the lands that became available due to the many farmers that quit. In the following period they doubled their lands from roughly 100 hectares to 200 hectares by renting new fields. Of course, this was not without risk as it required heavy investments in machinery and also a new grain dryer and grain silos. Looking back now, some of the lands they rented are too small and too scattered, thus decreasing their efficiency. About half of the time in the tractors is spent on the roads, not on the fields.

Markus' increased involvement with the farm led to him quitting his licentiate of art and buying Knehtilä farm from his parents in 1999. One year later in 2000 he started living in the big farmhouse, all by himself. It was not necessarily his desire to do so, but it was tradition.

Connecting arts, sciences & society

When Markus took over the farm in 1999, he saw an opportunity in one of his father's old contacts. Markus started a small cooperation with Finnish company Valtra Tractors, designing and testing tractors in return for the use of those tractors on his farm. With his art & design master and practical agricultural perspective he was more than qualified to do so. A few years later, in 2003, the collaboration stopped again, because Valtra Tractors changed owners. Being no longer a Finnish, but an American company, the design standards and work flows changed.

Organic eggs for sale at Palopuro Symbiosis Farm Shop

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"At that time I got involved with Valtra tractors, it was a Finnish company. Now it's American. But it was a lot of testing and I have a designer education so I know those people from the US and they have test tractors quite often here. And they want to have my opinion. Designing wasn't so high, so professional at that time. So those tractors manufactured around 2000 there are a lot of things that we discussed together. They gave us test tractors to work with and I had meetings in US factories. Because it was a Finnish company it was possible. But after they changed owners it was a different way. They have different standards."

(*MARKUS EEROLA*)

Back in 1999, Markus also started gathering information about ploughing, and its effects on the soil. Remembering the effects he saw first-hand from when his father and their neighbours ploughed the soil, he decided to stop ploughing.

//QUOTE//

"With a researcher background I was very interested in everything new and testing. So I started not ploughing these heavy soil fields. I started to mix them with the heavy cultivator so it mixed all the organic and clay land. Because ploughing, it came from several studies, that if clay is shiny the clay particles are flat. And my neighbours and father were ploughing so it was shiny. And also after ploughing the wheel was making a hard layer and water didn't go up or down. So I decided to go with a heavy cultivator and mix the soil."

(*MARKUS EEROLA*)

He asked help from a researcher from Hyvinkää, whom he had first gotten in contact with during his time studying at the ceramic and glass design department. Soil researchers had made use of the ceramic facilities, to create experimental ceramic tubes with nutrients. This was also Markus' first introduction to precision farming, which would later on become a hobby of his and fuel many research projects. So, when Markus needed help with researching the effects of ploughing, he knew who to call.

In that same period Markus met Minna, and together they started a small farm shop. She was a textile designer, and hand-pressed fabrics in a small area on the farm. They organized small events and markets, served coffee, and

created an open atmosphere for people to visit the farm - something uncommon at that time. In 2004 Markus and Minna got married. Their farm shop was the start of a welcoming experience at their farm, which would prove useful later on.

Around 2005 Markus took the opportunity to become a snow contractor for the municipality of Hyvinkää. Aside from providing him with extra income, through this position he also met quite a number of horse owners. There are many horses in Hyvinkää, and the owners do not have space to store the manure. Primed by his work on ploughing and his ideas on organic farming, another opportunity came to his mind: to collect horse manure for a fee, and spread it on the farms lands, all the while improving the quality and organic matter of the soils. However, the open spread of manure on soils in winter was illegal, so Markus had to come up with a solution to that challenge: he was going to need a cover of some sorts. He contacted a man with knowledge on manufacturing and sales, and they collaborated in the making of a machine that composted the manure, and stored it in plastic tubes.

Both the manure composting techniques as well as the soil and tractor experiments caught the interest of other researchers and farmers. All of a sudden the different elements seemed to work together: the farm's location was closeby Helsinki, and the small cafe and farm shop offered a welcoming space for tours and visitors.

> //QUOTE//
> *"It is situated quite good for many farmers if they are going to Helsinki. And it was easy to have a bus for farmers, and they have some coffee and some handicrafts."*
>
> (***MARKUS EEROLA***)

At some point during his work as a farmer and contractor he also got in contact with Hyvinkää municipality officers. Around 2007 the planning on a new housing area started. The Hyvinkää municipality officers and Markus came to the idea of working with biogas for the heating of the homes, and for Markus to become more actively involved in its development. Because of this, Markus decided to quit his job at farmers' union MTK as vice president of the delegation. One year later in 2008, as the developments of the biogas heating advanced and demanded more time from Markus, he realised that he is a farmer, not an energy producer. In addition the politics around renewable energy were unstable, further adding to Markus' decision to quit the biogas project and focus more on his farming.

By now Markus had 400 hectares of land to work on, and in the years 2009 -2010 he reached a critical moment. In these years the weather was bad: wet winters and springs seriously impacted the harvesting and sowing process. In addition, the grain dryer could not handle the large amount of grains that were wetter than usual. The large amount of hectares put extra stress on Markus, and it was next to impossible to find good but also affordable farm hands.

> //QUOTE//
> *"There's a lot of people who want to come here because of the ecology, but I need somebody to drive tractors."*
>
> (***MARKUS EEROLA***)

In addition, the financial challenges further increased. Even though the crop prices were relatively high, the industry decided to also increase the input prices, leaving no profit margin for the farms. In 2010 Markus and Minna seriously considered selling the farm: to stop with what they were doing, think of the children and the attention they needed, and move back into the art professions they were previously trained for.

> //QUOTE//
> *"There's a saying in Finland in farming that you have to have grades in school tests: you have to have 4 in math, and 10 for religion. So you have to have good religion, but bad math. The son who didn't read, kept the farm. The one that doesn't have the brains to go study at uni stays behind."*
>
> (***MARKUS LUSUA***)

The next chapter: Kari

In the period between 2003 and 2007 Kari Koppelmäki studied environmental science at the university in Hyvinkää. Due to his internships on farms he came in contact with farming. He started beekeeping in 2006, which was a big step for him as it was a first introduction to food production. He started selling the honey on markets, via the farmers he knew. Upon his graduation in 2007 he started working at the Regional Environmental Agency, in the field of Environmental Protection In Agriculture. This was a flexible job for him, through which he met a lot more farmers and further widened his perspective on farming. In 2008 he and his wife Päivi decided to buy a small farm. Of all places they wanted to avoid Hyvinkää the most, because growing up there was an utterly boring experience for them. Despite this, they embraced the opportunity when a farm was up for sale there, and moved back to Hyvinkää. The farm was initially not intended as a means of food production other than the small quantities to provide for themselves.

> //QUOTE//
> *"We wanted that place to be in the countryside and to have some land around us, but maybe mostly for ourselves. And our only criteria was, was that somewhere else than in Hyvinkää. Because we both had been studying in Hyvinkää before and we didn't like the place much. And then we ended up buying a farm from Hyvinkää and it just happened because there was an opportunity and then, why not?"*
>
> (***KARI KOPPELMÄKI***)

However, the farm they bought happened to be neighbouring to Markus Eerola's farm - which is a remarkable feature for a country that knows mostly desolate landscapes either cluttered with trees or open fields of agriculture. Kari and Päivi brought a new and fresh stimulus to the area and they and Markus got along well, as Markus was open to new ideas and change. By chance they also happened to have children of the same age, so that sped up their relationship. From his background in environmental science and his job at the environmental agency, Kari shared a lot of information on sustainability and farming with Markus. Together, they shared ideas and visions on organic farming and closing nutrient cycles in the form of a symbiosis system.

Cut forward to Markus' critical moment in 2010. Suddenly the organic farming system they had been discussing seemed like a way out of the conventional farming system that troubled him so. For one, the production would be lower, decreasing the pressure on the grain dryer. There would also be less inputs, cutting in their expenses. Overall, organic sales seemed to offer an opportunity to secure a larger profit margin for the farm. For Markus this was a big risk, seeing as they were the largest arable farm in Finland to go organic, and they had no animals to support their nutrient cycle. There was quite some scepticism from others about this plan. Despite the criticism and risks, at about 1 week apart, both Kari and Markus made the transition to organic agriculture.

//QUOTE//

"In 2010 it was really odd for most of the farmers to go organic. It was not normal. So we have a problem here up north because the spring is so intensive and the weeds come the same time as the grain. If you go to more middle Europe, the grain is faster than the weeds. But we have the problem that the weeds are as fast or even faster than the grain. So that was the problem. But all in all I got interest in the farm."

(***MARKUS EEROLA***)

A winter without snow at Palopuro Symbiosis

Markus regained his interest in farming due to the challenges and new ideas surrounding organic agriculture. Through their existing network with the university of Helsinki, Kari and Markus joined the university network for organic farmers and attended many farmers' meetings. They also set up information platforms and created new content that is relevant to organic farmers in the Finland context. Markus was also elected as vice-president of the MTK board in that same year, 2010. However, with him having publicly transitioned to organic agriculture he received a few phone calls from farmers that requested him not to further publicly speak about that in his time in office at MTK. MTK is a farmers' union that mostly represents conventional farmers, and so Markus' move to organic was frowned upon by some. Markus very diplomatically made no promises.

//QUOTE//

"I get calls from farmers somewhere saying: 'ok it's nice that you are elected chairman' - because there was an election - 'but don't tell anybody that you are in organic because it is an odd way to farm.'"

(***MARKUS EEROLA***)

During one of the experiments that they conducted with the university of Helsinki they met Jukka Kivela. He was testing organic fertilizers and looking for a space to grow organic strawberries. Markus rented some of his land to Jukka, and they started to get along well. Kari and Markus openly shared their vision and ideas for their symbiosis farming system, and by chance Jukka knew of a bakery that might be interested in moving there and using the biogas to bake bread. In that moment of serendipity, Markus reached out to the bakery and together they started working on a collaboration.

That same year they also hosted the first farmers' market on Knehtilä farm, collaborating with other producers and processors. Where they were planning on a small event and expected about 30 people to show up, the market was visited by roughly 300 people from the local communities and was a big success. The welcoming atmosphere they had already created on the farm with the farm shop and cafe enhanced and was enhanced by the market. Over the coming years the market grew, and as a result the farm became more popular.

Out of darkness, light

In 2013, Markus fell off a ladder and suffered a traumatic brain injury. He was out of the farm and MTK to recover for a few months. By chance there was a skilled student doing his internship that year on the farm, so he and Markus' father were able to take over the work on the farm. During his time

recovering from the accident, all Markus could do was think as he was confined to the bed. He started reconceptualizing the situation with the farm: the potential of the restaurant for which plans and construction work had already begun, his soil improvement practices with the composted horse manure, and the possibility of biogas on the farm. He saw the opportunities in all these elements and so the following year they took the leap of opening the farm restaurant, and he and Kari further discussed the layout of their symbiosis farming system. When he returned to his work at MTK he also saw how the EU was pushing for greener agriculture, and as such he felt extra motivated to move forward with Symbiosis. However, a year later, in 2014, the idea for Symbiosis stranded. The project seemed too complicated and ambitious to realise. In addition, the funding required for a biogas station was enormous, and not within reach for either Kari or Markus.

Moving back for a moment to 2013, the year of the accident, Kari started his MSc at the university of Helsinki. There he got to know his professor in agroecology, Juha Helenius, much better, and they started to talk about Symbiosis. In 2014, when the idea had stranded, it was Kari's professor who then advised them to not invest or create anything themselves at this moment. He advised them to first work out their plan on paper, and then with the help of the university get their project funded. Around the same time, when Markus discussed the idea with an agricultural minister he knew through MTK and told him that they would no longer continue with Symbiosis, this minister told Markus not to give up, and as such he showed faith and trust in their idea.

This reconceptualization of their challenges into the possibility to get funded, motivated Markus and Kari to write down the Symbiosis concept, and use their contacts at the regional environmental agency to hold a meeting with people from the agricultural and environmental ministries. This meeting in 2015 led to Symbiosis being funded through the RAKi program - a program invested in nutrient cycling in Finland. Kari was offered the job to lead the project development, and as such he quit his job at the environmental agency. From that moment on there was a budget to get all sorts of financial and technical experts involved, to fill in the missing knowledge and work out the details on Symbiosis.

Curly-haired horse at the petting zoo at Palopuro Symbiosis

With the funding of Symbiosis, the environmental ministry wanted to show their efforts through an animated video on a large upcoming conference. Although there were animators and environmental experts involved, the vision for the video was missing and as such could not be completed. Markus then invited an old contact of his, who is a brand maker and expert in marketing, to become the producer of the video and provide the visioning structure. They reconceptualized the message of the video, and so it could finally be finished. In addition to this, the brandmaker told Markus that there was an opportunity to create a product brand out of Symbiosis. The brand Knehtiän Pienipuro was born.

Symbiosis

With the opening of the restaurant and the many events, tours, markets, and weddings that were hosted on the farm, Markus increasingly realised the need for animals. The families that brought their children were expecting animals if they visited a farm. As such, in 2015 Markus invited a woman to settle for free on an unused part of the farm with her horses and rabbits, to start a small petting zoo and receive the families with children. In return, she renovated that part of the farm and created a welcoming experience. Flash forward to 2017, and the farm had grown increasingly popular and was well-visited by many different people. During one of their market days, Markus met the head of a local amateur theatre group. They clicked, and the theatre group expressed their desire to perform in one of the large barns during the summer months. Seeing that this barn was only used for the storage of machinery, Markus took the opportunity to attract more people to the farm. In 2018 the theatre was established and enjoyed a fully booked summer of performances.

Back in 2017, the plans for the inclusion of the bakery that would run on biogas were rejected. The location was too close to the grain dryer, and so posed a fire risk. Although Markus and Kari were still keen on getting the bakery involved on the farm, and the bakery had established enough funds through crowdfunding, there was no move being made. There was no clear direction and management at the bakery, and the communication between Symbiosis and the bakery became foggy. As a result, whether or not the bakery will join Symbiosis is unclear up to the point of this writing.

Also in 2017, Markus Lusua joined the Symbiosis team. Having his own organic farm, Markus Lusua was hired by Markus Eerola to help out with the practical work of farming. Markus

Biogas pumping station at Palopuro Symbiosis

Lusua proved to be a valuable asset, with his knowledge of organic farming and skills in repairing machinery. Markus Eerola was finally relieved of much of the farm work that had put so much stress on him the years before. The communication between the two farmers was also in many ways flawless, because they were both on the same page in terms of organic farming.

Back in 2016, Kari finished his MSc. One year later, together with the help of all the technical and financial experts, an official paper was published on the dynamics of Symbiosis. This led to the official start of the project on the farm, and more research to be conducted. At the same time, Kari was offered a PhD position, which led to a critical point in his life. Throughout the years Kari and his wife had scaled up vegetable production on their own farm, taking up much of their time. This PhD position, together with the fact that his wife was also starting a new job and their children were at an age where they needed more attention for hobbies and sports, caused Kari and his wife to take a step back and reconceptualize. What were they to do with their time, and with the farm? Soon they recognized their own potential in terms of farming, and Kari decided to focus more on his PhD for the coming time. Kari then also embraced the opportunity when a young farmer from Helsinki wanted to rent some of his land to produce vegetables.

> **//QUOTE//**
>
> *"Let's say if you have half an hectare, if you're able to manage that, that's already a lot of vegetables. But then you think that, okay, let's double that. I can make a double income, but then it's sometimes very difficult to understand that if you double it, you're not able to do it in the same time anymore.* [...] *Do you want to have some other life than only spending your whole summer on the farm?"*
>
> **(*KARI KOPPELMÄKI*)**

After having started his PhD, Kari attended a lecture at a conference. When given the chance, Kari commented and explained what they were trying to do with Symbiosis, and the struggles they were having with the biogas station. Because of his speaking up, he got noticed by a regional development manager who offered to match Kari with his contacts at energy company Nivos. Kari embraced that moment of serendipity and prepared a presentation for his meeting with the directors at Nivos. At the same time, Nivos was in a position where they still had not found a suitable agricultural partner for their biogas projects. Based on the reputation and social character of the farm, Nivos immediately, after the first slide of Kari's presentation, funded the construction of a biogas plant at their farm. Two years laters the biogas plant was constructed, and the farm visitors could pump gas for their cars. That same year the next scientific Symbiosis article was published, based on the findings of the previous article and their work on implementing biogas on the farm.

> **//QUOTE//**
>
> *"I was presenting the idea - I had like well prepared powerpoint slides - and I think it was after second of third slide he was like: 'yeah we can build this'"*
>
> **(*KARI KOPPELMÄKI*)**

Moving through these developments it becomes clear how Palopuro Symbiosis as a complex biophysical and social system was born out of the collaboration with others, sharing visions and struggles, and also from time to time out of moments of serendipity and seizing the opportunities it offers.

ERF

ERF is an interesting case, because before 1996 it did not exist. However, from its conception on there was a strong focus on organic agriculture.

Surviving & thriving: building ERF

ERF was established in 1996 with a clear goal: to temporarily govern lands on the edge of the cities Almere, Lelystad, and Zeewolde until those municipalities required them for city or infrastructure expansion. To do this in the form of a company that rents the lands, suited the municipalities well, because then there would have to be no compensation for when they needed them back. There was also a drive to govern the lands sustainably, without the use of pesticides, because of their vicinity to the cities.

> **//QUOTE//**
>
> *"We farm mainly at the outskirts of the city, so we farm land that will eventually be used for urban expansion. In the past they were also always on the outskirts of the city, so pesticide damage, yes that was an issue. The people had a garden, and the government was spraying, the wind*

> *blew from the wrong direction again so there were trees with crippled leaves hanging."*
>
> **(*JACO BURGERS, TRANSLATED FROM DUTCH*)**

By 2000, in a risky move ERF had become fully organic. The organic market was underdeveloped, and so sales were difficult. In combination with bad weather and mismanagement, ERF faced serious financial difficulties throughout the following years. This was also visible on the fields: other farmers could see how ERF's fields were messy and mismanaged. This caused a lot of doubt towards the company that was already not very loved due to the fact that it took away many hectares of land that the other farmers would have liked to farm themselves.

> **//QUOTE//**
>
> *"Back then everyone said that it was not possible, and that especially large-scale organic agriculture was not possible. Well, we have proven the opposite."*
>
> **(*JACO BURGERS, TRANSLATED FROM DUTCH*)**

By 2005, the ERF board asked Jaco Burgers to become manager at ERF and restructure the company in order to clear all financial issues. Jaco was a perfect candidate for them because of his previous working experience at banks from where he alleviated the debts and financial struggles of a number of farms. For Jaco this came as a welcome escape from conventional agriculture. His previous experience with large conventional farms where there was always a struggle over the price with processors and distributors had made him want to move toward organic where the story of the products still counts.

> **//QUOTE//**
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> *"The table potato and fries potato, that was always a fight. With the processors, always for the price. And I grew 300 hectares of potatoes and from one year to the next I said: 'I cut it out completely. I'm no longer planting a single potato.' Well, then everyone was a little in shock, both the farmers around me and the processors. Was this possible? Because the potato is the most important crop for arable farming. Well I say: 'not for me.'"*
>
> **(*JACO BURGERS, TRANSLATED FROM DUTCH*)**

Jaco Burgers. Photo credit: Pim van der Maden

Theo Heijboer. Photo credit: Pim van der Maden

From 2006 onwards he started as director at ERF and began a reorganisation, bringing in new people who in his eyes had the right mentality and expertise. They needed to quickly reduce the financial risks, and so they started renting out fields to expert farmers who paid a margin over what they produced. In addition they started to build up stable relationships with processors and distributors, simply by fulfilling promises and communicating clearly. They also started building on their reputation and relationship with the local communities by running more organised fields and asking their neighbours for help when they needed it. In 2007 they became fully GPS equipped in order to improve their workflow on the fields. Seeing that their practical manager was close to his retirement, and the farm work was ever increasing, they hired Theo Heijboer in 2008 as assistant practical manager. Two years later in 2010, Theo succeeded the retiring practical manager.

> **//QUOTE//**
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> *"Theo, the practical manager, is mainly busy with the cultivation outside. But during the growing season I am also outside every day. I myself grew up on a farm, and I am actually just a farmer. And that's what I like the most. To be in between those crops, so that I also know what's going on with those crops. Because if I have sold product X and I just see it growing daily, I also have the right story to tell."*
>
> **(*JACO BURGERS, TRANSLATED FROM DUTCH*)**

Over the years, the rental cost of their lands increased. As such, from 2012 onwards they started taking back the production of crops into their own hands. Instead of renting out lands, they started collaborations with expert

growers and thus gained control back over the production of their crops. In this process their employees also learned the techniques from the expert growers, so they could become more self-sufficient. In 2013 their collaboration and relationship with other growers led to ERF becoming shareholder in Biobrass, a processing company of red beets and parsnips amongst other produce. In this collaboration ERF saw the opportunity in using the processing expertise of one of the other growers. By becoming a shareholder and active collaborator in the processing of their products, ERF also strategically strengthened their market position in relation to the buyers of its produce. Around the same time ERF also started Hannah's BV, which was meant to market and help growers sell their products directly to consumers. This direct sales channel never became successful. However, Hannah's BV did become successful in marketing the story behind Biobrass to the larger buyers: the story of local farmers also locally processing their own produce.

> //QUOTE//
>
> *"That's the nice thing about being big. If it goes well, it goes relatively quickly and you can still achieve a nice result with relatively small margins. However, when things go wrong, yes, then you are always too big. That is why we start small with a lot of crops."*
>
> **(*JACO BURGERS, TRANSLATED FROM DUTCH*)**

As part of their new collaborations with growers, ERF started growing brussels sprouts in 2015 with grower Herbert BV and with distributor Green Organics. Over the years this proved a successful collaboration, and the land area grew to 83 hectares, and investments in machinery were made. An example of an unsuccessful collaboration is when ERF started growing parsley for dried herb producer VNK Herbs. VNK Herbs had asked ERF to produce parsley for their market in the USA. ERF jumped in on that opportunity by first growing 15 hectares of parsley in 2015. In 2016 due to its success that grew to 46 hectares, and it continued into 2017. However, in 2018 there were pesticide residues found in the dried herbs. This is not an uncommon issue, seeing that any pesticide residue that the wind brings to your fields from your neighbours is increased 10 fold when the herbs are dried. Nonetheless, the US market had a zero-tolerance policy, to which ERF simply did not want to oblige. As such, this challenge was not overcome, but instead ERF focussed its energies on different crops and markets.

Roy Michielsen. Photo credit: Pim van der Maden

> //QUOTE//
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> *"In the discussion of organic, with zero tolerance, that is impossible, it does not exist. And we experienced that too. It gets worse because you're going to be drying that stuff [parsley]. You dry it 10 times so your concentration becomes 10 times higher with residues. And that just comes blowing in from your environment. End of production."*
>
> **(*JACO BURGERS, TRANSLATED FROM DUTCH*)**

Nature inclusive farming: strip cropping

In the years leading up to 2008 the cities Almere and Lelystad grew, along with the highways connecting them. The green space that was sacrificed needed replacing, and thus the government wanted to connect nature areas the Veluwe and Oostvaardersplassen through project Oostvaarderswold. However, the economic crisis and the new Dutch cabinet Rutte I took away all funding that this project originally was supposed to have. However, nature organisations WWF, Flevolandschap, and Staatsbosbeheer were still keen on connecting the two nature areas. As such they found alternative sources of funding. However, many of the surrounding farmers, together with the Dutch agricultural organisation LTO, petitioned against this project, and won their case through the Council of State. This led to a permanent termination of the project in 2012. As such, instead of imposing a top down project, province Flevoland started a tender called Nieuwe Natuur in 2013, for which anyone could apply with a project. ERF saw this as an opportunity to gain more lands to work on and innovatively combine agriculture with living and nature. Bart Fokkens, who was the chair at the ERF board, was also the chair at the board of nature organisation Flevolandschap. As such the two collaborated in the tender, strengthening each other with their own expertise: ERF brought the practical farm-business knowledge, and Flevolandschap their nature creation and conservation knowledge and experience.

Around that same time, ERF was faced with the challenge of aphids in their peas. In the past they had always used organic pesticide Spruzit, however they could never predict whether it worked because it was difficult to get the timing right. In addition, when they did spray they also killed many other beneficial insects. As such, they started looking around for alternatives, and found it in the flower strips being used elsewhere. This was around the same time that ERF was taking back the reigns of their own productions, and thus had more financial stability. As such they were starting to envision and reconceptualize other ways of doing agriculture, which coincided with the plans for nature- and people-

inclusive farming with which they entered the tender.

In 2014 their proposal, called Noorderwold-Eemvallei, was accepted. They were granted a budget and land to realise new nature on, and to start experimenting with this form of agriculture. As such, more people were needed to guide the project. Roy Michielsen was hired to aid in bookkeeping, and as support for the project. In addition Roelof Balk was assigned as project manager, and he started organising meetings with knowledge experts in the fields of nature conservation and nature-inclusive agriculture. As a result, Pablo Tittonell visited ERF and shared his vision about nature-inclusive farming, which greatly inspired and helped form the vision of ERF on the matter.

Around that same time Roy visited a presentation on another farm in Flevoland, on the results of the previous year of strip cropping by Dirk van Apeldoorn from the WUR and the Louis Bolk Institute. The owner of that farm was not too keen on continuing with that program, and the other farmers present were not keen on starting with it either. However, upon hearing the effects of strip cropping on pests and the fact that the research program had enough funding for another 2 years, Roy embraced the opportunity in that moment of serendipity: ERF joined the program, and together with the Louis Bolk Institute and the WUR started experimenting with flower strips in peas and strips of different varieties of potatoes in 2015. It was then, through their contact with the Louis Bolk Institute that ERF could get in touch with agroecological farmer Mark Shepard, who happened to be visiting the country. Mark further shaped ERF's vision on nature-inclusive farming by sharing his experiences and vision, with a focus on making their efforts profitable, no matter what they are.

Through their flower strip experiments, contact with Dirk van Apeldoorn from the WUR was established. In 2015 the first ideas on larger strip cropping experiments were formed. Initially, a model was created by a student, which was too unrealistic for ERF to pull through. Dirk, as a more experienced and practical researcher, then reconceptualized this model into something that was workable for ERF. However, there were quite a few doubts about these experiments coming from ERF's employees, who after all had to be the ones to realise the projects. The fact that their last year of flower strip experiments had brought forth bad results due to bad weather did not help with these doubts. As such, in 2017 Dirk presented the new strip cropping plan to all employees at ERF in person, along with the reasoning and motivations behind it. This communication seemed to at least get all members on board, though it did not necessarily take away all doubts. They started the strip cropping experiment on 40 hectares, and they were faced with good luck in the form of a good growing year. In addition, the efficiency and working method with even the smaller strips ended up being much better than expected. As such, upon presenting the results at the end of 2017, most employees had gained trust and enthusiasm in the process, with some even being proud of working with strip cropping. The fact that the field looked beautiful and got quite some media attention contributed to this sense of pride. The strip cropping experiment was continued over the coming years on the same field.

> //QUOTE//
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> *"I also hear a number of employees say that they are proud of the fact that they are engaged in strip cropping and are now thinking about how to do that even better. If it had been an immediate failure it would have been a bit more difficult. But the positive results made us, as well as the employees, enthusiastic."*
>
> (***ROY MICHIELSEN, TRANSLATED FROM DUTCH***)

Moving back to 2017, as project Noorderwold-Eemvallei gained momentum and shape, it became clear that a separate company was needed for a more permanent sustainable governing of lands. In recent years, ERF had lost a lot of land to the development of housing area Oosterwold, and this made it all too clear that agriculture in the form of agroforestry, which needs 10 to 15 years to be established, was impossible under ERF's conditions. As such, in 2018 Hemus was established, with the main goal to gain experience and knowledge with nature-inclusive farming in the form of agroforestry, amongst others. The following year the business plan was developed, and a course on strip cropping was provided together with ERF, WUR, and other actors in their network. The goal of this course was to share their knowledge and experience with strip cropping with other farmers. For their work in strip cropping and their sharing of that knowledge ERF was awarded the Ekoland Innovation award in 2020. In that same year ERF transitioned the initial 40 hectare field of strip cropping under the governance of Hemus, and started a new field of 65 hectares to continue strip cropping experiments on.

With this latest achievement it becomes clear how ERF transformed from a farm struggling to survive, into a thriving one that wins awards because of their innovative practices and visions. In this process, the agency of the farmers was crucial: from strategically collaborating with others for knowledge and expertise, to creating legitimacy and trust by communicating clearly.

Synthesis

There are two main conclusions that can be drawn from this chapter. Firstly, the pathways of these farms were truly transformative in the sense that the farms are currently fundamentally different from their starting positions. The farms are currently made up of fundamentally different practices, and those practices are embedded in a whole new set of relations - with the market, employees, other producers, universities, researchers, processors etc. In addition, we can not only discern changed practices and relations, but also fundamentally changed ways of thinking, in how these farmers regard farming and sustainability.

Secondly, throughout the pathways towards these new systems, the transformative strategies as wielded by the farmers could be identified at multiple points and have shown to play a crucial role. In the end, the transformative agency of the farmers in the form of visioning, reconceptualizing problems into solutions, seeing and seizing opportunities, creating new relations with others for skills, resources and knowledge, etc. is what drove the transformations of the ways of doing and thinking in these farms. As such it becomes clear that these farmers have shown institutional entrepreneurship.

Strip cropping at ERF Photo credit: Dick Boschloo

Photo credit: Klaas Elssens

6.

Comparing pathways

From the reconstruction and analysis of the individual farm pathways in the previous chapter (Q2) we could see how the farmers continuously applied transformative strategies as they were adapting to and shaping the embeddings of their farms and working towards visions of sustainability. In this chapter the similarities and differences between those pathways will be highlighted in terms of the applied transformative agency. As such the goal here is to answer Q3:

Q3. *What are the main similarities and differences between the transformative pathways?*

The focus here is on comparing the same transformative strategies across the different pathways, as well as on comparing the sequence and relations between the different strategies, and the relations to their embeddings. In order to make such a comparison possible, a new set of dimensions has been induced: Sensemaking, Connecting, Embedding, and Developing (figure 4). For the visualised pathways according to these dimensions, see appendix 3.

The findings in this chapter are structured according to these dimensions. The chapter concludes with a short synthesis, in which the findings of the comparison of the transformative pathways and strategies are summarised.

Sensemaking

Throughout all pathways, all actors are at multiple stages trying to make sense of what is going on: what they are experiencing, what their context is throwing at them, and what they should do with it. If we look more closely at the transformative strategies, sensemaking comes in a variety of shapes. It can be the reconceptualization of problems into solutions, of the negative into the positive, and very much connected to this: it can be in the form of seeing opportunities in the contexts they find themselves in. Visioning is also very much part of this process, as that is what creates opportunities in their mind, but also, based on the opportunities they see, they create visions. Lastly, self-confidence, as part of the trust strategy, is also an important aspect of this dimension.

The pathways show that sensemaking often comes right after critical moments, that it is enhanced by widened perspectives, and that it comes in the form of seeing opportunities and serendipity also outside of critical contexts.

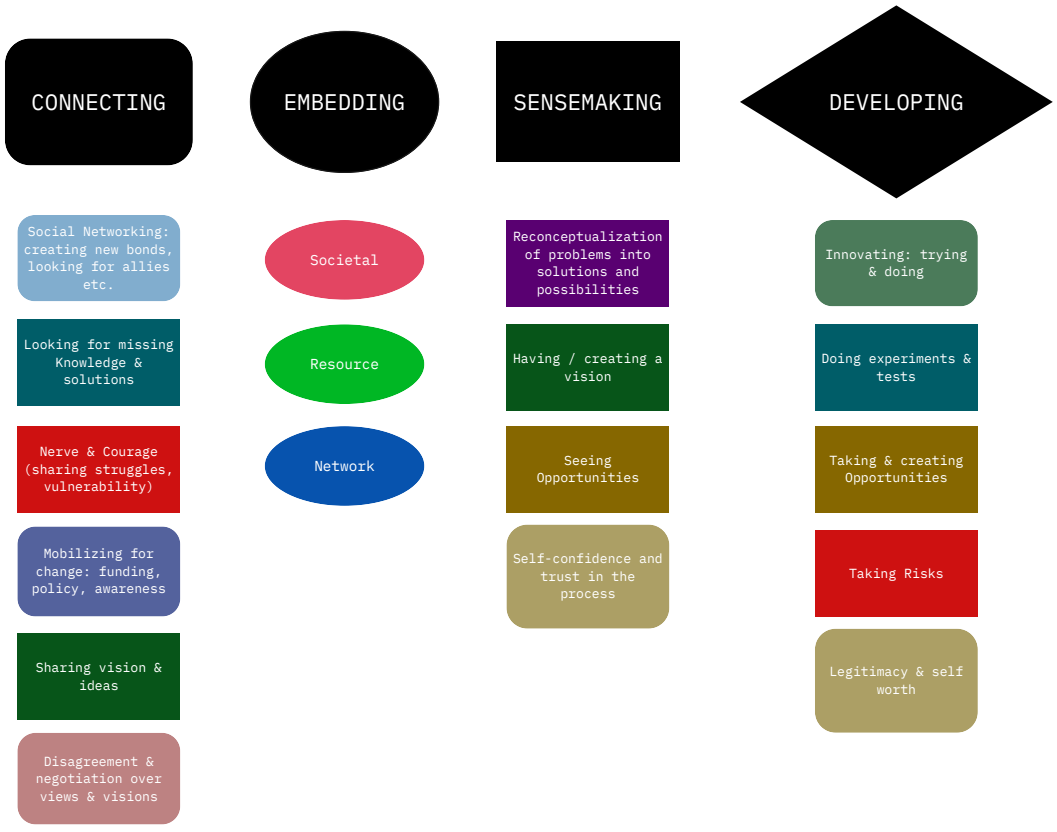

Figure 4: The 4 dimensions of Sensemaking, Connecting, Embedding, and Developing. Each dimension contains multiple (parts of) transformative strategy categories.

Making sense of embedding: opportunities & serendipity

Comparison of the pathways shows how sensemaking of certain contexts can lead to opportunities, visions, but also serendipity. In other words, the farmers have shown to be in sync with, and aware of, their embeddings to such an extent that they play in on them and see opportunities and possibilities, potentially through fortunate, random discoveries.

For example, in the case of the New Nature tender that was started by the province of Flevoland, ERF saw that as an opportunity to gain more lands to work on, and become a pioneer in nature-inclusive farming. They utilized their existing network embedding through Bart Fokkens by teaming up with nature organisation Flevolandschap. Their collaboration would be successful from the lens of the tender, because where ERF brought in the expertise and desire of viable organic agriculture, Flevolandschap carried the expertise of nature creation and conservation and thus would be a key towards nature inclusive farming. Another example of reading the embedding can be seen when Roy went to a meeting on strip cropping that occured at another farm in Flevoland. There he heard about the potential, but also how the other farmers were not too keen on starting or continuing with the experiments. In addition, a moment of serendipity struck: upon hearing that the project had 2 more years to go, he recognized the opportunity and ERF started flower strip trials.

> **//QUOTE//**
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> *"It turned out that there already was ongoing research in Lelystad for this strip cropping, and the result of doing it in a different way was that you would be less susceptible to it [aphids]. And that immediately caught my attention, like: 'hey, if we do it that way, we can actually achieve quite some results with a simple intervention.'"*
>
> **(*ROY MICHIELSEN, TRANSLATED FROM DUTCH*)**

In the case of Palopuro Symbiosis there are also a number moments during which the farmers read their contexts well and saw the opportunities those provided. Markus reached out to an old contact of his father, Valtra Tractors, to collaborate with them on designing and testing tractors on his farm. In other words, he saw the opportunity of that network context. Also later on, when the farm started to be visited more often by families on market days and wedding weekends, he realised the need for animals on the farm. As such he invited a woman with horses and rabbits to make free use of a 'forgotten' part of the farm, as long as she keeps animals there and receives families.

Grand Farm is no exception. When Alfred experienced his light bulb moment at the University of Berkeley, that is actually because he saw the opportunity in taking the vermicomposting technology home to Austria, where organic waste separation was already embedded in the socio-political structure. Similarly, much later on in the journey, Alfred sensed the need and opportunity for a research and innovation farm. This came about during the discussions with researchers and policymakers at the many focus groups and conferences: his context was asking for a farm where research and experimentation are welcomed. In terms of serendipity, Alfred made a fortunate but unplanned discovery when he received an open call for applications for the EIP Agri focus group on organic agriculture. He recognized the opportunity in that one email, applied, and was accepted.

In some instances serendipity was also actively, though not intentionally, created by sharing ideas and visions: by being vulnerable in the face of others. This will be discussed later on under the heading 'connecting'.

Change through perspective

> **//QUOTE//**
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> *"Even in school I was fascinated because we visited some organic farmers and the next day you'd visit those high intensity conventional producers, and you compared these both and the one was: 'you have to put it exactly like that and spray with that concentration' and the other would do anything - nothing - and he had - not the same yield - but he also had a good yield and had double the price. So that fascinated me quite a bit."*
>
> **(*ALFRED GRAND*)**

Another striking similarity between all farmers is the wide perspectives with which they view their own farms. They all have to some extent gained a perspective from outside of their own farm. By this I mean that they are capable of viewing their own farms through the eyes of an outsider: they know of alternative realities and are very much in touch with other forms of agriculture and thinking. The effect that these

Bird-spotting with Alfred

widened horizons have is that the farmers have also opened up to new ideas and ways of thinking: they have opened up for the possibility and potential of change.

Markus was very clear in pointing out how his time at the University of Art & Design in Helsinki in many ways impacted his life and his perspectives: he traveled abroad to visit art studios and also farms while he was there, and his classmates were international students from all over the world. He started seeing his family farm with new, more open eyes. Kari on the other hand never was a farmer to begin with, and so entered farming with a different set of eyes altogether. In addition, his environmental science study and work at the regional environmental agency brought him in contact with a wide variety of farmers and farming methods. As such, when he entered farming he already had a widened perspective.

> //QUOTE//
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> [*On studying*] *"Otherwise I wouldn't do these things that I do now. Because it prodded my mind quite a lot to have different values and see the farm not inside the farm but outside the farm: what's going on and what is the process there."*
>
> (***MARKUS EEROLA***)

Before coming to ERF, Jaco had worked for banks and other farms, often with a focus on restructuring and reorganizing the farms to make them profitable again. As such he had already seen and worked with a wide variety of farms, and understood the ins and outs of those farming methods. In fact it was his experience with conventional farming that drove him to search for an alternative model of farming, one where the story and product for what it is still count. In fact, Jaco went from a farmer with a neutral-stance to organic agriculture, to one who is now not only manager of organic farm ERF, but also the proud owner of his own biodynamic farm. Roy on the other hand first studied at Wageningen University and worked at a bank before joining ERF. As such, he too had a wider perspective on farming when he joined ERF.

> //QUOTE//
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> *"I was also a bit fed up with conventional agriculture. I was a manager on a 3000 hectare farm here in the Netherlands. We also grew quite a lot of potatoes there, but every year there was just a lot of fuss about how to get your potatoes sold properly, above cost price."*
>
> (***JACO BURGERS, TRANSLATED FROM DUTCH***)

For Alfred the world opened up after his first log in on the internet. Through the internet he learned first about vermicomposting, and he got in touch with people and studies around the world to learn more about it. In addition, it was his work on the earthworms that opened his eyes about the importance of soil. Later on, Alfred's involvement in a variety of conferences, focus groups, and research projects further widened his perspectives on agriculture, sustainability, and how soil is a crucial connecting factor between the two.

These examples show how these farmers have widened their perspectives throughout their pathways. In turn, the pathways as a whole show the legacy of their open-mindedness to new ideas and concepts: their open-mindedness to change.

Alfred in his vermicomposting facility

//QUOTE//

You have to learn to be open minded. Maybe it's best to go work a year or two somewhere else. And then have the idea because farmers are so stuck, positive and negative way, on the farm. So that's it, learn to be open minded. That helps to make decisions what to do further. And have experience with other ways of society. I think it's a global thing because I've been in many farm shows in Europe and those farms are alike in a way. So you have to have that experience. But they have to have their own decision if they want to change.

(***MARKUS EEROLA***)

In addition, together with their changing perspectives their visions changed as well. The farmers did not have exact or clear visions of their farms or projects when they first started out. Palopuro Symbiosis as a concept developed through time, by talking, researching, doing, and serendipity. ERF's vision of how to shape their version of nature-inclusive farming was also not set in stone when they won the New Nature tender. Their vision was greatly affected and shaped by the talks with Mark Shepard and Pablo Tittonell, and the collaboration with the Louis Bolk Institute and Dirk van Apeldoorn from the WUR. For Alfred his work and research on earthworms changed his views on agriculture.

Critical moments: Obstacles versus Challenges

Another occasion in which sensemaking appears to be important is in relation to critical moments. These can lead to 'dead ends' when the path discontinues or takes a turn, or they can lead to achievements over time, if the embeddings and perseverance of the farmers allow for it.

Alfred cleaning up plastic tarp swept up by the wind.

In relation to dead ends it is striking to see that, purely based on the interviews, when asked about whether they have ever experienced obstacles, each farmer - with no exception - answered that they had not. An obstacle here was described as a 'wall' that they could not overcome. Some farmers had to think harder than others, but they each concluded that they could not really think of 'walls' they were unable to overcome. Instead, they experienced challenges, which by definition are seen as "a stimulating task or problem" (Merriam-Webster, n.d.). As such they experienced issues that required work and thinking to overcome - but it was possible to overcome those issues in the first place. This is remarkable, because when looking at the pathways visually, there are a variety of dead ends, which one could argue, are walls that could not be overcome. Take for example ERF's production of parsley which ended due to a zero-pesticide tolerance in the US market, or think of Markus' cooperation with Valtra tractors which ended due to a change in ownership. These are dead ends, and yet the farmers do not experience them as such - at the moment of interviewing at least. Perhaps how Theo from ERF described how he views their failures with certain crops should be seen as metaphor. He explains how they tried growing pumpkins and winter wheat, which failed simply because of 'efficiency' issues. The alternatives they got to grow instead were not any worse for the soil, in fact in some cases they were better, and more importantly for them was that they were more cost-efficient. It becomes clear that he did not experience their failure with these crops as a negative event: it simply happened, and from there you pick up the pieces and move on.

This sensemaking mentality of seeing challenges becomes even more clear when we look at the critical moments that were not dead ends after all. After Alfred has gone through the trouble of finding a continuous flow system for his earthworms in Portland - a technique that keeps production stable also in cooler winter temperatures - and taking it home to Austria, he is confronted with a doubling of the license price of that very system, half a year into development. This is too high of a price for him to pay, so early in the development stage. However, instead of giving up, he reconceptualizes, and sees an opportunity in starting the development of his own system, fuelled by his vision for a vermicomposting business.

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[*On obstacles*] *"Just go up and see the whole scenery. And then this one point doesn't look so bad.* [...] *But of course when we get more experience the walls are harder. Nowadays it has changed a little bit, the walls are thicker...* [*laughs*]. *Unfortunately. But that's how life goes."*

(***MARKUS EEROLA***)

For Markus a similar response is seen when Finland enters the EU in 1995. As grain prices drop overnight, most farms suddenly see their income drop as well, and the profit that is left is mostly there due to subsidies. Demotivating as it is, Markus and his father do not give up. It is likely that the resource embedding of their relatively large farm size - about

100 hectares at that time - supported them financially as well. However, the crux is that they start seeing an opportunity in the extra lands that come for sale due to the farmers that do quit. In the following years their farm doubles, triples, and even quadruples to the size of 400 hectares in 2006.

An example of this sensemaking in ERF's case is when Jaco is faced with aphids in their peas and the effects of organic insecticide Spruzit. Their peas are infested with aphids, but the insecticide doesn't always work because the timing is difficult to get right. In addition, whenever they do use the insecticide, it also kills off any beneficial insects. Confronted with this issue of 'Russian Roulette', Jaco sees an opportunity in the flower strips that are experimented with on other farms, and that appear to gain decent results. This then formed the first motivation and vision for the flower strip experiments conducted later on with the Louis Bolk Institute.

> **//QUOTE//**
>
> *"You can see obstacles and then say: 'I'm not doing it', or you can see them and say: 'what can we do to improve that?' By nature it is often the first."*
>
> **(*ROY MICHIELSEN, TRANSLATED FROM DUTCH*)**

What these examples illustrate is that, when confronted with a critical moment or context, instead of letting it spiral down into negativity, these farmers manage to reconceptualize it into positive developments. They show flexibility in how they deal with such critical moments. They see opportunities, possibilities and thus envision potential pathways forward. And even when they do find themselves confronted with a 'dead-end', they do not regard it as an obstacle or something negative, but rather as something that simply 'is', which allows them to move on. However, it is important to note that many of these moments of sensemaking, whether in relation to critical moments or not, were not brought about by the farmers individually. Most often are these sensemaking moments informed and shaped by connecting first or simultaneously with others.

Connecting

Throughout the pathways, connecting is applied strikingly often by all farmers. When looking through the lens of transformative strategies, connecting can be seen in the form of looking for new information and knowledge, or by building social networks and thus expanding the available expertises and possibilities. Mobilizing for change - i.e. the search for funding, influencing of policies, and raising of awareness around resource deficits - is also part of this dimension as it is so closely related to connecting to others to achieve its goals. For the same reason the negotiation and conflict resolution strategy also fits well with this dimension. Finally, it is for connecting with others that sharing of ideas and visions is absolutely essential, for which you need a certain amount of nerve and courage.

When comparing the pathways it becomes clear that these connecting strategies are applied either in relation to the sensemaking process during critical moments, or in more general moments of curiosity and opening up to new ideas. Throughout each pathway the crucial role of universities and research institutes is evident, alongside the importance of communication. The effects that connecting has are significant: not only does it tap into the endless possibilities of a well of expertise and knowledge bases, it also creates moments of serendipity.

Critical connections: together, we make more sense

After multiple critical moments in the pathways, in the process of sensemaking, the farmers reach out in search for help. This can be in the form of looking for extra information, expertise, or simply an outsider's opinion.

For example, when Alfred was at a low point because of his vermicomposting, he asked an old acquaintance for advice. Alfred missed the management and marketing skills to properly get his vermicomposting products on the market. So even though his production techniques had been perfected, in the end the business was no success. Instead of giving up however, he asked Leopold Fischer for his expert advice: Leopold was a consultant in business development. From that moment of connecting, the opportunity in, and vision of VermiGrand developed further.

> **//QUOTE//**
>
> *"In 2009 I was quite unsure if I should keep the vermicomposting project running. Because I developed all the technologies but I was not successful in sales and management. And then I asked the partner that I have now in VermiGrand if he could look at it from a different perspective."*
>
> **(*ALFRED GRAND*)**

A critical moment for ERF was when the strip cropping experiment was introduced. Most of the co-workers challenged the reasoning behind it and doubted the experiment. What also did not help was that the first strip cropping model made by a student was far too unrealistic for ERF to pull through. At that point ERF asked Dirk van Apeldoorn from Wageningen University & Research to create a new model. Thankfully Dirk was an expert in creating practical and feasible experiments, and thus a much more realistic model was created that made sense for ERF and offered a way forward.

In the case of Palopuro Symbiosis, Markus was faced with a lock-in concerning the video they were producing about their farming system together with the environmental ministry. Although there were already multiple experts involved and there was a budget available, the vision for the video simply did not come together. Markus reached out to an old ac-

quaintance of his, who was a brandmaker and marketing expert. Markus proposed this brandmaker could be the producer of the video, and from that moment the video started taking off. In addition, the brandmaker signaled the potential of the story of their farming system in becoming a brand on its own.

For both Palopuro Symbiosis and Grand Farm, when they made the transition to organic they realised a lot of information and knowledge structures were actually missing. Reaching out to existing university and farmer networks helped them bridge that gap. For ERF the lack of knowledge of certain crop productions was bridged by cooperation with farmers that were experts in those fields. What these examples show is that in critical times when self-esteem is low, knowledge is missing, and the farmers are faced with challenges, they managed to make sense of those challenges when they reached out and did it together.

Through knowledge: complexity

What the previous examples also show is that when the farmers are connecting to others, they tap into a rich well of expertise and knowledge that would otherwise be unattainable for themselves to develop on their own. Critical moment or not, what it shows is that these farmers actively reach out and search for new knowledge and expertise, and very often take a shortcut by teaming up with others. More importantly however is the effect of this: the knowledge and expertise gained is used for the development and construction of highly complex (farming) systems that would be impossible to attain individually.

ERF's strategic collaboration with nature expert Flevolandschap won them a significant part of the New Nature tender. When they collaborated with farmers - each expert in their own selection of crops - they managed to save ERF from bankruptcy. Later on these collaborations changed: ERF no longer rented out their fields to expert farmers, but instead collaborated more closely with them. In other words, they were still making use of the farmers' expertise, but were now themselves in control and the official producers of those crops. The same strategy can be seen when ERF needed to conceptualize how they wanted to farm more nature-inclusively. Together with Flevolandschap they assigned a project manager, who in turn arranged a series of vision-forming meetings with a variety of professionals and experts: from agroecological farmer Mark Shephard to Pablo Tittonell. Later on, ERF's collaboration with WUR allowed them to include innovative and complex strip cropping experiments into their farming system design.

Markus' wife Minna and their son Peetro Sakki with the Pienipuro product line. Photo credit Kari Koppelmäki.

> //QUOTE//
> *"But for us it is not so much about achieving maximum production, it is about the system. And it is difficult to bring in the right parties who understand that."*
>
> **(*ROY MICHIELSEN, TRANSLATED FROM DUTCH*)**

For Grand Farm the same strategy can be identified at multiple occasions. Through the internet, Alfred reached out to the vermicomposting professor at Berkeley University to tap into their expertise and experience. Upon returning home he collaborated with the BOKU University to include their expertise and resources in experimenting for vermicomposting trails on his farm. The same strategy can be seen when he goes back to the USA, to Portland, to discover their version of continuous flow technology. Alfred's call for an outsider opinion led to Leopold Fischer and himself building up VermiGrand, each with their own set of knowledge and expertise. In fact, the concept of Grand Farm as a research and innovation farm is based on the idea of being unable to become an expert in everything yourself. Alfred intentionally collaborates with researchers and experts, offering them the physical resources for their experiments and receiving back the answers to whatever questions he might have for creating a more complex farming system.

> //QUOTE //
> *"I realised I can't learn everything myself and learn for 5 or 10 years and be an expert and apply that on the farm. That's not possible. So my work around for that problem is that I let people in on the farm who are expert already on that topic."*
>
> **(*ALFRED GRAND*)**

Finally, Palopuro Symbiosis is another beautiful example of how connecting to others and tapping into their expertise and knowledge allows for the construction of a complex system that even goes beyond farming alone. Neither Markus nor Kari could have created a system where a farm innovatively connects its nutrient cycles through a chicken farm and biogas station, and where it also connects to people and arts through a restaurant, theatre, petting zoo, and market days. It is through their collaboration - their connecting to - researchers, brandmakers, cooks, processors, theatremakers, energy producers, and politicians that they managed to become an attraction for scientific and farming tours, weddings, diners,

and theatregoers. And at the same time it allowed for the inclusion of a biogas station on farm, and the creation of a farm brand marketing some of their grain production.

Theatre production at Palopuro Symbiosis. Photo credit Kari Koppelmäki.

Universities & research institutes: (critical) knowledge allies

In their quest for knowledge, it is worth it to point out the crucial role that universities and research institutes have played in these pathways. All farms have sought contact with universities and research institutes to aid them in one way or another.

When Markus moved to organic, the existing university networks helped him overcome the challenges of missing information and experience. Many of the experiments that brought fame to his farm were set up and funded by universities or research institutes. Later on it would be the university of Helsinki that played a crucial role in the official conception and funding of Palopuro Symbiosis. In much the same way ERF reached out to the Louis Bolk Institute and the WUR to join their existing program in flower strip experiments. The strip cropping experiments were set up by them together, where the monitoring and its funding was carried by the WUR. In the case of Grand Farm, Alfred very early on reached out to Berkeley University for their knowledge on vermicomposting, and later on to the BOKU University for help with trials on his farm.

> **//QUOTE//**
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> *"We don't need fertilizers and chemicals, but also those farmers who buy them they get good information from the companies for how to use them. So there's a network through those companies. But we don't buy anything so we have to create networks by ourselves. And that was very good that the university was taking care of it."*
>
> **(*MARKUS EEROLA*)**

What all these examples show is that universities and research institutes have played a major role for all farms in answering their questions and helping them set up projects of their own. However, the data also shows how much knowledge was and is actually still missing when it comes to sustainable farming practices. When ERF asked WUR for the best combinations of crops, they were surprised to find that an overview of such 'basic' information, or in fact the information in itself, was missing. When Markus and Alfred turned to organic farming they too were faced with many knowledge gaps that applied to their local contexts. Alfred needed the help of the Rodale institute to develop an organic no-till method that worked in the context of his farm, because it did not exist yet. All of this points to the crucial role that universities and research have played in the past pathways, but also will need to play in the future.

> **//QUOTE//**
>
> *"We then asked Dirk: 'what should we do? Show me.' But Dirk said: 'actually, very little is known about how wide the strips should be and what should be next to each other.'"*
>
> **(*ROY MICHIELSEN, TRANSLATED FROM DUTCH*)**

Communication is key

Through the example of how the university of Helsinki helped Markus and Kari frame and communicate their concept for Palopuro Symbiosis, it becomes clear how important communication is in getting all actors on board, and moving projects forward. When comparing the pathways, not only is the importance of communication evident, we can also see that all farms have actors that are strong communicators.

Markus's art school background helps him understand abstract concepts and ideas. Furthermore, his research training allows him to explain such abstract concepts as well. At the same time his farming background helps him understand the farming society, and the way farmers think and work. These qualities come together in his efforts at farmers' union MTK and the many tours he gives on his farm to other farmers and researchers. Kari on the other hand also shows strong communicative qualities. Having studied environmental science and worked at the regional environmental agency with many farmers, he understands and can communicate with both sides of the sustainability spectrum: the environmentalists and the farmers. Kari was also the one to write the Palopuro Symbiosis reports, and as such one of the main communicators of that concept to funders. In addition, Markus Eerola could not stress enough how important it was for him to work with

someone who could take over work on his farm without much communication: Markus Lusua. The fact that their communication flows so naturally because they are on the same page with so many farming issues, has taken away a lot of stress from Markus Eerola. An example of where communication has failed in their case is the bakery: despite their efforts, the communication with the bakery is unclear and has not led to any clarity over whether or not the bakery will come to the farm. Yet, this has not stopped the farmers at Palopuro Symbiosis to continue their efforts in closing their nutrient cycles and further developing the social symbiosis on their farm.

In Grand Farm's case it is Alfred who has proven to be an excellent communicator - his participation in, and repeated invitations to focus groups are proof of it. After all, based on that participation and his communicative qualities he was also invited to speak at the FAO Global Soil Erosion Symposium. In Alfred's case communication proved to be important also when he was setting up his vermicomposting business. The story behind the product needed to be correct, and that was one of his main motivations to transition to organic agriculture. Later on he realised he needed Leopold Fischer's help to market their vermicomposting products properly: to communicate their story to their consumer base. Lastly, with Grand Farm as a research and innovation farm, Alfred has managed to bridge communication gaps between farmers, researchers, policy makers, and citizens.

> //QUOTE//
> *"Of course people always talk about you. In my time here I have actually noticed that when they take a look behind the scenes with you, that there is also more understanding. So then you also see at a meeting of farmers and negative comments are made about you, that they are corrected by the other."*
>
> **(*THEO HEIJBOER, TRANSLATED FROM DUTCH*)**

Markus Lusua discussing biogas with energy company Nivos

In the case of ERF, both Jaco and Roy have pointed to the importance of communication. Jaco's initial reason to move to an organic company was exactly because of the satisfaction he gets from the communication surrounding organic products, which did not exist in conventional agriculture. In order to sell their products well, it is so often the story and its communication that counts - the same holds for their processing company Biobrass. There, the story of Dutch organic produce, which is processed locally as well, is a story that fits the organic concept. Roy also pointed out how important communication has been in getting all actors on board for the strip cropping experiments. Where at first their co-workers doubted the experiment, it was Dirk van Apeldoorn's explanation and communication of their reasoning and results that pulled most of them on board. For ERF, communication is however a much more standardized working method as it is not a family farm, but in the first place a business like any other. This becomes more evident when comparing how these farms deal with negotiation and conflict management.

> //QUOTE//
> *"I can have it in my mind, but the people in the field must also implement it and that only works if they also know what the reasoning is."*
>
> **(*ROY MICHIELSEN, TRANSLATED FROM DUTCH*).**

Intergenerational conflicts (or not)

Where Markus and Alfred avoid disagreements, the farmers at ERF are simply not in a position to do so, seeing that their relation is in the first place a business relation, and also especially in relation to the farm. During the setup of the strip cropping experiment there were quite some disagreements over the width of the strips. Instead of avoiding the confrontation, they had to solve that disagreement rather matter-of-fact-like, going relatively objectively to the core of their 'hurt'. Soon they discovered that efficiency was at the heart of the issue, and agreed to experiment with different strip widths.

For Markus and Alfred however, the disagreements they have gone through with their parents took years of smoothening before they were resolved. Whether it is about art school or the transition to organic agriculture, seeing that it concerns family businesses and traditions there seems to be no quick-fix. Here the issue of intergenerational differences in values and opinions becomes apparent, and is confirmed by Markus Eerola, Markus Lusua, and Alfred. For such disagreements, both Markus Eerola and Alfred have indicated to avoid them where possible. And of course in Kari's case there was no family farm to begin with, although his mother came from a farming background and did doubt his move back into agriculture. Nonetheless, Kari is not burdened in the same way as Markus Eerola and Alfred: to live up to the expectations of their families to keep their family farm running and uphold family farming traditions.

//QUOTE//

[*On Kari:*] *"He doesn't have this ... from the past. He has been working with the farmers through the university."*

(*MARKUS LUSUA*)

Eerola family mail box at Palopuro Symbiosis

Being vulnerable: creating moments of serendipity

In the Sensemaking section we have seen how contexts of serendipity are recognized as opportunities. Here however, I would like to discuss how the farmers from time to time have created moments of serendipity by being vulnerable, meaning: by sharing ideas, dreams, struggles and visions with others, for which a certain amount of nerve and courage is required.

When Kari started his PhD, he attended a boring lecture at a conference. At some point during this lecture he asked a question, and explained his context: the vision they had for Symbiosis and the challenges they faced. This might seem like a minor thing, but what he effectively did was opening up - on his dreams, ideas, and struggles - without knowing how people would respond, or even intending on a certain outcome. This is what takes a certain amount of nerve and courage to do. The result however was a moment of serendipity: because of his speaking up he was noticed by a regional development manager of the government, who offered to connect Kari with the energy company that later on financed the biogas station - the missing link in their Symbiosis story. In much the same way a moment of serendipity was created when Markus and Kari both discussed their symbiosis plans and visions with the strawberry farmer Jukka Kivela, who at that time was renting a field at Markus' farm. By this exposition of their thoughts, visions and struggles - connecting on a very personal level if you like - Jukka brought forth what would be a fortunate and unplanned discovery for Markus and Kari. He linked them with a bakery that was looking for a new location and could potentially complete yet another step in their Symbiosis system.

Similarly, when Alfred offered Livia Klenkhart a cup of tea as she was doing research on one of his fields for the BOKU University, he openly discussed his dreams and visions for a market garden. This exposition led to Livia hooking into his story, and telling Alfred how she had experience with market gardening, was nearly done with her studies, and was looking for a job. Alfred can also be seen to create a moment of serendipity by participating actively in the Landmark project. The personal networking and connecting done there causes him to meet Rogier Schulte, which then results in Alfred being invited for the Lighthouse network. However, an example where connecting caused an unfortunate, unplanned discovery, was when he reached out to a conservation organisation in the USA on twitter. His way of farming was looked down upon, and he was effectively rejected from their conversation. This shows again why there is a certain amount of nerve and courage involved in the process of being vulnerable: it is not without risk of being rejected, and feeling shame.

In the case of ERF no such moment of serendipity that was created by connecting has been discovered from the dataset in this thesis. As we have seen under the heading Sensemaking there were definitely moments of serendipity which ERF actively took advantage of, but the current dataset did not bring forth how a moment of sharing ideas and visions led to a fortunate and unplanned discovery. Despite this, and especially seeing how many different actors were involved that were not part of my sample population, I would argue that the creation of a moment of serendipity through being vulnerable is likely to have occurred in their transformative pathways as well.

Developing

At certain points in time, after all the thinking and talking, sensemaking and connecting, the farmers take action: they start developing. The transformative strategies belonging to this dimension are doing experiments and conducting research, or more broadly in the form of innovating: trying new things, and testing those waters. In this sense the dimension represents taking opportunities through action and as such also taking the risks that inevitably accompany such opportunities and the process of innovation. In addition, legitimacy is also part of this dimension as it is created from the successes of their experiments and innovations.

From the comparison of the pathways it becomes clear that developing is a crucial step in the process of moving forward, because it results either in achievements or new challenges, and it always impacts the farmers' perspectives and learning. These challenges then require sensemaking and connecting again. In this process, the farmers shape the embedding of their farms: through certain strategic actions they create a favourable context from which new opportunities spring to live. Their achievements and daring innovations lead to

legitimacy. However, one could say that most legitimacy stems from the perseverance that these farmers show in holding on to their dreams, ideas, and visions.

Moving forward: taking the plunge

After many failed and tiring attempts to receive funding, Alfred took the plunge and started developing the market garden through his own pocket. A few years earlier and more to the north, ERF decided to simply start experimenting with strip cropping on a 40 hectare field. Despite the disagreement over the exact set-up of the experiment, it was Theo who told them that if they were to do the experiment they should do it well, take some risk and also include the more narrow strips. Going back even more in time, and even further north, and we find Markus taking a plunge when he decided to go organic. At that time they would be the biggest organic arable farm in Finland, and without husbandry that move was extra risky in terms of nutrient cycling.

> **//QUOTE//**
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> *"Back then in 2016 we said: 'we can still philosophize for a few more years, but we are just going to do it'. So then we just set up that plot and we started working. And actually that was quite good. Just do it."*
>
> **(*JACO BURGERS, TRANSLATED FROM DUTCH*)**

One of the products of VermiGrand.

These examples show clearly how all farmers have taken risks at some point. They felt that more sensemaking or connecting would not do them any more good, and decided to simply start with developing their farms by implementing the projects they were working on. As such it becomes clear that taking risks is an inevitable and crucial part of the process of innovating and experimenting. However, a difference in risk taking can be seen from farmer to farmer. Where Markus takes big risks - he does not have to think too long and hard over the investment into certain technologies - Kari now says he wishes that he had taken more risks before. Kari and Päivi are evidently more careful when it comes to making investments and trying new things. Alfred also admits that he says 'yes' more often than 'no', and that this attitude gets him into trouble from time to time as there are only so many hours in a week. Alfred, just like Markus, is an enthusiastic risk taker. ERF on the other hand is an interesting case, because the people that work there are in an entirely different relation with the farm than Alfred, Markus, and Kari are with theirs. ERF is not a family farm, and thus its director Jaco has to justify their actions and choices throughout the year to the board of the ERF Foundation, which keeps a close eye on the ERF company. As such, the data shows that the risks taken at ERF are carefully assessed and chartered, and rarely ever impulsive. This aspect of ERF will also be reflected upon in the discussion chapter.

Strategic embedding

Throughout the pathways, the farmers can also be seen to strategically shape their embedding to their advantage, such that they even reduce the risks they have to take.

ERF strategically connected with farmers to gain their expertise, and later on join them in the processing company Biobrass. What this effectively meant was that their resource and network embedding became more favourable: they had the right contacts for collaboration and gained a strong market position in relation to the big retailers. Overall, these actions reduced the financial risks of carrying your production alone, from seed to market.

For Palopuro Symbiosis, the creation of their restaurant and market events impacted their embedding significantly. It made the farm more famous and social, but can also be seen as a strategic development because it also strengthened their pre-existing attraction of farmers and researchers. A welcoming restaurant with the possibility of coffee and food adds value to any tour. Furthermore, despite its significant time demands, Markus' drive to remain in farmers' union MTK strategically gave him the latest information on the relations with the EU, and it connected him to a number of influential people in the agricultural and environmental policy scene.

Finally, Alfred very strategically incorporated his early vermicomposting company into the farm when he finally took over from his parents. What this meant was that the farm could cover the financial challenges of the vermicomposting business. In other words, where other

vermicomposting developers never lasted more than 2 years due to financial difficulties, Alfred created the opportunity to be able to develop that business next to the pre-existing profitable farm business. In addition, when he was later on faced with the critical decision of whether to continue with either winemaking or vermicomposting, he realised that in the field of vermicomposting he would have no competitors. As such, the decision to quit winemaking and continue vermicomposting was not just one of the heart, it was also strategic. In comparison, the friend that Alfred went to Berkeley University with and that was supposed to join him in his vermicomposting venture ended up not taking that risk. For him the risk of quitting his job was too great, and he did not have the stable embedding that Alfred had in the prospect of inheriting the farm as a stable income some day.

What these examples show is that the farmers have from time to time strategically shaped their embedding to reduce the risks they had to take.

Legitimacy

Legitimacy played an important part in many of the developing stages of these pathways. At the same time it was also often an important effect of those developments, which shows how legitimacy most often is unpredictable.

Markus would likely never have been able to design for Valtra Tractors without the existing legitimacy of his master of art. However, it was this tractor testing that in turn, together with their developments and achievements in soil experiments and horse manure composting, created legitimacy and attracted a variety of farmers and researchers to their farm. Alfred's trials with the Rodale Institute on zero-tillage organic agriculture led up to him organising a conference around that topic. The legitimacy that both developing moments had created then led up to Jeff Moyer inviting Alfred to become board member at Regenerative Organic Certified. As we have seen in ERF's case, the Ekoland award was a direct result of their efforts and achievements in strip cropping, and because of giving courses about their experiences with strip cropping. When ERF managed to restructure their business and their fields were no longer messy but well-organised, this created legitimacy with the wider community. Further building up their reputation and contacts by close collaboration with other farmer experts then led to them taking a share in the vegetable processing company Biobrass.

ERF winning the Ekoland Innovation Award. Photo credit Dick Boschloo

What all this shows is that the developing actions of these farmers created legitimacy, which in turn affected their network embedding and created new opportunities. Though it was in most cases unpredictable, legitimacy played a key part in helping the farmers move forward.

Persevering through the troubles of innovating

From the data it becomes clear that whenever the farmers try new things, experiment - develop their farm and projects further - they also very often 'create' trouble. In other words, their drive to move forward brings to light new critical moments in the form of challenges or obstacles. Think of Markus when he tries to build a small business around collecting horse manure, to then be faced with the restrictions on spreading that manure openly on the field in winter. Or think of Alfred, when he sets up an early version of vermicomposting production but is faced with a diminishing of his results due to winter temperatures. Or in the case of ERF, when they transition fully to organic and they are challenged by an underdeveloped organic market. Running into challenges and obstacles seems to be in the nature of innovating. And as we have seen, these are then the moments in which sensemaking and connecting start to play a part.

But what of their achievements? The cases above are zoomed-in illustrations of small pieces of the larger pathway. When zooming out it becomes clear that it is the farmers' persistence to continuously go through the moments of developing, sensemaking during critical moments, and connecting, that helps them to finally achieve success. In other words, by trying again and again, at some point the farmers achieve some form of success. It is also worth noting that these trials and errors constitute a learning process that feeds back into their ability to persevere. This process of persevering through trial and error and learning may take months, or even years (see figure 5, next page).

Alfred's journey to the current state of VermiGrand started more than 20 years ago. Many of his moments of innovating, in which he tried to do things that were new to him, were riddled with challenges. From his first vermicomposting experiment that failed due to all the wrong factors, to the continuous flow system collaboration that halted: Alfred persisted in his efforts to try to make vermicomposting work in his context in Austria. Even when he had the technique sorted out but was faced with his own lack of management and marketing skills, he still persisted and found a solution in the person that would become his business partner. His failure in winemaking school very early on acted as a

reminder for him to never give up and fail again. That same attitude could also be seen with Alfred's transition to organic: once they made the move, they quickly realised that a lot of information was missing. Coupling their transition with a zero-ploughing policy brought forth even more challenges in the form of weed management. However, Alfred's persistence to keep farming organically and never start ploughing again resulted in a farming system that works for their context.

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> *"A lot of people start vermicomposting but a lot of people end vermicomposting also after 2 years or so. So we really developed a method or process that works for us. And that's not very common. So most people get in trouble - and we also had troubles, no question about that. It took us 5 or 7 years to get really into production. But now we have that know-how."*
>
> **(*ALFRED GRAND*)**

In much the same way, Markus met many challenges in their transition to organic agriculture. Not only was his position in the farmers' union MTK questioned by other farmers, Markus also noticed how the information channels for organic agriculture were very informal and rather improvised. From there they had to create new sources of information with other farmers and the university in Helsinki. From there they also started doing trials on their farm related to organic. Furthermore, it was mainly due to the arrival of Kari and Markus Lusua later on, that their organic farming methods were significantly improved through crop rotation plannings and efficiency improvements.

For ERF, their current success with innovative strip cropping innovations also took years of trial and error - from stopping with the insecticide in peas and experimenting with flower strips, to then carefully introducing a combination of wide and narrow strips, and to now finally implementing strip cropping on even more hectares. Their efforts to start with agroforestry are still ongoing, after more than 4 years of trying to get the right funds, lands and people to do so. Only recently, with the establishment of Hemus, have they managed to find a way to start their agroforestry experiments.

> //QUOTE//
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> *"You have to make sure that you have the right strip, but the work does not change. After the first year everything was fine and it looked nice and most of the workload was better than expected. And then there was a change among the employees that what they first thought would be difficult, in the end was not so bad. At the same time research was being done, so people became interested in it too."*
>
> **(*ROY MICHIELSEN, TRANSLATED FROM DUTCH*)**

What these examples show is how the farmers have persevered in holding on to and working towards their dynamic visions, dreams and ideas of more sustainable systems, and that their learning processes - going through trial and error, connecting and making sense with others, etc. - very much supported this perseverance.

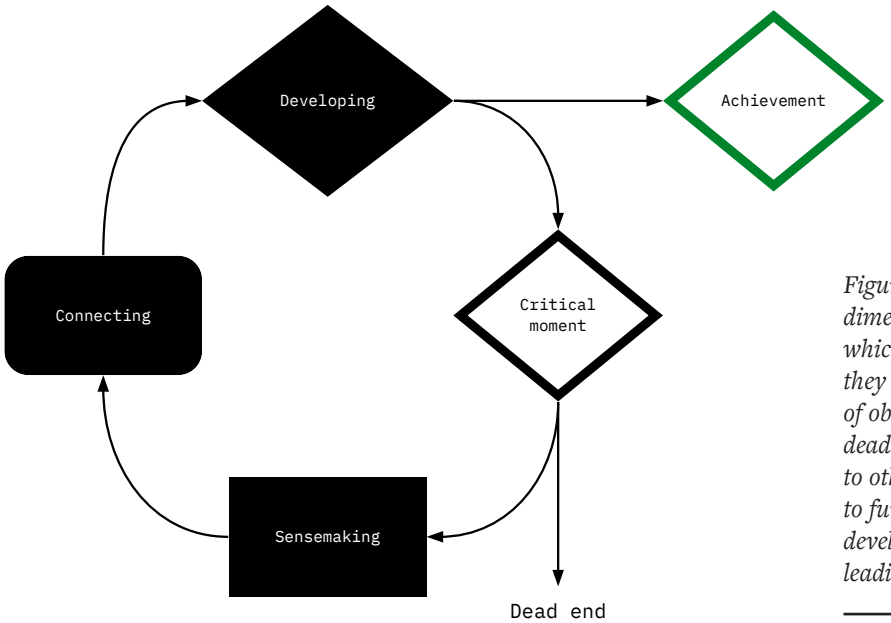


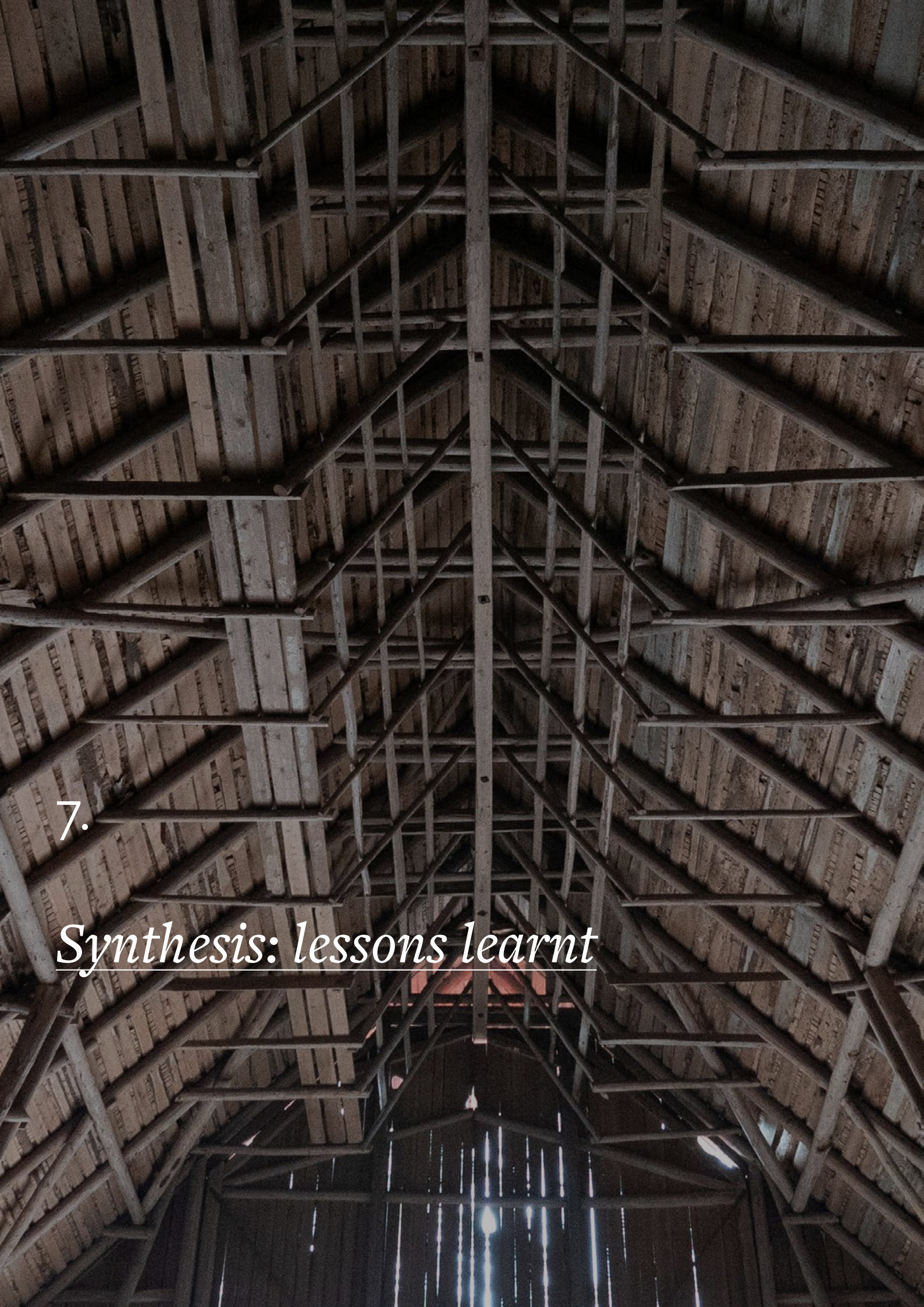
Figure 5: An example of a recurring cycle of dimensions. Developing leads to a critical moment, which is met with sensemaking by the farmer, where they start seeing solutions and opportunities instead of obstacles. If not, this part of the pathway leads to a dead end. After sensemaking the farmers may connect to others for expertise, skills, knowledge or resources to further their developments. They then continue developing, thus completing the cycle and potentially leading to new critical moments, or achievements.

Synthesis

From the comparison of the pathways and the transformative agency therein we have come to a number of interrelated findings. Firstly, sensemaking is a crucial process in which the farmers dealt with critical moments that could potentially have spiraled down into negativity and failure. Through sensemaking, they started reconceptualizing obstacles into challenges, and problems into solutions. Also outside of critical moments however, sensemaking allowed the farmers to see opportunities and sometimes even moments of serendipity. Sensemaking was enhanced by their widened perspectives: their ability and openness to deal with change and to see their farm from an outside perspective.

Secondly, the farmers very often strengthened their sensemaking process by connecting to others for an outside perspective, expertise, or knowledge. However, the farmers also connected to others when not necessarily faced with a critical moment: they were curious about new ways of thinking, visions, and ideas. As such, connecting to others further broadened their horizons. For the farmers, universities and research institutes played a crucial role in their quest for expertise, resources for experiments, and knowledge networks. Overall, communication was highlighted as a crucial factor in determining the success of their collaborations and connecting with others. Here, the difference between family farm and company farm became apparent, also in terms of intergenerational conflicts. In the end, connecting with others for skills and expertise allowed the farmers to create more complex systems. In addition, the vulnerable positions that the farmers took in the form of sharing their dreams and struggles with others has also created moments of serendipity.

Finally, the farmers were seen to take risks when they continued developing their farms and projects. Of course, through their innovating and experimenting they were also faced with many more critical moments, which the farmers faced with sensemaking and connecting. In this process, they actively re-embedded their farms into a new set of relations that were more beneficial for those developments, and as such brought forth new opportunities. Throughout these processes and experiences the farmers learned, which further enhanced their perseverance. And it is this perseverance in the process of dealing with critical moments, that they also attained achievements. Finally, the process of continued experimenting and innovating led to recognition and legitimacy.



7.

Synthesis: lessons learnt

In the past 3 chapters research questions 1 to 3 have been answered. After a brief introduction to the status quo of each farm (Q1) we have seen how those farms have transformed in terms of practices and embeddings, and how the transformative strategies of the farmers made that possible (Q2). In seizing opportunities and changing the ways of doing and thinking of themselves and their farms, the farmers have shown institutional entrepreneurship. We then looked at the similarities and differences in these pathways with respect to the applied transformative strategies (Q3). In this chapter, 8 lessons on the transformative agency of the farmers will be synthesized. As such, the goal here is to answer the overarching research question:

> *Which lessons on transformative agency can be deducted by reconstructing and comparing the pathways that three pioneering farms have journeyed in order to become agricultural pioneers?*

The chapter is divided according to these lessons, and each section ends with a single phrase summarizing the core. Please note that the lessons mentioned below are not mutually exclusive: they are strongly connected and also enhance each other.

Widened horizons: opening up to opportunities & change

> **//QUOTE//**
>
> *"We believe that those production systems should be different, so that means that you have to experiment, that things can go wrong, and if that is the starting point, you sometimes have to go to the extreme, otherwise you get nowhere."*
>
> **(*ROY MICHIELSEN, TRANSLATED FROM DUTCH*)**

Throughout the transformative pathways, each farmer has gone through experiences that have widened their perspectives and opened their eyes to be able to see their farm from an outsider's point of view. These widened perspectives allow them to be more flexible and creative in their thinking and see alternative ways of doing: they are open to change. They have seen too much of the world to be confined by the boundaries of the socio-political, network, and resource embedding of their farms.

Pienipuro products at the farm shop at Palopuro Symbiosis

However, what these widened horizons mean quite literally is that the farmers can envision other ways of farming, and that they are actually more motivated to do so. Their open-mindedness also leads to a different kind of awareness of their embeddings: they see opportunities, possibilities, and serendipity. They are also open to the change that those opportunities bring. In fact, they see opportunities precisely because they are open-minded to the change that accompanies such opportunities.

1. Challenge yourself with new ideas and perspectives to open up for opportunities and serendipity, and the change that they bring.

> **//QUOTE//**
>
> *"That gave me a very huge perspective, what I had was really quite narrow. But to go to art school, and easy to travel and easy to of course [meet] international students. So it was an opened world. And that was a very good thing for me because otherwise I would be quite narrow view in the world, just live in the farm."*
>
> **(*MARKUS EEROLA*)**

Being curious: through people, complexity

Each farmer has shown a remarkable motivation to learn, and search for new information and knowledge. In most cases, they took short cuts through universities, research institutes, companies, and most importantly: through the people that worked there. The farmers tapped into the existing expertise, knowledge, and skills of other people to enrich their own farms and projects. In addition, they also actively made use of the embedding of such universities, companies and research institutes by making strategic use of their funds and facilities to advance their projects. More importantly, the effect of this was that the farmers were capable of building farming systems that were far more complex than they could ever achieve alone. More people add more complexity by the simple fact that each person brings in a unique skill set and knowledge background.

2. Tap into other people's knowledge & skills, and achieve the unachievable, together.

However, in a more literal sense, more people also means more complexity in all processes. The farmers have stressed the importance of communication at multiple times, and there are also examples of when communication failed, or came close to failing. Communication is important in order

to get all actors on board, and work towards success together. So with more people and more complexity, also more and better communication is needed.

3. Complexity requires communication to create cohesion and direction.

Reaching out: making sense together

The data shows that an important part in determining the success of the pioneering projects that these farmers achieved, is how they deal with critical moments. They manage to make sense out of these moments, and instead of going down a negative spiral of obstacles and dead ends, they see challenging opportunities. Their broadened horizons as discussed above aid them in this sensemaking process, as they can do so more creatively, flexibly, and with more openness to the change of direction that is so often needed when facing a challenge. In case they do hit an obstacle and their project hits a dead end, they simply accept these for what they are and do not carry them around heavily. What helps them in this sensemaking process, is that the farmers very often reach out to other people for some sort of support. This could be in the form of second opinions, help, or knowledge and expertise. In other words, when they struggled, they very often reached out and as such did not have to face their challenges alone. In addition, they have shown to have the nerve and courage to reach out and be vulnerable about their dreams and struggles when the times were tough.

4. When in trouble, connect: together we make more sense than alone

Re-embedding the farm: dare to do

> //QUOTE//
>
> [*On strip cropping reception*] *"The first reaction is always resistance: 'it does not work, it won't go, it is moving back in time'. We have also received such comments. And then I always say: 'we'll do it first and then we'll see if it's true and if there are other problems we need to tackle'."*
>
> (***THEO HEIJBOER, TRANSLATED FROM DUTCH***)

The farmers have all taken risks at some point in time. At these moments more sensemaking and connecting would not help, and the time had come to experience the effects of implementing their ideas and trying something new. As much as their embedding shaped their risk taking, the farmers have also shown transformative agency by strategically hooking in on these embeddings, and shaping them in return through their risky developments of their projects and farms. In other words, by taking risks and developing their projects and farms, they have also strategically created favourable contexts for those developments, and reduced the risks they had to take in the future. It is important to note that not all of these effects on their embedding were foreseen or intended - for example in most cases when their developments brought forth significant legitimacy - but in some cases their actions were nonetheless meant to strategically shape their embedding. What all of this indicates however, is that risk-taking seems to be an inevitable part of the process of transforming the practices and embeddings of the farm.

5. Try creating the embedding you want, by daring to do

In addition, there is one more finding on serendipity and the shaping of embedding that I would like to share in relation to daring to take risks. Despite the fact that there was no data found to support this finding at ERF, there were a number of examples at each of the other two farms. As such, I would still like to mention this as an important finding of this study: despite the risk to lose face, feel ashamed, or be laughed at, the farmers at Grand Farm and Palopuro Symbiosis shared their dreams and struggles with other people throughout their pathways. They have opened up to complete strangers about their visions and ideas, without any promise of success or acceptance. In short: the farmers have positioned themselves vulnerably from time to time. What this led to was that moments of serendipity arose. In other words, the farmers unintentionally and unplanned created a context that brought forth a fortunate discovery through the simple fact that another person connected with their shared dreams and struggles.

6. Dare to be vulnerable by exposing your dreams and struggles, and serendipity may follow

Alfred harvesting swiss chard at Grand Garten.

Persevering dreams

All in all, we can conclude that throughout the transformations of themselves and their farms, the farmers persevered. And it is this perseverance that is the connecting factor between the above-mentioned lessons. The personal transformations and broadened horizons of these farmers allowed them to make sense out of difficult times, see opportunities and develop their farm further through experimenting. However, at the same time those critical moments, experiments, and opportunities are also exactly what transformed the farmers and broadened their horizons. As such the transformations of the farms go hand in hand with the transformations of the people involved: they influence each other, much like the farm practices and their embeddings influence each other.

> //QUOTE//
> *"You gain new insights, but you do so by trial and error. One learns by doing. It is not like if you read a book you can do it. You have to figure it out for yourself."*
>
> (***THEO HEIJBOER, TRANSLATED FROM DUTCH***)

Of course, this perseverance is something we all need, farmer or not, to attain success. On a small scale it is something I needed to finish this thesis, and something you needed to actually read through the whole thing (to which I say: well done, you are now near the end). So what exactly makes these farmers pioneers? The answer lies in their dreams and visions. These farms are all pioneering in the way they have transformed and are transforming still towards more sustainable farming systems, either through vermicomposting, nutrient cycling, or nature- and people-inclusive ways of farming. And it is exactly the development and perseverance of the dreams of such farming systems, the dreams of the people behind those transformations, that makes these farms pioneering. Despite the many challenges, obstacles, and huge complexity, they held onto their dreams of their projects and farms. Now we must not forget that these dreams, visions and plans were equally dynamic as the pathways towards achieving them: the experimenting, developing, connecting and sensemaking continuously shaped the farmers' visions and dreams. Nonetheless, the perseverance of the farmers to continue their search and pathway towards more sustainable farming systems is what makes these farms pioneering.

Seedling sprouting at Grand Garten.

7. **If you keep trying often enough there is a chance you will succeed one way or another, even if it takes years.**

> // QUOTE //
> *"It's not how often you fall down, it's how often you stand up again. So if something is really bad I say: 'ok, stand up again and try.'"*
>
> (***ALFRED GRAND***)

Demystifying the pioneer: through learning, hope

What we have seen so far is that these farmers have shown resilience of their visions and plans by persevering with the help of their abilities, skills, and mindsets, and that they have created complex sustainable farming systems by experimenting and building new knowledge together with other people. However, if any conclusion can be drawn from this research, it is that these pioneering farmers are by no means gods or superheroes. Let us not forget that even before pioneers, they are in the very first place human. The data shows that they, just like you and me, failed, struggled, doubted, and felt shame from time to time, and that they had to learn how to deal with such emotions and the transformative aspects - i.e. fundamental and radical changes - of their pathways. And now I hear you think: yes, but we knew that already. However, what I mean is that the mistakes they have made and challenges they faced, currently may look relatively simple, but the truth is that at the time of traversing them they were accompanied by strong emotions such as fear, self-doubt or frustration. In other words, the pathways we construct now, in their retrospectivity, make the challenges, choices and actions of the past seem logical and naturally flowing. However, back in the day these pathways did not exist: they unfolded and were being lived.

> //QUOTE//
> *"All farming has happened kind of accidentally, like how we became farmers. It wasn't clear vision or plan. It just happened."*
>
> (***KARI KOPPELMÄKI***)

In addition, it can take years of deadlock, doubt, or lack of motivation before these farmers finally started harvesting

success. In other words, the processes of sensemaking, developing and connecting can take years to complete. In this process, we have seen that the farmers also personally go through transformations. What these personal transformations indicate is that, along the way, the farmers have built their capacities to not only deal with change, but to in fact change and transform the practices and embeddings of their farm. In other words: through their personal transformations they have built their transformative agency and vice versa. As such, it becomes clear that the process of transformation has also been a learning process: through learning from their mistakes, their connections, their achievements, and their actions, choices and experiences in general they have transformed personally and they have built the capacity to transform the practices and embeddings of their farms.

And it is exactly these factors combined - the learning process through which they built transformative agency, the long time it took, and the struggle with heavy emotions, challenge after challenge - which gives hope to the rest of us. Because realising that these pioneers were not born with superpowers but are just as human as you and I, and just like you and I have faced similar struggles and challenges, means that we too can become pioneers.

8. **When we start to demystify these agricultural pioneers by recognizing them as human beings, hope arises: if they learned how to do it, we can learn to do it too.**

In short: 8 lessons on transformative agency

In short, the farmers in this study are as human as you and I. Yet, what makes them special is that they have managed to build the capacity and agency to transform the practices and embeddings of their farms by learning from their choices, actions, and embeddings, and that they have applied that agency in their quest for more sustainable farming systems. They are special because they dream, but also because they are not afraid to take action and persevere in realising those dreams. In developing and working towards their dynamic visions and dreams, and dealing with change and its challenges, the farmers have made use of a variety of strategies and attitudes, which can be summarized in the 8 lessons postulated in this chapter:

1. **Widened horizons: challenge yourself with new ideas and perspectives to open up for opportunities and serendipity, and the change that they bring.**
2. **Through knowledge, complexity: tap into other people's knowledge & skills, and achieve the unachievable, together.**
3. **Complexity requires communication to create cohesion and direction.**
4. **When in trouble, connect: together we make more sense than alone**
5. **Taking risks: try creating the embedding you want, by daring to do**
6. **Dare to be vulnerable by exposing your dreams and struggles, and serendipity may follow**
7. **Persevering: if you keep trying often enough there is a chance you will succeed one way or another, even if it takes years.**
8. **Learning and building transformative capacities: when we start to demystify these agricultural pioneers by recognizing them as human beings, hope arises - if they have learned how to do it, we can learn to do it too.**

8.

Discussion

In this chapter the lessons on transformative agency from the synthesis will be put into the perspective of existing theories and literature. Afterwards, the methodology will be reflected upon by discussing the limitations and strengths of this research. Finally, the practical and theoretical implications of this research will be reflected upon, as well as possibilities for future research.

Scouting the theoretical & literature embedding

The strategies taken from Westley et al. (2013) have been found to play significant roles in the transformational pathways of the farms studied in this research. Furthermore, throughout the process of transformation the farmers have changed the institutional embedding of themselves and their farms: they have changed their ways of doing and thinking. In this sense they can be regarded as institutional entrepreneurs, playing in on the opportunities surrounding their farms as they wield transformative strategies (Westley et al. 2013). In addition it has become evident that the farmers are indeed continuously affecting and being affected by the embedding of their farm, as positioned by the theory of three-fold embedding (Hess 2004; Methorst et al. 2017). However, it is now interesting to see to what extent the lessons resulting from the comparison of these pathways are reflected in the wider literature.

Transformative pathways: Adaptive cycle

Where in this research the transformative strategies were grouped by induced dimensions, Westley et al. (2013) organised these strategies in the so-called adaptive cycle: a cycle of transformation through which a social-ecological system moves continuously. This cycle has distinctive phases, or opportunity contexts, and in the transition from each phase to the next, the institutional entrepreneur makes use of a different set of strategies that fit that context. This fits with the findings of this research, as the farmers studied here are very much in touch with the embeddings of their farms, adapt their strategies accordingly, and also shape those (institutional) embeddings intentionally or unintentionally.

However, when looking more closely at the transition from opaque to hazy opportunity contexts, we see that shocks and disturbances open up the existing institutions or regimes to new interpretations and understandings. In terms of transformative strategies, Westley et al. (2013) state that during "a perception of crisis [...] transformational agents at this point often connect with actors in the system and engage in various forms of sensemaking" (p. 8). The pathways in this research have shown that these moments of sensemaking and connecting are very much evident and also often connected to critical moments. In line with Dorado (2005), Westley et al. (2013) also state how in this stage, the change agents use convening strategies, in the sense that they bring other actors aboard to work together. It is important to note that this convening is not done by convincing others of an existing vision, but that they create such a vision together by truly cooperating. When Alfred reaches out to Leopold Fischer, they create a new vision and company together; when Markus reaches out to the brandmaker, they create the vision and farm brand together; when ERF reaches out to Dirk van Apeldoorn, they create a vision for the strip cropping experiment together. In other words, the sensemaking and connecting that is done in relation to critical moments is well represented by this phase of the adaptive cycle.

For the transitions of other phases in the adaptive cycle, similarities with the farms' pathways can also be found. In

Harvesting at Palopuro Symbiosis. Photo credit: Helena Eslon

the transition from hazy to transparent opportunity contexts (release to reorganization to exploitation), Westley et al. (2013) describe how certain ideas or visions are picked over others and how resources are collected to support those ideas. In the pathways, these would still be moments of connecting and sensemaking, but also certainly of developing as the farmers start experimenting and innovating. In the next transition, from transparent to opaque again (exploitation to conservation) we see that the best ideas and innovations gain permanent support and that these are integrated in the institutional context. In the case of the farmers, these would be moments like when Alfred and Leopold establish vermigrand, or when ERF repeatedly starts doing strip cropping year after year and even expands the amount of hectares, or when the markets and restaurant become a set part of the practices and embedding of Palopuro Symbiosis. In other words, these are moments during which an innovation has become a more or less set part of their farm's practices.

As such, it becomes clear that the relations between the dimensions of sensemaking, connecting, developing, and embedding as found in this research are similar to the phases and their relations in the adaptive cycle as described by Westley et al. (2013). However, these findings are even better supported by the framework of resilience of social systems as put forth by Fath, Dean and Katzmair (2015) and later also by Darnhofer et al. (2016). The authors in both papers bring forth a revised version of the adaptive cycle. The phases are more or less the same as we have seen with Westley et al. (2013) however, they visualize it in a way that is even more recognizable in the pathways of these farmers. For example, during the reorganization phase, the many short arrows pointing away from the main loop indicate dead ends, or visions and experiments that were never embedded, realised, or that simply failed. Then, moving from exploitation into conservation there is a complex vortex of trial and error. What they mean by this is that in fact there are many smaller scale adaptive cycles through which the system moves continuously as it moves through the larger cycle back to conservation. This captures the finding of smaller sequences of critical moments, sensemaking, connecting, and developing in these pathways.

However, despite the fact that there are developments, events, and strategies in the pathways that could be said to follow the adaptive cycle, there are also those that cannot be divided into distinct phases as nicely. For this Fath, Dean and Katzmair (2015) acknowledge that the boundaries between these phases are at times fuzzy, and that they influence each other. In other words, they acknowledge that there is some form of randomness in applied strategies and events.

To conclude, it is important to note that the induced dimensions are not the same as the adaptive cycle phases. Where the dimensions describe strategies, skills, and attitudes, the adaptive cycle stages describe the contexts in which such strategies are used. However, the lessons on transformative agency that were induced from the relations between the dimensions of sensemaking, connecting, developing, and embedding seem to strongly correlate with the adaptive cycle framework.

Perseverance: resilience & inner transformations

One of the most striking lessons on the transformative agency of these farmers is that they persevered in moving towards their dynamic visions and ideas. Despite the many challenges, critical moments and obstacles, they wielded

Markus Lusua climbing the biogas compost heap at Palopuro Symbiosis.

an array of transformative strategies through which they managed to make sense of those moments and started seeing opportunities, possibilities, or simply a way forward. This finding is closely echoed in the theory of resilience on transformations.

Resilience is an interesting topic, because a critique of the concept is that it actually stands in the way of transformations (Olsson, Galaz & Boonstra 2014). However, "resilience requires that a system can change and should not be equated with resisting change" (Walker et al. 2010, p. 12). Indeed, resilience is about dealing with disturbances, and as such welcoming change. It is important to note here that resilience and transformations take place across scales and dimensions. In other words, "building resilience at a certain scale can reduce resilience at other scales (Olsson, Galaz & Boonstra 2014, p. 3). This is seen for example when ERF experimented with strip cropping and discovered that it was much easier than expected, and that it brought welcome benefits in terms of pest management. This increases the resilience of the notion of strip cropping, and reduces the notion of continuing with monocultures on their farm. It also shows that "resilience is not a 'thing' that can be seized, held or measured" (Darnhofer et al. 2016, p. 118). It is the result of changing relations, of actions and choices, and as such is dynamic.

In addition to this, the theory on resilience recognizes that the agents themselves too, change. Fath, Dean and Katzmair (2015) describe how "a resilient system is one that can navigate all stages of the adaptive cycle" (p. 2). By this they effectively mean that such a system can deal with disturbances. It is however important to note that after such a disturbance, the system reorganises instead of recovers, indicating that there is no going back to the state before the disturbance. What this actually means is that "while at times a shock can be buffered and the farm might 'bounce back' and return to its previous state, at other times it will need to 'bounce forward', i.e. transform" (Darnhofer et al. 2016, p. 113). When such transformations occur, the rules of the game change, effectively meaning that the farmers have changed their values and views on farming. This closely resonates with one of the main findings of this research: throughout the transformations of their farms, the farmers themselves too, have transformed. The farmers have broadened their horizons, or in fact, changed their views on farming when they started vermicomposting, went to art school, or went through a personal change of heart when moving first from conventional to organic, and later to biodynamic farming.

So in order to deal with transformations, the farmers themselves also have to go through change and be open to it (Darnhofer et al. 2016). But now we start to touch upon the nature of transformations and the adaptive cycle, because the values of the farmers are also very much formed and shaped by the experimentation and learning that is necessary for these transformations. In other words, the views and values of the farmer are continuously impacting their capacity to be resilient and transform, and at the same time these transformations also create new learning moments which impact their views and values. As such, the personal transformations in terms of broadened views, or open minds that the farmers in this research were found to have developed, indeed seem to explain well their capacity to deal with disturbances and challenges, which resonates with a relational perspective on resilience.

The importance of personal transformations or, the 'inner dimension' of transformations is also reflected in the work of Grenni et al. (2020). In their place-shaping perspective

Alfred dealing with wind damage at Grand Garten.

on transformations, they argue how this inner dimension - which encompasses our values and meanings - plays a central role in transformation processes. They state how "meanings and values are key elements in determining people's willingness to embrace change, and as such they are likely to play an extremely important role in the quest for sustainability" (Grenni et al. 2020, p. 412). In other words: how people view the world, in terms of values and meanings, affects the types of action those people are willing to take and whether or not they are open to change and different futures. At the same time, change also affects those very values and meanings. Building on this work, Horlings et al. (2020) argue that transformations towards sustainability always encompasses inner change, and thus change in mindsets, values, and identities. This finding closely resonates with the role of the personal transformations of the farmers as found in this research, in how their values and ways of thinking were affecting, and affected by, the changing practices and embeddings of their farms.

> //QUOTE//
>
> *"What I learned is that there's always a solution for everything. And that's more a technical approach, but it's also for life. There's always a solution, you just have to be open to see it. Even if the solution is hard to accept. But there's always a solution, even if it hurts. Ok we have to start from scratch or go back 3 months."*
>
> **(*ALFRED GRAND*)**

In addition to this, the way in which farmers respond to the context of their farms and the disturbances thrown at them is not only highly dependent on their values, but also on their experimenting and their networks (Darnhofer et al. 2016). In fact, their values are very much the result of their learning and thus also the experiments they engage in. Through these experiments, farming is reconceptualized: different ways of thinking and doing are touched upon. As such, "experimenting is thus an attitude, a state of mind, as much as it is the material act of performing experiments" (Darnhofer et al. 2016, p. 119). Furthermore, together with the networks they are involved in, farmers remain in touch with the wider context and are thus more in tune with opportunities and serendipity. All of these attitudes and strategies build on to the resilience of their farming. And what's more, they reinforce the findings in this research on building transformative capacities through connecting, developing, and in general: learning.

So, how does this all relate to perseverance? One of the lessons in this research is that it is the perseverance of the dreams and visions of the farmers, that actually pulls their farms and themselves through these transformations. This too can be found in the theory on resilience, when Fath, Dean and Katzmair (2015) state how a resilient system or organisation also "continues to satisfy a set of goals as defined by members within that organisation" (p. 8). It is important to note here that these goals are so very often not very clear visions, but rather vaguely defined plans that change through time. But what this does indicate is that as long as the farming system satisfies such plans, these farmers will continue to build resilience and persevere. After all, it is their motivation to make their farms work, and their curiosity, experimenting and learning for new forms of thinking and doing, that for a large part determine whether their projects and farms are resilient and thus successful in the long term. The farmers studied in this research have shown perseverance, or rather, resilience, in that through their attitudes, skills, and strategies they kept some of their ideas and projects moving forward, and that they did not quit. They have shown transformative agency through their resilience and perseverance in developing a direction, or (moral) compass, adapting and changing it as needed, and moving towards it. And in doing so they have transformed themselves and their farms through a range of transformative strategies, as summarized by the lessons in this research. As we have seen above, this is echoed in the literature on resilience, the adaptive cycle, and the inner dimension of transformations.

Knowledge & complexity: the path to sustainability

One of the other main findings of this research is how often these farmers have reached out and connected to others in search of advice, experience, knowledge, information, collaborations, or the resources to generate new knowledge. This research argues how this 'connecting' to others and the resulting development of their (research) projects and farms is what enabled these farmers to create such complex pioneering farming systems in terms of sustainability. As we have seen above, the experimenting and learning in which these farmers engaged, is also what built resilience and allowed these farmers to persevere. However, here I would like to dive one step deeper into the relations between sustainability, complexity, and knowledge.

> //QUOTE//
>
> *"I definitely don't want to be an expert, because I can borrow that knowledge or gain that from my friends and researchers I'm working with."*
>
> **(*ALFRED GRAND*)**

As we have seen throughout the pathways but also with the theory on resilience, the transformation to sustainable systems goes hand in hand with many challenges, critical moments, or disturbances. However, sustainability in itself is also highly complex, as it connects to so many aspects of a system, and is grounded in both the local embedding, such as the environment or social structures, but also the wider landscape of international politics and for example climate change (Caniglia et al. 2020; Norström et al. 2020; Šūmane et al. 2018; Abson et al. 2017). As such, the challenges that sustainable farming and the transformation towards it inevitably bring forth are also highly complex. What this means is that, unlike its industrial cousin, sustainable agriculture cannot be prescribed or imposed onto a local

context, but instead is heavily knowledge dependent because it is so context-specific (Šūmane et al. 2018; Ingram 2008). In fact, the knowledge needed here is contextual knowledge, which is grounded in the social, environmental, political and economic context of the farm. Šūmane et al. (2018) explain it well when they state that "to manage sustainable agriculture, the challenge is to have the necessary skills, attitudes and abilities to overcome the problems that arise when managing a complex situation, and to integrate different knowledge bases and generate learning" (p. 235). In short, the transformation to, and maintenance of sustainable agriculture not only relies on the development of contextual knowledge, but also on the development of abilities, skills, and attitudes to apply it. In turn, these developments build on the transformative agency of the farmers.

This finding is reinforced by the multiple calls from researchers to make knowledge creation more inclusive, combining formal and informal, or researcher and farmer knowledge bases (Caniglia et al. 2020; Norström et al. 2020; Šūmane et al. 2018; Abson et al. 2017; Lehébel-Péron et al. 2016). Here, farmers' knowledge is defined as knowledge that is based on practical experience and that allows them to farm in the embedding of their farms (Šūmane et al. 2018). By comparing the pathways of the farms in this research, both informal and formal knowledge networks can be identified. The role of universities and research institutes is also very clear in that they have played crucial parts in helping these farmers move forward with certain projects. The EIP Agri initiative, in which Alfred Grand is strongly involved, is such an example of the co-creation of knowledge. In addition, as Šūmane et al. (2018) claim and what these farmers have proven, is that their relationship with researchers and knowledge institutions can be used to test scientific knowledge against the complex contexts of their farms.

> **//QUOTE//**
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> *"I always try to support research or science on the farm because I think farmers can contribute a lot. Not because they are so important but because they have a different perspective, a different view on a certain topic."*
>
> **(*ALFRED GRAND*)**

Nonetheless, the hurdles that these farmers had to go through in order to finally set up such research connections and knowledge collaborations were at times significant. Of course, it starts already when farmers need to transform from an industrial, productivist farming system, to a more sustainable one, as that requires a different mindset and a whole new knowledge base (Šūmane et al. 2018). Also this change in mindset can be seen with the farmers studied here, in the form of broadening their horizons through working with earthworms, studying art, or having a clear understanding of the failures of conventional agriculture through work experience elsewhere. In addition, to deal with the complexity of sustainability challenges and the multi-faceted, multi-actor knowledge creation processes, the importance of knowledge mediators is stressed (Šūmane et

Complex tire tracks caused by spreading biogas compost at Palopuro Symbiosis. Photo credit: Lee Williams

al. 2018). These too, can be found at the farms studied here: Kari has guided much of the knowledge and research in the development of nutrient cycling of Palopuro Symbiosis; Alfred himself is in the center of the research and innovation that takes place at his farm; and finally for the strip cropping Dirk van Apeldoorn is a crucial actor as he is the main researcher and thus has the overview, but he is also practical and can think from ERF's perspective as a farm that also needs to be cost-efficient.

> **//QUOTE//**
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> *"I find it amazing that everyone has quite a lot of knowledge on only a small subject. And that is also what happens in the soil, because that is still really a black box to me. How can we turn the dials that improve the soil? That is still disappointing. What should I do and what can I achieve... Yes, that is still quite a big quest to get there."*
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> **(*JACO BURGERS, TRANSLATED FROM DUTCH*)**

So in conclusion, the finding that the development of contextual knowledge and the skills and capacities to apply that knowledge have enabled these farmers to build complex and sustainable farming systems, resonates strongly with recent research. It is clear how action, for example in the form of experiments or simply the further development of projects, creates knowledge. At the same time, knowledge also supports action and in addition, it supports the transformative capacity of these farmers to navigate change and the challenges that change brings forth (Caniglia et al. 2020). In this process it is the curiosity of these farmers, and their willingness and drive to learn - i.e. their attitudes - which are crucial for the integration of knowledge from a multitude of sources and for their innovations towards sustainable farming systems (Šūmane et al. 2018). As such it becomes clear that researchers should never "be separate from the processes of change that they investigate" (Caniglia et al. 2020, p. 6), and that the barriers for farmers to access the creation of contextual and inclusive knowledge should be taken down. Sustainability and the transformation towards it equal complexity, and to deal with that complexity a wealth of context-based knowledge and the capacities to apply that knowledge are needed. The very fact that this is a lesson coming from the experiences of these farmers is precisely what explains for a large part why these farmers are pioneers in the transformation towards sustainable farming systems.

Markus Lusua showing the farm buildings at Palopuro Symbiosis.

> **//QUOTE//**
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> *"The researcher, he's problem driven. He's looking for what is the problem, why, how can I monitor the problem. They are looking into understanding the problem, which is really important. But the farmer doesn't go for the problem. He's not interested to understand the problem. He's interested to find a solution.* [...] *But if you combine those attitudes you can really go faster. Because it's important to know why the problem is there, but it's even more important to find a solution to get rid of that problem."*
>
> **(*ALFRED GRAND*)**

Personal transformations through shame & vulnerability

There is one more strand of research that deserves our attention when it comes to personal transformations through learning, and more specifically: through sensemaking out of critical moments. The results of this research show that very often in these moments of sensemaking, the farmers have done so by reaching out: through connecting with other expert practitioners and professionals, farmers, researchers, and industry experts. The nerve and courage that is required to face yourself and others about your critical moments, challenges, and the emotions that play an inevitable part in those processes, are recurring themes in the grounded theory work of Brené Brown.

In her work on shame resilience theory, Brown (2006) explains how shame is a psycho-social-cultural construct in the sense that it deals with strong emotions, our relations to others, and cultural expectations. The resilience to shame, she argues, is created by several abilities and attitudes. Firstly, in recognizing and accepting their own vulnerability and shame, actors are more capable to deal with the fact that they feel such emotions and are thus more inclined to better deal with them. It leads them to not simply point blame to themselves or others, but to seek support. Secondly, through critical awareness, the actor can contextualize their shame and emotions by positioning them in the wider socio-cultural context. It allows them to take a step back and see that they are not alone with such issues. Thirdly, in what Brown calls reaching out, the actor builds support networks where empathy is shared and they can again discover that they are not alone in their struggles. Here it is important to realise that "the experiences that make us feel the most alone, and even isolated, are often the most universal experiences" (p. 49). Finally, Brown mentions how being able to 'speak shame' - i.e quite literally being able to talk about feeling emotions of shame - is an important factor connecting these strategies. It is important to mention that in general, these strategies and

abilities to deal with shame are strongly interconnected and can be learned.

Brown further extrapolates these findings and their implications in her more recent books, 'Rising Strong' (2015), on the process of getting back up after failures and mistakes, and 'Dare to Lead' (2018), where those concepts are applied in the arena of leadership. One of the key lessons in these books is that being vulnerable is a crucial part of our learning process. Of course, vulnerability is always coupled with moments of uncertainty, risk, and failure, and as such deals with difficult emotions, such as shame. Now instead of pulling up our armour and denying our emotions of shame, she argues that to truly rise from our falls we need to embrace those emotions and learn how to deal with them. This feeds back into her earlier work on shame resilience, where we could see that part of this process is connecting with others and practicing empathy, where the focus lies on the emotions behind our experiences. To become resilient to shame then, means to be able to take risk, be courageous, and put yourself in a vulnerable position as you face your emotions truthfully and try to make sense of them, and rise from your failure and mistakes. Although this is a difficult process because of the emotions that are part of it, it leads to learning, and thus growth and (personal) transformation.

This closely resembles the findings in this study on personal transformations and reaching out in order to make sense out of critical moments with others. When the farmers failed with a particular experiment, or hit yet another challenge when they thought they were done after so many years of development, these too incited deep emotions related to shame: anger, fear, frustration, grief, loneliness etc. Although these farmers were not necessarily fluent in shame resilience at all times, they did manage to build some shame resilience when they picked up the courage and nerve to reach out and connect to others. In short, the courage that is seen when the farmers in this study connect to others to make sense of their critical moments is reflected, supported, and further expanded by Brown's work on shame resilience.

In short, being vulnerable - i.e. being courageous enough to acknowledge and deal with emotions of shame - leads to true learning, building new skills, and thus transformations of how we think and do. Seeing that personal transformations and building transformative capacities through learning are essential for system transformations, Brown's work seems like a crucial addition to understanding such processes. The farmers in this study have shown that they too have taken vulnerable positions when they mustered up the courage to face their struggles and discuss them openly with others. In fact, them partaking in this study and sharing the struggles of their transformative pathways, is such an act of vulnerability and through it, leadership by example and collective learning.

Reflection on methods

Limitations

Retrospectivity: creating narratives

In this thesis the pathways of 3 pioneering farms were reconstructed and compared. In doing so, both the farmers and I have created narratives that together form these pathways.

Straight harvest lines at Palopuro Symbiosis. Photo credit: Helena Eslon

However, at the time when the events happened, these pathways did not exist, nor did those narratives. What this means is that there is a risk to cherry pick certain events and create relations - i.e. storylines - that were not there. For example, it is very easy for us to now say, retrospectively, how all of Alfred's perseverance and efforts culminated into VermiGrand. However, we then risk forgetting the heavy emotions that played a part of that process, and that Alfred has been on the brink of quitting with vermicomposting. In addition, there was not always a grand vision or goal towards which these farmers worked: sometimes events simply occurred. This aspect of randomness is very often at stake of being lost in the process of creating narratives. There are even some, who argue against narrativity, and that do not believe that our lives are a collection of stories, albeit with a hint of randomness (Strawson 2004). However, by talking to these farmers it becomes evident that they do see narratives in their own lives and their farms. Based on this I believe one cannot ignore the fact that seeing such narratives affects future actions: Alfred realises there is a vermicomposting storyline running through his life and as such he shall continue to try and live it out. In other words, I believe to have seen that through narratives these farmers make sense of the events and developments in their lives and farms, and that as such these narratives to some extent also shape future action.

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> *"If I couldn't speak English, I couldn't have done what I did. Because I wouldn't have made contact to the University of Berkeley, which was quite significant. I wouldn't have gone to California for a week. I couldn't have made any conversation with anyone there. So I think that was very critical for my development. To be able to communicate at least a little bit in the beginning."*
>
> **(*ALFRED GRAND*)**

Nonetheless, this still leaves the issue of cherry picking or avoiding events and creating relations that serve certain narratives, either by the farmer or myself as researcher. This would not necessarily have to be intentional: the retrospective nature of the data means that the farmers were also at all times at risk of simply forgetting events or their exact unfolding. These inconsistencies sometimes became apparent as one person would remember an event happening in a different year or order than the other person. This was countered as much as possible by feeding that information back to the farmers, so they could review how the pathways exactly unfolded. In the first place by talking to multiple people about the same events, and in the second place by spacing the interviews and pathway mapping exercises in time, both functioning as a form of regulation on how the events and their unfolding and relations were remembered.

In the end, despite my efforts to counter the effects of retrospectively creating narratives it remains important to remember that at the time when these pathways unfolded, there was not always a clear plan, goal or vision, that emotions such as fear, shame or despair could have run high, and that there was not always light at the end of the tunnel. So despite the relatively clear storylines we see now, there certainly also was a lot of randomness.

The individualist superhero

It is also worth noting that by focussing on the transformative agency of the farmers, there is a risk of making the process seem too individualist or neoliberalist. In other words, by focussing on the agency of the farmer and their potential to bring about transformations, one also risks effectively shifting the responsibility to the individual (Darnhofer et al. 2016). In this way, the responsibility and role of the collective, the state, and market risk being ignored or downplayed. In addition, by focussing on strategies this responsibility of the individual is enhanced by making it sound that they are also equipped with superpowers or carefully thought through plans.

Naturally, these farmers are no superheroes playing their part in their personal action comic pathways. Instead, as we have seen, their transformative agency is built through the interaction and connection with others. In fact, if we were to ascribe a 'superpower' to these farmers, it is exactly their collaborative capacity. In addition, there are also clear examples of how policies and market structures have shaped these farms, for example when Finland joined the EU and the grain price dropped overnight, or how EIP Agri allows Alfred to join the wider conversation on sustainable agriculture in the first place. In addition it is also worth mentioning again that despite the fact that these farmers certainly strategized certain parts of their pathways, they also very often did not have such a clear plan. As such, despite the fact that also in these cases the farmers have shown transformative agency, it remains important to acknowledge that for transformations to take place there are also other, larger actors that have agency and need to play their part. So in conclusion, the transformative agency of these farmers does not originate from innate superpowers, but instead is built along the way through collective interaction.

In 2020, Darnhofer has taken the notion of agency one step further by placing it in relation to non-humans in the form of affection. This touches upon some of the data in this research: Markus mentions how the farm seems to live on its own and how even the mail delivery person notices the welcoming nature on their farm, even when there is no event going on; Alfred mentions how the work of the earthworms and their capacity to create healthy soils inspired him; the farmers at ERF were convinced, motivated, and inspired by the beauty of the strip cropping fields and the attention that it received from others. What these examples show again, is that agency is not confined to the farmer as an individual. However, they also show that their (transformative) agency is built not only through their interaction with other humans, but also with nature and non-humans.

This is also reflected in the work of Moriggi et al. (2020), who take a care-based perspective on transformative agency. They argue that for transformations towards sustainability we need a mindset change, where the responsibility for such transformations is not rooted in individualism and subjectivity, but rather in relations. What this means is

that responsibility should come from our care for other entities, human and non-human. This again stresses the importance of our relations to non-humans, as Darnhofer (2020) also argued. Such relations were not explicitly taken into account in this research, but the data provides hints that such relations to non-humans have played a part in the transformational pathways of these farms. As such, it would be a valuable strain of future research, and should be taken into account in future studies on transformations towards sustainability.

Sample population

In relation to the sample population, there is also a limitation in the fact that for Grand Farm, Alfred Grand was the main person who could talk about the farm's pathway as a whole. The other farmer that I interviewed there had only been working on the farm for about half a year, rendering her reflection on the farm's pathway rather short. I tried to counter this by interviewing Alfred's wife, but she was unable to participate. The effect of this could be that in Grand Farm's pathway there has been more cherry picking of events, and that there are more inconsistencies with reality. However, seeing that for large parts of the pathways of the other farms there was also only just one person that could reflect on it, this case is not that much of an exception. For example, for Palopuro Symbiosis, Kari only joined the farm around 2009 and as such cannot reflect on the pathway of Knehtilä farm before that time. Overall, what this means is that the accuracy of the data decreases slightly, simply because it was not verified by another person. However, seeing that most of the other data that could be verified did not show large discrepancies, the chance for inconsistencies with reality are deemed relatively small.

Apart from Alfred Grand's wife, I would have also liked to interview Alfred's partner in Vermigrand, Leopold Fisscher, Markus Eerola's wife, and chair of the ERF foundation Bart Fokkens. However, Markus Eerola's wife was very busy running the restaurant, and Leopold Fisscher was occupied abroad during my visit to the farm. Perhaps, with a more careful planning this could have been avoided in part. However, the difficulty of this research is that even though I had already made a selection of people to interview together with Markus, Alfred, and Roy, other actors that came up during the interviews or pathway mapping could not have been planned for in advance. Bart Fokkens is an excellent example here, as I only understood the role he played upon starting my data analysis. As such, to include them would simply mean to be lucky enough to find the right time with them, or a prolonged period of field work, which is not within the scope of this research. The effect of including those other actors would probably not have provided different results, but likely expanded and nuanced them. After all, these actors would have offered their point of view on these pathways, and potentially shine light on a different set of events and developments.

The data also points to differences between ERF and the other two farms. For example, in the dataset of this thesis, ERF's pathway is the shortest and least complex of the three. In part, this is caused by the fact that within my sample population, Jaco was the only actor who had been working at ERF the longest. And yet even he had not been present from the moment when ERF was established, but had only arrived roughly 10 years later. What this quite simply means is that the reality is likely to be more nuanced than the current dataset shows. In terms of the other differences that were found, such as in the case of risk taking and communication, it is likely that these are caused by the fact that ERF is not a family farm, but a 'regular' business, where risks and communication are dealt with differently than within a family setting. The fact that they have to account for their actions and choices, i.e. account for the risks they are going to take and have taken, allows for less impulsive action.

Seeing that knowledge accumulation and generation is an important outcome of this research, there is one more limitation in terms of the sample population that deserves attention: the connection to universities. These farms were selected from the Wageningen University Lighthouse Farm Network. What this means is that these farms are in a way a biased selection of farms that had already connected with at least one university. In that sense the finding that they reach out to other people's knowledge and expertise may actually be biased. Nonetheless, it is in the first place important to note that the findings of this study are by definition hard to extrapolate onto a larger population due to the qualitative nature of this research. However, it was also not the goal of this research to make inferences about a larger population: this thesis set out to gain lessons from the experiences of 3 pioneering farms, by comparing their pathways. In addition, these farmers have reached out to universities and other knowledge institutes throughout their pathways, and long before they connected to the Lighthouse Farm Network. In fact, we may conclude that them joining this network is actually an effect of their attitudes and strategies: their curiosity and open mindedness. Finally, whether or not other agricultural pioneers exist that have not had an equally strong focus on knowledge generation by connecting to universities or research institutes, the effects that this had within the current sample are overwhelming. These farmers have been able to tap into the wealth of knowledge, expertise, and other resources of knowledge institutions and professionals alike. And in so doing, they have been able to learn and build their transformative capacities and construct complex farming systems.

The thesis pathway: a learning journey on data collection

The limitation that impacted the results the most is the structure of the data collection. I first conducted interviews where I asked about their status quo (Q1) and the pathways and applied strategies (Q2). Afterwards I started the pathway mapping exercise on a separate day from the interview. During the data analysis it occurred to me that focussing more on the mapping exercise would have been a more efficient way to collect the data, for a number of reasons.

The questions in the interviews were too focussed on the transformative strategies, and not enough on the actual events of the pathway. What this means is that quite a number of questions were too broad and not specific enough, which made answering them more difficult. For example,

when I asked about moments in which other people doubted their choices or projects, this would often lead to similarly vague answers as well. Instead, I realised that the questions should have merely been informed by these strategies, and focus purely on the unfolding of events in the pathways. In other words, the questions should have been centered on specific events in their pathways, during which I should have kept the strategies in the back of my mind and applied them in the background. Because the other questions in the interview - mainly those in which I diverted away from the interview guide and asked on about how the event they were talking about came to be and why - led to the most interesting and nuanced pieces of information. What I realised is that I should have focussed on the mapping of their pathways from the start, and intertwine that with the interview, as questions would naturally flow from the discussion on those events. However, this was also part of my personal learning journey, because I can say that throughout my data collection and analysis I started to grasp much better what these pathways actually were: that they were not constructed but rather journeyed, or, lived.

Now, in the case of Grand Farm and Palopuro Symbiosis, I managed to still get a very satisfying amount of information because the interviews were long enough and I conducted detailed mapping exercises with them. The farmers at these two farms had taken a significant amount of time for this research, which is why the inefficiency of the interviews did not harm the final results as much. What also helped significantly is that these farms were family farms, and thus the personal lives of these farmers were automatically involved - even in the case of Kari and Markus Lusua, who did not grow up on the farm that was studied. All actors were so personally involved with the processes and events on their farms, that they automatically told the personal stories of their lives when I asked about it.

Unfortunately I visited ERF only at the very end of my field work, and as such discovered this inefficiency in my methodology too late. Of all three farms, the least amount of time was spent with ERF, simply because the farmers there were too busy. This meant that the inefficiency of the interviews as discussed above became apparent. When I was ready to move on to start filling in the pieces of their pathways, our time had run out. In addition to this, the fact that ERF is not a family company may also have played a part. In contrast with Grand Farm and Palopuro Symbiosis, the farmers at ERF in my experience were less personally connected to the farm, and so also less inclined to automatically tell their personal stories and pathways.

As such, if the focus had been on the pathway mapping from the start, the data collection would have been much more efficient. Coupling that with a stricter time limit in the case of ERF, their data could have been more complete and rich. Naturally, the same holds also for the other two farms: their data could have been even richer and more nuanced if the time that was spent there had been more efficiently put to use in terms of data collection. However, the difference is that for the other two farms I had relatively few questions left when looking at their pathways. For ERF there are a number of developments where I did not know how they exactly unfolded. The result of this was that once I started comparing the pathways in my data analysis, with ERF the comparison fell short in some occasions, such as with the creation of serendipity due to vulnerability of the farmers in sharing their ideas, dreams, and struggles. Seeing that there are multiple examples within the pathways of Grand Farm and Palopuro Symbiosis in this case, my hypothesis would be that ERF too has created such moments of serendipity through exposing their thoughts and visions, but that this methodology was simply unable to uncover it.

In short, pathway mapping has been found to be a highly effective tool in bringing to light transformative agency in this research. Had the focus on that exercise been stronger, the data collection would have been more efficient, and the data more nuanced and rich.

Strengths

In order to counter the issues of retrospective data collection, multiple farmers for each farm were interviewed. Except in the case of Grand Farm, this proved valuable because each farmer added extra details to the pathways. For example, in the case of Palopuro Symbiosis it was truly the joint effort of Kari and Markus that mapped their pathway of the last 10 years more richly.

The visual pathway mapping exercise also proved a great asset in this research. From these exercises, a wealth of new information sprang each time we conducted them, even though we would have talked about the same topics for multiple hours the previous day. I recognised that the visual aspect of these exercises helped the participants dig deeper and more importantly, see connections that they would have otherwise forgotten about.

Despite the fact that in hindsight I would have incorporated the interviews into the pathway mapping exercises, there is merit in the physical separation of two moments of data collection from the same participants. What I mean by this, is that having two separate sessions allowed for reflection on both the side of the participant as well as my own. For future research however, I would recommend to do so in a way that incorporates pathway mapping in both moments of data collection.

Despite being a lengthy process, analysing the data through multiple rounds of summarizing, coding, categorization, and then creating dimensions proved to be very valuable. The large sum of transcribed texts became manageable and navigable, but above all I also quite literally got to know the data much better. Given the realisation that it was at times impossible to assign a certain strategy over another - or in a certain order - the induction of dimensions was absolutely critical. These dimensions captured the essence of many categories together, and had very little overlap with each other, allowing them to be much more clearly assigned to certain actions and events in the pathways. The strength in this however, is that the categorised pathways - based on the strategy categories - were still very much linked with this

newer pathways that was divided into dimensions. As such, comparison on both levels was still possible, allowing for both overview and depth in the data analysis.

Implications

If transformations towards more sustainable farming systems are to succeed it is valuable to look at the agricultural pioneers that have already created such pathways, albeit in their own contexts. This research offers valuable lessons from such perspectives.

First and foremost, the lessons that are the result of this thesis are not only valuable to researchers to further understand the relations between transformative agency (Westley et al. 2013) and three-fold embedding (Hess 2004; Methorst et al. 2017), but also to the farming community and those actors involved in the transformation towards sustainable food systems. The lessons are grounded in strategies that were crucial in building the transformative capacities of the farmers in this study, and as such could be seen as handles or tools for others facing similar transformative processes. Though success is never guaranteed, and though in fact failure is very much part of the process of transformations, what these lessons show is that transformations towards sustainable and complex systems are possible through personal transformations, knowledge building, connecting to others, and the courage to try and try again. In other words: for farmers it is worthwhile to recognize that they are not alone with the struggles they go through, in trying to transform their farming system. Especially seeing that the farmers in this study are as human as any other, their transformative pathways and the lessons derived from them should be a signal of hope and possibility.

The lessons extracted in this research show close correlation with the theory on resilience in the transformations of social-ecological systems as put forth by Fath, Dean, and Katzmair (2015) and Darnhofer et al. (2016). What this effectively means is that this could be a useful framework for future studies to describe and analyse the transformational pathways of farms.

The sustainable farming systems that were researched were for a large part made possible by building a rich variety of contextual knowledge and expertise, and the skills and capacities to apply and work with them. This underlines the importance of such knowledge and capacities in the transformation towards more sustainable farming systems. In addition, it also underlines the significance of the humility of the farmers in this study by recognizing all too often that they are not the all-knowing expert, and require help, expertise, and knowledge from outside. The implication of this is that more effort - both from the farming and research communities - should be directed towards the co-creation of contextual knowledge and the skills and capacity to wield it. To do so it is crucial to take down the barriers that hinder such inclusive co-production processes.

This research deepens our understanding of the transformative processes of three pioneering farms that are part of the Lighthouse Farm Network. This network is not only a collection of outdoor classrooms and living laboratories - it is also taking an exemplary position by shining beacons of light in terms of the possibilities in sustainable farming. As such, understanding how three of their farms have actually managed to transform into exemplary farming systems contributes to one of the root causes of this network. In addition, by doing so this study has signalled a new perspective and direction of research for this network: one that focuses not on farming techniques, but rather on the transformative processes through which the farming systems governing such techniques came to be.

This research has brought to light the role of personal change in the process of transformations. This brings focus to the importance of people's values and ways of thinking, and the importance of how they could be impacted in order to transform.

Finally, the transformations that these farmers have gone through in terms of themselves and their farms also sheds light on their capacities to deal with change, and their capacities to persevere and deal with the difficult emotions such as shame and vulnerability that are a necessary part of that process. The implication here is that future studies into transformations would do well to include this perspective and deepen our understanding into how such emotions and attitudes define and influence transformational processes.

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> *"There's poor understanding - communication - between science and farmers, and farmers and the society. So we try to be the bridge because we understand farmers, we know how to talk to them so they understand what you mean, but we also know how to talk to scientists."*
>
> **(*ALFRED GRAND*)**

Future research

The data used in this research suggests that there are many more lessons to be extracted by analysing and comparing the transformative pathways of agricultural pioneers. When these lessons are held against their embedding in terms of literature and theories, even more questions arise.

First of all there is value in checking to what extent these findings resonate with the pathways of the other farms in the Lighthouse Farm Network, or more broadly: with other agricultural pioneers. This could provide a further nuance to the lessons proposed here. The advice offered here is to focus strongly on pathway mapping as a means to uncover transformative agency.

Alternatively it would be valuable to compare to what extent

conventional farms share the same lessons with farms that are pioneering in terms of sustainability. The difficulty here would be the selection of the sample, based on definitions of what we mean when we say 'conventional' or 'pioneering', because in a way also farms that are highly unsustainable in many ways can be said to have pioneered when looking at for example technology. Nonetheless, it would be interesting to investigate what truly are the differences between such farms.

In relation to the limitations of this study it would be interesting to investigate the differences in strategies and attitudes between family farms and non-family farms when dealing with transformations towards sustainability. Here the role of intergenerational differences of values and opinions could play center stage.

As discussed in the limitations section, the data suggests that non-humans have likely had a role to play in the transformative pathways of these agricultural pioneers. It would be interesting to further investigate the role of the relations to non-humans in the building and application of transformative agency. The focus here would be on the care for non-humans, for example in the form of aesthetics, as hinted by the data in this research.

Finally, it would be interesting to integrate the work of Brown (2006) into the theory transformative agency and three-fold embedding. A more detailed view on how agricultural pioneers make sense of, and learn from critical moments by dealing with difficult emotions such as shame and vulnerability could prove to be highly valuable. Seeing that leading the way towards more sustainable systems is the goal of most studies that try to understand transformations, and also of the farms in the Lighthouse Farm Network, it would almost seem unethical to ignore or exclude the difficult emotions of shame and vulnerability that are an inevitable part of such transformations.

9.

Conclusion

This thesis offers lessons on the transformative agency of the farmers behind three pioneering farms, by reconstructing and comparing their pathways towards sustainability. In doing so, the focus was on the transformative strategies that these farmers applied in relation to the three-fold embedding of their farms. As such, the objective of this study was to investigate what both the scientific and farming communities can learn from those that have already paved pathways towards more sustainable farming systems.

The 8 lessons on the transformative agency of the farmers that form the result of this research can be summarized as followed:

1. Opening up to change

The farmers have gone through horizon-widening experiences and learned to view their farms with outsider perspectives. As such, they were open minded to change, opportunities and serendipity.

2. Through knowledge, complexity

The farmers very often opened up the boundaries of the embeddings of their farms by connecting with other people for skills, expertise, and knowledge. In so doing, they have been able to construct highly complex sustainable farming systems by tapping into the knowledge and resources of others. This also shows the importance of the co-creation of contextual knowledge and the capacities to apply it.

3. Communication

In these collaborative and complex processes, communication has shown to be crucial in creating cohesion and shared directions.

4. Making sense together

The farmers managed to make sense of their errors and critical moments by their widened perspectives and by sharing those struggles with others, through which they have shown to be courageously vulnerable.

5. Taking risks

The farmers were not afraid to take risks and start experimenting and innovating through trial and error. In doing so, they have shaped the embedding of their farms and the future risks of their projects and practices.

6. Being vulnerable

Their vulnerability in sharing ideas and struggles with others, without any guarantee of success of acceptance, has also led to moments of serendipity.

7. Persevering dreams

The farmers managed to develop dreams and visions of different ways of farming, adapted them with changing contexts and insights, and overall persevered in their pursuit of these dreams and visions despite the many challenges, disturbances, and critical moments that they faced during the transformations of their farms. In other words: overall they did not quit and succeeded in changing the practices and embeddings of their farms. The above discussed transformative capacities and strategies have played crucial roles in this perseverance.

8. Learning & building transformative capacities: hope

Finally, these transformative capacities and strategies were built along the way through doing and learning, trial and error. Learning from applying such strategies and actions resulted in personal transformations of the farmers themselves as it broadened their horizons, and changed their values and ways of thinking and doing. And it is exactly these changed values and open mindsets that further propelled their transformative agency. In other words, their open-mindedness to change and to new ways of doing and thinking was as much the result of their experimenting, learning, connecting, and horizon-widening experiences, as that experimenting, connecting, and learning was the result of those very mindsets and attitudes. What all this shows is that transformative agency, to a greater or lesser extent, is something that can be developed through doing and learning, which in turn gives hope to all others with a desire to transform towards sustainability.

Moving forward, it is recommended to test to what extent these lessons resonate with other pioneering farms, but also with farms we consider as conventional, in order to bring to light further nuances. In addition, it is worth comparing family farms with non-family farms in their transformations towards sustainable farming systems, with a focus on intergenerational differences. In doing so the frameworks of resilience of social-ecological systems and the adaptive cycle of transformations could be highly useful. In researching the process of transformations, the role of the relations to non-humans should also not be ignored. Furthermore, it is recommended to include the theory on shame resilience, as this could provide a deeper understanding of the attitudes and skills transformative agents wield in overcoming challenges and disturbances, and to achieve personal transformations. Finally, the role of the co-creation of contextual knowledge and the capacities to apply it cannot be stressed enough, and must be supported if the scientific community seeks to advance the transformation of our food systems towards sustainability.

R.

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Farm dog Knehtilä Farm, Palopuro Symbiosis

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Empty train carriage on the way to Grand Farm

A.

Appendices

APPENDIX 1

INTERVIEW BLUEPRINT

Introduction CASUAL & OFF FILM

- Thanks for time & participation
- Filming the interview:
  - More detailed analysis
  - Only used for thesis - film is not published or seen by anyone other than me
  - Are they OK with that?
- Start recording: more explanation follows now

Introduction ON FILM

- Who am I: MOA student at WUR & visual storyteller
- Purpose of interview: msc thesis on pioneering farms and their learning journey
- Results
  - Small book with pictures & personal stories
  - Published online on university website
  - Sent to them via email
- Length: 1.5 - 2 hours
- Recording:
  - Why: Detailed analysis of data
  - Used only for thesis: so not published anywhere else
  - Used for Transcribing & coding
  - Storage: on 2 of my external hard drives for 5 years
- Permission to record
- Confidentiality
  - Who works with the data: myself & my supervisors (Dirk Roep & Blair van Pelt)
  - The result (thesis book) will be published online
  - This includes the pictures and personal stories
  - GDPR agreement:
- Do you give me permission to use the data from this interview, the pictures taken on your farm, and the personal stories in my thesis book?
- Role division
  - They: answering questions
  - Me: guiding interview and posing questions

Opening Questions

- Why are you willing to cooperate with my research?
  Prioritize 1 question per objective

RQ1: What is the current version of the sustainable farming systems of the three pioneering farms?

Objective 1.1: to map their current practices:

- First I would like to know a bit more about your farm as it is now.
- How would you describe your farm?
  - Products
  - Ways of producing / practices
  - Other activities
  - Relations to markets / community / institutions
- What products are produced on your farm?
  - Fruit
  - Veg
  - Meat
  - Dairy
  - Raw materials
  - Processed products
- How are those products produced?
  - Pest control
  - Fertilization
  - Seeds
  - Soil preparation
  - Animal husbandry
- Is there food being processed on your farm?
  - Cleaning / separation
  - Product creation (Packaging, jars etc.)
- How would you describe your role in the farm (operation)
- What are you most happy with about your farm?

Objective 1.2: to map their current resource embedding

- Could you describe the resource flows that enter and leave your farm?
- Where do the farm's resources come from?
  - Feed
  - Fertilizer
  - Pest control
  - Seeds
  - Animals
  - Money
  - Knowledge
  - Labour
- Where do the resources that leave your farm go to?

Objective 1.3: To map their current network embedding

- Where do the farms products end up?
- Whose forks?
- So let's start with the fork and work our way back to the farm: how do they get there?
- What does a typical day at the farm look like and who is involved?
  - Employees
  - Hired workers
  - Family

  - Volunteers
  - Visitors
  - Seasonal labour
  - Are there other people that you work with less frequently?
  - Colleague producers
  - Market relations
  - Marketing experts
  - Processors
  - Researchers
  - Farm experts (veterinarians, tech etc.)
- Who would you list as the most important people for the way your farm operates now?
  - Employees
  - Family
  - Market relations
  - Policy actors
  - Researchers
- Could you tell me something about the networks you are part of?
  - Farmers' networks (e.g. Via Campesina)
  - Research (lighthouse)
  - Producer-Consumer networks
  - Policy-forming bodies
- Why are you part of these networks?
  - Sharing experience
  - Knowledge building
  - Uniting voice
  - Policy influencing
  - Networking: building relations

Objective 1.4: to map their current societal embedding

- What motivates you to farm the way you farm?
  - Personal experiences
  - People
  - Context (news, neighbours etc.)
- What would you like agriculture to look like in 10 or 20 years time?
- Now let's talk about the communities that your farm is part of. If we start zoomed in at farm level, and gradually zoom out to show neighbors, nearby villages and cities, and eventually Europe or even the world: could you describe the communities that the farm is part of?
  - Farm level
  - Nearby villages / towns
  - Neighbours
  - Other (local) farmers
  - International community / partners
- Can you describe your relationship with these communities? Do they affect your farm?
  - Views on your farm
  - Critique
  - Support
- How does the farm affect these communities?
- Who depends on your farm?

RQ2: How have the pioneering farms created the pathways that led to the realization of their status quo?

Objective 2.1: to map the starting point of their transition

- How long has the farm existed? How old is the farm?
- When did you come into the picture?
- Was the farm different then from what it is now?
- If yes: lets go back to the moment right before the farm practices were changed: what did you want to change and why?
  - New techniques / practices
  - New products
  - New markets
- If no: let's go back to the moment before you started/joined the farm: what motivated you to start/join the farm?
  - SKIP TO 2.6

Objective 2.2: To map the farm practices at that before change:

- You described your farm in the beginning of this interview, but what was it like at the moment of this turning point you just identified? What were the main differences?
  - Products
  - Practices
  - People
  - Markets
- What didn't change?

Objective 2.3: To map the resource embedding at that time

- How was the resource flow to and from the farm different or the same then?

Objective 2.4: To map the network embedding at that time

- Who were the most important people for you farm then?
- Which forks did the products end up on?
- Through what channels?
- Which networks were you part of at that time?
- Why were you part of those networks?

Objective 2.5: To map the societal embedding at that time

- Again zooming out from farm level: Were the communities that the farm was involved with different then?

  - Neighbours
  - Other farmers
  - Nearby towns
  - International partners / colleagues
- If so: how were they different?
- How were the relationships between the farm and the communities at that time?

Objective 2.6: To outline the triggers and vision behind their transition

- What triggered you to do things differently?
  - Influences
  - Motivations
  - Experiences
- What has influenced the idea/direction to start / change?
  - People
  - Circumstances
  - Events
- Did everyone important on the farm share that idea with you?
- If not, how did you approach/navigate that
- The idea/direction you had for the farm then, how does that compare to the current idea you have for the farm?

Objective 2.7: To map the subsequent think-do gaps and bridges in general

- What were the first steps you took to make the ideas you had come true?
  - Practices
  - Products
  - Markets
  - Knowledge / tech
  - People / relations
- What was your role in this process?
- What sort of challenges did you run into?
  - Social
  - Skills / experience
  - Institutions
  - Finance
  - Other peoples' views
  - Technology
  - Knowledge
  - Natural resources
- How did you approach those challenges?
  - People
  - Institutions
  - Tech
  - Knowledge
  - Funding
- Who else was involved in addressing those challenges?
  - Employees
  - Family
  - Researchers
  - Policy actors
  - Networks
- Did you come across obstacles / gaps?
- Were there obstacles or gaps that you could not navigate or solve?
- If so, how did you deal with that?

Objective 2.8: To discuss strategy 1 - acquiring & building knowledge, solutions, & views, including research and experiments

- What kind of new information or technology was needed to change the farm?
- How did you acquire that information and technology?
  - Research networks
  - Other farmers/colleagues
  - Local knowledge
- Did you experiment with new information and techniques?
- How did you conduct these experiments?
- Who was important for these experiments?

Objective 2.9: Strategy 2 - building (shared) visions

- - discussed already under 2.6

Objective 2.10: Strategy 3 - social networks

- How did you find the markets you are involved with now?
- When did you become part of the networks you are part of now?
- What was your motivation?
- What role did those networks play in changing the farm practices?
- How did the people that are currently important to the farm join?
- Who do you look up to? Who are you influenced by?
- How do they influence you?
- Objective 2.11: Strategy 4 - trust, legitimacy & social capital
- Were there ever moments that other people doubted your plans or direction or ideas?
- If yes: can you describe such a situation?
- How did you approach such situations?
- How did you deal with winning people's trust?
  - Funders
  - Colleagues
  - Partners
  - Family

  - Employees
  - Consumers
  - Community

Objective 2.12: Strategy 5 - Developing innovations by identifying and introducing alternative ways of doing

- What innovations, or new practices, did you introduce in the farm?
- What were the effects of these innovations?

Objective 2.13: Strategy 6 - mobilizing for change by raising awareness of resource challenges, searching for funding, and influencing policy decisions

- What kind of resource challenges did you have?
  - Finance
  - Feed
  - Fertilizer
  - Land
  - Tech
  - Knowledge
  - Social - Skills, Experience
  - How did you approach these challenges?
  - Relations
  - Policy
  - Funding
  - Raising awareness
  - Research

Objective 2.14: Strategy 7 - Capturing windows of opportunity by timing resources with chances, taking risks & convincing others to do the same

- Could you mention a moment of opportunity that you recognized?
- How did you approach such an opportunity?
- What risks were you aware of that you were taking then?
- How did you approach those risks?
- How did others around you deal with those risks?
- Did you have to convince others to also take risks?

Objective 2.15: Strategy 8 - Identifying & reconceptualizing issues & opportunities

- Could you name some of the achievements or successes that you had along the way?
- What kind of effect did they have?

Objective 2.16: Strategy 9 - Negotiation & conflict resolution

- Were there any conflicts along the way?
- How did you approach them?

Objective 2.17: Strategy 10 - Nerve, courage, & openness to failure

- Did you ever have doubts about the transition / changes on your farm?
- How did you deal with these doubts?
- Could you describe a moment where you had to step back and reflect because it was hard?
- How did you deal with those moments / difficulties?
- Could you mention a moment when things did not go according to plan?
- How was that?
- Was it good or bad?

Objective 2.18: Strategy 11 - The role of chance, and how it is made less coincidental by expertise, knowledge & skill

- Can you mention a moment when things unexpectedly came together?
- A moment when chance played a role?
- How did you deal with such moments of chance?

Objective 2.19: To outline the future prospects, lessons learned, and challenges of the farm

- Looking back, what to you is the most special part of the story that we discussed?
- What are your ideas for the future of the farm?
- What's the way forward? And what do you think the path will look like?
- Are there any challenges that you anticipate?
- How do you plan on dealing with them?
- Do you feel that your experience of the past journey will help you in moving forward?

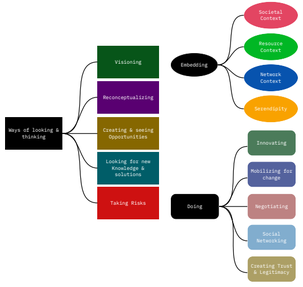
Objective 2.20: To open the interview up to any final remarks

- Is there anything else you think that has been important in the transition of your farm?
- Is there anything else you feel is worth mentioning?
- CONCLUSION
- Thank you
- Any questions?
- Recap:
  - Looked at what the farm is and was
  - Transition / learning journey: what it took to get there
- Next steps:
  - Mapping exercise on a separate day
  - Interview used for data analysis
  - Thesis being sent to them
- Stop recording

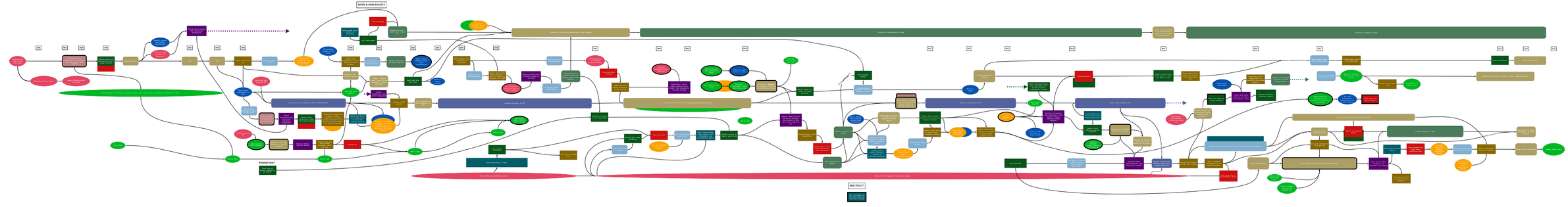
APPENDIX 2

Categorised Pathways

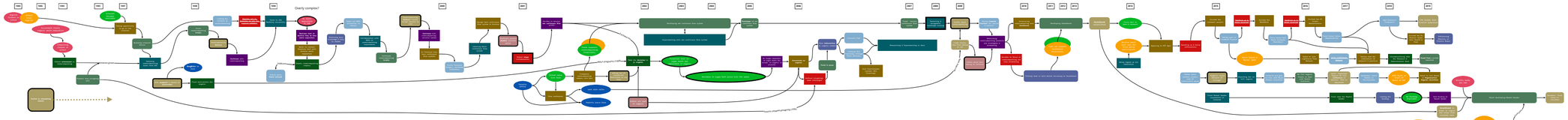
Legend



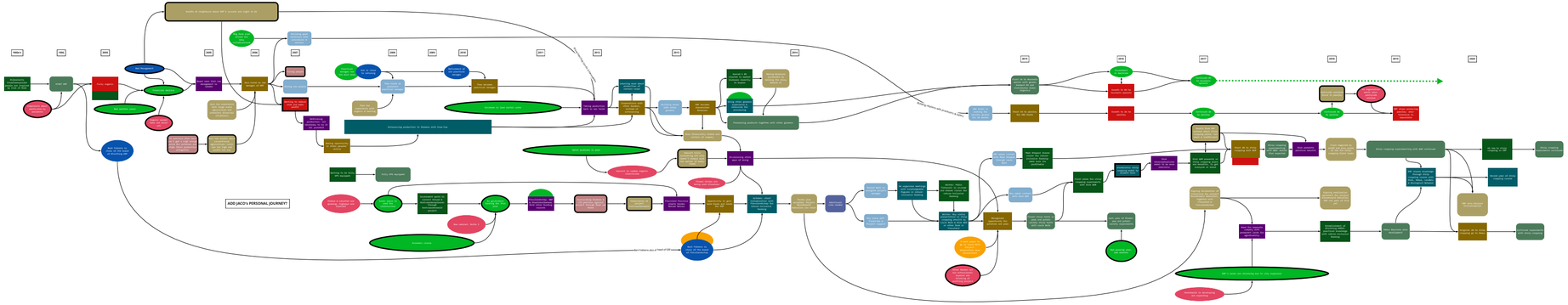
2.1 Palopuro Symbiosis



2.2 Grand Farm



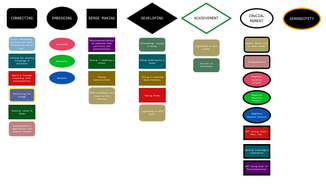
2.3 ERF



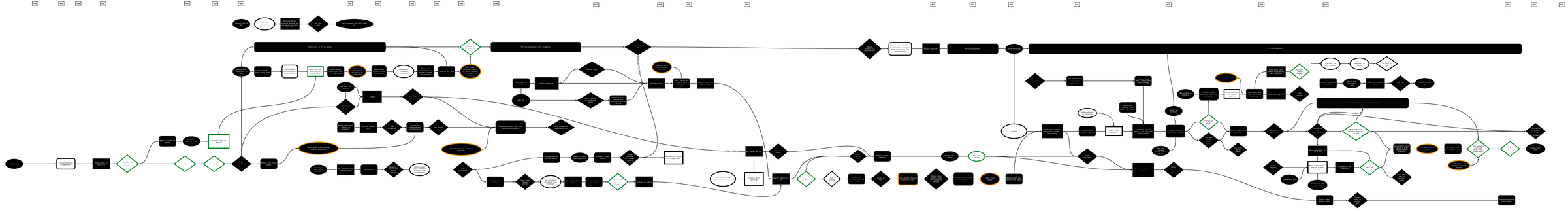
APPENDIX 3

Pathways by dimensions

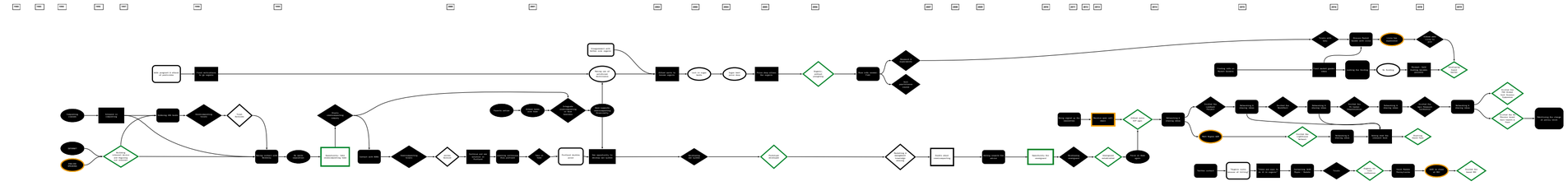
Legend



3.1 Palopuro Symbiosis



3.2 Grand Farm



3.3 ERF