



D7.7 OVERVIEW OF PRECONDITIONS FOR TRUST IN DATA SHARING

Simone van der Burg, Mark Ryan, Elsje Oosterkamp, Marc-Jeroen Bogaardt, Else Giesbers and Houkje Adema

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Author of the document	Simone van der Burg, Mark Ryan, Elsje Oosterkamp, Marc-Jeroen Bogaardt, Else Giesbers and Houkje Adema
Contact details of the coordinator	George Beers (george.beers@wur.nl)



PROJECT SUMMARY

The internet of things (IoT) has a revolutionary potential. A smart web of sensors, actuators, cameras, robots, drones and other connected devices allows for an unprecedented level of control and automated decision-making. The project Internet of Food & Farm 2020 (IoF2020) explores the potential of IoT-technologies for the European food and farming industry.

The goal is ambitious: to make precision farming a reality and to take a vital step towards a more sustainable food value chain. With the help of IoT technologies higher yields and better-quality produce are within reach. Pesticide and fertilizer use will drop and overall efficiency is optimized. IoT technologies also enable better traceability of food, leading to increased food safety.

IoF2020 involves 33 use-cases organised around five trials (arable, dairy, fruits, meat and vegetables) develop, test and demonstrate IoT technologies in an operational farm environment all over Europe, with the first results that were realised in the first quarter of 2018.

IoF2020 uses a lean multi-actor approach focusing on user acceptability, stakeholder engagement and the development of sustainable business models. IoF2020 aims to increase the economic viability and market share of developed technologies, while bringing end-users' and farmers' adoption of these technological solutions to the next stage. The aim of IoF2020 is to build a lasting innovation ecosystem that fosters the uptake of IoT technologies. Therefore, key stakeholders along the food value chain are involved in IoF2020, together with technology service providers, software companies and academic research institutions.

Led by the Wageningen University and Research (WUR), the 100+ members consortium includes partners from agriculture and ICT sectors, and uses open source technology provided by other initiatives (e.g. FIWARE). IoF2020 is part of Horizon2020 Industrial Leadership and is supported by the European Commission with a budget of €30 million.

EXECUTIVE SUMMARY

Just like D7.6, this deliverable offers a synthesis of the work we've been doing in WP7. Based on the empirical work presented in previous deliverables, we draw conclusions regarding how trust in data sharing can be fostered. This is done in two steps.

First we explain what we understand trust to be. There are generally two different approaches to trust in the ethical literature. One can be called the 'individualist-contractarian' approach to trust. This approach to trust imagines human beings as individuals, who will only choose to engage in relationships with others after careful and (informed) rational consideration. This choice may also be formally sealed with a contract. The other approach to trust is sometimes called the 'social-phenomenological approach' and supposes that human beings are social beings to begin with and are therefore always already part of trusted social relationships, from childhood onwards. According to this approach, trust has an embodied, affective and social dimension, long before reflections come up about whether or not there are also reasons to trust other people. This approach supposes that trust cannot be 'created' after reflecting on the reasons one might have to trust or distrust other people, but it is first and foremost a lived aspect of human life.

These two approaches to trust also come forward in the interviews and focus groups we did with stakeholders all through WP7 about data sharing. Sometimes our respondents take an individualist-contractarian perspective to trust in these relationships and they bring forward preconditions that have to be satisfied before signing a contract which seals the start of a data sharing relationship. But next to contracts, stakeholders also bring forward considerations that pertain to lived aspects of relationships with the actors with whom they (are to) share data. With some of these actors (such as other actors in the value-chain or the government) they already have a history which informs their anticipation of how these relationships will develop further when (a larger variety of) data are shared (more frequently); with others such as the tech providers they do not have a relationship yet and they imagine what this relationship will be like. This second approach gives rise to considerations of these stakeholders about checks and balances that need to be in place to develop trust in the new partners, and maintain trust in already established relationships when they also become data sharing relationships. These considerations reveal how people want to be treated in data sharing practices: they don't just focus on the reasons one may have for (not) entering these relationships, but on the norms and values that need to be respected in daily interactions with data and which make these practices trustworthy and sustainable over time.

In this deliverable we looked back at the empirical work that we did and we noted all of the recommendations that people made with regard to how they want to be treated in the data sharing network, and how not. Both contribute to trust in data sharing, understood in this double way: as an individualist contractarian approach to trust in data sharing and a social-phenomenological approach. More specifically, we made two lists which we noted in two tables: one representing the do's and don'ts that stakeholders have brought forward and on which their trust depends, the other offers an overview over the still remaining concerns and unclarity that cause distrust and which need attention in follow-up research and development of checks and balances that will foster trust in farm data sharing.



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1. INTRODUCTION

These past years it has become clear that stakeholders involved in digital farming networks, are not always willing to share farm data. This has been described in the literature which we reviewed in this project (D7.1, published in: Van der Burg et al. 2019), but it also came forward in our own empirical research that we described at length in various deliverables (D7.3, D7.4 and the report based on the Data Sharing Action).

In response to farmer's distrust of farm data sharing, principles, codes of conduct and codes of practice have been shaped all over the world, to foster trust in farm data sharing. In the EU, farmer's representatives from Copa-Cogeca and CEJA (Conseil Européen des Jeunes Agriculteurs) and major agribusinesses presented the EU Code of Conduct for Agricultural Data Sharing by Contractual Agreement in 2018.¹ This EU Code of Conduct provides a valuable start to the discussion about trust in farm data sharing in Europe. In the research carried out in WP7 of IOF2020, however, we saw that there's a lot of support for the Code of Conduct, but there's also a lot of uncertainty and disagreement between stakeholders about what the EU Code of Conduct for agricultural data sharing by contractual agreement requires. Furthermore, we saw that many stakeholders had reflections and concerns that are important for their trust in data sharing, which go beyond the constraints of the EU Code of Conduct. In our interviews and focus groups many stakeholders brought forward values such as trust, but also other values that they consider important for the realisation of trust such as respect for private freedoms such as privacy and autonomy, fairness, citizenship or care for the commons and inclusiveness, which are not all included in the Code of Conduct yet. They also brought forwards uncertainties about the content of these values and what they demand stakeholders to do or refrain from doing.

In closing the work we have carried out for this Work Package 7, we therefore look again at the various deliverables and summarize the requirements that various stakeholders brought forward and which need to be satisfied before they can trust data sharing, as well as the various values that together help to realise trust. Furthermore, we also listed the concerns and unclarities with respect to the content of these values and how they can be realised, which will give valuable input to future research.

2. BACKGROUND OF THIS REPORT

In this deliverable we look again at the empirical material that we collected during WP7. The questions we wanted to find an answer to are:

- (1) What are preconditions for trust in data sharing that respondents in our empirical work in WP7 brought forward?
- (2) What are remaining concerns and unclarities that demand follow-up research?

¹ https://www.cema-agri.org/index.php?option=com_content&view=article&id=37&catid=19&Itemid=216

Box 1 provides an overview over all activities of WP7, which led to the deliverables that we promised. We highlighted in blue the activities in which we collected empirical material, which is also the basis for this deliverable D7.7.

Box 1 List of activities providing the building blocks for D7.7

1. A literature review, providing an overview over the ethical questions raised in the literature about digital ('smart') farming (D7.1, published article)
2. A landscape of ethical questions related to use cases, based on the literature study as well as interactive workshops, webinars with use cases and requests for ethical support from use cases (D7.2, report)
3. Interviews with 23 stakeholders within the Netherlands and Belgium to explore (a) what values play a role in their reflections on farm data sharing, and (b) what their preferred view on the data sharing future is. This resulted in 4 vignettes representing rival ways to shape the data sharing future and a list of values. (D7.3, report)
4. Focus groups with 226 stakeholders (including 116 tech-developers and researchers and 110 farmers across the EU), to find out what their preferred data sharing future is. The vignettes and values identified in step 1 were used as input to enhance and broaden reflection of participants in focus groups: first determining the intuitive preference for a vignette and then developing it further based on a reflection on values. This led to a broader and more varied view on the pros and cons of alternative ways to shape the data sharing future, as well as a clear perspective to the values that participants hold dear when it comes to farm data sharing (D7.4, report)
5. Workshops done with use case participants, leading to materials that will continue to support reflection of future digital farming innovators. A value sensitive design method, made available on a website which provides step-by-step guidance for tech-developers who want to reflect on the values to which their technology gives rise and take the values of their stakeholders into account (D7.5, interactive website)
6. Evaluation of the EU Code of Conduct on Agricultural Data Sharing by Contractual Agreement (EUCC) against the literature on how contracts can contribute to trust (Van der Burg et al 2020a) and against a combination of standards outlined in the literature on codes of conduct and the results of the focus groups with 226 stakeholders, and providing recommendations on how to improve and next steps to take. (D7.6, 2 scientific articles and report)
7. In the context of the Data Sharing Action we conducted 33 interviews with use case leaders to get an overview over current data streams in their use case, as well as their perspectives on the added value of data sharing, perceived obstacles and solutions to overcome the obstacles. (Report on the data sharing activity)

Just like D7.6, this deliverable offers a synthesis of the work we've been doing in WP7, but here we focus on listing the preconditions for trust in data sharing that were put forward by respondents, as well as the still remaining concerns and unclarities that deserve follow-up research. Before doing that, however, we will first clarify our perspective to trust and how it is related to the lists of preconditions for trust in data sharing that will follow.

3. WHAT IS TRUST?

Trust is a theme that is discussed a lot in relation to data sharing. When asked what constitutes trust, stakeholders frequently come forward with very different stories. In the discussions that we witnessed in the context of WP7 we frequently encountered two different approaches to trust. One can be

considered ‘dominant’ as it is articulated also in the form of various codes, guidelines and principles developed all over the world to guide data sharing: this is the individualist-contractarian approach to trust. This is also the approach that underlies the EU Code of Conduct for Agricultural Data Sharing by Contractual Agreement. (See also Van der Burg et al 2020a) This individualist-contractarian approach however frequently eclipses a different approach to trust, which also figures prominently in the considerations of stakeholders, and which we think deserves more attention in the further development of guidelines for trust in data sharing in the future. This approach is called the social-phenomenological approach to trust.

Mark Coeckelbergh (Coeckelbergh 2012) describes the nature of the individual-contractarian approach as follows. This approach to trust considers the nature of human beings first as individuals, who engage in relationships with others only after careful and rational consideration. Their trust in these relationships depends on their *reasons* to engage in the relationship: they choose freely to engage in the trust relationship based on rational arguments, but they can also retreat from these relationships if they no longer see reasons to trust others. Formal contracts can be formed to underpin the trust relationships, but that does not have to be the case: contracts can also be a metaphor to describe the rational basis of these trust relationships. Even if no actual contract is formed, the individualist contractarian approach takes as a supposition that relationships are always engaged in based on a rational reflection about one’s reasons to trust another person. In digital ethics Taddeo’s concept of e-trust between non-human actors (such as robots or systems) is based on a version of this contractarian-individualist approach to trust, as she discusses trust as the result of rational deliberation: there are ‘reasons’ to choose to trust these machines or systems (Taddeo 2010). If there would be no reasons to trust, we would stop trusting.

In contrast to trust relationships based on reasons, which can be articulated in a contract, there is also another way to look at trust. Coeckelbergh calls this the ‘social-phenomenological approach’ to trust, which starts from the supposition that human actors are always already part of social relationships, before trust arises as a topic for consideration. Trust is part of human relationships from childhood onwards and has an embodied, affective and social dimension, long before people start reflecting on the reasons they may have for trusting or distrusting other people. This approach supposes that trust cannot be ‘created’ after reflecting on the reasons one might have to trust or not to trust another person, but it is first and foremost a *lived* aspect of human life. This social-phenomenological approach to trust forms Coeckelbergh’s own approach to trust relationships between human and non-human actors such as artefacts, tools, machines or digital systems. Therewith he draws attention to the fact that discussions about whether to trust artefacts or not, always come up in contexts in which people are already interacting with (digital) artefacts and systems. Furthermore, he draws attention to the fact that contexts may differ with respect to the history people have with dependence on digital technology: in some contexts digital technologies have been around for some time, and people have grown used to working with them, while in other contexts people have not so much experience doing that.

We believe that both these approaches to trust are important for farm data sharing. On the one hand, stakeholders put forward that they will only place trust in others when they have reasons to do so, and they call for contracts as a basis for data sharing just like in the individual-contractarian approach to trust. On the other hand, the social-phenomenological perspective allows to understand why distrust

sometimes persists even when a contract has been formed and signed. Even when a contract has been shaped, the partners in the data sharing network often do not yet know each other. Sometimes, when there is already a history of data sharing between actors, it is easier to have trust. But in cases when people start sharing data with a distant actor whom they never met or who did not prove to be trustworthy in the past, it is hard to trust. What is lacking in these cases is the trust that is based on a history of social interaction.

This double perspective to trust also throws some light on the values that the stakeholders bring forward when they reflect on data sharing. Some of these values fit in the individualist-contractarian approach to trust; such as the demand to respect autonomy and to ascribe farmers a level of control over their data. Others mention values which cannot be settled in a contract, but which characterize a continuing social relationship of trusted interactions; for example, because the wellbeing of the group is fostered in the interactions, benefits are fairly distributed and decisions are taken in an inclusive manner. This double perspective to trust will help to understand the do's and don'ts that will contribute to bringing trust in data sharing about.

4. PRECONDITIONS FOR TRUST IN DATA SHARING

In line with the deliverables on which this D7.7 is based, we have ordered the preconditions for trust in data sharing around the ethical themes (or rather: values) that played a dominant role in the reflections of our respondents. These themes contribute to the two perspectives to trust: autonomy, privacy and transparency contribute to the individualist contractarian approach to trust, as they are most often understood as demanding to give information about what is done with data and asking consent for that use from the farmer who is going to share data. The values that concern the type of relationship that should be fostered between data sharers contribute to the social-phenomenological perspective to trust, such as fair access to data, fair distribution of benefits, care for the commons and inclusiveness. In the following, we'll first present the do's and don'ts that we came across in relation to these values. Afterwards, we'll list the questions, concerns and uncertainties to which the do's and don'ts give rise and which need to be answered in the future.

4.1. A LIST OF DO'S AND DON'TS

In table 1 we present a list of do's and don'ts related to data sharing. The list of do's and don'ts simply summarizes what our various respondents (farmers, tech companies and researchers) brought forward. The considerations brought forward under the theme of autonomy, privacy and transparency are perhaps most familiar for stakeholders involved in farm data sharing. The do's and don'ts formulated under these themes fit very well with the requirements of the EU Code of Conduct for Agricultural Data Sharing by Contractual Agreement and prescribe that farmers should have the chance to choose about whether or not to share data, based on information. It is stated that this information should be transparent and comprehensible, but also that farmers ought not to be manipulated towards sharing their data, and that everyone should stay loyal to the commitments they make.

The other values listed concern the fostering of a good relationship between data sharers, once the decision to start sharing data has been taken. Under ‘fairness’², we listed reflections about two different approaches to ‘fair’; one focuses on fair access to data and is sometimes referred to as data sovereignty. It requests that those whose data are collected should also continue to have access to them, or should be enabled to ask them back and do something with them. The other meaning of ‘fairness’ focuses on the fair distribution of benefits of data sharing. Under this theme a lot of considerations are listed which pertain to the data market and who is entitled to harvest benefits from data. Considerations about data ownership are listed here, such as questions about who the data owners are and what they are entitled to do with data, or how actions need to be prevented that lead to unfair or harmful consequences for businesses in the market. Fair competition is also an important topic of consideration in this respect, as respondents were concerned about the sharing of data that could harm their competitive position if they fell into the hands of their competitors.

Table 1. The do’s and don’ts of data sharing

Do’s and don’ts	Source
Do’s	
The autonomy of farmers should be respected; farmers should be seen as partners in the data sharing network whose opinion has to be taken into account.	D7.4, p. 20 Data sharing action, p.23
Every actor who wants to make use of data, needs to provide transparent information about what he or she wants to do with the data to the person from whom the data stem	D7.3, p. 11 Data sharing action, p.29
Data can be used only after the actor from who the data stem has read the information about how the data are going to be used and has given explicit consent for this use	D7.3, p. 11 D7.4, p. 19/20
Data that reveal private information should be protected	D7.4, p. 27
Don’ts	
Farmers should not be manipulated or pushed toward sharing their data	D.7.4, p.20
Companies should not take advantage of farmers; they should honor their commitments and refrain from doing things with data that a farmer did not consent to	D7.4, p.20
Fairness 1. Fair access to data	
Do’s	
Farmers should (at the minimum) have a right to their own data; they should be able to access data stemming from their own farm and use them for their own purposes	D7.4, p. 23
Fairness 2. Fair distribution of benefits	
Do’s	
Those who share data should get value in return (money, investment/business opportunities, improved knowledge, a better product or more efficient production process etc.)	D7.3, p. 15 D7.4, p.23/24 Data sharing action, p.18
Farmers should be allowed to ask money in return for their data	D7.4, p. 24 Data sharing action, p.21

² ‘Fair’ has an ethical meaning in this deliverable, as in ‘honest’ and ‘just’. To avoid possible confusion, it is perhaps good to mention here that we leave out of scope the meaning of FAIR as a technical quality of datasets which are Findable, Accessible, Interoperable and Reusable.

Data that reveal information that is important for the competitiveness of a business should be protected	D7.4, p. 27 Data sharing action, p.20/23/24/26
Data sharing in the value chain should help tailor the production to the demand of the consumer, which will diminish overproduction and waste. (This also demands that the entire chain collaborates to compensate for the loss of revenues in periods in which a farmer has less production because of diminished demands of consumers)	D7.3, p. 17
Don'ts	
Companies should not be allowed to sell processed data sets (or should give farmers a fair share of the profits)	D7.4, p. 24
Companies should not be allowed to develop new products (other than initially planned) on the basis of the data/information that is given to them.	D7.4, p. 24
Care for the commons	
Do's	
When certain protective measures are respected, data should be accessible to everyone, like books in a library	D7.3, p. 13 Data sharing action, p.33/34
Each contributor to a data sharing network that is shaped as a library should be allowed an overview over the purposes for which data are shared, and what actors make use of the data	D7.4, p. 26
Data should be made available for use for 'the commons': such as, to show compliance with the law, for development of innovations, for research, for policy-making, to protect food safety or the environment and enhance acceptance of food production.	D7.3, p. 13 D7.3, p. 17/18 D7.4, p.25/26 Data sharing action, p.20/21
Don'ts	
Avoid imposing unnecessary hurdles to data sharing for public purposes; data should flow as much as possible	D7.3, p. 16 Data sharing action, p.26
Data cannot be used (by governments, certifiers, NGO's or consumers) to publicly penalize farmers, also not when they break the law.	D7.3, p.28
Inclusiveness	
Do's	
Regulation about data sharing should be shaped in an inclusive manner; the present unequal negotiation opportunities and power should be mitigated	D7.4, p. 28
Don'ts	
The formation of monopolies around data should be prevented (like large companies who keep the data that they collect for themselves)	D7.3, p. 13/14 D7.4, p. 23
Social inequalities should be prevented which are caused by the digital divide: so, between people who are able to buy digital technologies, use them and harvest benefits from them, and people who cannot buy or use these technologies because they do not have the money or because they live in an area without the necessary connectivity to use them.	D7.3, p.30
Emerging inequalities should be prevented which relate to the big data divide: so, there are concerns that benefits will be harvested only by the people who have access to large data reservoirs and who have the knowledge and expertise to do something with data, but not by the people who do not have access to large data reservoirs or who don't have the knowledge and expertise to do anything with them.	D7.3, p.30

Under 'care for the commons' we listed considerations about public availability or use of data. As data sharing is being fostered for public purposes as well, this topic figured also in the minds of our respondents. Some suggested that data should be made accessible and usable as a source of

knowledge for everyone, as in a library. As part of a library data would be considered public knowledge resources. Others thought that farm data should be made available for specific public purposes, such as the protection of the environment, fostering safe and acceptable food, informing public policy, or doing research and enhancing innovation. While the value of data serving such purposes was appreciated, some also worried about ways in which this could be harmful: they articulated prohibitions that prevent the use of data for the (public) penalization of farmers who disrespect the law, or who harm the environment, or have accidentally produced polluted food.

Under ‘inclusiveness’ we noted all fears related to social inequalities that could come about as an effect of having privileged access to data, or lacking that access. Or power inequalities that could generate as an effect of differences in digital expertise between people who do and those who do not know how to harvest benefits from data. Considerations about shifts in the power relationships in the social networks around farms are listed here, and their potential negative effects on the competition between companies. Inclusiveness is aiming to counter the social inequalities to which these power distributions may give rise.

Each of the ethical themes in table 1 labels recognizable recommendations and prohibitions, but they also give rise to a lot of questions and discussion. As it turns out, the do’s and don’ts that were often brought forward were not as straight forward for everyone as one might expect. They need further clarification and elaboration.

4.2. UNCLARITIES, QUESTIONS AND UNCERTAINTIES

Looking at table 1, questions arise related to the way in which themes can or should be combined. Under ‘fairness’, for example, there are considerations listed which shape the data sharing network as a market in which data are traded. In relation to this theme it is important to distinguish between ownership rights of different actors, which in principle means that some actors will have access to some data and be allowed to benefit from it, while others don’t. Shaping the data sharing network as a market, however, invites to think about the preconditions for data sharing in a different way, than when data are considered as resources that ought to be made available in a data library where data are available for everyone, or when data are shared for public purposes. Data market spaces and data libraries steer the imagination about the data sharing future in very different directions, which gives rise to contrasting ideas about prohibitions and recommendations that should govern data sharing. Both could materialize in Europe next to each other, as separate data spaces meant for public and market uses, but it is not yet clear how these spaces ought to be related and what do’s and don’ts should govern each of them, or whether and how both spaces can be connected.

Apart from questions about contrasts between public and market farm data spaces, respondents also raised unclarities, questions and uncertainties about each value theme that they brought forward, which we listed in table 2.

Table 2. Concerns and unclarities related to every value

Concerns and unclarities	Source
Autonomy, privacy and transparency	

The demand to ask a farmer's consent to collect and use farm data suggests that farmer's autonomy is respected, but in fact extra (secondary) use of the same data is hard to control by a farmer	D7.3, p.12
Autonomous choice demands that farmers are informed. But farmers are often not well informed before signing an agreement about data sharing, especially not when the consent procedure is digitalised.	D7.3, p.12 D.7.4, p.21
Farmers do not have a full understanding of what data sharing entails, and what its value is	Data sharing action, p.23/29
As data transform (they are for example processed, anonymized, split, combined with other data etc.), it is unclear who is entitled to decide about what data	D7.4, p.20/21 D7.4, p. 23
The control given to farmers to decide about data is actually constrained to the raw data, but farmers are not aware of this	D7.4, p.20/21 D7.4, p. 23
It is unclear what farm data should be considered private and therefore deserve protection	D7.4, p.27
Fairness 1. Fair access to data	
Data sharing is irreversible: even if you can get raw data back, the copies of data can still be somewhere. It is therefore impossible to ask data back	D7.3, p. 11/12
Farmers often do not have access to data, even not to their own data	D7.4, p.23
Fairness 2. Fair distribution of benefits	
The meaning of fairness is unclear. What does a 'fair' distribution of benefits from data sharing mean/require? What rights and responsibilities does fairness entail for the various contributors to the data sharing network?	D7.4, p.25 D7.4, p. 24 Data sharing action, p.25/26
Are tech companies allowed to earn money with data, by selling data to third parties?	D7.4, p.22 D7.4, p. 23
Do tech companies have the right to use and sell the processed and interpreted data that originate from farms? Who is the owner of the raw data? Who is the data owner after a tech company has invested time, money and effort on the data?	D7.4, p.21/23/24 Data sharing action, p.23/25/26
Added value of data sharing is unclear; how can it be settled?	Data sharing action, p.22
Care for the commons	
For what commons can data be used? And under what preconditions? Some participants suggested that the management of the data library should adopt policy regarding what types of people are welcome to use the data, for what purposes they can use them and under what conditions they can use them.	D7.4, p.27
Some data sharers are afraid their data will be used to shape regulation that they do not agree with. How should this be dealt with?	Data sharing action, p.23
Who should be in charge of the library? Who should be involved in setting the rules for data sharing? And how should their interests be balanced?	D7.3, p.13/14 D.7.4, p.29
How can a data library which is accessible to all be combined with market competition?	D7.3, p.13/14 D.7.4, p.27
Inclusiveness	
How should we deal with unequal negotiation power of different stakeholders deciding about data?	D7.4, p.28/29
Data sharers generally do not know each other, which is a hurdle to trusting them with your data	Data sharing action, p.24/34

Related to autonomy, privacy and transparency, for example, lots of uncertainties come forward with respect to the (limited) transparency and comprehensibility of information provided to farmers and the negative effect this will have on their capacity to decide autonomously about whether to share data or not. Furthermore, the fluidity of data is brought forward as a complicating factor, as it makes data hard to control for a farmer. Once data are collected at a farm and move through the network, they change irreversibly as they are processed, split and connected to other data. As data continually change due to efforts and technologies of tech providers, it becomes increasingly difficult to discern to whom a certain set of data belongs and who should therefore decide about data. Furthermore, data can be copied and this also makes data sharing hard to control. This fluidity and changing nature of data, as well as the lack of uniqueness of data (they can be copied) raised a lot of questions about the limitations of the control that farmers can actually hope to have over data. Parallel, it raises also questions about the limitations of the effective exercise of the farmers' right to decide autonomously about 'their' data.

In relation to fairness, plenty of uncertainties are listed that pertain to the meaning of fairness and what kind of rights it entails for various actors in the data sharing network. Here also, the fluidity and changing nature of data plays a complicating role in the development of clear guidelines regarding who is to be the owner of what, or who is to be entitled to benefit from what. As various actors in the data sharing network use their time, money and expertise to add value to data, there are various candidate 'owners' of data who think they are entitled to benefit. Eventually it becomes quite difficult to nail down who is the owner of data at a particular moment and what the value of data is at that point in time that he is entitled to harvest.

Related to the 'care for the commons' theme, the fluidity and changing nature of data raise less problems, as data are approached as a shared resource that in principle should be accessible to anyone. Nevertheless, this theme also gives rise to questions regarding who should have access to that resource and under what conditions, much in the way in which similar questions are asked about the conditions under which books in a library can be used, or patient data can be re-used for research after having been stored in a biobank. The question how open data should be is frequently being asked, and for whom data should be open. Furthermore, the question is asked whether everyone who provides data to the library should always agree with all of the purposes for which data from the library are being used. Questions such as these lead to the further question about who should be in charge of the library, or of the formation of the policy that states for what purposes data can be used, and why, and what the limitations are for data use. The degree to which the policy of data libraries ought to be inclusive is a common topic for reflection: should governments be in charge? Tech companies? Or farmers? Or should all of them have a role in collaboration?

All of these questions and unclarities provide a starting point for future research, as a lot of the distrust in data sharing continues to circle around these themes. Some focus on possibilities to honor autonomy, privacy and transparency by means of the formation of contracts, others focus on the development of playrules for the collaboration between those who decide to enter the data sharing network, focusing on values such as fairness, care for the commons and inclusiveness. Based on these reflections we want to make some final remarks in the next section about trust in data sharing and the directions we see for further research.

5. CLOSING REFLECTIONS

To foster trust in data sharing, we think a double approach is needed. It is important to look at the conditions that have to be met to make a good contract, as business contracts mark an important beginning to relationships. But contracts will not do all the work to bring about trust. After an individual decided to engage in a business data sharing relationship, he or she becomes part of a network, in which it becomes rather difficult to clearly delineate between the data-‘possessions’ of different individuals, because of the fluidity and transformative nature of the data. After entering the network, it therefore seems more important to look at the data sharing activities as social activities, which should be approach with a social perspective to trust. Trust in such a relationship (even if it is a digital one) does not depend on a single information-based choice to either share data or not; it depends on how the partners in the data sharing network subsequently behave. After having decided to enter the relationship freely and based on information, it is important that this relationship continues to be valuable for those that are part of it; for example, by fostering their wellbeing, in a way that is fair and acceptable to all, and by protecting them against harms. The quality of the relationship needs care and nurturing over time.

Considering trust in data sharing as a social matter, demands to consider the question what makes such relationships valuable. To think about that, it does not help very much if we continue to think about data sharing as a data ‘market’, where individuals come to trade their data with other individuals: data are not like commodities that can be owned and sold and profited from individually. Data sharing is more like a social game in which various players are entitled to certain wins, but can also suffer some losses. The rules of this game should make clear what every player in the game can expect and what everyone’s rights and duties are in the game, in order to make sure that everyone entering the relationship knows what he or she is getting into. Prior to engaging in the game, it may be useful to form contracts. But the information provided to the contractors should not pretend to offer control and ownership of data after they enter the game. The contract should rather make clear that after one’s choice to enter the game, this individual control over data is lost. However, this does not mean anarchy. Transparent information should be provided about the rules of the game and newcomers should be asked to consider whether they find these rules acceptable prior to entering the game. These rules should make clear what goals can be served with data sharing, how benefits are distributed, what harms are prevented, and who is to have access to the data. Types of actions with data should be allowed or restricted in the game, and it should be clarified cheaters are identified and what repercussions will follow. This does more justice to the social nature of data sharing and raises no false expectations in the individuals who enter the relationship.

Next to play rules for businesses who share data, we think there is an important trust-building role to play for data libraries which attracted a lot of interest of our stakeholders. Data libraries serve public goals. As such, data libraries can also play a role in fostering trust in data sharing. They can be open to the public and can be used by everyone who respects the conditions. As trust has an important social-experiential dimension, libraries can organise activities which educate stakeholders in the data sharing network and engage them in interactions with data, as well as reflections about what these data can and cannot do for society. The data libraries that attracted the interest of a lot of our respondents, could be considered as locations where engagement with data is organised and trust is

fostered in a social and experiential way. They are also locations where reflections about the societal goals that data should serve can take shape in an inclusive manner.

In both business contexts and data libraries, the social dimension of sharing should however receive more attention than it has received until now. It should be acknowledged that data sharing is actually *sharing*, not simply transferring something from one individual to the next, or selling something. Even in a market context it makes no sense to speak about data as if they are ‘items’ that are sold and bought and from which individuals from which these data originate benefit. While we do not deny that there are of course market interests in data, the data economy should be understood as a social interaction. Actors who want to benefit from the sharing of data, should therefore spend as much effort to develop the play rules that make the data sharing relationship flourish, as they do to make the technology work.

6. REFERENCES

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