



Digital compliance: Perspectives of key stakeholders

(D3.2.2 & D3.2.3 Analysis of workshops and interviews)

Anne-Charlotte Hoes and Lan Ge

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Developing a digital compliance platform involves both technical and organisational challenges for which research is needed. A major organisational challenge is the choice and design of viable business models and strategies. One of the work packages in the Farm Digital project (WP3) therefore conducts research on this aspect. This report presents the findings from a series of interviews and workshops on business models and strategies for digital compliance with key stakeholders in the value network of FarmDigital.

Key words: stakeholder analysis, digital compliance, platform, SWOT

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P.O. Box 29703, 2502 LS The Hague, The Netherlands, T +31 (0)70 335 83 30,
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Summary

S.1 Key findings

Different actors involved in organising agrifood chain transparency hold different views and expectations of farm data sharing and digital compliance in general and AgriPlace in particular. The findings are summarised into Strength, Weakness, Opportunity, and Threat (SWOT) matrices that enable the analysis of agreements and differences among different stakeholders.

Reducing administrative burden alone provides limited value for farmers as the key users of the compliance platform. More value creation mechanisms should be explored, for example, by developing tools and methods for analysing compliance data and providing benchmarking information for improving farm performance. At the same time, concerns of privacy and data security should be adequately addressed.

As a prototype compliance platform, the business case of Agriplace faces some uncertainties in the current phase of development. Proactive actions are recommended to establish alliance and align with key stakeholders in the value network in seeking collaborative value propositions. In particular, alignments with cooperatives, trade, retail and standards organisations (including compliance scheme owners) on data requirements and with other solution providers on data registration and re-use deserve top priority.

S.2 Methodology

Farmers in international agrifood chains must share information with customers and certification bodies in order to prove compliance to various requirements. Digitalisation of the evidences and automated data exchange through information standards are expected to make the process of providing and sharing compliance information easier and more efficient. The project FarmDigital (www.farmdigital.nl) was set up to develop information standards and a prototype digital compliance platform to support digital compliance.

Developing a digital compliance platform involves both technical and organisational challenges for which research is needed. A major organisational challenge is the choice and design of viable business models and strategies. One of the work packages in the Farm Digital project (WP3) therefore conducts research on this aspect. Besides desk study on business models related to data platforms, an important activity in WP3 is to conduct stakeholder analysis and stakeholder consultation through interviews, meetings, and workshops with the aim to understand their perspectives and derive implications for business models and strategies.

This report presents the findings from a series of interviews and workshops on business models and strategies for digital compliance with key stakeholders in the value network of FarmDigital.

1 Introduction

Farmers in international chains must share information with customers and certification bodies in order to prove compliance to various requirements. The demand for information continues to increase because stakeholders (i.e. the government, certification bodies, banks, clients, the retail sector and consumers) want to have more insight into how safe and sustainable their food is. This demand for food information emerged due to rising environmental and social concerns with regard to food production. Moreover, the length and complexity of modern agrifood chains created a distance between consumers and farmers that makes it infeasible for consumers to address their concerns and questions directly to the growers.

Since for many farmers, in particular in arable farming, most farm data are still paper-based, exchange of food production information is considered burdensome and time consuming. Moreover, farm data that is digitalised is spread over different systems across which automatic data exchange is not yet possible and manual exchange cumbersome. Digitalisation of the evidences and automated data exchange through information standards are expected to make the process of providing and sharing compliance information easier and more efficient. Such developments, however, require concerted actions by a wide range of stakeholders involved in the data sharing processes. This is why the project FarmDigital (www.farmdigital.nl) was set up by a consortium of stakeholders involved. Figure 1 illustrates the information sharing that takes place in the partner network FarmDigital so that consumers can have insight into the safety and sustainability of their food.

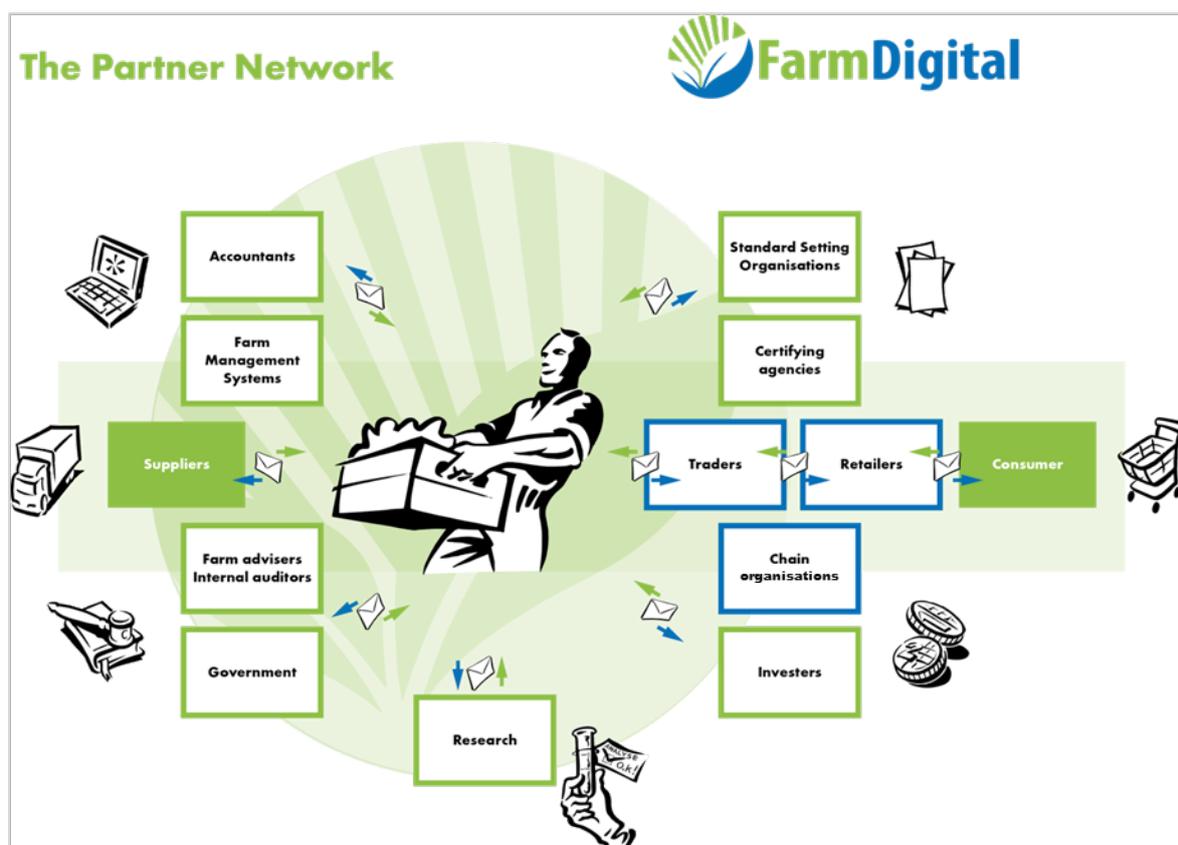


Figure 1 Illustration of the partner network FarmDigital (envelops indicate data exchange)

FarmDigital is an action research programme that supports the agricultural sector in making information sharing throughout the food supply chain easier. Action research, following Stinger

(2013), means that the project not only studies a phenomenon but also engages with the participants with the intent to improve the studied situation. This is done by developing an Open Information Architecture (OIA), building a software prototype named AgriPlace and exploring business models to be able to further invest in simplifying data sharing in the arable sector.

The OIA represents not only a technological perspective to organise digital solution for food transparency, but also implies new business and social arrangements among different stakeholders. The latter aspect poses organisational challenges for which research is needed. A major organisational challenge is the choice and design of viable business models. One of the work packages in the Farm Digital project (WP3) conducts research on this aspect. Besides desk study on business models related to data platforms, WP3 also conducts stakeholder analysis and stakeholder consultations through interviews, meetings, and workshops to obtain insights into the perspectives of different stakeholders.

This report focuses on the perspectives of key stakeholders on the topics of farm data sharing and the prototype AgriPlace (see Figure 2 for further details on AgriPlace). In Chapter 2 we present our research questions and elaborate on the research approach. In Chapter 3 we present our main findings and the conclusions can be found in Chapter 4.

AgriPlace

Safe and secure online data management

Less effort, more structure. A complete platform to efficiently manage all your certifications.

Quick Collection

Collect your farm data using the easy tools AgriPlace provides you with, such as AgriForms (intelligent digital forms that save you a lot of effort).

Easy Management

With AgriPlace you safely manage your data in one central place. You can access and manage your data anywhere using your PC, tablet or phone.

Direct Sharing

With AgriPlace you strengthen the communication with your auditor, buyers and other partners. You can now easily share your information with whomever you want.

Figure 2 Text box with information on AgriPlace cited from website www.AgriPlace.com

2 Research questions and research process

2.1 Research questions

To be able to develop an acceptable and valuable information sharing solution as envisaged by FarmDigital, it is essential to take into account the needs, concerns and prospects of users and other key stakeholders in the wider network. One of the research subjects for FarmDigital is therefore what these needs, concerns and prospects are. To address the research subject, we have formulated the following research questions:

1. Which actors are key stakeholders with regard to sharing farm data and AgriPlace?
2. Who are key drivers for digitalising food production compliance?
3. What is the perspective of the key stakeholders with regard to digitalisation and farm data sharing?
 - What are their views on the digitalisation of agrifood?
 - Which consequences do they see for their organisation?
- a. What are the positive aspects?
- b. Where do they expect challenges and resistance?
- c. What is the perspective of the key stakeholders with regard to the case AgriPlace?
 - What are their views on AgriPlace?
 - What effects do they expect of AgriPlace on their own organisations?
 - What are the opportunities?
 - What are the challenges?
- d.

2.2 Research process

In general, we used a qualitative research approach to address the research questions as this is more suitable for gaining further understanding in the thoughts and opinions of various stakeholders. Answers to the research questions are then analysed to derive implications for the business model of a compliance platform such as AgriPlace.

To answer the first research question, a desk study was carried out and participants of the FarmDigital project were consulted. Following suggestions in stakeholder theory (Freeman, 2010; Mitchell, Agle and Wood, 1997), we focus on identifying stakeholder groups that are directly affected by and can affect other stakeholders of digital compliance. To answer the second, third and fourth research questions, we organised five structured workshops and consulted project partners during 2 project events. In addition to the workshops, 13 individual interviews or consultations were conducted. The list of interview respondents and the interview questions/topics can be found in Appendix 1. The main topics and dates of the workshop and consultations during project meetings were:

- Business model workshop during Business council meetings (26 June 2016)
- Consultation and feedback during future of farm compliance workshop in Veghel (23 October 2015)
- Consultation and feedback on research in progress during business council meetings (25 November 2015)
- Digital compliance and data sharing workshop (30 November 2015)
- Farm Management solution providers (19 January 2016)
- Cooperation's on the future of farm data sharing and AgriPlace (6 April 2016)
- Auditors on their experience with AgriPlace (12 April 2016).

The list of participants of the different meetings and workshops can be found in Appendix 2.

The key findings of the workshops, interviews and desk study are presented in Chapter 3. Based on these findings two SWOT matrices were constructed to provide an overview of the perspective of

various stakeholder groups on farm data sharing in general and AgriPlace in particular. SWOT is an [acronym](#) for *strengths*, *weaknesses*, *opportunities*, and *threats* (see Table 1). The Stanford Research Institute developed the SWOT matrix in the 1960s and even today it is commonly used to improve business strategies (Humphrey, 2013) by identifying the helpful and harmful factors within and outside the organisation.

Table 1 *The SWOT matrix*

	Helpful	Harmful
Internal (or present)	Strengths (S)	Weaknesses (W)
External (or future)	Opportunities (O)	Threats (T)

3 Findings – perspective of stakeholders on data sharing and AgriPlace

3.1 Key stakeholders of FarmDigital

One of the key objectives of FarmDigital is to support compliance processes in agrifood chains by making information flows digital and more efficient. This will inevitably have impact on existing information flows. Changes in information flows can influence a wide range of actors. As shown in Figure 1, various actors and businesses are involved in compliance activities with different stakes and interests. These actors and businesses, creating tangible and intangible values through different exchanges and relationships, form various interwoven value networks of compliance.¹ The exchange of compliance information is an activity that is part of a broad value network as illustrated in Figure 3.

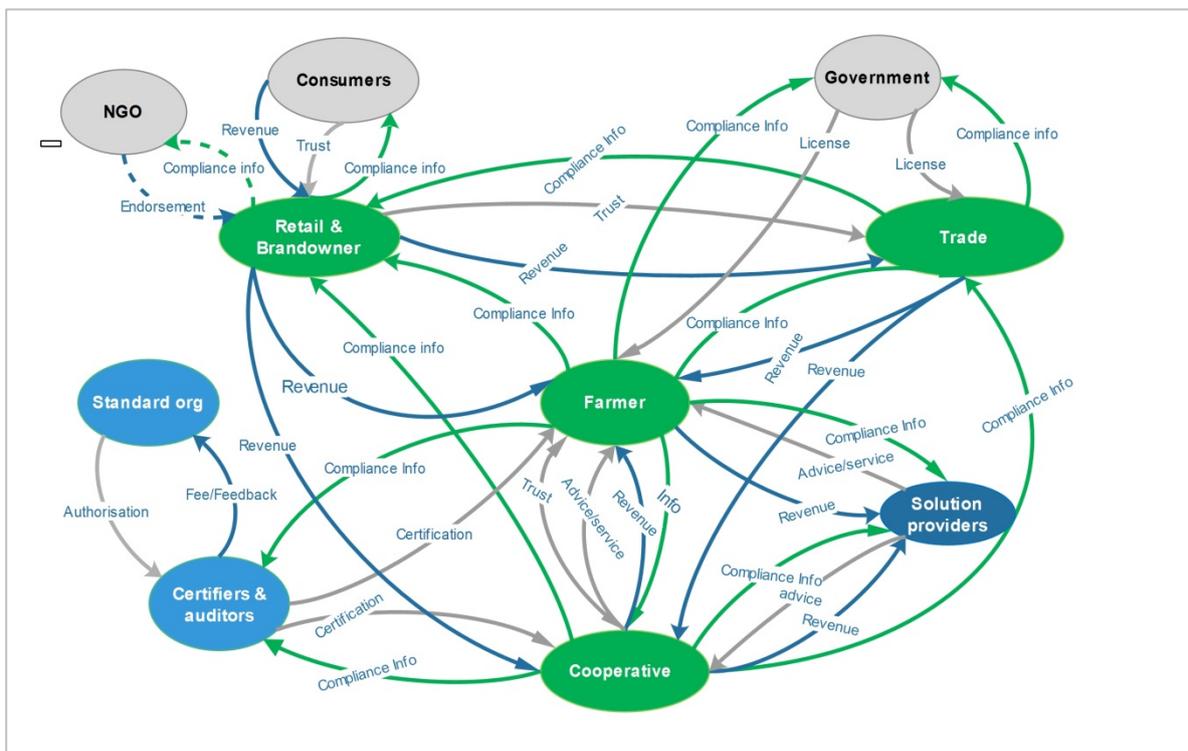


Figure 3 Value networks of the compliance platform

In Figure 3 we use green lines to show the flows of information and blue lines to show the actual and potential flows of values in the value network. We distinguish three key stakeholder groups in the value network of compliance activities. These are:

- the key value chain partners (indicated with the colour green in Figure 3)
- the key compliance and data storage partners (indicated with the colour blue in Figure 3)
- the interested parties (indicated with the colour grey in Figure 3).

¹ More information on the concept of ‘value network’ can be found in Allee (2000): ‘Reconfiguring the value network’. In: *Journal of Business strategy*, 21 (4), 36-39 and Peppard and Rylander (2006): ‘From value chain to value network: Insights for mobile operators’. In: *European Management Journal*, 24 (2), 128-141.

In this study we focus on identifying key value chain partners and the key compliance and data storage partners in the arable and horticultural sector in the Netherlands as they will be directly affected by changes in information flows in the context of FarmDigital and their responses will affect the development of FarmDigital. Through consultation with FarmDigital partners and internet search, the following groups and organisations are found to be the key players:

- Dutch arable and greenhouse farmers: roughly 20,000 arable farmers, 4,400 greenhouse growers, 2,700 arable vegetable growers and 2,350 arable fruit growers. The largest arable-and greenhouse farmers organisations are LTO Nederland and LTO Glaskracht (Dutch Federation of Agriculture and Horticulture, an entrepreneurial and employers' organisation).
- Farmers Cooperatives and sector organisations: The cooperatives are for example Coforta (the owner of the trade company The Greenery), Nedato, Agrico, Agrifirm, Fruitmasters, van Natura, Suiker Unie, AVEBE, CZAV, Aviko, Sensus, Consun, etc. The sector organisation GroentenFruit Huis represents the vegetable and fruit sector and is a collaboration between DPA and FrugiVenta. FrugiCom is an initiative of GroentenFruit Huis.
- Trade: for example: Best Fresh Group, The Greenery, HZPC. The auctions ZON and Veiling Zaltbommel are cooperatives.
- Retail and Brand Owners: for example Unilever, Heineken, Heinz, Jumbo, Ahold, Tesco, Campbells, etc. Centraal Bureau Levensmiddelen handel (CBL) represent the Dutch Retail and food services.
- Solution providers: AgroVision, GreenlinQdata, CROP-R, ISAGRI, Dacom, VAA ICT Consultancy, etc.
- Auditors/certification org: GS1, Skal, Demeter, SGS Control Union, ags, Vinçotte ISACert, MPS ECAS, etc.

This extensive list of organisations shows that a wide network of organisations is involved in organising digital solutions to increase food chain transparency.

3.2 Key drivers of digital compliance

Digital solutions and data-driven innovations are topical issues in agriculture (Esmeijer, Bakker, Ooms, and Kotterink, 2015). In the previous section (§3.1) we highlighted that the key stakeholders for organising digital solution to increase food chain transparency are the value chain partners, compliance and solution providers. In this section we explore which key stakeholder may take the lead in organising digital compliance. We did this by asking interviewees and workshop participants who has the lead in organising digital compliance and by exploring ongoing digital compliance initiatives.

Interviewees and workshop participants stress that Dutch cooperatives, brand owners and retail organisations in combinations with solution providers and IT companies currently have the lead in furthering digital compliance. This is not so strange when taking into account the structure of the agrifood chain (see Figure 4 that shows the distance between farmers and consumers in the Dutch agrifood chain). Although consumers and farmers are the primary problems owners, it is unrealistic to expect that they are able to organise digital compliance considering the limited influence they have within the agrifood chain. Cooperatives and brand owners/retail are able to set sectoral change in motion.

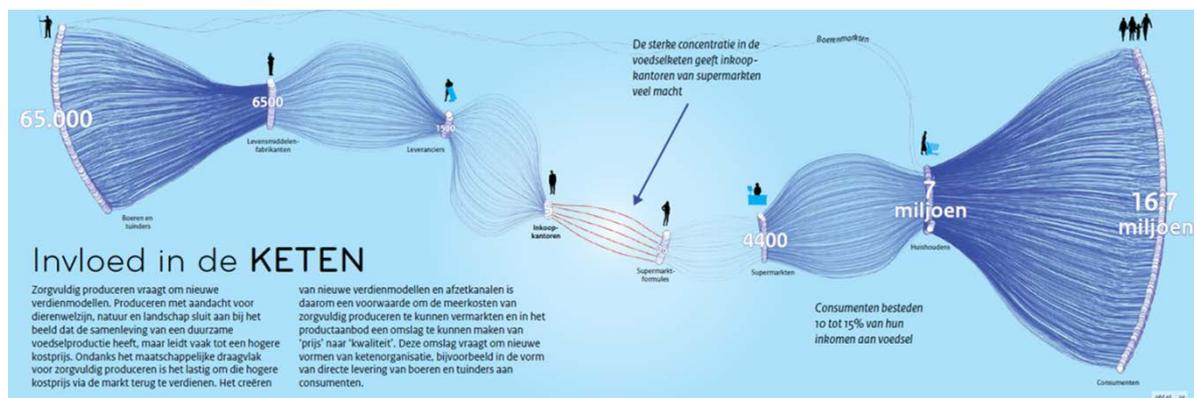


Figure 4 Infographic of influence of Dutch food chain published in 2012 (www.pbl.nl)

There are diverse initiatives working towards digital compliance in the agrifood chain. Two initiatives deserve to be specially mentioned as they illustrate current practices of agrifood digital compliance. These are the quality system in the Dutch dairy sector and the Sustainability Consortium. An interviewee and workshop participant points out that information streams with regard to the quality control of milk are digitalised in the Netherlands. In this initiative, cooperatives take the lead in organising digital compliance. The Sustainability Consortium is a good example of Brand Owners and Retail initiating digital compliance. An interviewee that works as a researcher in the Sustainability Consortium noted that the software company SAP invested millions of euros in developing IT solutions to organise the information streams to be able to assess the environmental life-cycle impact of food products (for more information see www.sustainabilityconsortium.org). Figure 5 provides a matrix with the key drivers for digital compliance and places the initiatives in this context. More information on the sectors strategy to organise digital compliance can be found in deliverable D3.3.1.

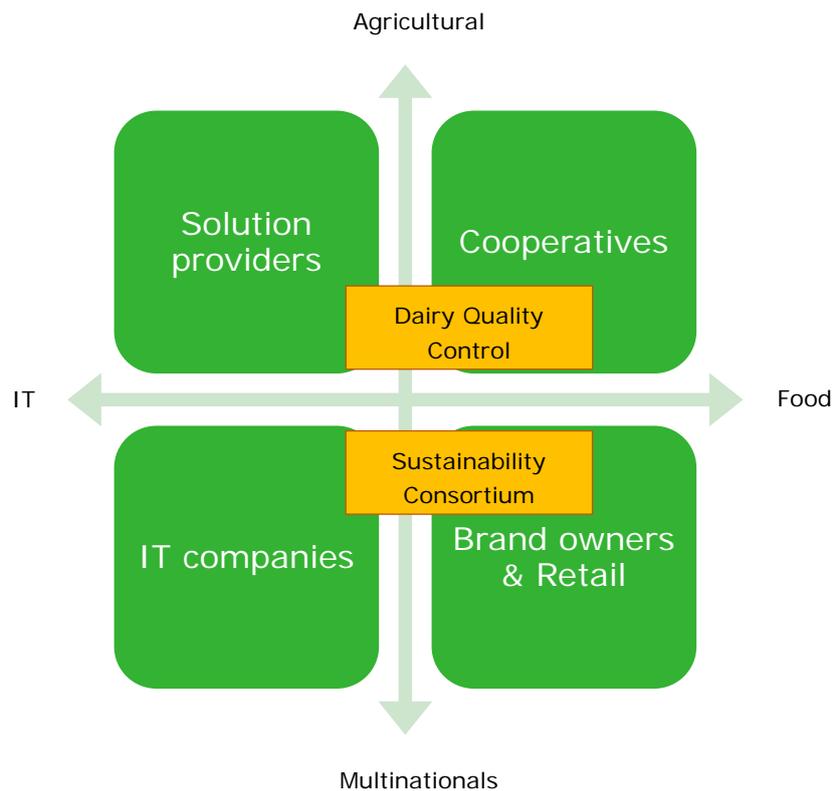


Figure 5 Key drivers for digital compliance

Although these initiatives play an important role in achieving food transparency, interviewees and workshop participants doubt whether these are enough to realise digital compliance. Changes in law and/or a food crisis can also play a vital role in achieving change in practice.

3.3 Perspective of key stakeholders on farm data sharing

3.3.1 Farmers

The arable farmers who were consulted during this study recognise and/or expect an increase in demand for sharing farm data. Some are however not so pleased with this development as it demands time and energy to capture, store, and share farm data. Moreover, the danger of losing their business privacy is mentioned numerous times. Also, at the moment farmers do not experience advantages from sharing farm data as the demanders of farm data offer them limited information, or other revenues for the information, in return.

Moreover, farmers fear that platforms for data sharing will increase the demand for data. And that this might even result in useless data storage and sharing. There is an aversion to such useless data collection as it will cost time and effort for the farmers without any benefit.

With regard to the potential value of data sharing, several farmers that attended the workshop point out that sharing farm data becomes valuable for farmers if it results in personalised advice that enables him to improve his business. In addition to personalised advice, farmers would like to gain information on consumer demands from retail and brand owners. Farmers can use such information to make predictions and adapt their production accordingly. This way they can minimise threats such as overproduction.

To sum up, farmers' views on current and future demand of digital farm data are:

- Current
 - Same farm data requested in many different formats
 - Administrative burden in varying degrees
 - Purpose of data requirement is often unclear
 - Different attitudes towards data collection
 - Majority: basically a necessary evil
 - Minority: useful decision-support tool.
- Future
 - Demand for farm data will continue to increase
 - Multiple use of registered data
 - From 'I have to collect data' to 'I want to collect data'
 - Importance of farm management information systems
 - Interested in the value of data.

3.3.2 Cooperatives

Cooperatives see the growing trend of sharing farm data as inevitable. Their customers and governments demand more food production information to be able to make more informed purchase and policy decisions. Moreover, new information technologies make this feasible.

Most cooperatives that we spoke to have high expectations with regard to the benefits digital solutions for sharing farm data will bring. Several cooperatives struggle with complying with the request by their clients and administration to provide food data (such as farm data). They expect that IT solutions will make compliance simpler and more efficient and improve the quality of data they receive from their members.

Moreover, cooperatives expect that the monitoring and analysis of compiled food data will bring new intelligence to the agrifood sector which will enable farmers and cooperations to improve food production. Also, accurate and detailed farm data can make recalls more precise, thereby reducing food waste (and costs) in case of recalls.

In addition, cooperatives anticipate that IT solutions for ease sharing of farm data will be available in the near future and that investments to realise this are not so high. We also asked the cooperatives who should take the lead in organising and developing such IT solutions. Two cooperatives said that their organisations were in the lead to develop this for their members. Other cooperatives have other priorities but support the development of IT solutions for easy sharing of farm data.

An interview with an independent sustainability consultant tells us that digitalisation of farm data is already commonplace within the dairy sector. The Dutch dairy cooperative FrieslandCampina, with over 13,500 member dairy farms in 2015, primarily organises the communication between the cooperative and the dairy farmers online through the site Melkweb.frieslandcampina.com. The site can only be accessed by members and provides information about the milk the farmer has supplied and as such monitors the revenues of the farmer. In addition the website provides information about their farm, regulations, news, different dairy farm issues, local dairy events, etc. and is interactive as farmers can respond to items, fill in forms, use the market place function and contact the cooperation

with questions and requests. Furthermore, the website is used for the sustainability programme of FrieslandCampina. With the sustainability programme 'Foqus planet', FrieslandCampina stimulates dairy farmers to manage their farms in such a way that they make progress on issues such as grazing, biodiversity and soil condition, animal welfare and reducing dairy's environmental impact. The programme Foqus planet includes financial rewards that farmers can obtain if they, among others, participate in workshops that educate farmers on sustainability issues and if farms make progress on issues such as grazing. Through milk web farmers can manage their personal Foqus planet programme. For example, farmers can gain further information on how they can work on the abovementioned sustainability issues, they can register for events such as workshops and they can fill in data to assess and report on the sustainable performance of their farm. More on developments within the field can be found in the deliverable 3.3.1, which focuses on the sector strategy with regard to sharing farm data.

Although cooperatives of arable farmers see great potential in digitalisation of farm data they also see low digital literacy among their members. The gap between the opportunities that digitalisation of farm data brings and the current digitalisation practice of farmers worries them. In general cooperatives find it desirable that their members (i.e. farmers) digitalise their farm data in order to achieve the abovementioned benefits. Therefore many cooperatives motivate their farmers to use at least a farm management system. Moreover, similar to the farmers, cooperatives also fear an ever increasing demand for data that can result in useless bureaucracy.

Cooperatives note that a weakness of digitalised farm data is that such information streams can be hacked. In addition, digitalised information can more easily get misplaced (e.g. theft of laptop with information). Also slipups can more easily occur such as forwarding farm data without consent. Cooperatives fear that trust issues between cooperatives and farmers can emerge in cases of farm data information leaks.

3.3.3 Retail and Brand Owners

For retail and brand owners, having certificates alone is no longer sufficient. Certification is rather considered a precondition for purchase. Several retail organisations and brand owners indicate that they want to know in detail how safe and sustainable the food is that they can purchase. This way they can decide to buy more desired food products, such as more sustainable product. By offering these preferred products to consumers, retail and brand owners want to acquire more clients and better serve their customers by providing more information on the quality of the products.

One of the interviewees stressed that retail and brand owners want more farm information rather than raw farm data as it will require a lot of expertise and time to interpret these data. They merely want to assess for instance the sustainability of the food products that are available on the market.

3.3.4 Trade

Trade organisations note that compliance data are necessary to meet increasing demand for evidences, traceability and transparency. Trade organisations need to ensure the availability of data for traceability and risk management purposes but they are not interested in having raw farm data per se. Trade is also interested in the possibilities offered by Big Data analytics. For Big Data analytics to work, consensus has to be reached with regard to data requirements and format. Trade prefers a sectoral dialogue to agree upon data requirements and format.

3.3.5 Solution providers

Solution providers show considerable interest in the development of digital compliance. More specifically, they see the following possibilities for their business:

- Use of open standards for data exchange
- Hosting the platform
- Sales of digital solutions to farmers
- Using the data to develop digital products

When discussing possible development scenarios at the workshop in January 2016, the participating solution providers almost unanimously agreed that data standards and platforms should be developed in a bazar-manner where an ecosystem of digital solutions co-exist and connect with each other. The provider of the platform should be a non-profit organisation or consortium.

It should be noted that a potential weakness of the bazar approach is that consensus has to be reached with many partners within the agrifood chain with regard to the standards and that this may considerably slow down the realisation of data sharing for digital compliance (Goes, personal communication). Coordination at the sector level is therefore needed to support collective interest and lower implementation costs. The branch organisations AgroConnect and FrugiCom are playing a key role in organising consensus through established network.

3.3.6 Auditors and standards organisations

The auditors and standards organisations that were consulted anticipate that IT solutions for sharing farm data will be developed in the near future. Auditors anticipate that this will not immediately make audits more efficient because data still need to be verified and assessed and it can be anticipated that more data are collected in a digital rather than paper-based system. Moreover, the audits have a specific procedure that auditors know and for which they developed routines. Changing routines requires investment of time and energy in learning about new best/effective practices and developing new procedures and even many institutional frameworks for auditors. For example, auditors expect that the planning procedure has to change in order to make use of digital evidences.

The consulted auditors and standards organisations do expect that IT solutions for farm data sharing will make audits more effective. Auditors could make risk profiles and screen famers with the available data. This enables auditors to audit high risk groups more frequently and lower the audits of low risk groups.

Standards organisations such as GLOBAL G.A.P., GS1 and SKAL see the potential of digital compliance in improving the efficiency of work flow and increasing the number of certified farmers.

3.3.7 SWOT analysis of farm data sharing and digital compliance

Based on the findings from the interviews, consultations and workshops, we have constructed a SWOT matrix for farm data sharing and digital compliance that summarizes the perspectives of different stakeholders. The matrix is shown in Table 2.

Table 2 The SWOT view of digital compliance by key stakeholders

Stakeholder	Strength	Weakness	Opportunity	Threat
Farmers	<ul style="list-style-type: none"> • Compliance made easy due to digitalisation and re-use of data • Better insight into compliance requirements and farm performance 	<ul style="list-style-type: none"> • Limited feedback to farmers • May increase (useless) data collection 	<ul style="list-style-type: none"> • Support farm management decisions • Gain insight into consumer preferences and feedback • Access to (new) markets 	<ul style="list-style-type: none"> • Ever-increasing demand for data and rising requirements • Data security • Privacy concerns
Cooperatives	<ul style="list-style-type: none"> • Compliance made easy due to digitalisation and re-use of data • Efficiency in gathering farm data and providing compliance information to customers 	<ul style="list-style-type: none"> • Limited feedback from other value chain partners • Data overload instead of relevant info 	<ul style="list-style-type: none"> • Enhance database to provide better support, marketing, personalised advice to farmers • Push/pull for farmers to digitalise farm data • Enhance trust from members 	<ul style="list-style-type: none"> • Trust issues • (if data are hacked, misplaced or forwarded without consent) • Resistance from members due to limited level of digital literacy
Retail and brand owners	<ul style="list-style-type: none"> • Efficiency in accessing detailed information due to digitalisation and improved interoperability • Improved traceability 	<ul style="list-style-type: none"> • Limited interoperability between different sources of data 	<ul style="list-style-type: none"> • Improving supply chain intelligence • Providing customers with more and better information • More specific call backs during food safety crisis 	<ul style="list-style-type: none"> • no threat perceived
Trade	<ul style="list-style-type: none"> • Improved traceability and risk management • Better sustainability reporting 	<ul style="list-style-type: none"> • Limited interoperability between different sources of data 	<ul style="list-style-type: none"> • Obtaining more supplier analytics • Easier to supply specific product demands to buyers 	<ul style="list-style-type: none"> • Increase complexity of trade due to bureaucracy • Losing suppliers due to resistance to digital compliance • Data overload
Solution providers	<ul style="list-style-type: none"> • Greater market potential for IT solutions 	<ul style="list-style-type: none"> • Limited market 	<ul style="list-style-type: none"> • New IT-services • International markets • Cross-domain knowledge and experience 	<ul style="list-style-type: none"> • Increased competition
Auditors and standards organisation	<ul style="list-style-type: none"> • More digitalised and structured evidence available 	<ul style="list-style-type: none"> • Complications for planning and changes to routines • Data still need to be verified • Transition period in which both paper and digital data are available costs more work 	<ul style="list-style-type: none"> • Develop risk-based audit • More in-depth audit on specific items • Better prepared /easier for unannounced audits 	<ul style="list-style-type: none"> • Importance of audit undermined • New competencies needed for 'digital audit'

Table 2 shows that most stakeholders see great opportunities in creating value from digital compliance in the long run due to its strength in digitalisation and re-use of compliance data. Much of the weakness is of a short-term nature that reflects the phase of the technological development. Privacy concerns and aversion to excessive collection could create resistance to the development and should be carefully addressed.

3.4 Perspective of key stakeholders on AgriPlace

3.4.1 Farmers

There is a high diversity in responses among farmers with regard to AgriPlace. Some welcome initiatives such as AgriPlace (for example, the organic farm ERF, Geerse VOF) as they expect providing compliance information will become easier and more efficient. Some are more sceptical about the added value of a compliance platform as they already have an advanced farm management system (for example, Lobros), others are yet to be informed of the possibilities and motivated to participate in digitalisation initiatives.

As AgriPlace has been active in the market, some farmers have already had first-hand experience with AgriPlace prior to the start of the FarmDigital project. Many farmers have heard of AgriPlace. Some farmers we consulted had no experience with AgriPlace. One farmer who attended the workshop said that AgriPlace had no value for him as he had an extensive farm management system in which he organised his compliance data well.

3.4.2 Cooperatives

Several cooperatives such as Agrico and Nedato support AgriPlace and encourage their members (farmers) to purchase AgriPlace or have purchased AgriPlace for their members. An employee of AgriPlace shared that these cooperatives expect that their members will organise their certification better due to the software of AgriPlace. Moreover, it can be anticipated that farmers will be inclined to acquire additional certificates if compliance is made easier through AgriPlace. If farmers have more certificates the market share expands. This way cooperatives can sell the products faster and for better prices.

The cooperatives that we consulted during interviews and the workshops are rather sceptical towards AgriPlace. The workshop attendees questioned the value of AgriPlace. They argued that good farm management systems could offer the same service as AgriPlace. Moreover, one cooperative noted that they did not trust a third party with the data of their farmers. Also, an important reason why many cooperatives are critical towards AgriPlace is because of the seed money that AgriPlace obtained. This lowered their trust towards AgriPlace and thereby their willingness to participate with AgriPlace.

Cooperatives (and also auditors) did see the added value of AgriPlace for organisations such as HZPC. Apparently HZPC organised its Global GAP certificate collectively, thereby having the responsibility to organise the internal audit. AgriPlace can assist them in easing this procedure. In addition, internationally there are probably also partners (for example producers' groups in Costa Rica and South Africa) who are potential clients for AgriPlace.

3.4.3 Retail and Brand Owners

Retail and brand owners welcome initiatives such as AgriPlace as this will make it possible to have access to more farm data than certificates alone. This makes it possible for them to provide more information to consumers. Retail companies Jumbo and Albert Heijn are both partners of FarmDigital and contribute to the development of AgriPlace.

3.4.4 Trade

In general, trade companies appreciate and support AgriPlace in providing the digital solution for compliance. Many trade companies have been working together with AgriPlace in testing the prototype.

3.4.5 Solution providers

There are diverging views on AgriPlace among solution providers. Some perceived AgriPlace as a new entrant in their business that aims to compete with their own business (e.g., AgroVision, CROP-R).

Others see in AgriPlace a potential partner that provides complementary service to their own (e.g., AgroConnect). In the course of the project, stances may change. For example, at the start of the project (June 2015), GreenLinQdata and AgriPlace often found each other as competitors in user-acquisition sessions with farmers or farmers' organisations. A year later, GreenLinQData has become a strategic partner of AgriPlace. They team up in offering digital solutions for farm management that can also serve compliance purposes.

3.4.6 Auditors and standards organisations

Auditors have been envisaged as a key impact channel of AgriPlace. For most auditors, concerns have to do with the practical constraints such as scheduling and norm hours specified by scheme owners (standards organisations). Some concerns were also raised about the undermining effect digital compliance may have on the importance of field audit.

In the short run, it is expected that scheduling for audits may become more complex, which means currently it is not easy to incorporate the inspection of digital evidence into regular planning due to, for example, not knowing when data will be available/uploaded. Furthermore, the following observations are made:

- In the short run, no significant impact expected on audit (in terms of time needed, costs, and audit procedures)
- In the long run, more digital information will become available for audit (but the verification process remains)
- Standards organisations ('scheme-owners') may initiate changes for auditing as more data are available
 - More items for audit
 - More targeted audit
 - More unannounced audits
- AgriPlace offers a structure to organise evidences/documents relevant for audit—could help growers who had not been organised
- AgriPlace helps to re-use evidence-documents for different standards
- AgriPlace contributes to the creation of digital databases which can be used for further analysis
- Keep the promises: AgriPlace may have made promises that are difficult to meet ('less time', 'easy certification', 're-use of data')
- Link to existing systems: AgriPlace should be linked to farm management systems
- Take into account the scheduling of audits: Ensure availability of data for prior-inspection
- On auditing
 - Growers may have unrealistic expectation that time for audits can be shortened and therefore the costs for audit can be reduced
 - The importance of field audit may be undermined (audit is more than checking data--not everything can be 'datafied')
- On growers
 - Growers may have unrealistic expectation that time for audits can be shortened and therefore the costs for audit can be reduced
 - Since 'irrelevant' questions are filtered out by the digital format of AgriPlace, farmers may fail to understand the rationale underlying the questions → this potentially lowers the learning effect of self-assessment by the grower

Standards organisations and/or compliance scheme owners are in a pivotal position in compliance processes due to their influence on both the data required and the way data should be verified.

3.4.7 SWOT analysis of AgriPlace

Based on the findings from the interviews, consultations and workshops on AgriPlace, we have similarly constructed a SWOT matrix for AgriPlace as shown in Table 3.

Table 3 The SWOT view of AgriPlace by key stakeholders

Stakeholder	Strength	Weakness	Opportunity	Threat
Farmers	<ul style="list-style-type: none"> • Digitalisation of evidences • Compliance process made clear • Re-use of stored data 	<ul style="list-style-type: none"> • Not including all types of compliance/certificates • Limited added value in comparison to FMS • Costs 	<ul style="list-style-type: none"> • Access to new market • Obtaining insight into farm performance 	<ul style="list-style-type: none"> • Privacy • Switch costs (lock-in) • Initiatives like AgriPlace may increase the demand for even more data! (the more data are available, the more questions arise, the more evidences are needed)
Cooperatives	<ul style="list-style-type: none"> • Service to ease compliance and information management 	<ul style="list-style-type: none"> • Small market in Netherlands • Risk as third party stores data • Costs • Limited added value perceived from other providers • root cause of limited digitalisation of management system is not tackled 	<ul style="list-style-type: none"> • Push/pull for farmers to certify • A way to introduce late adopters with digital compliance 	<ul style="list-style-type: none"> • Lock-in • Switch costs • Management Systems as alternative with more added value
Retail/Brand owners	<ul style="list-style-type: none"> • Service to ease compliance and information management 	<ul style="list-style-type: none"> • still limited user base • Limited check on data consistency and integrity 	<ul style="list-style-type: none"> • Detailed and digitalised evidences available 	<ul style="list-style-type: none"> • no threat expected
Trade	<ul style="list-style-type: none"> • Service to ease compliance and information management 	<ul style="list-style-type: none"> • still limited user base • Limited check on data consistency and integrity 	<ul style="list-style-type: none"> • Improved quality assurance/markets thanks to more information and data analytics 	<ul style="list-style-type: none"> • no threat expected
Solution providers	<ul style="list-style-type: none"> • Understanding of compliance processes 	<ul style="list-style-type: none"> • functional capabilities still in development • limited customer/user base 	<ul style="list-style-type: none"> • Strategic alliance • Greater market 	<ul style="list-style-type: none"> • Competition
Auditors and standards organisations	<ul style="list-style-type: none"> • Improving quality of evidences • Facilitating auditing processes 	<ul style="list-style-type: none"> • Data still need to be verified • Complications for planning and changes to routines 	<ul style="list-style-type: none"> • More in-depth audit on specific items 	<ul style="list-style-type: none"> • Importance of audit undermined • Negative publicity due to unkept promises in making compliance easy

Despite different perspectives on AgriPlace as shown in Table 3, some agreements can be found and are shown in Table 4. Competition with incumbent solution providers can be a threat to the future development of AgriPlace. To carve out its unique positions in the marketplace, it is important for AgriPlace to address these issues and routinely update their status. Furthermore, as noted in the literature on platform business, marketing needs to be baked into the platform (Parker and Van Alstyne, 2011) to increase the user base.

Table 4 The SWOT matrix for AgriPlace

Strengths (S)	Weaknesses (W)
<ul style="list-style-type: none">• Addressing a topical issue by key stakeholders• Supported by cooperatives, trade, retail and standards organisations	<ul style="list-style-type: none">• Limited functional capabilities• Limited user base
Opportunities (O)	Threats (T)
<ul style="list-style-type: none">• Developing value-adding services based on knowledge and expertise on compliance processes and compliance data• Capitalizing on network effects and alliance with value chain partners	<ul style="list-style-type: none">• Competition with incumbent solution providers• Delay in software development• Short-term finance

3.5 Discussion on stakeholder perspectives

The stakeholders that we consulted during interviews, meetings, and workshops share the view that digital solutions for organising agrifood chain transparency and digital compliance will take place in the (near) future. Stakeholders have however different expectations with regard to who will organise these digital solutions and different perspectives with who should organise this. Several stakeholders express the view that it is desirable to collectively develop the digital solution, sharing the investment costs and being able to take into account the needs and interest of the different stakeholders. However, these stakeholders also note that such a collective approach is probably unrealistic due to the current network of the arable and greenhouse agrifood chain that is characterised by as a widely distributed, loosely linked, non-hierarchical, international network with a large proportion of specialised small and medium-sized enterprises (Hoes, 2011).

Digital solutions for organising agrifood chain transparency can be successful if farmers use the developed software. Our study suggests that there is high diversity in responses among farmers with regard to data sharing through digital platforms. Farmers may fear losing privacy and some farmers currently see limited value in storing and sharing their farm data digitally. A logical explanation for this diversity is that there are diverse profiles of farmers and farmers' organisations in terms of farm size, entrepreneurship, and technology-savviness. While large farms may be well-acquainted with professional farm management software and other digital solutions, many smaller farmers or cooperatives are still quite unfamiliar with or reluctant to use IT. To organise on-boarding it is important to distinguish farmers with different profiles and provide targeted services. Further research, such as a user survey, is needed to assess in more detail the diversity of farmers and their opinion concerning the value of FarmDigital and AgriPlace.

Several farmers and cooperatives note that digitalising farm data could not only be used to organise food transparency but also to provide tailor-made advice to farmers and cooperatives (through for example big data analytics and benchmarking). Currently the Dutch dairy sector is organising the information flows, intelligence and expertise for this. Learning from the success of this case, stakeholders of FarmDigital should investigate ways to organise information feedback loops, thereby making digitalising of farm data valuable for all stakeholders involved. The experiences within the Dutch dairy sector can be used to gain insight in how to organise this for the horticultural and arable sector. An employee of a cooperation that participated in our workshop did mention that the feedback loops in the dairy sector are much quicker (milk is collected daily) and useful (e.g. insight into health cow with cell count) then in the horticultural or arable field.

Most interviewees and workshop participants were critical with regard to the added value of the pilot AgriPlace. Some argued that well-functioning farm management systems could probably offer the same service as AgriPlace. One workshop participant said that the video clip of AgriPlace raises high

expectations with regard to what AgriPlace offers. The participant expects that farmers will not extend their subscription if the high expectations are not met. Others stated that the market for AgriPlace is limited as most farmers only have one or two certificates making the added value of AgriPlace marginal. Others noted that AgriPlace might make it easier for farmers to acquire certificates, thereby resulting in an increase of certificates and also the usefulness of AgriPlace. This indicates that there are still considerable uncertainties about the business case of AgriPlace that should be addressed in further strategic development. Furthermore, it is well-known in the literature that the automation of work processes often encounters resistance of employees due to unease with changes in routines and fears of potential job loss (Hoos, 2000; Joshi, 2005). Great attention should therefore be paid to the concerns of auditors.

4 Conclusions and recommendations

This study shows that a wide network of actors is involved in organising digital solutions for compliance in agrifood. Their perspectives on digital compliance in general and the prototype compliance platform AgriPlace differ considerably from each other. The SWOT matrices constructed in this study provide insights into the differences and potential agreements. It is anticipated that larger organisations within the agrifood chain, such as cooperatives and (international) retail and brand organisations will take the lead in furthering digital compliance as they have the influence and resources to initiate a sector transformation like this. Moreover, these incumbents (cooperatives, retail, and brand owners) feel pressured by NGOs, consumers and governments to organise food transparency and to stimulate sustainable food production.

As one of the 'complying' parties in digital compliance, farmers show less enthusiasm in digitalising and sharing data than cooperatives and other parties in the network. Farmers do recognise that digitalisation is the future and proving compliance is important. This, however, does not imply that farmers are eager to use digital solutions for compliance purposes. When the choice is left to the farmers, short-term tangible benefits are needed to get farmers on board. This could be for example reduced fees and feedback on farm performances.

Towards the future implementation of FarmDigital and development of Agriplace, we may conclude that reducing administrative burden may provide limited value for farmers, even though it is recognised that an effective and simple administration system helps minimise the costs of capturing, storing and exchanging farm data. More value creation mechanisms should therefore be explored. A well-known mechanism is for example developing tools and methods for analysing compliance data and providing benchmarking information for improving farm performance. At the same time, concerns of privacy and data security should be adequately addressed.

At the moment of writing this report (September 2016), there is still a considerable level of uncertainty with regard to the business case of AgriPlace. Part of the uncertainty is inherent to innovative solutions that have yet to overcome teething problems. More importantly, the uncertainty has to do with the unpredictability of responses by other stakeholders in the network. Proactive actions are recommended to establish alliance and align with key stakeholders in the value network in seeking collaborative value propositions. In particular, alignments with cooperatives, trade, retail and standards organisations (scheme-owners) on data requirements and with other solution providers on data registration and re-use deserve top priority.

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Interviews

Appendix 1

I.1 Interviewees

Adrie Omzigt, Agrico
Dick Koorn, projecten LTO-noord
Jacco Vooijs, Fruitmasters
Klaas Jan van Calker, Sustainability 4 U
Laurens Meijer, Jumbo Supermarkten
Niels Maris, Agrifirm
Peter Verbaas, FrugiVenta
Pieter Brooijmans, SuikerUnie
Roy Michielsen, ERF
Vera Holst, Skal Biocontrole

I.2 Consultation and secondary analysis of interviews

Jan-Kees Vis, Unilever
Koen Boone, Wageningen UR
Quirijn van der Goes, Centric

I.3 Interview questions Farm Digital

1. Wat is de huidige situatie m.b.t. aanvragen, gebruik/analyse en delen van voedselproductie data?
Aan welke actoren vraagt uw organisatie voedselproductie informatie/data?
Wat voor informatie/data vraagt u?
Levert uw organisatie voedselproductie informatie/data aan derde?
Analyseert/gebruikt uw organisatie voedselproductie data? Zo ja, waarom?
 - a. Wat voor IT oplossingen/programma's gebruikt uw organisatie?
 - b.
2. Wat voor problemen loopt uw organisatie tegenaan m.b.t. data
 - d. Verzameling data/info?
 - e. Delen data/info?
 - f. Analyseren data/info?
3. Welke kansen laat uw organisatie liggen m.b.t. analyseren voedselproductie informatie/data?
 - a.
 - b.
 - c.
4. Welke trends ziet u op het gebied van voedselproductie informatie/data?
 - a. In welke ontwikkelingen investeert uw organisatie?
Welke andere actoren/organisaties houden zich bezig met het verzamelen/analyseren van voedselproductie informatie/data?
 - b. Welke nieuwe spelers houden zich bezig met het verzamelen/analyseren van voedselproductie informatie/data?
 - c. Welke nieuwe oplossingen/programma's worden ontwikkeld?
 - d.
5. Wat voor een impacts hebben deze trends (mogelijk) op uw organisatie?
 - a. Welke nieuwe kansen bieden deze trends?
 - b. Welke risico's bieden deze trends?
6. Welke impact hebben deze trends (mogelijk) op boeren?
 - a. Welke nieuwe kansen bieden deze trends?
 - b. Welke nieuwe kansen bieden deze trends?
7. Waarom is de workshop van 6 april interessant voor u? Wat hoopt u mee naar huis te nemen?

Meetings and Workshops

Appendix 2

Participants of workshop on future of farm compliance workshop, 23 October 2015

Albert Wielink, The Greenery
Erwin Blozijl, OTC Holland
Gerard Pronk, Pront fruit
Ineke Burki, The Greenery
Laurens Meijer, Jumbo Supermarkten
Maarten Jooren, Levarht
Marissa van der Veen, OTC Holland
Martin Topper, Zonneheerdt
Roy Michielsen, ERF
Thijs Geerse, Geerse VOF
Werner Louwerse, Lobros
Wim van der Ree, Nedato

Participants of workshop on digital compliance and data sharing, 30 November 2015

Albert Wielink, The Greenery
Conny Graumans, AgroConnect
Jan Salvador van Ven, CROP-R
Martijn van Es, AgriPlace
Peter Laan, GreenlinQ
Werner Louwerse, Lobros

Participants of workshop on Farm Management solution providers, 19 January 2016

Harij Schmeitz, Fresh Informationmanagement Centre
Lesley Schell, Vinçotte ISACert
Loek Boortman, GS1
Nico Broersen, People4Earth
Peter Laan, GreenlinQ
Roy Michielsen, ERF

Participants of workshop on Cooperations on the future of farm data sharing, 6 April 2016

Dick Koorn, projecten LTO-noord
Jacco Vooijs, Fruitmasters
Niels Maris, Agrifirm
Vera Holst, Skal Biocontrole

Participants of workshop on AgriPlace and Auditors on their experience with AgriPlace, 12 April 2016

Heleen Hogendoorn, Vinçotte ISACert
Inge Kreupeling, SGS
Leen van Driel, MPS ECAS
Lesley Schell, Vinçotte ISACert
Piet van Splunter, Vinçotte ISACert
Wietze Middag, Control Union

Wageningen Economic Research
P.O. Box 29703
2502 LS The Hague
The Netherlands
T +31 (0)70 335 83 30
E communications.ssg@wur.nl
www.wur.eu/economic-research

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REPORT
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Wageningen Economic Research
P.O. Box 29703
2502 LS Den Haag
The Netherlands
E communications.ssg@wur.nl
www.wur.eu/economic-research

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