The Food Safety Market: An SME-powered industrial data platform to boost the competitiveness of European food certification

D6.2 - Annual Report from Pilots

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ACRONYMS LIST

DMHP	Data Management Handling Plan
EU	European Union
FAIR	Findable, Accessible, Interoperate and Reusable
SUS	System Usability Scale
TheFSM	The Food Safety Market

EXECUTIVE SUMMARY

The goal of "The Food Safety Market" project (TheFSM) is to deliver an open industrial virtual data platform that will facilitate the exchange and connection of data between different food safety actors who are interested in sharing information critical to certification. Extensive piloting will ensure thorough testing of the FSM's applications and services. Central to this are these applications: FOODAKAI 2.0, AGRIVI 2.0 and FOODINSPECTOR. All three have to be piloted and tested extensively before full-scale deployment. Whereas deliverable 6.1 contains a description of a general pilot plan, this deliverable contains the three separate pilot plans – each tailor-made for one of the applications. These pilot plans plus their appendixes will be listed in this document in the following order: FOODAKAI, AGRIVI, FOODINSPECTOR. Although these three documents are partially overlapping, they also contain application specific pilot information.

The primary purpose of a pilot is to demonstrate that the design and products work in the production environment as the designers expected and meet the business requirements. Furthermore, it reduces the risk of encountering problems during the full-scale deployment.

Conducting a pilot consists of the following different activities:

I. Creation of a pilot plan
II. Preparation of the pilot
III. Deployment and test the pilot
IV. Evaluation of the pilot results
V. Adaptations to the products tested in the pilot
VI. Testing the new revised product
VII. Finalization of the product.

The three pilot plans in this deliverable define the scope and objectives of each pilot, identify pilot participants, where the pilot will be conducted and the duration. It includes a schedule for deploying and conducting the pilot and plans for training and communicating with pilot participants, evaluating the pilot, identifying risks and contingencies, and other key activities that occur during a pilot deployment. Seven separate documents are included in each of the three pilot plans that will go into these important topics. Overall, the three pilot plans, each specifically designed for one of the three applications, describe the entire piloting process. All three documents will be updated several times over the course of this project.

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1. INTRODUCTION

Recently, "The Food Safety Market" project (TheFSM) was granted in the EU H2020 programme (Grant Agreement number: 871703). This project aims to deliver an open industrial virtual data platform that will facilitate the exchange and connection of data between different food safety actors who are interested in sharing information critical to certification. To this end, extensive piloting is foreseen to test the applications and services developed by the project partners and these will be supported and channeled through the infrastructure of FOODAKAI 2.0, AGRIVI 2.0 and FOODINSPECTOR. The primary purpose of a pilot is to demonstrate that the design and products work in the production environment as the designers expected and meet the business requirements. Furthermore, it reduces the risk of encountering problems during the full-scale deployment.

Pilots are foreseen in many countries during the project duration (i.e. Greece, Netherlands, Italy, Romania, Austria, Croatia, Poland, Hungary, Cyprus, Egypt, Jordan) and to ensure optimal pilot execution and product development, a guidance for the participants is essential.

In the chapters below, detailed pilot plans are presented for the three applications, namely:

- FOODAKAI 2.0
- AGRIVI 2.0
- FOODINSPECTOR

Each pilot plan goes through four steps: i) the description of the pilot plan, ii) preparing for the pilot, iii) deploying and testing the pilot and iv) the evaluation of the pilot. Included within those four steps are seven documents detailing pilot training, support, communication, evaluation, risk and contingency planning, backup and recovery and the pilot schedule. Overall, the three pilot plans, each specifically designed for one of the three applications, describe the entire piloting process. As they are based on the same general pilot plan, the three plans partially overlap in their content. All three documents will be updated several times over the course of this project.

2. FOODAKAI

2.1. Introduction

Recently, "The Food Safety Market" project (TheFSM) was granted in the EU H2020 programme (Grant Agreement number: 871703). This project aims to deliver an open industrial virtual data platform that will facilitate the exchange and connection of data between different food safety actors who are interested in sharing information critical to certification. To this end, extensive piloting is foreseen to test the applications and services developed by the project partners and these will be supported and channeled through the infrastructure of FOODAKAI 2.0. The primary purpose of a pilot is to demonstrate that the design and products work in the production environment as the designers expected and meet the business requirements. Furthermore, it reduces the risk of encountering problems during the full-scale deployment.

Pilots are foreseen in many countries during the project duration (i.e. Greece, Netherlands, Italy, Romania, Cyprus, Egypt, Jordan) and to ensure optimal pilot execution and product development, a guidance for the participants is essential.

2.2. Overview of Designing a Pilot Project

A pilot is the last and major step to the deployment of services that can be offered to clients and therefore the set-up and design of the pilots is essential to make sure it delivers the information needed for the project to optimise the products being deployed. Within a pilot the product and services are tested in a controlled environment in which the users perform their normal business tasks using the new features. This demonstrates that the design works in the production environment as expected, that users can utilize the system effectively and that it meets TheFSM business requirements.

A pilot consists of the following different activities i) creation of a pilot plan, ii) preparation of the pilot, iii) deployment and test the pilot, iv) evaluation of the pilot results, v) adaptations to the products tested in the pilot, vi) testing the new revised product, vii) finalization of the product. These steps are shown in the flow diagram below.

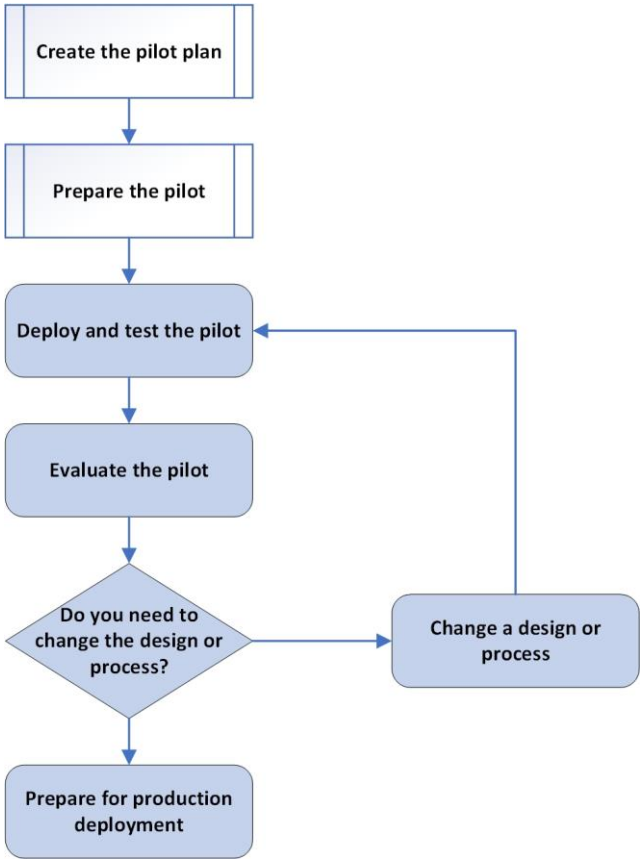

Figure 1: The Various Steps in a Pilot for FOODAKAI 2.0

2.3. STEP 1: Pilot Plan

The first step in any pilot is to design a pilot plan. The pilot plan defines the scope and objectives of the pilot, identifies pilot participants, where the pilot will be conducted and the duration. It includes a schedule for deploying and conducting the pilot and plans for training and communicating with pilot participants, evaluating the pilot, identifying risks and contingencies, and other key activities that occur during a pilot deployment. The expected contributions and responsibilities of the pilot participants, including confidentiality and ownership should be made clear in a simple legal agreement.

In TheFSM project, we will conduct pilots for FOODAKAI 2.0. The pilots will be implemented in all countries where we have partners (i.e. Greece, Netherlands, Italy, Romania, Cyprus, Egypt, Jordan) during the project period. For each pilot a dedicated pilot plan and materials are needed and will be based on the specificity of the case and products being tested.

Based on the results and needs, it could be that the same case and products are being tested in different countries. All FOODAKAI 2.0 pilot plans will be based on this guidance document

describing all elements needed to be considered, but not necessarily all features need to be included in each pilot. This will depend on the needs and requirements of each specific pilot.

2.3.1. STEP 1A: Pilot Scope and Objectives

The first step in planning a pilot is to define the objectives and the scope of the pilot.

Pilot Objectives

The goals of TheFSM project are:

1. Food safety data interoperability and semantics: TheFSM will incorporate advanced semantic technologies that can enable highly sophisticated data interoperability and integration capabilities.
2. Multilinguality support for localized food safety applications: TheFSM will offer advanced multilinguality for both textual information and data ontologies, based on the expertise and technology stack of the partners.
3. Automated and smart contracts for food safety data transactions: TheFSM will offer a multi-sided data brokerage service, where actors like farmers can act as "traders" of their data, that can be used for purposes of certification, product risk assessment and verification.
4. Real-time processing and big data storage & visualization: TheFSM will incorporate big data indexing, processing and visualization capabilities to support real-time data processing and food risk model execution.

To achieve these goals, the FOODAKAI 2.0 pilots aims are:

- Ensure that the system works properly in the business environment.
- Ensure the pilots are carried out according to plan in an organized and constructive fashion.
- Ensure that FOODAKAI 2.0 meets the business and functional requirements.
- Test the deployment process.
- Gather information for estimating future support requirements.
- Gather information for estimating actual hardware requirements.
- Develop and test end-user training materials.
- Train the installation, support and help desk teams.
- Build user support for the TheFSM deployment project.
- Market TheFSM system to potential users.

Pilot Scope

The scope of the pilots will depend on the business and functional requirements that FOODAKAI 2.0 has to meet, and a clear description by FOODAKAI which services and features will be included

and which will not. FOODAKAI will also describe the areas of functionality that the pilot implementation affects, and note to what extent they are affected, and in which situations they are affected. Other elements to consider are the following:

1. Be sure to address international language issues in the pilot.
2. Do not expect to test every feature or service during the pilot. Focus on the most important business and functional requirements, processes that present the greatest risk, and events that are most likely to occur.
3. Prioritizing the features to be tested in the pilot is particularly important if the team plans to conduct multiple pilots.
4. If certain aspects of your design cannot be covered by the pilot, describe them.
5. Also specify the duration of the pilot, in terms of either time or of the criteria to be met.
6. Be sure to describe how you expect to proceed after the pilot is complete. If you plan to keep some functions in place and remove others for the full production rollout, identify the features that will be removed.

2.3.2. STEP 1B: Pilot Group and Pilot Sites

For a pilot, good candidates have some of the following characteristics:

- Are able to derive tangible benefit from the tested TheFSM application.
- Play a noncritical role in day-to-day operations.
- Most pilot participants should have the same technical expertise as the average user in your organization.
- Are enthusiastic about the TheFSM project.
- Are comfortable with technology.

The candidates were selected after having several meetings with partners that indicated an interest in the TheFSM technology. The selection of a pilot site or sites often depends on the type and location of the pilot participants who have been selected and the number of support staff available to help them. The number of pilot sites and the size of the pilot users group were defined based on: i) the objectives of the pilot, ii) the countries where we have partners and support staff, iii) specific technology requirements that can be piloted only by using particular sites or user groups. The table below shows the specific information related to FOODAKAI 2.0 with regards to the pilot group.

Table 1: Pilot Groups and Pilot Sites FOODAKAI 2.0

Pilot	Country	TheFSM Resp	Group

P1	Greece	TÜV AU HELLAS	Actors in the food supply chain
P2	Netherlands	WFSR	Actors in the food supply chain
P3	Italy	Valoritalia	Wine producers(all chain)
P4	Romania	TÜV AU Romania	Food processors
P8	Cyprus	TÜV AU HELLAS - TÜV AU CYPRUS	Actors in the food supply chain
P9	Egypt	TÜV AU HELLAS – TÜV AU EGYPT	Actors in the food supply chain
P10	Jordan	TÜV AU HELLAS – TÜV AU JORDAN	All actors in food supply chain

2.3.3. STEP 1C: Pilot Plan Documents

The pilot plan includes a number of documents that provide procedures for successfully rolling out the pilot in a business environment. The pilot plan includes the following documents: a training plan, a support plan, a communication plan, an evaluation plan, a risk and contingency plan, a backup and recovery plan, a schedule. Below a more detailed description of these plans is provided.

Document 1: Pilot Training Plan

A training plan describes what the pilot participants need to know before they begin the pilot and

describes how you plan to train them. It should include:

- Which features of the new system the participants need to be trained on, the form training will take, and when training will occur.
- A plan to provide training for the support and operations teams, which might need to be more detailed than the training presented to pilot participants.
- An estimation of how long it will take and when to begin. Many organizations find that it works best to provide training just prior to pilot installation.
- Remember to include training in the pilot plan schedule.

Document 2: Pilot Support Plan

The support plan identifies who will provide support for pilot participants, the level of support required, and how users can report problems.

Defining Support Team Roles

For each pilot, we identified who will support participants: project team members such as developers and testers were chosen.

Table 2: Support Teams FOODAKAI 2.0

Pilot	Country	TheFSM Resp	Support team	Support team role
P1	Greece	TÜV AU HELLAS	Mavropoulos Konstantinos, Stelios Vaporidis, Ellie Vaggeli	Head of pilots, Pilots coordinator, Pilots project management
P2	Netherlands	WFSR	Yamine Bouzembrak, Hans Marvin	Pilots leaders in the Netherlands
P3	Italy	Valoritalia	Francesca Romero, Cristina Micheloni, Andrea Zaffonato, Anna Polloni, Sonia Gastaldi	Use Case Leader, Technical manager, Technical Manager, Technical Manager, Technical Manager
P4	Romania	TÜV AU Romania	George Gheorghiu, Iuliana Demeter, Aurelia Grecu	Head of pilots, Pilots coordinators

P8	Cyprus	TÜV AU HELLAS - TÜV AU CYPRUS	Sousanna Charalambidou	Pilots coordinator
P9	Egypt	TÜV AU HELLAS – TÜV AU EGYPT	Mavropoulos Konstantinos, Stelios Vaporidis, Ellie Vaggeli	Head of pilots, Pilots coordinator, Pilots project management
P10	Jordan	TÜV AU HELLAS – TÜV AU JORDAN	Mavropoulos Konstantinos, Stelios Vaporidis, Ellie Vaggeli	Head of pilots, Pilots coordinator, Pilots project management

**emails and phone numbers are not shown in this table for GDPR reasons.*

A contact list for support staff that includes the names, phone numbers, and e-mail addresses of all support staff members for TheFSM was developed. The link to the Support team contact list: https://drive.google.com/file/d/1yqZ5N9L3RQzbIRa-qxbNH1SOTtpXe8OT/view?usp=sharing

Problem Tracking and Resolution

When problems arise during pilot testing, participants must have a way to report them to the team. The incident tracking system, problem escalation process, and issue resolution process your team develops should identify:

- Where participants post their problems.
- How problems will be reviewed, prioritized, and fixed and in what timeframe.
- The escalation process the team will use to notify the appropriate team members.
- How change requests are submitted, approved, tested, and implemented.

Document 3: Communication Plan

The communication plan is used to identify the type of information that will be communicated, to whom it will be communicated, by what means, and how often. Soon after selecting the participants, meet with them to:

- Obtain their commitment to the pilot.
- Provide them with a timeline for the pilot.
- Clarify participants' responsibilities.
- Describe the type of testing they are to perform.

The table below presents the information required for the communication plan. It is filled with each activity that needs communication during the pilot.

Table 3: Communication Plan FOODAKAI 2.0 (to be completed)

Activity	Participants	Channel	When	Responsible

Provide test plans for any special tasks they are to perform.

- Discuss communication mechanisms that have been established and how they should be used by participants.
- Discuss the level of support you plan to provide.
- Clarify problem reporting and issue resolution procedures.
- Discuss rollback plans.

Pilot participants need to understand what the pilot entails. Ensure that they understand how the pilot might affect their work. Be sure to address any concerns they might have about the pilot or their role in the deployment process.

As the pilot deployment date approaches, the release management team should provide participants with the following information:

- Scheduled dates for training and for upgrading computers
- Procedures they need to follow before their computers are upgraded
- Contact names and numbers for support

Regular and comprehensive communication with pilot participants helps to ensure that participants are committed to the success of the pilot project. Mechanisms for communicating information about the pilot: Web sites, frequently asked questions (FAQ) pages, procedures, and status reports. As you determine how you will communicate with participants during the pilot, begin creating the required mechanisms.

Document 4: Evaluation Plan

The evaluation plan describes the way the feedback from the pilot participants will be collected and assessed. The evaluation plan contains information on the sources of feedback and how to collect this feedback. It then continues with a section on how to analyze the results and concludes with a discussion on how to decide to continue with the pilot.

Document 5: Risk and Contingency Plan

The risk and contingency plan describes the risk factors that could prevent the pilot from being deployed successfully. Risks might include the test lab being behind schedule, required hardware or software being unavailable, or participants working on other projects or needing additional training.

Properly addressing risk factors that could prevent a successful deployment in a pilot environment reduces the likelihood of encountering those same problems when you deploy into your production environment.

Document 6: Backup and Recovery Plan

The backup and recovery plan establishes guidelines and procedures to prevent problems that might cause data loss or interruptions to your organization's operations, and to allow recovery as quickly as possible if such events do occur. The backup plan should define procedures for backing up the most recent system and user data. Furthermore, it should define how the restore process using the backup files is tested and executed. In addition, the backup plan should identify who is responsible for performing backups, and should include the schedule for all periodic backups and periodic testing of backups, as well as instructions for labeling and storing all backup files.

Document 7: Pilot Schedule

One of the earliest activities in planning a pilot is to draft a schedule, which is usually included in the master project schedule.

Table 4: Pilot Schedule FOODAKAI 2.0

Pilot country	TheFSM Resp	Estimated period for the first pilot iteration	Estimated period for the second pilot iteration	Estimated period for the third pilot iteration
Greece	TÜV AU HELLAS	Q4, 2021	Q2, 2022	Q4, 2022
Netherlands	WFSR	Q4, 2021	Q2, 2022	Q4, 2022
Italy	Valoritalia	Q4, 2021	Q2, 2022	Q4, 2022

Romania	TÜV AU Romania	Q4, 2021	Q2, 2022	Q4, 2022
Cyprus	TÜV AU HELLAS - TÜV AU CYPRUS	Q4, 2021	Q2, 2022	Q4, 2022
Egypt	TÜV AU HELLAS – TÜV AU EGYPT	Q4, 2021	Q2, 2022	Q4, 2022
Jordan	TÜV AU HELLAS – TÜV AU JORDAN	Q4, 2021	Q2, 2022	Q4, 2022

2.3.4. STEP 1D: Developing a Data Management Handling Plan

For the FOODAKAI application a Data Management Handling Plan (DMHP) has been prepared. The objective of a DMHP document is to gather information that will assist Consortium Partners in accessing the privacy and confidentiality of the applications. This document will establish the legal and ethical standards for data generation, use, storage and sharing on the FOODAKAI 2.0 application. The document is formulated in alignment with the European commission's open data policy and its objective to make research findable, accessible, interoperate and reusable (FAIR). The following tables summarise the key features of the life cycle of FOODAKAI data including collection, storage, preservation and archiving.

Table 5: Data Production and Storage FOODAKAI 2.0

DATA PRODUCTION AND STORAGE	
Types or categories of data generated/collected	• Food recalls, border rejections, laboratory testing data, companies information, country risk indicators, prices, child labour indicators, food hazards, food ingredients, inspections/audits results. • Information about the suppliers, the ingredients, finished products, lab tests, audits results and certificates that a company has. • Personal information and preferences of the end-user that is using the application
Personal or non-personal data	• The data that is collected from the National Food Safety Authorities includes non-personal information • The application of FOODAKAI 2.0 will also save personal information of the Food Safety experts such as Name, Surname, Phone, Job title, ingredients and hazards preferences
Data formats	CSV, JSON, Html, xls
Reproducibility of data	The processed data can be reproduced because we are also storing the original version of the collected data.
Data size	More than 200M food safety data records are collected and processed by Agroknow and will be used in the FOODAKAI 2.0 application. (500GB)
Software tools for creating/processing/ visualising data	Elasticsearch, Python, HighCharts, Java, Spring MVC, HighCharts, ReactJS, Redux, Ruby on Rails
Use of pre-existing data	We are collecting food safety data that are published by the National Authorities
Data storage and backup strategies	Data is stored on the cloud and dedicated virtual machines. Daily incremental back up.

Table 6: Organisation, Documentation and Metadata FOODAKAI 2.0

ORGANISATION, DOCUMENTATION AND METADATA	
Standards for documentation of metadata	Internal data model that is based on FRBR (https://www.ifla.org/publications/functional-requirements-for-bibliographic-records)
Best practice/guidelines adopted for data management	• Best practices defined by GODAN and RDA for managing agrifood data. • EFSA vocabularies for the classification of products and hazards were used. • GS1 standards for exchanging data throughout the supply chain.
Tools for formatting fata	Tools developed by the EU Big Data Grapes project were used to format data
Directory and file naming convention used.	The data is organized following the data structure of elasticsearch and the Postgresql

Table 7: Data Access FOODAKAI 2.0

DATA ACCESS	
Risks to data	• Insufficient protection of end user's personal information. • Insufficient protection of business critical information that a company has stored in FOODAKAI 2.0 application • Data breach during the exchange of information between different systems

Risk management	• For the protection of end user's and company's information we have the following policy • Our basic policy is that nothing outside of Heroku which is our cloud service, has open communication with our database. The database resides on closed hub that can only communicate with our application via the security of Heroku • User data that are stored to production DBs, cannot be accessed by non-production environments. As for the replication of data, currently there is no procedure to ensure that production data are not replicated to other environments.
Data access & requirements for access	We have an authentication and authorization layer to access: • The non-personal data collected by the National Authorities and International organizations • The user personal data and preferences • The business critical information such as suppliers, ingredients, products, lab tests, certificates and audits.
Correct execution of the data access process	• Data access rights per role are documented. • Only authorized Agroknow employees have access to the data.
Procedures to follow in the event of a data breach	• Perform a diagnosis to identify which data is affected • Identify the vulnerability • Restore the correct data from a backup file • Inform the end user and the company for the data breach.

Table 8: Data Sharing and Reuse FOODAKAI 2.0

DATA SHARING AND REUSE OF DATA	
Organization/labelling of Data for easy identification	We have a unique identifier for: • Companies • Recalls and border rejections • Products and hazards classification terms

Data Sharing & Audience for Data Sharing	A Data API is provided to get information of recalls, border rejections, lab tests, inspections, prices.
Data Sharing Requirements	Restricted to specific groups. Subscription is needed.
Re-use of data	Registration - access given only by the database owner / Subscriptions
Audience for reuse	Food companies, Research Centers, Commercial partners
Restrictions on the re-use of data	The data that is processed and stored by Agroknow and will be used by the applications is not shared and can be re-used only by authorized third party systems.
Publication of data	No data is published right now.

Table 9: Data Preservation and Archiving FOODAKAI 2.0

DATA PRESERVATION AND ARCHIVING	
Archiving of data for preservation and long-term access	The processed data is stored on the private cloud and dedicated servers with daily backups.
Time period for data retention	The data will be retained at least until the end of 2025.
File formats of retained data	JSON, CSV, XML, HTML
Data archives	In long term storage cloud components offered by commercial clouds and in back up files stored in Agroknow's dedicated servers.

Long-term maintenance of data (systems and procedures)	Agroknow has a process that ensures the long-term maintenance of the data that is collected, processed and stored by the FOODAKAI 2.0 application. Automatic daily back-ups of the data that is processed by Agroknow Big Data Platform and stored in the applications are performed. The back up process is monitored and in case of a failure, responsible data managers are notified. The backup files are store in two different cloud infrastructure. There is a data restore process that can be activated when needed. In terms of systems, Agroknow is using the following systems · Backup tools that are offered by the cloud providers (Amazon, Heroku) · Scripts developed by the technology team to back up data that is processed in our dedicated servers

2.4. STEP 2: Prepare for the Pilot

After the creation of a pilot plan, the second step in a pilot is its preparation.

2.4.1. STEP 2A: Prepare Pilot Sites

As a first step, the pilot sites need to be prepared. It is important to identify if there are any special security measures, like firewalls or threat protection software, that can block your participants from entering TheFSM application. Make sure to have the application tested before the pilot is scheduled to begin.

2.4.2. STEP 2B: Prepare Pilot Participants

Once you have selected the pilot participants, communication with the participants should be established as early as possible. Your initial contact should open the channel of communication and set participants' expectations. It is important to inform them of the goal of the pilot and to establish clearly what is expected of the participants and what their responsibilities are. Ensure that they understand how the pilot might affect their work. Furthermore, it is often necessary that a participant fills in a consent form in accordance with the General Data Protection Regulation. You might also want to include a non-disclosure agreement if sensitive data is accessed by the participants.

As the start date for the pilot approaches, prepare participants for their role by keeping them apprised of pilot deployment plans, target dates and the training plan. Provide participants with the following information:

- Scheduled date for the start of the pilot and the deployment plans.
- The type of training the participants will receive and the scheduled date(s).
- Procedures the participants need to follow on their computers to be able run the pilot.
- Contact names and numbers for support
- The (personal) log-in codes, if necessary.

The training of the participants should happen just before the pilot is scheduled to start. The duration and type of training you provide depends on the scope of the pilot, as determined in the training

plan. Training might be required for both support staff and pilot participants. If so, train the support staff before the pilot participants, so that the participants can have assistance as soon as the pilot begins if they need it.

If participants need log-in codes to use the platform, make sure to send these to the participants before the training starts.

2.4.3. STEP 2C: Test the Rollout Process

Although the lab environment will be sufficient to debug most problems with the pilot deployment, the pilot provides an opportunity to assess the accuracy of deployment procedures in the actual production environment. Schedule time during the testing phase for the pilot team to develop, document and test the rollout procedures.

2.5. STEP 3: Deploy and Test the Pilot

The third step in developing a pilot is its deployment and testing. After the pilot plan and pilot preparations have been finalized, it is time to start deploying the pilot. Start this process with a trial run of the pilot and make sure to keep tracking the pilot after deployment to monitor its progress closely.

2.5.1. STEP 3A: Conduct a Trial Run of the Pilot

When the pilot is ready to be deployed, it is important to test the deployment of the application with the pilot team first. Performing this trial run of the pilot ensures that any problems with the deployment will be identified before the application has to go live. A trial run should test all elements that will be executed during the official deployment.

2.5.2. STEP 3B: Deploy the Pilot

After any problems identified during the trial run have been solved and a successful trial run has been executed, it is time to deploy the pilot. Document the deployment process and use this information to update the pilot plans to do with future rollouts.

2.5.3. STEP 3C: Resolve Issues during the Pilot

During the pilot, the participants perform their regular tasks and they should be able to report any problems they encounter when using the application. They should be able to do so using an incident-tracking system. For more information on how to adopt an incident-tracking system, see 'Step 4A: Obtain Feedback'. Problems that are reported by the participants should be reviewed, prioritized, and fixed according to procedures outlined in the issue resolution plan. Problems can be resolved either by further development of the application and a rollback of the pilot or by incorporating the resolution or workaround as extra information in the training material and by informing the support staff of the resolution or workaround so they can assist the participants to resolve this problem. Note that if a rollback is required, clear communication with the participants is essential of how and when this will happen. If multiple pilots are scheduled, make sure to evaluate the results of the current pilot and to resolve the problems found before beginning the next pilot.

2.5.4. STEP 3D: Monitor the Pilot

During the pilot, the release management team should continually monitor the pilot looking for bottlenecks and areas that need to be fine-tuned. The more information you collect during the pilot, the more accurately you can evaluate its success and recommend how to proceed with the full deployment to the entire business environment. Have the team check problem reports frequently and look for trends and for problems in the application performance, such as:

- Mention of degradation in performance, such as slower response time.
- Mention of tasks that could be performed before, but not after, rollbacks.
- Mention of tasks that can be accomplished only by using a workaround.

It is important that the pilot team communicates with the pilot participants periodically. Talking with users frequently reveals issues or problems that might otherwise go unnoticed. As the pilot team receives feedback, they will need to assess problems that pose risk to the overall project. Specifically, they should look for situations that might result in:

- Scope changes
- Cost increases
- Interoperability problems
- Unanticipated downtime

Assessing the severity of these issues allows the release management team to make informed decisions about whether to proceed with the production deployment.

2.6. STEP 4: Pilot Evaluation

During the pilot, participants will provide feedback about how well the design and features are working. This feedback is crucial because based on this information the decision will be made to change the design or process and conduct further piloting tests, or alternatively to continue towards production deployment. In this evaluation plan the following topics will be discussed:

- How to obtain feedback from the pilot participants
- How to analyze the feedback
- Strategies to decide the next step

2.6.1. STEP 4A: Obtain Feedback

Sources of Feedback

The primary source of feedback will be the user, which in the case of FOODAKAI 2.0 is a group of individuals with a wide variety of occupations, computer skills and experiences. Because of the variety in the kind of user, it is important to collect three types of information:

- Background information on the user.
- Usability experience.
- Information on specific problems, see the Incident-tracking system in the next section.

For both the background information and the usability experience questionnaires will be used. To measure usability experience the SUS (System Usability Scale) will be applied. Next to the SUS questions, several open-ended questions will be asked. These questions more specifically address the objectives of the pilot as described in table 1 (see Step 1: Creating a Pilot Plan) and may differ per application and country.

The background information questionnaire will have to be filled in before the pilot begins. See Appendix A below for this questionnaire. Based on the type of users and pilot objectives related to the specific applications and countries, additional questions will be added that address these issues. The SUS questionnaire can be found in Appendix B. Finally, besides background information and usability experience, it is important to get information on specific problems during the pilot. To this end users should be encouraged to report any problems, both big and small. There are several options available for users to provide this feedback, see the Incident-tracking system in the next section.

Methods for Collecting Feedback

Questionnaires

To make it easy for respondents to fill in the usability questionnaire (the SUS) and the background information questionnaire, they will be accessible online. Participants will receive two separate emails with a brief introduction to why they are asked to fill in this questionnaire and why it matters (see Appendix D for an example email). These emails will include a link to the questionnaire. Follow-up emails will be sent in case of the absence of a response within two weeks (see Appendix E for an example follow-up mail). For the analysis of the SUS it is important that all questions (1 to 10, marked in red in Appendix B) are answered (this excludes the additional

questions at the end). In developing the online webform make sure that participants can only submit their questionnaire when these questions have in fact an answer.
To get information on specific problems that users encounter, an 'Incident-tracking system' should be in place. As a general rule, the kind of incident-tracking system chosen should depend on how it:

1) Facilitates the collection process
2) Aid the analysis of the collected information

Incident-tracking System

The preferred way to collect information on specific problems is to set up a website in which users can fill in a standard template for reporting problems (see Appendix C). Alternatively, if this method is not feasible, a general email account can be set up and users can fill in the standard template and send it to that email address. Users should receive some training to fill in the standard template. Instructions will also be sent through email (see Appendix F for an example email with instructions).

Metrics on FSM's Architecture and Findability of Information

If based on the three types of information above (background information, usability experience, reported problems) specific issues stand out that require further testing, several options are available depending on the nature of the problems. Below these options are listed.

- Problems related to FOODAKAI 2.0 architecture: If serious problems or much of the negative feedback from participants point to the design and layout of the website, Treejack (https://www.optimalworkshop.com/treejack/) or similar tools can be used to assess this issue. Treejack provides a paid service in which we can give participants specific tasks and Treejack will then monitor completion time, success rate, and metrics on directness (do participants need to backtrack a lot or was it a direct success).
- Problems related to findability: If users seem unable to find things on FOODAKAI 2.0, tools such as Chalkmark (https://www.optimalworkshop.com/chalkmark/) can be used. Chalkmark works similar to Treejack but is more specific to testing whether users can find something quickly or not.

Metrics on Task Performance

If there is a need to delve deep into a specific problem that cannot be solved by the options presented above, specific tasks that address this issue can be assigned and given to participants in a more controlled environment. An example would be to invite a group of participants to a location where they together will perform certain tasks with FOODAKAI 2.0. During these tasks their performance will be measured.

The following metrics should be analyzed when participants are given a timed task:

- Number of errors
- Percentage of the task completed successfully
- Number of hints/prompts needed to complete the task

- Time to complete the task
- Major problems/obstacles associated with each task

Other optional metrics are:

- Time to achieve a certain level of competence
- Time spent reading/searching vs. working
- Time to recover from an error

Develop an automated logger to measure completion times, mouse clicks and search patterns. The tasks should be carefully constructed to match the objectives of the pilot. The right metrics should be chosen that will answer these questions. For instance, if you want to know how easy it is to perform a specific task with FOODAKAI 2.0, use a metric such as the error rate and time to completion. If you want to assess how effective a tutorial is in teaching a specific task, compare error rates and completion times between participants who used and not used the tutorial.

Storage of Feedback

The results from the questionnaires and the reported problems should preferably be stored in a database, Excel or other similar format. Make sure to create backups in case of technical problems. Keep track of respondents that have not yet filled in their questionnaire.

2.6.2. STEP 4B: Analyse Feedback

After having collected and stored the feedback, the next step is to analyze it. The underlying goal here is to transform the feedback into the metrics and standards used to assess the usability of FOODAKAI 2.0 and the objectives of the pilot.
The analysis of the SUS will be described first, followed by the background questionnaire, reported problems and finally, if applicable, specific metrics.

Analysis: SUS

To analyze the SUS, make sure you have the complete dataset in a well-organized structure within your analysis environment (e.g. Excel, R, Python, SPSS). The scoring and interpretation of the SUS is not complicated, but requires careful analysis.
First, it is important to filter out dubious questionnaires. Sometimes respondents rush through a questionnaire and just select answers randomly. This can easily be detected in the SUS based on the organization of the questions:

- All even numbered questions (2, 4, 6, 8 and 10) are negative, meaning that a high score on these questions (e.g. a score of 5 'strongly agree') refers to a negative usability experience.
- All odd numbered questions (1, 3, 5, 7, 9) are positive, meaning that a high score on these questions refers to a positive usability experience.

If respondents score both high on even and odd numbered questions, or show low scores on both types of questions, it may point to an inconsistency in how they filled in this questionnaire. There

is no standard for when to remove a respondent who shows such inconsistencies, but as a general guideline when 2 such inconsistencies are present this respondent should be removed from the analysis.
The actual scoring of the SUS should be conducted as follows:

- For each of the odd numbered questions, subtract 1 from the score.
- For each of the even numbered questions, subtract their value from 5.
- Take these new values which you have found, and add up the total score. Then multiply this by 2.5.

The result is a score between 0 and 100. This is NOT a percentage, but simply a raw score. The average SUS score is 68. SUS scores above this number are considered 'above average' and scores below 68 are 'below average'. The table below can be used to further interpret the SUS score.

Table 10: Interpreting the SUS

SUS score	Grade	Rating
> 80.3	A	Excellent
68 - 80.3	B	Good
68	C	Okay
51-68	D	Poor
< 51	F	Awful

Calculate a SUS score for each respondent and then average over these SUS scores to get the final SUS score for the group. Added to the SUS are several questions on positive and negative experiences using FOODAKAI 2.0. Analyse these responses carefully and relate them to the background questionnaire and the reported problems to gain further insights into both strong and weak points of FOODAKAI 2.0.

Analysis: Background Questionnaire

Questions 1 and 2 can be used to divide users based on experience. Average SUS scores should be calculated for each of the three groups mentioned in question 2 to gain insight into the relationship between computer experience and usability.
Additionally, based on the age information the user group can be divided in two subgroups, namely 40 years or younger and older than 40 years. Average SUS scores for these groups can again be calculated to gain insight into the relationship between age and usability.

Questions 3 and 4 need to be carefully analysed to gain insight into what users like and dislike. The results of question 3 should be cross-checked with the reported problems and the SUS to see if these are consistent.

Analysis: Reported Problems

Every reported problem should be carefully analysed to find out what the actual problem is. Reported problems should be linked to the listed objectives of the pilot (see table 1 in Step 1: Creating a Pilot Plan).

Reported problems can be categorized and these categories can then be counted to get insight into where the weaknesses and problems of FOODAKAI 2.0 are located. More specific analysis of the individual reports can then point to specific problems, which then have to be prioritized. Problems that are both severe and frequent are critical problems that should get a priority and should be included in the preliminary report.

Analysis: Specific Metrics

When specific metrics are collected to gain insight into specific problems, use statistics such as the mean, median, the min and max, and standard deviation to get insight. Data can be grouped over different conditions to make comparisons, for instance did the group that got the tutorial perform better than the group that did not?

Report Findings

Directly after the pilot a first preliminary analysis can be conducted that gives insight into the larger trends and patterns. This analysis can take place in the days following the end of the pilot and results should be sent to the relevant people after at maximum 3 days. The goal here is to identify hot spots (worst problems) that have to be fixed and communicate these (and only these) findings to the development team so they can work on these issues immediately without having to wait for the final report.

A second and more comprehensive analysis can then be finished in 2-4 weeks following the end of the pilot. This final report includes the preliminary findings plus all other relevant material that were not previously covered.

Reported problems can be categorized and these categories can then be counted to get insight into where the weaknesses and problems of FOODAKAI 2.0 are located. More specific analysis of the individual reports can then point to specific problems, which then have to be prioritized. Problems that are both severe and frequent are critical problems that should get a priority and should be included in the preliminary report.

2.6.3. STEP 4C: The Next Step

After the feedback has been collected and analyzed, the very important decision has to be made what to do next. If the evaluation process has been conducted well, there will be sufficient information to evaluate whether the delivered design meets the design specification, as well as the business requirements.

Depending on how well the pilot meets the success criteria, there are a number of strategies that can be employed at this point in the pilot deployment:

- Stagger the pilot forward. If the pilot was deemed partially successful, deploy the pilot to the next pilot group or, if your team has planned to conduct multiple pilots, proceed with the next pilot.
- Roll back the pilot. When the pilot is not completely successful, it is often necessary to roll it back so that issues can then be resolved. Typically, a rollback is required when:
    - The production environment contains invalid or problematic data that was not discovered in testing and that caused the deployment to fail. Roll back the pilot to the configuration used before the pilot began, clean up the data, and redeploy the pilot so that the pilot group can continue with its work.
    - Production configurations and settings, such as Group Policy settings or security restrictions, cause problems with the deployment that could not be detected in the test lab. After rolling the pilot back to the configuration used before the pilot began, resolve the problems with the conflicting configurations or settings and redeploy the pilot.
- Suspend the pilot. If the pilot is not successful and issues cannot be resolved easily, suspend the entire pilot, halting all pilot testing until the issues have been resolved and the pilot can be redeployed. This requires rolling the pilot back to the configuration used before the pilot began.
- Patch the pilot and continue. If the pilot is not successful, but the issues raised are easily fixed, issue the same pilot group a "patch," a fix to existing code.
- Proceed to the production deployment phase. If the pilot is deemed successful and ready for production, you can proceed with your plans for full deployment.

The pilot is not complete until the team ensures that the proposed solution is viable in the production environment and that every component of the solution is ready for deployment.

2.7. Supplementary Materials

Appendix A: Background Questionnaire

Background Questionnaire

Thank you for taking the time to participate in our usability test. Your participation will provide valuable feedback about your experience using FOODAKAI 2.0.

Before we begin, we would like you to fill out this brief questionnaire so that we will have more information about your experience using the Internet and, more specifically, going through the process of certification.

Name:

Age:

Occupation:

1. How often do you use the Internet?

a. Every day
b. Every other day
c. A few times a week
d. Rarely
e. Almost never

2. How experienced are you in using computers and the internet?

a. Highly experienced, I am at the level of a computer programmer
b. Somewhat experienced, I frequently use computers or the internet
c. Not experienced, I rarely use computers or the internet

3. Which features frustrate you the most when you use a website?

a.

b.

c.

4. Which features make you happy when you use a website?

a.

b.

c.

Appendix B: System Usability Scale

SUS — System Usability Scale

Name:	
Age:	
Occupation:	

1. I think that I would like to use this system frequently

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

2. I found the system unnecessarily complex

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

3. I thought the system was easy to use

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

4. I think I would need the support of a technical person to be able to use this system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

5. I found the various functions in this system were well integrated

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

6. I thought there was too much inconsistency in this system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

7. I would imagine that most people would learn to use this system very quickly

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

8. I found the system very cumbersome to use

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

9. I felt very confident using the system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

10. I needed to learn a lot of things before I could get going with this system

STRONGLY						STRONGLY
AGREE	1	2	3	4	5	DISAGREE

List the most negative aspect(s):

1.

2.

3.

List the most positive aspect(s):

1.

2.

3.

Other Comments:

Appendix C: Problem Report

Problem Report

Name:	
Date:	
Browser:	

Indicate the severity of the problem

Mildly annoying 1 2 3 4 5 Very frustrating

Summary of the problem:

Screenshot:

What was the expected result?

What was the actual result?

How to reproduce the problem?

Other comments:

Appendix D: Invitation email to fill in the SUS questionnaire

Dear <name user>,

Are you enjoying FOODAKAI 2.0? Or is there anything we can do to improve your experience?

We would be grateful if you could spare 10 minutes of your time to answer a short survey and let us know if FOODAKAI 2.0 actually benefits you and how we can improve further.

Here is the link to the survey.

Thank you

<Signature>

Appendix E: Reminder to fill in questionnaire

Dear <name user>,

Two weeks ago you received an email to fill in a short survey about FOODAKAI 2.0.

Because we have not yet received your answer, we would like to remind you.

We would be grateful if you could spare 10 minutes of your time to answer a short survey and let us know if FOODAKAI 2.0 actually benefits you and how we can improve further.

Here is the link to the survey.

Thank you

<Signature>

Appendix F: Instruction email on how to report problems

Dear <name user>,

In the coming period you will be using FOODAKAI 2.0>. In order to find out if FOODAKAI 2.0 actually benefits you and how we can improve further, we would like to encourage you to report any problem you may encounter during this time. These reported problems will be carefully analyzed by the development team in order to make improvements to FOODAKAI 2.0.

Problems can be reported by going to this link.

Please try to be precise in your descriptions. Screenshots are usually very helpful too!

Try to report one problem at a time. We would like to encourage you to report all problems you encounter, including minor ones.

Thank you

<Signature>

3. AGRIVI

3.1. Introduction

Recently, "The Food Safety Market" project (TheFSM) was granted in the EU H2020 programme (Grant Agreement number: 871703). This project aims to deliver an open industrial virtual data platform that will facilitate the exchange and connection of data between different food safety actors who are interested in sharing information critical to certification. To this end, extensive piloting is foreseen to test the applications and services developed by the project partners and these will be supported and channeled through the infrastructure of AGRIVI 2.0. The primary purpose of a pilot is to demonstrate that the design and products work in the production environment as the designers expected and meet the business requirements. Furthermore, it reduces the risk of encountering problems during the full-scale deployment.

Pilots are foreseen in many countries during the project duration (i.e. Greece, Netherlands, Italy, Romania, Austria, Croatia, Poland, Hungary, Cyprus, Egypt, Jordan) and to ensure optimal pilot execution and product development, a guidance for the participants is essential.

3.2. Overview of Designing a Pilot Project

A pilot is the last and major step to the deployment of services that can be offered to clients and therefore the set-up and design of the pilots is essential to make sure it delivers the information needed for the project to optimise the products being deployed. Within a pilot the product and services are tested in a controlled environment in which the users perform their normal business tasks using the new features. This demonstrates that the design works in the production environment as expected, that users can utilize the system effectively and that it meets TheFSM business requirements.

A pilot consists of the following different activities i) creation of a pilot plan, ii) preparation of the pilot, iii) deployment and test the pilot, iv) evaluation of the pilot results, v) adaptations to the products tested in the pilot, vi) testing the new revised product, vii) finalisation of the product. These steps are shown in the flow diagram below.

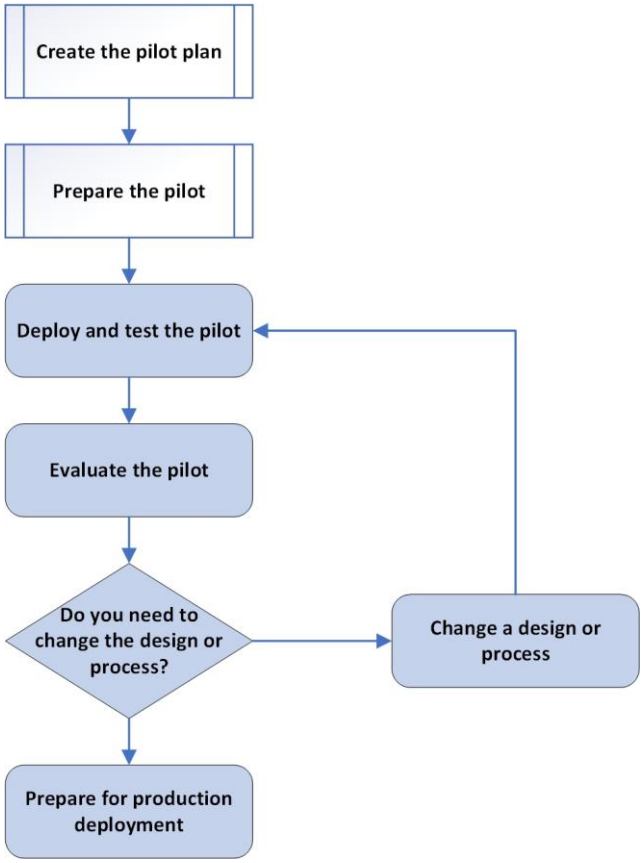

Figure 2: The Various Steps in a Pilot for AGRIVI 2.0

3.3. STEP 1: Pilot Plan

The first step in any pilot is to design a pilot plan. The pilot plan defines the scope and objectives of the pilot, identifies pilot participants, where the pilot will be conducted and the duration. It includes a schedule for deploying and conducting the pilot and plans for training and communicating with pilot participants, evaluating the pilot, identifying risks and contingencies, and other key activities that occur during a pilot deployment. The expected contributions and responsibilities of the pilot participants, including confidentiality and ownership should be made clear in a simple legal agreement.

In TheFSM project, we will conduct pilots for AGRIVI. The pilots will be implemented in all countries where we have partners (i.e. Greece, Netherlands, Italy, Romania, Austria, Croatia, Poland, Hungary, Cyprus, Egypt, Jordan) during the project period. For each pilot a dedicated pilot plan and materials are needed and will be based on the specificity of the case and products being tested. Based on the results and needs, it could be that the same case and products are being tested in different countries. All AGRIVI 2.0. pilot plans will be based on this guidance document

describing all elements needed to be considered, but not necessarily all features need to be included in each pilot. This will depend on the needs and requirements of each specific pilot.

3.3.1. STEP 1A: Pilot Scope and Objectives

The first step in planning a pilot is to define the objectives and the scope of the pilot.

Pilot Objectives

The goals of TheFSM project are:

1. Food safety data interoperability and semantics: TheFSM will incorporate advanced semantic technologies that can enable highly sophisticated data interoperability and integration capabilities.
2. Multilingual support for localized food safety applications: TheFSM will offer advanced multilingual for both textual information and data ontologies, based on the expertise and technology stack of the partners.
3. Automated and smart contracts for food safety data transactions: TheFSM will offer a multi-sided data brokerage service, where actors like farmers can act as "traders" of their data, that can be used for purposes of certification, product risk assessment and verification.
4. Real-time processing and big data storage & visualization: TheFSM will incorporate big data indexing, processing and visualization capabilities to support real-time data processing and food risk model execution.

To achieve these goals, AGRIVI 2.0 will have to:

- Ensure that the system works properly in the business environment.
- Ensure that the design meets the business requirements.
- Ensure the pilots are carried out according to plan in an organized and constructive fashion.
- Create comprehensive pilot plans for the AGRIVI 2.0 for all combinations of partners and countries.
- Ensure that the pilots are designed and implemented to test to what extent the AGRIVI 2.0 application meets the business and functional requirements.
- Ensure AGRIVI 2.0. meets the baseline business and functional requirement targets that were assessed in testing.
- Conduct the pilot programs in an iterative fashion in which previous findings and feedback are incorporated in the next pilot.
- Test the deployment process.
- Gather information for estimating future support requirements.
- Develop and test end-user training materials.
- Train the installation, support and help desk teams.

- Provide support to pilot partners in executing pilots for AGRIVI 2.0 application.

Pilot Scope

The scope of the pilots will depend on the business and functional requirements that AGRIVI 2.0 has to meet, and a clear description by AGRIVI which services and features will be included and which will not. AGRIVI will also describe the areas of functionality that the pilot implementation affects, and note to what extent they are affected, and in which situations they are affected. Other elements to consider are the following:

1. Be sure to address international language issues in the pilot.
2. Do not expect to test every feature or service during the pilot. Focus on the most important business and functional requirements, processes that present the greatest risk, and events that are most likely to occur.
3. Prioritizing the features to be tested in the pilot is particularly important if the team plans to conduct multiple pilots.
4. If certain aspects of your design cannot be covered by the pilot, describe them.
5. Also specify the duration of the pilot, in terms of either time or of the criteria to be met.
6. Be sure to describe how you expect to proceed after the pilot is complete. If you plan to keep some functions in place and remove others for the full production rollout, identify the features that will be removed.

3.3.2. STEP 1B: Pilot group and Pilot Sites

For a pilot, good candidates have some of the following traits:

- Are able to derive tangible benefit from the tested TheFSM application.
- Play a noncritical role in day-to-day operations.
- Most pilot participants should have the same technical expertise as the average user in your organization.
- Perform a variety of activities using a variety of computer hardware.
- Are enthusiastic about the TheFSM project.
- Are comfortable with technology.

You can identify candidates by conducting interviews or requesting volunteers. Volunteers, in particular, can be very helpful, because their offer to participate indicates an interest in the TheFSM technology.

The selection of a pilot site or sites often depends on the type and location of the pilot participants who have been selected and the number of support staff available to help them. Determine the number of pilot sites and the size of the pilot users group based on:

- The objectives of the pilot.

- The number of functions and features you are testing.
- The size of your support staff.
- Specific technology requirements that can be piloted only by using particular sites or user groups.

The table below shows the specific information related to AGRIVI 2.0 with regards to the pilot group.

Table 11: Pilot Groups and Pilot Sites AGRIVI 2.0

Pilot	Country	TheFSM Resp	Applications	Group
P1	Greece	TÜV AU HELLAS	AGRIVI 2.0	Actors in the food supply chain
P2	Netherlands	WFSR	AGRIVI 2.0	Actors in the food supply chain
P3	Italy	Valoritalia	AGRIVI 2.0	Wine producers (all chain)
P4	Romania	TÜV AU Romania	AGRIVI 2.0	Food processors
P5	Croatia	AGRIVI	AGRIVI 2.0	Food processing company farmers
P6	Hungary	AGRIVI	AGRIVI 2.0	Food processing company farmers
P7	Poland	AGRIVI	AGRIVI 2.0	Food processing company farmers
P8	Cyprus	TÜV AU HELLAS - TÜV AU CYPRUS	AGRIVI 2.0	Actors in the food supply chain

P9	Egypt	TÜV AU HELLAS – TÜV AU EGYPT	AGRIVI 2.0	Actors in the food supply chain
P10	Jordan	TÜV AU HELLAS – TÜV AU JORDAN	AGRIVI 2.0	All actors in food supply chain

**Participants names and user liaison names are not shown in the table for GDRP reasons*

User liaison: *is someone who has good communication skills and a good relationship with both the pilot group and the project team. The liaison can provide information about the type of work the pilot group performs and can prepare the group for its role in the pilot.*

3.3.3. STEP 1C: Pilot Plan Documents

The pilot plan includes a number of documents that provide procedures for successfully rolling out the pilot in a business environment. The pilot plan includes the following documents: a training plan, a support plan, a communication plan, an evaluation plan, a risk and contingency plan, a backup and recovery plan, a schedule. Below a more detailed description of these plans is provided.

Document 1: Pilot Training Plan

A training plan describes what the pilot participants need to know before they begin the pilot and describes how you plan to train them. It should include:

- Which features of application the participants need to be trained on, how to access the application, the form training will take, and when training will occur.
- A plan to provide training for the support and operations teams, which might need to be more detailed than the training presented to pilot participants.
- An estimation of how long it will take and when to begin. Many organizations find that it works best to provide training just prior to pilot installation.

- Remember to include training in the pilot plan schedule.

Document 2: Pilot Support Plan

The support plan identifies who will provide support for pilot participants, the level of support required, and how users can report problems. Pilot support plan needs to provide concise

instructions for pilot participants regarding the support approach once pilots have started.

Defining Support Team Roles

For each pilot, we identified who will support participants: project team members such as developers and testers were chosen. Only the information relevant to AGRIVI 2.0 is provided in the table below.

Table 12: Support Teams AGRIVI 2.0

Pilot	Country	TheFSM Resp	Support team	Support team role
P1	Greece	TÜV AU HELLAS	Mavropoulos Konstantinos, Stelios Vaporidis, Ellie Vaggeli	Head of pilots, Pilots coordinator, Pilots project management
P2	Netherlands	WFSR	Yamine Bouzembrak, Hans Marvin	Project manager, Support project management
P3	Italy	Valoritalia	Francesca Romero, Cristina Micheloni, Andrea Zaffonato, Anna Polloni, Sonia Gastaldi	Use Case Leader, Technical manager, Technical Manager, Technical Manager, Technical Manager
P4	Romania	TÜV AU Romania	George Gheorghiu, Iuliana Demeter, Aurelia Grecu	Head of pilots, Pilots coordinators
P5	Croatia	AGRIVI	Tanja Matosevic, Tanja Folnovic	Project manager, Support team lead
P6	Hungary	AGRIVI	Tanja Matosevic, Tanja Folnovic	Project manager, Support team lead
P7	Poland	AGRIVI	Tanja Matosevic, Tanja Folnovic	Project manager, Support team lead

P8	Cyprus	TÜV AU HELLAS - TÜV AU CYPRUS	Sousanna Charalambidou	Pilots coordinator
P9	Egypt	TÜV AU HELLAS – TÜV AU EGYPT	Mavropoulos Konstantinos, Stelios Vaporidis, Ellie Vaggeli	Head of pilots, Pilots coordinator, Pilots project management
P10	Jordan	TÜV AU HELLAS – TÜV AU JORDAN	Mavropoulos Konstantinos, Stelios Vaporidis, Ellie Vaggeli	Head of pilots, Pilots coordinator, Pilots project management

**emails and phone numbers are not shown in the table for GDRP reasons*

A contact list for support staff that includes the names, phone numbers, and e-mail addresses of all support staff members for TheFSM was developed. The link to the Support team contact list: https://drive.google.com/file/d/1yqZ5N9L3RQzbIRa-qxbNH1SOTtpXe8OT/view?usp=sharing

Problem Tracking and Resolution

When problems arise during pilot testing, participants must have a way to report them to the team. The incident tracking system, problem escalation process, and issue resolution process your team develops should identify:

- Where participants post their problems and what is the expected way of describing a problem
- How problems will be reviewed, prioritized, and fixed and in what timeframe.
- The escalation process the team will use to notify the appropriate team members of the progress
- How change requests are submitted, approved, tested, and implemented.

Document 3: Communication Plan

The communication plan is used to identify the type of information that will be communicated, to whom it will be communicated, by what means, and how often.

Soon after selecting the participants, meet with them to:

- Obtain their commitment to the pilot.
- Provide them with a timeline for the pilot.

- Clarify participants' responsibilities.
- Describe the type of testing they are to perform.

The table below presents the information required for the communication plan. It is filled with each activity that needs communication during the pilot.

Table 13: Communication Plan AGRIVI 2.0 (to be completed)

Activity	Participants	Channel	When	Responsible

Provide test plans for any special tasks they are to perform.

- Discuss communication mechanisms that have been established and how they should be used by participants.
- Discuss the level of support you plan to provide.
- Clarify problem reporting and issue resolution procedures.
- Discuss rollback plans.

Pilot participants need to understand what the pilot entails. Ensure that they understand how the pilot might affect their work. Be sure to address any concerns they might have about the pilot or their role in the deployment process.

As the pilot deployment date approaches, the release management team should provide participants with the following information:

- Scheduled dates for training and for upgrading computers
- Procedures they need to follow before their computers are upgraded
- Contact names and numbers for support

Regular and comprehensive communication with pilot participants helps to ensure that participants are committed to the success of the pilot project. Mechanisms for communicating information about the pilot: Web sites, frequently asked questions (FAQ) pages, procedures, and status reports. As you determine how you will communicate with participants during the pilot, begin creating the required mechanisms.

Document 4: Evaluation Plan

The evaluation plan describes the way the feedback from the pilot participants will be collected and assessed. The evaluation plan contains information on the sources of feedback and how to

collect this feedback. It then continues with a section on how to analyze the results and concludes with a discussion on how to decide to continue with the pilot.

Document 5: Risk and Contingency Plan

The risk and contingency plan describes the risk factors that could prevent the pilot from being deployed successfully. Risks might include the test lab being behind schedule, required hardware or software being unavailable, or participants working on other projects or needing additional training.

Properly addressing risk factors that could prevent a successful deployment in a pilot environment reduces the likelihood of encountering those same problems when you deploy into your production environment.

Document 6: Backup and Recovery Plan

The backup and recovery plan establishes guidelines and procedures to prevent problems that might cause data loss or interruptions to your organization's operations, and to allow recovery as quickly as possible if such events do occur. The backup plan should define procedures for backing up the most recent system and user data. Furthermore, it should define how the restore process using the backup files is tested and executed. In addition, the backup plan should identify who is responsible for performing backups.

Document 7: Pilot Schedule

One of the earliest activities in planning a pilot is to draft a schedule, which is usually included in the master project schedule.

Table 14: Pilot Schedule AGRIVI 2.0

Pilot country	TheFSM Resp	Estimated period for the first pilot iteration	Estimated period for the second pilot iteration	Estimated period for the last pilot iteration
Greece	TÜV AU HELLAS	Q4, 2021	Q2, 2022	Q4, 2022
Netherlands	WFSR	Q4, 2021	Q2, 2022	Q4, 2022

Italy	Valoritalia	Q4, 2021	Q2, 2022	Q4, 2022
Romania	TÜV AU Romania	Q4, 2021	Q2, 2022	Q4, 2022
Cyprus	TÜV AU HELLAS - TÜV AU CYPRUS	Q4, 2021	Q2, 2022	Q4, 2022
Egypt	TÜV AU HELLAS – TÜV AU EGYPT	Q4, 2021	Q2, 2022	Q4, 2022
Jordan	TÜV AU HELLAS – TÜV AU JORDAN	Q4, 2021	Q2, 2022	Q4, 2022

3.3.4. STEP 1D: Developing a Data Management Handling Plan

For each application to be tested a Data Management Handling Plan (DMHP) has to be prepared. The objective of a DMHP document is to gather information that will assist Consortium Partners in accessing the privacy and confidentiality of the applications. This document will establish the legal and ethical standards for data generation, use, storage and sharing on the AGRIVI 2.0 application.

The document is formulated in alignment with the European commission's open data policy and its objective to make research findable, accessible, interoperate and reusable (FAIR). The template is based upon the Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020, detailing:

(a) How project data will be handled;

(b) What data will be collected, processed or generated;

(c) What methodology & standards will be applied; and

(d) Whether data will be shared /made open access/ how data will be curated and preserved.

The following tables aim to gather information on the key feature of the life cycle of data including collection, storage, preservation and archiving.

Table 15: Data Production and Storage AGRIVI 2.0

DATA PRODUCTION AND STORAGE	
Types or categories of data generated/collected	• Farmer contact data • Crop production data • Farmer contracting data • Food processing company data.
Personal or non-personal data	Personal data such as: first name, last name, address, country, phone, email address
Data formats	Data will be collected via end user input in AGRIVI FMS software and stored in a database.
Reproducibility of data	Data backups are created every 3h.
Data size	• Farm data will be collected on a daily basis depending on crop vegetation stage and • the actual farmer's activities in the field/farm. • Traceability data will be collected on daily basis depending on the intensity of farm • activities throughout the season. • Supplier information will be collected at the start of the pilot and will not change • often.
Software tools for creating/processing/ visualising data	AGRIVI– FMS (Farm Management Software).
Use of pre-existing data	Yes; Weather history from DarkSky service
Data storage and backup strategies	Unlimited cloud storage. Data backups are created every 3h.

Table 16: Organisation, Documentation and Metadata AGRIVI 2.0

ORGANISATION, DOCUMENTATION AND METADATA	
Standards for documentation of metadata	Not applicable
Best practice/guidelines adopted for data management	Not applicable
Tools for formatting fata	Not applicable
Directory and file naming convention used.	Not applicable

Table 17: Data Access AGRIVI 2.0

DATA ACCESS	
Risks to data	• Unauthorized access, loss or destruction of data • Data breach
Risk management	• Risk is transferred to data centres where adequate infrastructure for providing service for our core product (farm management software) and the services AGRIVI uses in daily operations is ensured. • To access any user data (e.g. via database access), a person needs to have access to the database, which is regulated by network access restrictions and login credentials.
Data access & requirements for access	User needs to have valid user login credentials for accessing AGRIVI FMS (email address and password).
Correct execution of the data access process	• To access his personal data, a person needs to have valid user login credentials for AGRIVI FMS.

	• To access any user data (e.g. via database access), a person needs to have access to the database, which is regulated by network access restrictions and login credentials. • Correct execution of the access process is checked by Quality Assurance.
Procedures to follow in the event of a data breach	• Internal security & data privacy procedures. • Data Protection Officer in place.

Table 18: Data Sharing and Reuse AGRIVI 2.0

DATA SHARING AND REUSE OF DATA	
Organization/labelling of Data for easy identification	Not applicable.
Data Sharing & Audience for Data Sharing	Not applicable.
Data Sharing Requirements	Subscription and user access required.
Re-use of data	Subscription access is given to the required parties by the subscription owner.
Audience for reuse	Food processing companies
Restrictions on the re-use of data	The data is not shared, can be re-used only by authorized 3rd party systems or if approved by the end user (farmer)
Publication of data	No data is published at the moment.

Table 19: Data Preservation and Archiving AGRIVI 2.0

DATA PRESERVATION AND ARCHIVING	
Archiving of data for preservation and long-term access	Cloud-based database clusters with 3-hour database backup policy.
Time period for data retention	Data is kept for a max. period of 5 years after a user has deactivated his AGRIVI FMS account.
File formats of retained data	MariaDB & MongoDB databases.
Data archives	Not applicable
Long-term maintenance of data (systems and procedures)	• Data is maintained internally. • Customers have the option to request data removal. • Data is automatically purged after a period of 5 years after a user has deactivated his • AGRIVI FMS account.

3.4. STEP 2: Prepare for the Pilot

As shown in Figure 1, after the creation of a pilot plan, the second step in a pilot is its preparation.

3.4.1. STEP 2A: Prepare Pilot Sites

As a first step, the pilot sites need to be prepared. It is important to identify if there are any special security measures, like firewalls or threat protection software, that can block your participants from entering TheFSM application (i.e. AGRIVI 2.0). Make sure to have the application tested before the pilot is scheduled to begin.

3.4.2. STEP 2B: Prepare Pilot Participants

Once you have selected the pilot participants, communication with the participants should be established as early as possible. Your initial contact should open the channel of communication and set participants' expectations. It is important to inform them of the goal of the pilot and to establish clearly what is expected of the participants and what their responsibilities are. Ensure

that they understand how the pilot might affect their work. Furthermore, it is often necessary that a participant fills in a consent form in accordance with the General Data Protection Regulation. You might also want to include a non-disclosure agreement if sensitive data is accessed by the participants.

As the start date for the pilot approaches, prepare participants for their role by keeping them apprised of pilot deployment plans, target dates and the training plan. Provide participants with the following information:

- Scheduled date for the start of the pilot and the deployment plans.
- The type of training the participants will receive and the scheduled date(s).
- Procedures the participants need to follow on their computers to be able run the pilot.
- Contact names and numbers for support
- The (personal) log-in codes, if necessary.

The training of the participants should happen just before the pilot is scheduled to start. The duration and type of training you provide depends on the scope of the pilot, as determined in the training plan. Training might be required for both support staff and pilot participants. If so, train the support staff before the pilot participants, so that the participants can have assistance as soon as the pilot begins if they need it.

If participants need log-in codes to use the platform, make sure to send these to the participants before the training starts.

3.4.3. STEP 2C: Test the Rollout Process

Although the lab environment will be sufficient to debug most problems with the pilot deployment, the pilot provides an opportunity to assess the accuracy of deployment procedures in the actual production environment. Schedule time during the testing phase for the pilot team to develop, document and test the rollout procedures.

3.5. STEP 3: Deploy and Test the Pilot

The third step in developing a pilot is its deployment and testing. After the pilot plan and pilot preparations have been finalized, it is time to start deploying the pilot. Start this process with a trial run of the pilot and make sure to keep tracking the pilot after deployment to monitor its progress closely.

3.5.1. STEP 3A: Conduct a Trial Run of the Pilot

When the pilot is ready to be deployed, it is important to test the deployment of the application with the pilot team first. Performing this trial run of the pilot ensures that any problems with the deployment will be identified before the application has to go live. A trial run should test all elements that will be executed during the official deployment.

3.5.2. STEP 3B: Deploy the Pilot

After any problems identified during the trial run have been solved and a successful trial run has been executed, it is time to deploy the pilot. Make sure to make a back-up of the current system and store it safely. Document the deployment process and use this information to update the pilot plans to do with future rollouts.

3.5.3. STEP 3C: Resolve Issues during the Pilot

During the pilot, the participants perform their regular tasks and they should be able to report any problems they encounter when using the application. They should be able to do so using an incident-tracking system. For more information on how to adopt an incident-tracking system, see 'Step 4A: Obtain Feedback'. Problems that are reported by the participants should be reviewed, prioritized, and fixed according to procedures outlined in the issue resolution plan. Problems can be resolved either by further development of the application and a rollback of the pilot or by incorporating the resolution or workaround as extra information in the training material and by informing the support staff of the resolution or workaround so they can assist the participants to resolve this problem. Note that if a rollback is required, clear communication with the participants is essential of how and when this will happen.

If multiple pilots are scheduled, make sure to evaluate the results of the current pilot and to resolve the problems found before beginning the next pilot.

3.5.4. STEP 3D: Monitor the Pilot

During the pilot, the release management team should continually monitor the pilot looking for bottlenecks and areas that need to be fine-tuned. The more information you collect during the pilot, the more accurately you can evaluate its success and recommend how to proceed with the full deployment to the entire business environment. Have the team check problem reports frequently and look for trends and for problems in the application performance, such as:

- Mention of degradation in performance, such as slower response time.
- Mention of tasks that could be performed before, but not after, rollbacks.
- Mention of tasks that can be accomplished only by using a workaround.

It is important that the pilot team communicates with the pilot participants periodically. Talking with users frequently reveals issues or problems that might otherwise go unnoticed.

As the pilot team receives feedback, they will need to assess problems that pose risk to the overall project. Specifically, they should look for situations that might result in:

- Scope changes
- Cost increases
- Interoperability problems
- Unanticipated downtime

Assessing the severity of these issues allows the release management team to make informed decisions about whether to proceed with the production deployment.

3.6. STEP 4: Pilot Evaluation

As shown in Figure 1, the 4th step in the pilot is its evaluation. During the pilot, participants will provide feedback about how well the design and features are working. This feedback is crucial because based on this information the decision will be made to change the design or process and conduct further piloting tests, or alternatively to continue towards production deployment. In this evaluation plan the following topics will be discussed:

- How to obtain feedback from the pilot participants
- How to analyze the feedback
- Strategies to decide the next step

3.6.1. STEP 4A: Obtain Feedback

Sources of Feedback

The primary source of feedback will be the user, which in the case of AGRIVI 2.0 is a group of individuals with a wide variety of occupations, computer skills and experiences. Because of the variety in the kind of user, it is important to collect three types of information:

- Background information on the user.
- Usability experience.
- Information on specific problems, see the Incident-tracking system in the next section.

For both the background information and the usability experience questionnaires will be used. To measure usability experience the SUS (System Usability Scale) will be applied. Next to the SUS questions, several open-ended questions will be asked. These questions more specifically address the objectives of the pilot as described in table 1 (see Step 1: Creating a Pilot Plan) and may differ per application and country.

The background information questionnaire will have to be filled in before the pilot begins. See Appendix A below for the questionnaire. Based on the type of users and pilot objectives related to the specific applications and countries, additional questions will be added that address these issues. The SUS questionnaire can be found in Appendix B. Finally, besides background information and usability experience, it is important to get information on specific problems. To this end users should be encouraged to report any problems, both big and small. There are several options available for users to provide this feedback, see the Incident-tracking system in the next section.

Methods for Collecting Feedback

Questionnaires

To make it easy for respondents to fill in the usability questionnaire (the SUS) and the background information questionnaire, they will be accessible online. Participants will receive two separate

emails with a brief introduction to why they are asked to fill in this questionnaire and why it matters (see Appendix D for an example email). These emails will include a link to the questionnaire. Follow-up emails will be sent in case of the absence of a response within two weeks (see Appendix E for
an example follow-up mail). For the analysis of the SUS it is important that all questions (1 to 10, marked in red in Appendix B) are answered (this excludes the additional questions at the end). In developing the online webform make sure that participants can only submit their questionnaire when these questions have in fact an answer.
To get information on specific problems that users encounter, an 'Incident-tracking system' should be in place. As a general rule, the kind of incident-tracking system chosen should depend on how it

1) Facilitates the collection process
2) Aid the analysis of the collected information

Incident-tracking System

The preferred way to collect information on specific problems is to set up a website in which users can fill in a standard template for reporting problems (see Appendix C). Alternatively, if this method is not feasible, a general email account can be set up and users can fill in the standard template and send it to that email address. Users should receive some training to fill in the standard template. Instructions will also be sent through email (see Appendix F for an example email with instructions).

Metrics on TheFSM's Architecture and Findability of Information

If based on the three types of information above (background information, usability experience, reported problems) specific issues stand out that require further testing, several options are available depending on the nature of the problems. Below these options are listed.

- Problems related to AGRIVI 2.0 architecture: If serious problems or much of the negative feedback from participants point to the design and layout of the website, Treejack (https://www.optimalworkshop.com/treejack/) or similar tools can be used to assess this issue. Treejack provides a paid service in which we can give participants specific tasks and Treejack will then monitor completion time, success rate, and metrics on directness (do participants need to backtrack a lot or was it a direct success).
- Problems related to findability: If users seem unable to find things on AGRIVI 2.0, tools such as Chalkmark (https://www.optimalworkshop.com/chalkmark/) can be used. Chalkmark works similar to Treejack but is more specific to testing whether users can find something quickly or not.

Metrics on Task Performance

If there is a need to delve deep into a specific problem that cannot be solved by the options presented above, specific tasks that address this issue can be assigned and given to participants in a more controlled environment. An example would be to invite a group of participants to a

location where they together will perform certain tasks with AGRIVI 2.0. During these tasks their performance will be measured.
The following metrics should be analyzed when participants are given a timed task:

- Number of errors
- Percentage of the task completed successfully
- Number of hints/prompts needed to complete the task
- Time to complete the task
- Major problems/obstacles associated with each task

Other optional metrics are:

- Time to achieve a certain level of competence
- Time spent reading/searching vs. working
- Time to recover from an error

Develop an automated logger to measure completion times, mouse clicks and search patterns.
The tasks should be carefully constructed to match the objectives of the pilot. The right metrics should be chosen that will answer these questions. For instance, if you want to know how easy it is to perform a specific task with AGRIVI 2.0, use a metric such as the error rate and time to completion. If you want to assess how effective a tutorial is in teaching a specific task, compare error rates and completion times between participants who used and not used the tutorial.

Storage of Feedback
The results from the questionnaires and the reported problems should preferably be stored in a database, Excel or other similar format. Make sure to create backups in case of technical problems. Keep track of respondents that have not yet filled in their questionnaire.

3.6.2. STEP 4B: Analyse Feedback

After having collected and stored the feedback, the next step is to analyze it. The underlying goal here is to transform the feedback into the metrics and standards used to assess the usability of AGRIVI 2.0 and the objectives of the pilot.
The analysis of the SUS will be described first, followed by the background questionnaire, reported problems and finally, if applicable, specific metrics.

Analysis: SUS
To analyse the SUS, make sure you have the complete dataset in a well-organized structure within your analysis environment (e.g. Excel, R, Python, SPSS). The scoring and interpretation of the SUS is not complicated, but requires careful analysis.
First, it is important to filter out dubious questionnaires. Sometimes respondents rush through a questionnaire and just select answers randomly. This can easily be detected in the SUS based on the organization of the questions:

- All even numbered questions (2, 4, 6, 8 and 10) are negative, meaning that a high score on these questions (e.g. a score of 5 'strongly agree') refers to a negative usability experience.

- All odd numbered questions (1, 3, 5, 7, 9) are positive, meaning that a high score on these questions refers to a positive usability experience.

If respondents score both high on even and odd numbered questions, or show low scores on both types of questions, it may point to an inconsistency in how they filled in this questionnaire. There is no standard for when to remove a respondent who shows such inconsistencies, but as a general guideline when 2 such inconsistencies are present this respondent should be removed from the analysis.
The actual scoring of the SUS should be conducted as follows:

- For each of the odd numbered questions, subtract 1 from the score.
- For each of the even numbered questions, subtract their value from 5.
- Take these new values which you have found, and add up the total score. Then multiply this by 2.5.

The result is a score between 0 and 100. This is NOT a percentage, but simply a raw score. The average SUS score is 68. SUS scores above this number are considered 'above average' and scores below 68 are 'below average'. The table below can be used to further interpret the SUS score.

Table 20: Interpreting the SUS

SUS score	Grade	Rating
> 80.3	A	Excellent
68 - 80.3	B	Good
68	C	Okay
51-68	D	Poor
< 51	F	Awful

Calculate a SUS score for each respondent and then average over these SUS scores to get the final SUS score for the group. Added to the SUS are several questions on positive and negative experiences using AGRIVI 2.0. Analyse these responses carefully and relate them to the background questionnaire and the reported problems to gain further insights into both strong and weak points of AGRIVI 2.0.

Analysis: Background Questionnaire

Questions 1 and 2 can be used to divide users based on experience. Average SUS scores should be calculated for each of the three groups mentioned in question 2 to gain insight into the relationship between computer experience and usability.
Additionally, based on the age information the user group can be divided in two subgroups, namely 40 years or younger and older than 40 years. Average SUS scores for these groups can again be calculated to gain insight into the relationship between age and usability.
Questions 3 and 4 need to be carefully analysed to gain insight into what users like and dislike. The results of question 3 should be cross-checked with the reported problems and the SUS to see if these are consistent.

Analysis: Reported Problems

Every reported problem should be carefully analysed to find out what the actual problem is. Reported problems should be linked to the listed objectives of the pilot (see table 1 in Step 1: Creating a Pilot Plan).
Reported problems can be categorized and these categories can then be counted to get insight into
where the weaknesses and problems of AGRIVI 2.0 are located. More specific analysis of the individual reports can then point to specific problems, which then have to be prioritized. Problems that are both severe and frequent are critical problems that should get a priority and should be included in the preliminary report.

Analysis: Specific Metrics

When specific metrics are collected to gain insight into specific problems, use statistics such as the mean, median, the min and max, and standard deviation to get insight. Data can be grouped over different conditions to make comparisons, for instance did the group that got the tutorial perform better than the group that did not?

Report Findings

Directly after the pilot a first preliminary analysis can be conducted that gives insight into the larger trends and patterns. This analysis can take place in the days following the end of the pilot and results should be sent to the relevant people after at maximum 3 days. The goal here is to identify hot spots (worst problems) that have to be fixed and communicate these (and only these) findings to the development team so they can work on these issues immediately without having to wait for the final report.
A second and more comprehensive analysis can then be finished in 2-4 weeks following the end of the pilot. This final report includes the preliminary findings plus all other relevant material that were not previously covered.
Reported problems can be categorized and these categories can then be counted to get insight into where the weaknesses and problems of AGRIVI 2.0 are located. More specific analysis of the individual reports can then point to specific problems, which then have to be prioritized. Problems that are both severe and frequent are critical problems that should get a priority and should be included in the preliminary report.

3.6.3. STEP 4C: The Next Step

After the feedback has been collected and analyzed, the very important decision has to be made what to do next. If the evaluation process has been conducted well, there will be sufficient information to evaluate whether the delivered design meets the design specification, as well as the business requirements.

Depending on how well the pilot meets the success criteria, there are a number of strategies that can be employed at this point in the pilot deployment:

- Stagger the pilot forward. If the pilot was deemed partially successful, deploy the pilot to the next pilot group or, if your team has planned to conduct multiple pilots, proceed with the next pilot.
- Roll back the pilot. When the pilot is not completely successful, it is often necessary to roll it back so that issues can then be resolved. Typically, a rollback is required when:
    - The production environment contains invalid or problematic data that was not discovered in testing and that caused the deployment to fail. Roll back the pilot to the configuration used before the pilot began, clean up the data, and redeploy the pilot so that the pilot group can continue with its work.
    - Production configurations and settings, such as Group Policy settings or security restrictions, cause problems with the deployment that could not be detected in the test lab. After rolling the pilot back to the configuration used before the pilot began, resolve the problems with the conflicting configurations or settings and redeploy the pilot.
- Suspend the pilot. If the pilot is not successful and issues cannot be resolved easily, suspend the entire pilot, halting all pilot testing until the issues have been resolved and the pilot can be redeployed. This requires rolling the pilot back to the configuration used before the pilot began.
- Patch the pilot and continue. If the pilot is not successful, but the issues raised are easily fixed, issue the same pilot group a "patch," a fix to existing code.
- Proceed to the production deployment phase. If the pilot is deemed successful and ready for production, you can proceed with your plans for full deployment.

The pilot is not complete until the team ensures that the proposed solution is viable in the production environment and that every component of the solution is ready for deployment.

3.7. Supplementary Materials

Appendix A: Background Questionnaire

Background Questionnaire

Thank you for taking the time to participate in our usability test. Your participation will provide valuable feedback about your experience using AGRIVI 2.0.

Before we begin, we would like you to fill out this brief questionnaire so that we will have more information about your experience using the Internet and, more specifically, going through the process of certification.

Name:

Age:

Occupation:

1. How often do you use the Internet?

a. Every day
b. Every other day
c. A few times a week
d. Rarely
e. Almost never

2. How experienced are you in using computers and the internet?

a. Highly experienced, I am at the level of a computer programmer
b. Somewhat experienced, I frequently use computers or the internet
c. Not experienced, I rarely use computers or the internet

3. Which features frustrate you the most when you use a website?

a.

b.

c.

4. Which features make you happy when you use a website?

a.

b.

c.

Appendix B: System Usability Scale

***SUS* — System Usability Scale.**

Name:	
Age:	
Occupation:	

1. I think that I would like to use this system frequently

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

2. I found the system unnecessarily complex

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

3. I thought the system was easy to use

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

4. I think I would need the support of a technical person to be able to use this system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

5. I found the various functions in this system were well integrated

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

6. I thought there was too much inconsistency in this system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

7. I would imagine that most people would learn to use this system very quickly

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

8. I found the system very cumbersome to use

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

9. I felt very confident using the system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

10. I needed to learn a lot of things before I could get going with this system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

List the most negative aspect(s):

1.

2.

3.

List the most positive aspect(s):

1.

2.

3.

Other Comments:

Appendix C: Problem Report

Problem Report

Name:	
Date:	
Browser:	

Indicate the severity of the problem

Mildly annoying 1 2 3 4 5 Very frustrating

Summary of the problem:

Screenshot:

What was the expected result?

What was the actual result?

How to reproduce the problem?

Other comments:

Appendix D: Invitation email to fill in the SUS questionnaire

Dear <name user>,

Are you enjoying AGRIVI 2.0 application? Or is there anything we can do to improve your experience?

We would be grateful if you could spare 10 minutes of your time to answer a short survey and let us know if AGRIVI 2.0 application actually benefits you and how we can improve further.

Here is the link to the survey.

Thank you

<Signature>

Appendix E: Reminder to fill in questionnaire

Dear <name user>,

Two weeks ago you received an email to fill in a short survey about AGRIVI 2.0 application.

Because we have not yet received your answer, we would like to remind you.

We would be grateful if you could spare 10 minutes of your time to answer a short survey and let us know if AGRIVI 2.0 application actually benefits you and how we can improve further.

Here is the link to the survey.

Thank you

<Signature>

Appendix F: Instruction email on how to report problems

Dear <name user>,

In the coming period you will be using AGRIVI 2.0 . In order to find out if AGRIVI 2.0 actually benefits you and how we can improve further, we would like to encourage you to report any problem you may encounter during this time. These reported problems will be carefully analyzed by the development team in order to make improvements to AGRIVI 2.0.

Problems can be reported by going to this link.

Please try to be precise in your descriptions. Screenshots are usually very helpful too!

Try to report one problem at a time. We would like to encourage you to report all problems you encounter, including minor ones.

Thank you

<Signature>

4. FOODINSPECTOR

4.1. Introduction

Recently, "The Food Safety Market" project (TheFSM) was granted in the EU H2020 program (Grant Agreement number: 871703). This project aims to deliver an open industrial virtual data platform that will facilitate the exchange and connection of data between different food safety actors who are interested in sharing information critical to certification. To this end, extensive piloting is foreseen to test the applications and services developed by the project partners and these will be supported and channeled through the infrastructure of FOODINSPECTOR. The primary purpose of a pilot is to demonstrate that the design and products work in the production environment as the designers expected and meet the business requirements. Furthermore, it reduces the risk of encountering problems during the full-scale deployment.

Pilots are foreseen in many countries during the project duration (i.e. Greece, Netherlands, Italy, Romania, Austria, Croatia, Poland, Hungary, Cyprus, Egypt, Jordan) and to ensure optimal pilot execution and product development, a guidance for the participants is essential.

4.2. Overview of Designing a Pilot Project

A pilot is the last and major step to the deployment of services that can be offered to clients and therefore the set-up and design of the pilots is essential to make sure it delivers the information needed for the project to optimise the products being deployed. Within a pilot the product and services are tested in a controlled environment in which the users perform their normal business tasks using the new features. This demonstrates that the design works in the production environment as expected, that users can utilize the system effectively and that it meets TheFSM business requirements.

A pilot consists of the following different activities i) creation of a pilot plan, ii) preparation of the pilot, iii) deployment and test the pilot, iv) evaluation of the pilot results, v) adaptations to the products tested in the pilot, vi) testing the new revised product, vii) finalisation of the product. These steps are shown in the flow diagram below.

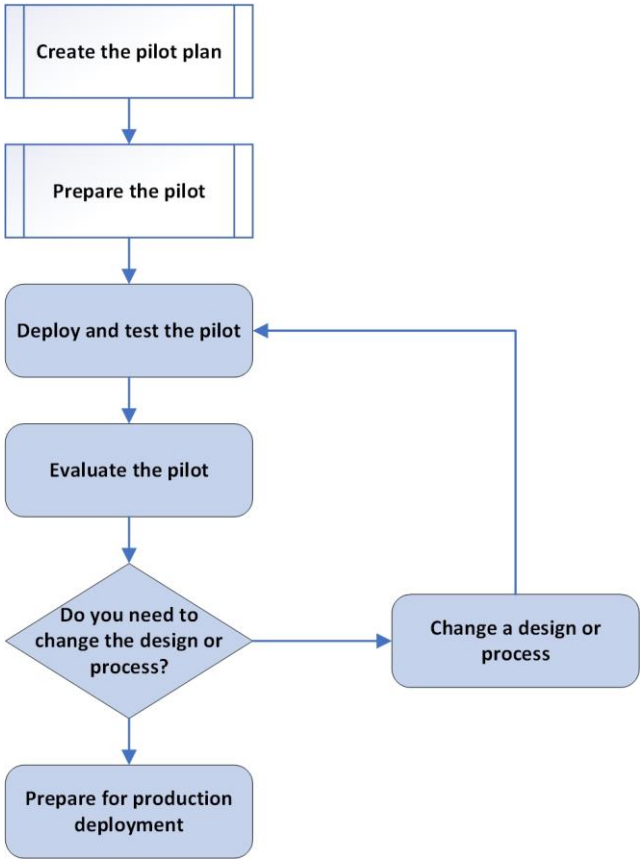

Figure 3: The Various Steps in a Pilot for FOODINSPECTOR

4.3. STEP 1: Pilot Plan

The first step in any pilot is to design a pilot plan. The pilot plan defines the scope and objectives of the pilot, identifies pilot participants, where the pilot will be conducted and the duration. It includes a schedule for deploying and conducting the pilot and plans for training and communicating with pilot participants, evaluating the pilot, identifying risks and contingencies, and other key activities that occur during a pilot deployment. The expected contributions and responsibilities of the pilot participants, including confidentiality and ownership should be made clear in a simple legal agreement.

In TheFSM project, we will conduct pilots for FOODINSPECTOR. The pilots will be implemented in all countries where we have partners (i.e. Greece, Netherlands, Italy, Romania, Cyprus, Egypt, Jordan) during the project period. For each pilot a dedicated pilot plan and materials are needed and will be based on the specificity of the case and products being tested.

Based on the results and needs, it could be that the same case and products are being tested in different countries. All FOODINSPECTOR pilot plans will be based on this guidance document

describing all elements needed to be considered, but not necessarily all features need to be included in each pilot. This will depend on the needs and requirements of each specific pilot.

4.3.1. STEP 1A: Pilot Scope and Objectives

The first step in planning a pilot is to define the objectives and the scope of the pilot.

Pilot Objectives

The goals of TheFSM project are.

1. Food safety data interoperability and semantics: TheFSM will incorporate advanced semantic technologies that can enable highly sophisticated data interoperability and integration capabilities.
2. Multilinguality support for localized food safety applications: TheFSM will offer advanced multilinguality for both textual information and data ontologies, based on the expertise and technology stack of the partners.
3. Automated and smart contracts for food safety data transactions: TheFSM will offer a multi-sided data brokerage service, where actors like farmers can act as "traders" of their data, that can be used for purposes of certification, product risk assessment and verification.
4. Real-time processing and big data storage & visualization: TheFSM will incorporate big data indexing, processing and visualization capabilities to support real-time data processing and food risk model execution.

To achieve these goals, FOODINSPECTOR aims in the pilots are:

- Ensure that FOODINSPECTOR works properly in the business environment.
- Ensure that FOODINSPECTOR meets the business and functional requirements.
- Ensure FOODINSPECTOR meets the baseline business and functional requirement targets that were assessed in testing.
- Test the deployment process.
- Gather information for estimating future support requirements.
- Develop and test end-user training materials.
- Train the installation, support and help desk teams.
- Market TheFSM system to potential users.

Pilot Scope

The scope of the pilots will depend on the business and functional requirements that FOODINSPECTOR has to meet, and a clear description by Agroknow which services and features will be included and which will not. Agroknow will also describe the areas of functionality that the pilot implementation affects, and note to what extent they are affected, and in which situations

they are affected. Other elements to consider are the following:

1. Be sure to address international language issues in the pilot.
2. Do not expect to test every feature or service during the pilot. Focus on the most important business and functional requirements, processes that present the greatest risk, and events that are most likely to occur.
3. Prioritizing the features to be tested in the pilot is particularly important if the team plans to conduct multiple pilots.
4. If certain aspects of your design cannot be covered by the pilot, describe them.
5. Also specify the duration of the pilot, in terms of either time or of the criteria to be met.
6. Be sure to describe how you expect to proceed after the pilot is complete. If you plan to keep some functions in place and remove others for the full production rollout, identify the features that will be removed.

4.3.2. STEP 1B: Pilot Group and Pilot Sites

For a pilot, good candidates have some of the following traits:

- Are able to derive tangible benefit from the tested TheFSM application.
- Play a noncritical role in day-to-day operations.
- Most pilot participants should have the same technical expertise as the average user in your organization.
- Perform a variety of activities using a variety of computer hardware.
- Are enthusiastic about the TheFSM project.
- Are comfortable with technology.

The candidates were selected after having several meetings with partners that indicated an interest in the TheFSM technology. The selection of a pilot site or sites often depends on the type and location of the pilot participants who have been selected and the number of support staff available to help them. Determine the number of pilot sites and the size of the pilot users group were defined based on:

- The objectives of the pilot.
- The countries where we have partners and support staff.
- Specific technology requirements that can be piloted only by using particular sites or user groups.

The table below shows the specific information related to FOODINSPECTOR with regards to the pilot group.

Table 21: Pilot Groups and Pilot Sites FOODINSPECTOR

Pilot	Country	TheFSM Resp	Applications	Group
P1	Greece	TÜV AU HELLAS	Food Inspector	Actors in the food supply chain
P2	Netherlands	WFSR	Food Inspector	Actors in the food supply chain
P3	Italy	Valoritalia	Food Inspector	Wine producers(all chain)
P4	Romania	TÜV AU Romania	Food Inspector	Food processors
P8	Cyprus	TÜV AU HELLAS - TÜV AU CYPRUS	Food Inspector	Actors in the food supply chain
P9	Egypt	TÜV AU HELLAS – TÜV AU EGYPT	Food Inspector	Actors in the food supply chain
P10	Jordan	TÜV AU HELLAS – TÜV AU JORDAN	Food Inspector	All actors in food supply chain

**Participants names and user liaison names are not shown in the table for GDRP reasons.*

4.3.3. STEP 1C: Pilot Plan Documents

The pilot plan includes a number of documents that provide procedures for successfully rolling out the pilot in a business environment. The pilot plan includes the following documents: a training plan, a support plan, a communication plan, an evaluation plan, a risk and contingency plan, a backup and recovery plan, a schedule. Below a more detailed description of these plans is provided.

Document 1: Pilot Training Plan

A training plan describes what the pilot participants need to know before they begin the pilot and describes how you plan to train them. It should include:

- Which features of the new system the participants need to be trained on, the form training will take, and when training will occur.
- A plan to provide training for the support and operations teams, which might need to be more detailed than the training presented to pilot participants.
- An estimation of how long it will take and when to begin. Many organizations find that it works best to provide training just prior to pilot installation.
- Remember to include training in the pilot plan schedule.

Document 2: Pilot Support Plan

The support plan identifies who will provide support for pilot participants, the level of support required, and how users can report problems.

Defining Support Team Roles

For each pilot, we identified who will support participants: project team members such as developers and testers were chosen. The table below shows only specific information related to FOODINSPECTOR.

Table 22: Support Teams FOODINSPECTOR

Pilot	Country	TheFSM Resp	Support team	Support team role
P1	Greece	TÜV AU HELLAS	Mavropoulos Konstantinos, Stelios Vaporidis, Ellie Vaggeli	Head of pilots, Pilots coordinator, Pilots project management
P2	Netherlands	WFSR	Yamine Bouzembrak, Hans Marvin	Project manager, Support project management
P3	Italy	Valoritalia	Francesca Romero, Cristina Micheloni, Andrea Zaffonato, Anna Polloni, Sonia Gastaldi	Use Case Leader, Technical manager, Technical Manager, Technical Manager, Technical Manager
P4	Romania	TÜV AU Romania	George Gheorghiu, Iuliana Demeter, Aurelia Grecu	

P5	Croatia	AGRIVI	Tanja Matosevic, Tanja Folnovic	Project manager, Support team lead
P6	Hungary	AGRIVI	Tanja Matosevic, Tanja Folnovic	Project manager, Support team lead
P7	Poland	AGRIVI	Tanja Matosevic, Tanja Folnovic	Project manager, Support team lead
P8	Cyprus	TÜV AU HELLAS - TÜV AU CYPRUS	Sousanna Charalambidou	Pilots coordinator
P9	Egypt	TÜV AU HELLAS - TÜV AU EGYPT	Mavropoulos Konstantinos, Stelios Vaporidis, Ellie Vaggeli	Head of pilots, Pilots coordinator, Pilots project management
P10	Jordan	TÜV AU HELLAS - TÜV AU JORDAN	Mavropoulos Konstantinos, Stelios Vaporidis, Ellie Vaggeli	Head of pilots, Pilots coordinator, Pilots project management

**emails and phone numbers re not provided in the table for GDPR reasons.*

A contact list for support staff that includes the names, phone numbers, and e-mail addresses of all support staff members for TheFSM was developed. The link to the Support team contact list: https://drive.google.com/file/d/1yqZ5N9L3RQzbIRa-qxbNH1SOTtpXe8OT/view?usp=sharing

Problem Tracking and Resolution

When problems arise during pilot testing, participants must have a way to report them to the team. The incident tracking system, problem escalation process, and issue resolution process your team develops should identify:

- Where participants post their problems.
- How problems will be reviewed, prioritized, and fixed and in what timeframe.
- The escalation process the team will use to notify the appropriate team members.
- How change requests are submitted, approved, tested, and implemented.

Document 3: Communication Plan

The communication plan is used to identify the type of information that will be communicated, to whom it will be communicated, by what means, and how often.

Soon after selecting the participants, meet with them to:

- Obtain their commitment to the pilot.
- Provide them with a timeline for the pilot.
- Clarify participants' responsibilities.
- Describe the type of testing they are to perform.

The table below presents the information required for the communication plan. It is filled with each activity that needs communication during the pilot.

Table 23: Communication Plan FOODINSPECTOR (to be completed)

Activity	Participants	Channel	When	Responsible

Provide test plans for any special tasks they are to perform.

- Discuss communication mechanisms that have been established and how they should be used by participants.
- Discuss the level of support you plan to provide.
- Clarify problem reporting and issue resolution procedures.
- Discuss rollback plans.

Pilot participants need to understand what the pilot entails. Ensure that they understand how the pilot might affect their work. Be sure to address any concerns they might have about the pilot or their role in the deployment process.

As the pilot deployment date approaches, the release management team should provide participants with the following information:

- Scheduled dates for training and for upgrading computers
- Procedures they need to follow before their computers are upgraded
- Contact names and numbers for support

Regular and comprehensive communication with pilot participants helps to ensure that participants are committed to the success of the pilot project. Mechanisms for communicating information about the pilot: Web sites, frequently asked questions (FAQ) pages, procedures, and status reports. As you determine how you will communicate with participants during the pilot, begin creating the required mechanisms.

Document 4: Evaluation Plan

The evaluation plan describes the way the feedback from the pilot participants will be collected and assessed. The evaluation plan contains information on the sources of feedback and how to collect this feedback. It then continues with a section on how to analyze the results and concludes with a discussion on how to decide to continue with the pilot.

Document 5: Risk and Contingency Plan

The risk and contingency plan describes the risk factors that could prevent the pilot from being deployed successfully. Risks might include the test lab being behind schedule, required hardware or software being unavailable, or participants working on other projects or needing additional training.

Properly addressing risk factors that could prevent a successful deployment in a pilot environment reduces the likelihood of encountering those same problems when you deploy into your production environment.

Document 6: Backup and Recovery Plan

The backup and recovery plan establishes guidelines and procedures to prevent problems that might cause data loss or interruptions to your organization's operations, and to allow recovery as quickly as possible if such events do occur. The backup plan should define procedures for backing up the most recent system and user data. Furthermore, it should define how the restore process using the backup files is tested and executed. In addition, the backup plan should identify who is responsible for performing backups, and should include the schedule for all periodic backups and periodic testing of backups, as well as instructions for labeling and storing all backup files.

Document 7: Pilot Schedule

One of the earliest activities in planning a pilot is to draft a schedule, which is usually included in the master project schedule.

Table 24: Pilot Schedule FOODINSPECTOR

Pilot Country	TheFSM Resp	Estimated period for the first pilot iteration	Estimated period for the second pilot iteration	Estimated period for the last pilot iteration
Greece	TÜV AU HELLAS	Q4, 2021	Q2, 2022	Q4, 2022
Netherlands	WFSR	Q4, 2021	Q2, 2022	Q4, 2022

Italy	Valoritalia	Q4, 2021	Q2, 2022	Q4, 2022
Romania	TÜV AU Romania	Q4, 2021	Q2, 2022	Q4, 2022
Cyprus	TÜV AU HELLAS - TÜV AU CYPRUS	Q4, 2021	Q2, 2022	Q4, 2022
Egypt	TÜV AU HELLAS – TÜV AU EGYPT	Q4, 2021	Q2, 2022	Q4, 2022
Jordan	TÜV AU HELLAS – TÜV AU JORDAN	Q4, 2021	Q2, 2022	Q4, 2022

4.3.4. STEP 1D: Developing a Data Management Handling Plan

For each application to be tested a Data Management Handling Plan (DMHP) has to be prepared. The objective of a DMHP document is to gather information that will assist Consortium Partners in accessing the privacy and confidentiality of the applications. This document will establish the legal and ethical standards for data generation, use, storage and sharing on the FOODINSPECTOR application.

The document is formulated in alignment with the European commission's open data policy and its objective to make research findable, accessible, interoperate and reusable (FAIR). The template is based upon the Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020, detailing: i) how project data will be handled; ii) what data will be collected, processed or generated; iii) what methodology & standards will be applied; and iv) whether data will be shared/made open access/how data will be curated and preserved. The following tables aim to gather information on the key feature of the life cycle of data including collection, storage, preservation and archiving.

Table 25: Data Production and Storage FOODINSPECTOR

DATA PRODUCTION AND STORAGE	
Types or categories of data generated/collected	• Inspections and audits results, certificates, food recalls, border rejections, laboratory testing data, companies information, food hazards, food ingredients. • Information about the suppliers, the ingredients, finished products, lab tests, audits results and certificates that a company has • Personal information and preferences of the Food Inspector and the Food Safety expert working in the food company who are using the Food Inspector application
Personal or non-personal data	• Inspection and audit results include business information • The data that is collected from the National Food Safety Authorities includes non-personal information • The application of Food Inspector will also save and manage personal information of inspector and the food safety and quality assurance expert such as Name, Surname, Phone, Job title, ingredients and hazards preferences
Data formats	CSV, JSON, Html, xls
Reproducibility of data	The processed data can be reproduced because we are also storing the original version of the collected data.
Data size	More than 200M food safety data records are collected and processed by Agroknow and will be used in the Food Inspector application. (500GB)
Software tools for creating/processing/ visualising data	Elasticsearch, Python, HighCharts, Java, Spring MVC, HighCharts, ReactJS, Redux, Ruby on Rails
Use of pre-existing data	We are collecting food safety data that are published by the National Authorities (recalls, inspections)

Data storage and backup strategies	Data is stored on the cloud and dedicated virtual machines. Daily incremental back up.

Table 26: Organisation, Documentation and Metadata FOODINSPECTOR

ORGANISATION, DOCUMENTATION AND METADATA	
Standards for documentation of metadata	Internal data model that is based on FRBR [1]. *[1] https://www.ifla.org/publications/functional-requirements-for-bibliographic-records*
Best practice/guidelines adopted for data management	• Best practices defined by GODAN and RDA for managing agrifood data. • EFSA vocabularies for the classification of products and hazards were used. • GS1 standards for exchanging data throughout the supply chain.
Tools for formatting fata	Tools developed by the EU Big Data Grapes project were used to format data. New tools will be developed to meet the requirements of the Food Inspector application.
Directory and file naming convention used.	The data will be organized following the data structure of elasticsearch and the Postgresql.

Table 27: Data Access FOODINSPECTOR

DATA ACCESS	
Risks to data	• Insufficient protection of end user's personal information. • Insufficient protection of business critical information that a company has stored in Food Inspector application

	• Data breach during the exchange of information between different systems
Risk management	• For the protection of end user's (Food Inspector, Food Safety Expert) and company's information we have the following policy • Our basic policy is that nothing outside of Heroku which is our cloud service, has open communication with our database. The database resides on closed hub that can only communicate with our application via the security of Heroku • User data that are stored to production DBs, cannot be accessed by non-production environments. As for the replication of data, currently there is no procedure to ensure that production data are not replicated to other environments.
Data access & requirements for access	We have an authentication and authorization layer to access: • The non-personal data collected by the National Authorities and International organizations • The user personal data and preferences The business critical information such as suppliers, ingredients, products, lab tests, certificates, inspections and audits reports.
Correct execution of the data access process	Data access rights per role are documented. Only authorized Agroknow employees have access to the data.
Procedures to follow in the event of a data breach	• Perform a diagnosis to identify which data is affected • Identify the vulnerability • Restore the correct data from a backup file • Inform the end user and the company for the data breach.

Table 28: Data Sharing and Reuse FOODINSPECTOR

DATA SHARING AND REUSE OF DATA

Organization/labelling of Data for easy identification	• We will have a unique identifier for • Companies • Recalls and border rejections • Products and hazards classification terms • Inspections, audits and certificates
Data Sharing & Audience for Data Sharing	A Data API is provided to get information of certificates, audits, recalls, border rejections, lab tests, inspections, prices
Data Sharing Requirements	Restricted to specific groups. Subscription is needed.
Re-use of data	Registration - access given only by the database owner / Subscriptions
Audience for reuse	Food companies, Research Centers, Commercial partners, Certification Bodies
Restrictions on the re-use of data	The data that is processed and stored by Agroknow and will be used by the applications is not shared and can be re-used only by authorized third party systems.
Publication of data	No data is published right now.

Table 29: Data Preservation and Archiving FOODINSPECTOR

DATA PRESERVATION AND ARCHIVING	
Archiving of data for preservation and long-term access	The processed data is stored on the private cloud and dedicated servers with daily backups.
Time period for data retention	The data will be retained at least until the end of 2025.

File formats of retained data	JSON, CSV, XML, HTML
Data archives	In long term storage cloud components offered by commercial clouds and in back up files stored in Agroknow's dedicated servers.
Long-term maintenance of data (systems and procedures)	Agroknow has a process that ensures the long-term maintenance of the data that is collected, processed and stored by the Food Inspector applications. Automatic daily back-ups of the data that is processed by Agroknow Big Data Platform and stored in the applications are performed. The back up process is monitored and in case of a failure, responsible data managers are notified. The back up files are store in two different cloud infrastructure. There is a data restore process that can be activated when needed. In terms of systems, Agroknow is using the following systems • Backup tools that are offered by the cloud providers (Amazon, Heroku) • Scripts developed by the technology team to back up data that is processed in our dedicated servers

4.3.5. STEP 2: Prepare for the Pilot

As shown in Figure 1, after the creation of a pilot plan, the second step in a pilot is its preparation.

4.3.6. STEP 2A: Prepare Pilot Sites

As a first step, the pilot sites need to be prepared. It is important to identify if there are any special security measures, like firewalls or threat protection software, that can block your participants from entering TheFSM application (i.e. FOODINSPECTOR). Make sure to have the application tested before the pilot is scheduled to begin.

4.3.7. STEP 2B: Prepare Pilot Participants

Once you have selected the pilot participants, communication with the participants should be established as early as possible. Your initial contact should open the channel of communication and set participants' expectations. It is important to inform them of the goal of the pilot and to establish clearly what is expected of the participants and what their responsibilities are. Ensure

that they understand how the pilot might affect their work. Furthermore, it is often necessary that a participant fills in a consent form in accordance with the General Data Protection Regulation. You might also want to include a non-disclosure agreement if sensitive data is accessed by the participants.

As the start date for the pilot approaches, prepare participants for their role by keeping them apprised of pilot deployment plans, target dates and the training plan. Provide participants with the following information:

- Scheduled date for the start of the pilot and the deployment plans.
- The type of training the participants will receive and the scheduled date(s).
- Procedures the participants need to follow on their computers to be able run the pilot.
- Contact names and numbers for support
- The (personal) log-in codes, if necessary.

The training of the participants should happen just before the pilot is scheduled to start. The duration and type of training you provide depends on the scope of the pilot, as determined in the training plan. Training might be required for both support staff and pilot participants. If so, train the support staff before the pilot participants, so that the participants can have assistance as soon as the pilot begins if they need it.

If participants need log-in codes to use the platform, make sure to send these to the participants before the training starts.

4.3.8. STEP 2C: Test the Rollout Process

Although the lab environment will be sufficient to debug most problems with the pilot deployment, the pilot provides an opportunity to assess the accuracy of deployment procedures in the actual production environment. Schedule time during the testing phase for the pilot team to develop, document and test the rollout procedures.

4.4. STEP 3: Deploy and Test the Pilot

The third step in developing a pilot is its deployment and testing. After the pilot plan and pilot preparations have been finalized, it is time to start deploying the pilot. Start this process with a trial run of the pilot and make sure to keep tracking the pilot after deployment to monitor its progress closely.

4.4.1. STEP 3A: Conduct a Trial Run of the Pilot

When the pilot is ready to be deployed, it is important to test the deployment of the application with the pilot team first. Performing this trial run of the pilot ensures that any problems with the deployment will be identified before the application has to go live. A trial run should test all elements that will be executed during the official deployment.

4.4.2. STEP 3B: Deploy the Pilot

After any problems identified during the trial run have been solved and a successful trial run has been executed, it is time to deploy the pilot. Make sure to make a back-up of the current system and store it safely. Document the deployment process and use this information to update the pilot plans to do with future rollouts.

4.4.3. STEP 3C: Resolve Issues during the Pilot

During the pilot, the participants perform their regular tasks and they should be able to report any problems they encounter when using the application. They should be able to do so using an incident-tracking system. For more information on how to adopt an incident-tracking system, see 'Step 4A: Obtain Feedback'. Problems that are reported by the participants should be reviewed, prioritized, and fixed according to procedures outlined in the issue resolution plan. Problems can be resolved either by further development of the application and a rollback of the pilot or by incorporating the resolution or workaround as extra information in the training material and by informing the support staff of the resolution or workaround so they can assist the participants to resolve this problem. Note that if a rollback is required, clear communication with the participants is essential of how and when this will happen.

If multiple pilots are scheduled, make sure to evaluate the results of the current pilot and to resolve the problems found before beginning the next pilot.

4.4.4. STEP 3D: Monitor the Pilot

During the pilot, the release management team should continually monitor the pilot looking for bottlenecks and areas that need to be fine-tuned. The more information you collect during the pilot, the more accurately you can evaluate its success and recommend how to proceed with the full deployment to the entire business environment. Have the team check problem reports frequently and look for trends and for problems in the application performance, such as:

- Mention of degradation in performance, such as slower response time.
- Mention of tasks that could be performed before, but not after, rollbacks.
- Mention of tasks that can be accomplished only by using a workaround.

It is important that the pilot team communicates with the pilot participants periodically. Talking with users frequently reveals issues or problems that might otherwise go unnoticed.

As the pilot team receives feedback, they will need to assess problems that pose risk to the overall project. Specifically, they should look for situations that might result in:

- Scope changes
- Cost increases
- Interoperability problems
- Unanticipated downtime

Assessing the severity of these issues allows the release management team to make informed decisions about whether to proceed with the production deployment.

4.5. STEP 4: Pilot Evaluation

As shown in Figure 1, the 4th step in the pilot is its evaluation. During the pilot, participants will provide feedback about how well the design and features are working. This feedback is crucial because based on this information the decision will be made to change the design or process and conduct further piloting tests, or alternatively to continue towards production deployment. In this evaluation plan the following topics will be discussed:

- How to obtain feedback from the pilot participants
- How to analyze the feedback
- Strategies to decide the next step

4.5.1. STEP 4A: Obtain Feedback

Sources of Feedback

The primary source of feedback will be the user, which in the case of FOODINSPECTOR is a group of individuals with a wide variety of occupations, computer skills and experiences. Because of the variety in the kind of user, it is important to collect three types of information:

- Background information on the user.
- Usability experience.

For both the background information and the usability experience questionnaires will be used. To measure usability experience the SUS (System Usability Scale) will be applied. Next to the SUS questions, several open-ended questions will be asked. These questions more specifically address the objectives of the pilot as described in table 1 (see Step 1: Creating a Pilot Plan) and may differ per application and country.

The background information questionnaire will have to be filled in before the pilot begins. See Appendix A below for this questionnaire. Based on the type of users and pilot objectives related to the specific applications and countries, additional questions will be added that address these issues. The SUS questionnaire can be found in Appendix B. Finally, besides background information and usability experience, it is important to get information on specific problems during the pilot. To this end users should be encouraged to report any problems, both big and small. There are several options available for users to provide this feedback, see the Incident-tracking system in the next section.

Methods for Collecting Feedback

Questionnaires

To make it easy for respondents to fill in the usability questionnaire (the SUS) and the background information questionnaire, they will be accessible online. Participants will receive two separate emails with a brief introduction to why they are asked to fill in this questionnaire and why it matters (see Appendix D for an example email). These emails will include a link to the questionnaire. Follow-up emails will be sent in case of the absence of a response within two weeks

(see Appendix E for an example follow-up mail). For the analysis of the SUS it is important that all questions (1 to 10, marked in red in Appendix B) are answered (this excludes the additional questions at the end). In developing the online webform make sure that participants can only submit their questionnaire when these questions have in fact an answer.
To get information on specific problems that users encounter, an 'Incident-tracking system' should be in place. As a general rule, the kind of incident-tracking system chosen should depend on how it

1) Facilitates the collection process
2) Aid the analysis of the collected information

Incident-tracking System

The prefered way to collect information on specific problems is to set up a website in which users can fill in a standard template for reporting problems (see Appendix C). Alternatively, if this method is not feasible, a general email account can be set up and users can fill in the standard template and send it to that email address. Users should receive some training to fill in the standard template. Instructions will also be sent through email (see Appendix F for an example email with instructions).

Metrics on FSM's Architecture and Findability of Information

If based on the three types of information above (background information, usability experience, reported problems) specific issues stand out that require further testing, several options are available depending on the nature of the problems. Below these options are listed.

- Problems related to FOODINSPECTOR architecture: If serious problems or much of the negative feedback from participants point to the design and layout of the website, Treejack (https://www.optimalworkshop.com/treejack/) or similar tools can be used to assess this issue. Treejack provides a paid service in which we can give participants specific tasks and Treejack will then monitor completion time, success rate, and metrics on directness (do participants need to backtrack a lot or was it a direct success).
- Problems related to findability: If users seem unable to find things on FOODINSPECTOR, tools such as Chalkmark (https://www.optimalworkshop.com/chalkmark/) can be used. Chalkmark works similar to Treejack but is more specific to testing whether users can find something quickly or not.

Metrics on Task Performance

If there is a need to delve deep into a specific problem that cannot be solved by the options presented above, specific tasks that address this issue can be assigned and given to participants in a more controlled environment. An example would be to invite a group of participants to a location where they together will perform certain tasks with FOODINSPECTOR. During these tasks their performance will be measured.
The following metrics should be analyzed when participants are given a timed task:

- Number of errors
- Percentage of the task completed successfully

- Number of hints/prompts needed to complete the task
- Time to complete the task
- Major problems/obstacles associated with each task

Other optional metrics are:

- Time to achieve a certain level of competence
- Time spent reading/searching vs. working
- Time to recover from an error

Develop an automated logger to measure completion times, mouse clicks and search patterns. The tasks should be carefully constructed to match the objectives of the pilot. The right metrics should be chosen that will answer these questions. For instance, if you want to know how easy it is to perform a specific task with FOODINSPECTOR, use a metric such as the error rate and time to completion. If you want to assess how effective a tutorial is in teaching a specific task, compare error rates and completion times between participants who used and not used the tutorial.

Storage of Feedback

The results from the questionnaires and the reported problems should preferably be stored in a database, Excel or other similar format. Make sure to create backups in case of technical problems. Keep track of respondents that have not yet filled in their questionnaire.

4.5.2. STEP 4B: Analyse Feedback

After having collected and stored the feedback, the next step is to analyze it. The underlying goal here is to transform the feedback into the metrics and standards used to assess the usability of FOODINSPECTOR and the objectives of the pilot.

The analysis of the SUS will be described first, followed by the background questionnaire, reported problems and finally, if applicable, specific metrics.

Analysis: SUS

To analyse the SUS, make sure you have the complete dataset in a well-organized structure within your analysis environment (e.g. Excel, R, Python, SPSS). The scoring and interpretation of the SUS is not complicated, but requires careful analysis.

First, it is important to filter out dubious questionnaires. Sometimes respondents rush through a questionnaire and just select answers randomly. This can easily be detected in the SUS based on the organization of the questions:

- All even numbered questions (2, 4, 6, 8 and 10) are negative, meaning that a high score on these questions (e.g. a score of 5 'strongly agree') refers to a negative usability experience.
- All odd numbered questions (1, 3, 5, 7, 9) are positive, meaning that a high score on these questions refers to a positive usability experience.

If respondents score both high on even and odd numbered questions, or show low scores on both types of questions, it may point to an inconsistency in how they filled in this questionnaire. There is no standard for when to remove a respondent who shows such inconsistencies, but as a general

guideline when 2 such inconsistencies are present this respondent should be removed from the analysis.
The actual scoring of the SUS should be conducted as follows:

- For each of the odd numbered questions, subtract 1 from the score.
- For each of the even numbered questions, subtract their value from 5.
- Take these new values which you have found, and add up the total score. Then multiply this by 2.5.

The result is a score between 0 and 100. This is NOT a percentage, but simply a raw score. The average SUS score is 68. SUS scores above this number are considered 'above average' and scores below 68 are 'below average'. The table below can be used to further interpret the SUS score.

Table 30: Interpreting the SUS

SUS score	Grade	Rating
> 80.3	A	Excellent
68 - 80.3	B	Good
68	C	Okay
51-68	D	Poor
< 51	F	Awful

Calculate a SUS score for each respondent and then average over these SUS scores to get the final SUS score for the group. Added to the SUS are several questions on positive and negative experiences using FOODINSPECTOR. Analyse these responses carefully and relate them to the background questionnaire and the reported problems to gain further insights into both strong and weak points of FOODINSPECTOR.

Analysis: Background Questionnaire

Questions 1 and 2 can be used to divide users based on experience. Average SUS scores should be calculated for each of the three groups mentioned in question 2 to gain insight into the relationship between computer experience and usability.
Additionally, based on the age information the user group can be divided in two subgroups, namely 40 years or younger and older than 40 years. Average SUS scores for these groups can again be calculated to gain insight into the relationship between age and usability.
Questions 3 and 4 need to be carefully analysed to gain insight into what users like and dislike. The results of question 3 should be cross-checked with the reported problems and the SUS to see if these are consistent.

Analysis: Reported Problems

Every reported problem should be carefully analysed to find out what the actual problem is. Reported problems should be linked to the listed objectives of the pilot (see table 1 in Step 1: Creating a Pilot Plan).
Reported problems can be categorized and these categories can then be counted to get insight into where the weaknesses and problems of FOODINSPECTOR are located. More specific analysis of the individual reports can then point to specific problems, which then have to be prioritized. Problems that are both severe and frequent are critical problems that should get a priority and should be included in the preliminary report.

Analysis: Specific Metrics
When specific metrics are collected to gain insight into specific problems, use statistics such as the mean, median, the min and max, and standard deviation to get insight. Data can be grouped over different conditions to make comparisons, for instance did the group that got the tutorial perform better than the group that did not?

Report Findings
Directly after the pilot a first preliminary analysis can be conducted that gives insight into the larger trends and patterns. This analysis can take place in the days following the end of the pilot and results should be sent to the relevant people after at maximum 3 days. The goal here is to identify hot spots (worst problems) that have to be fixed and communicate these (and only these) findings to the development team so they can work on these issues immediately without having to wait for the final report.
A second and more comprehensive analysis can then be finished in 2-4 weeks following the end of the pilot. This final report includes the preliminary findings plus all other relevant material that were not previously covered.
Reported problems can be categorized and these categories can then be counted to get insight into where the weaknesses and problems of FOODINSPECTOR are located. More specific analysis of the individual reports can then point to specific problems, which then have to be prioritized. Problems that are both severe and frequent are critical problems that should get a priority and should be included in the preliminary report.

4.5.3. STEP 4C: The Next Step
After the feedback has been collected and analyzed, the very important decision has to be made what to do next. If the evaluation process has been conducted well, there will be sufficient information to evaluate whether the delivered design meets the design specification, as well as the business requirements.
Depending on how well the pilot meets the success criteria, there are a number of strategies that can be employed at this point in the pilot deployment:

- Stagger the pilot forward. If the pilot was deemed partially successful, deploy the pilot to the next pilot group or, if your team has planned to conduct multiple pilots, proceed with the next pilot.

- Roll back the pilot. When the pilot is not completely successful, it is often necessary to roll it back so that issues can then be resolved. Typically, a rollback is required when:
    - The production environment contains invalid or problematic data that was not discovered in testing and that caused the deployment to fail. Roll back the pilot to the configuration used before the pilot began, clean up the data, and redeploy the pilot so that the pilot group can continue with its work.
    - Production configurations and settings, such as Group Policy settings or security restrictions, cause problems with the deployment that could not be detected in the test lab. After rolling the pilot back to the configuration used before the pilot began, resolve the problems with the conflicting configurations or settings and redeploy the pilot.
- Suspend the pilot. If the pilot is not successful and issues cannot be resolved easily, suspend the entire pilot, halting all pilot testing until the issues have been resolved and the pilot can be redeployed. This requires rolling the pilot back to the configuration used before the pilot began.
- Patch the pilot and continue. If the pilot is not successful, but the issues raised are easily fixed, issue the same pilot group a "patch," a fix to existing code.
- Proceed to the production deployment phase. If the pilot is deemed successful and ready for production, you can proceed with your plans for full deployment.

The pilot is not complete until the team ensures that the proposed solution is viable in the production environment and that every component of the solution is ready for deployment.

4.6. Supplementary Materials

Appendix A: Background Questionnaire

Background Questionnaire

Thank you for taking the time to participate in our usability test. Your participation will provide valuable feedback about your experience using FOODINSPECTOR.

Before we begin, we would like you to fill out this brief questionnaire so that we will have more information about your experience using the Internet and, more specifically, going through the process of certification.

Name:

Age:

Occupation:

1. How often do you use the Internet?

a. Every day
b. Every other day
c. A few times a week
d. Rarely
e. Almost never

2. How experienced are you in using computers and the internet?

a. Highly experienced, I am at the level of a computer programmer
b. Somewhat experienced, I frequently use computers or the internet

c. Not experienced, I rarely use computers or the internet

3. Which features frustrate you the most when you use a website?

a.

b.

c.

4. Which features make you happy when you use a website?

a.

b.

c.

Appendix B: System Usability Scale

SUS — System Usability Scale.

Name:	
Age:	
Occupation:	

1. I think that I would like to use this system frequently

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

2. I found the system unnecessarily complex

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

3. I thought the system was easy to use

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

4. I think I would need the support of a technical person to be able to use this system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

5. I found the various functions in this system were well integrated

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

6. I thought there was too much inconsistency in this system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

7. I would imagine that most people would learn to use this system very quickly

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

8. I found the system very cumbersome to use

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

9. I felt very confident using the system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

10. I needed to learn a lot of things before I could get going with this system

STRONGLY STRONGLY

AGREE 1 2 3 4 5 DISAGREE

List the most negative aspect(s):

1.

2.

3.

List the most positive aspect(s):

1.

2.

3.

Other Comments:

Appendix C: Problem Report

Problem Report

Name:	
Date:	
Browser:	

Indicate the severity of the problem

Mildly annoying 1 2 3 4 5 Very frustrating

Summary of the problem:

Screenshot:

What was the expected result?

What was the actual result?

How to reproduce the problem?

Other comments:

Appendix D: Invitation email to fill in the SUS questionnaire

Dear <name user>,

Are you enjoying the FOODINSPECTOR application? Or is there anything we can do to improve your experience?

We would be grateful if you could spare 10 minutes of your time to answer a short survey and let us know if FOODINSPECTOR actually benefits you and how we can improve further.

Here is the link to the survey.

Thank you

<Signature>

Appendix E: Reminder to fill in questionnaire

Dear <name user>,

Two weeks ago you received an email to fill in a short survey about the FOODINSPECTOR application.

Because we have not yet received your answer, we would like to remind you.

We would be grateful if you could spare 10 minutes of your time to answer a short survey and let us know if the FOODINSPECTOR application actually benefits you and how we can improve further.

Here is the link to the survey.

Thank you

<Signature>

Appendix F: Instruction email on how to report problems

Dear <name user>,

In the coming period you will be using FOODINSPECTOR. In order to find out if FOODINSPECTOR actually benefits you and how we can improve further, we would like to encourage you to report any problem you may encounter during this time. These reported problems will be carefully analyzed by the development team in order to make improvements to the FOODINSPECTOR application.

Problems can be reported by going to this link.

Please try to be precise in your descriptions. Screenshots are usually very helpful too!

Try to report one problem at a time. We would like to encourage you to report all problems you encounter, including minor ones.

Thank you

<Signature>