

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

D4.1.2 - Annual Report from Iterative Application Development

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EXECUTIVE SUMMARY

This deliverable reports the process and outcomes of agile and iterative development of the software applications, namely Food Inspector Application, FOODAKAI 2.0 application and the Agrivi 2.0 application. It presents how the software applications that food supply chain stakeholders use, can be connected to TheFSM to support data exchange for the business scenarios identified in WP1 and piloted in WP6. More specifically, the objectives during the second year of the project were to a) iteratively develop functional versions of the applications along with and informed by the piloting activities, b) add new features to each application as informed by the focus groups and pilots, c) interconnect the applications internally and also externally with third-party services, d) test and verify the smooth, robust and complete integration of the various components and services.



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1. INTRODUCTION

This task focuses on setting up an **agile process** that will enable the **iterative implementation**, deployment and **testing** of the various product features with actual users. We designed and put in place a method of work that is executing software development sprints which are then tested with representative focus groups with actual users, in order to get early and continuous feedback on the new product features. An appropriate **mechanism** and **virtual communication tools** were set up to enable weekly team check-ins of all the people involved in developing and deploying product features and components.

During the second year, the above process was tested and enhanced in the context of the pilot activities, and two new processes were added: a) weekly "hackathons" internally in the technology team and also within the user and tech teams, b) an ICE process specifically designed for adding new data sources and data types to the platform and applications.

This document is structured as follows. In the second section we define and analyze the agile development process that is adopted for the development of applications. Third section focuses on the collaboration, communication tools and the routines that are adopted by the technical partners and the development teams of the project. In the fourth section we present a methodology that is used to prioritize the developments using criteria such as impact, confidence and ease. The process for testing the new developments is presented in section 5. In the last section we present the outcomes of the agile development process for the three applications that will be developed in the context of the project.

This deliverable uses the outcomes reported in deliverable D1.1 for the user and business requirements, the recommendations of D6.3, as well as the overall architecture of TheFSM Platform presented in deliverable D3.1. In addition to that, the second release of the platform D3.2 is used to develop the interaction of the applications with the TheFSM platform.



2. AGILE APPLICATIONS DEVELOPMENT ITERATIVE PROCESS

The adopted agile development process includes the following steps

- 1. **Requirements identification:** Based on the business scenarios defined in WP1 a set of user stories were documented and shared with the development team from the partner that leads the development of the application
- 2. **Design**: Based on the user stories the development team is creating a set of wireframes that gives a good idea of the operations that will be developed. The wireframes are presented to a focus group of users to validate that the designed operations will bring value to the end users. Based on the feedback we are creating the final version of wireframes
- 3. **Development:** The final wireframes are used to start the development of the alpha version.
- 4. **Testing:** the alpha version is tested from the technical and usage point of view by internal teams of technology partners.
- 5. **Deployment:** Based on the testing results the development team is deploying the alpha version of the application.
- 6. **Review**: the alpha version is open for testing and review by the focus groups and the feedback is collected using interviews and online questionnaires.

The outcomes of the review are the input for the design and deployment of the beta version. The iterative process is repeated for the beta version and for the first official release of the application (1.0).



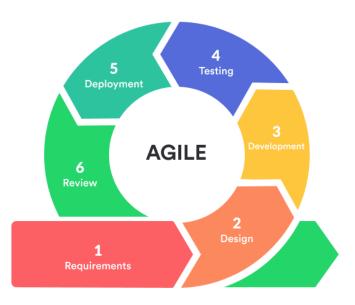


Figure 1: The development iterative process followed in TheFSM project for the implementation of applications

The requirements identification step is the sprint 0 and it creates a set of personas and user stories which are added in the sprint backlog. All the stories are organized in Epics (software modules) and the duration of each sprint is from 2-4 weeks. The outcome of each sprint is one or a couple of features that are developed in their alpha version. The end users may be involved in a sprint, if necessary, to provide clarifications about the required functionality of a feature.

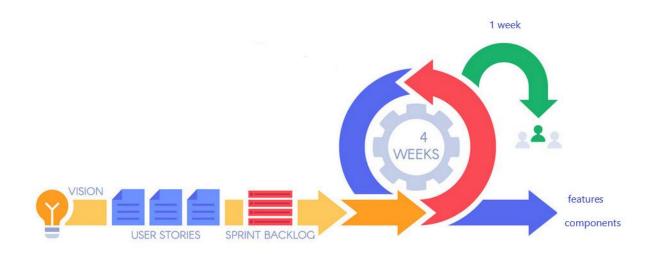


Figure 2: The process that is used to transform users' stories to features



3. ROUTINES AND VIRTUAL COMMUNICATION TOOLS

3.1. MEETINGS

3.1.1. The Program Increment (PI) planning meeting

Following the best practices of the agile development process, every three months we are organizing a Program Increment (PI) Planning meeting, which is a cadence-based event that serves as the heartbeat of the Agile Process, aligning all the teams on the main objectives of the project. This should be a face to face meeting but due to pandemic it is organized online using virtual meeting tools like Zoom and Microsoft teams. To design the program increment for each software application, the development team is using the outcomes of the TheFSM project plenary meeting.

Using the key outcomes that we want to achieve within the next increment, the development team is designing all the iterations (sprints) of the increment. Dependencies between the development teams are identified and discussed to make sure that the work will be completed on time. The potential risks are identified and mitigation actions are planned to ensure that high quality developments will be delivered.

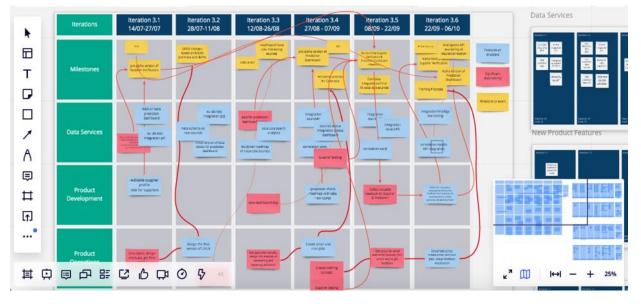


Figure 3: Program Increment planning board

3.1.2. Biweekly sprint planning meetings

Every two weeks, the development teams of the applications together with the partners responsible for the platform development and the data modeling, meet to discuss the progress of the last sprint and to plan the focus of the next sprint. The biweekly meetings include a



retrospective session to discuss what the main learnings from the last sprint were. In addition to that, we are reporting the progress towards the project increment using the key results that are defined after each plenary meeting. The progress of the work in each sprint is monitored using the sprint burndown chart.

Sprint burndown chart



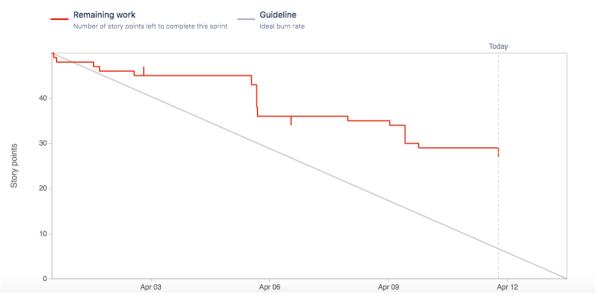


Figure 4: Sprint burndown diagram

3.1.3. Weekly Hackathons

As a direct output of the piloting activities, the need for an intermediate meeting that links the biweekly sprint planning meetings was identified. The idea was for a working-session-type meeting, where the tech partners and invited user partners work together on specific technical tasks to overcome blocking issues. Special focus was given to the timely address of any issues that hindered the correct execution of the piloting activities.

3.1.4. Daily Check Ins (Scrums)

The development teams of each TheFSM application meet every working day at the same time to discuss the most important objective of the day and if there are any issues that are blocking the progress of the developments for the sprint.

3.2. Communication and collaboration tools

To organize our work and to share code and documents we use the following tools

- Trello
- Jira
- Gitlab



- Bitbucket
- Google drive

To communicate we use the following tools

- Microsoft teams
- Zoom



4. DEVELOPMENT PRIORITIZATION

In order to select which features are the most important ones to start implementing we use the ICE score prioritization method¹. The method is based on the following three factors

- **Impact** demonstrates how much your idea will positively affect the key metric you're trying to improve.
- **Confidence** shows how sure you are about Impact. It is also about ease of implementation in some way.
- **Ease** is about the ease of implementation. It is an estimation of how much effort and resources are required to implement this idea.

The development teams are using the following simple rules to run effective the ICE scoring method

- Keep it simple
- Make sure you have cleared the objectives and the focus for the specific period
- Involve leaders from all the departments and partners to select the priorities for the key results
- Use a Lean Canvas to further analyze a product feature
- The ideas which are selected as the ones with high priority to be implemented have a project manager who is responsible for monitoring the progress and validating the outcomes of development.
- For features which have scored in ICE very similarly, we perform an analysis using a Lean canvas

During the second year, the aforementioned process was enhanced and made more specific especially for the integration of new data sources and data types. To ensure the quality and validity of new data, we focused on collecting and processing information only from trusted sources. This cannot be an automated process and is thus highly controlled and based on specific criteria. More specifically, we analyze each data source using the following set of criteria:

- **Authority:** Who publishes the information and which is the authority level of the organization in the food safety and fraud area
- **Openness**: If the data are published under an open license and permit commercial exploitation
- **Quality:** Which are the metadata that the data source provides for the food safety incidents, how reliable and consistent are they
- **Frequency of updates:** How frequent the data is updated and how fresh and relevant they are
- Format: Which is the format of the data and how easy is to process the specific format

¹ Ref: https://www.productplan.com/glossary/ice-scoring-model/



- Accessibility: If it is possible to get the data in an automated way, through scrapping, an RSS feed or using an API
- **Relevance:** if the data published by the source is relevant to risk intelligence and other TheFSM activities and goals



5. TESTING OF NEW FEATURES

The beta version of the applications (FoodInspector, FOODAKAI 2.0, Agrivi 2.0) are tested both by internal teams of each partner and by end users of the focus groups. During the second year, the applications and their specific features were also demonstrated, tested, and evaluated by internal and outside key stakeholders. The outcome of these pilot activities directed the development of the new features reported in the following sections, but also allowed us to make many of the alpha version features more robust and feature-complete. The relevant feedback and all issues identified during the testing are reported using Jira and Hubspot. Any issue received is stored in the internal ticketing system that the application owners have. The feedback from the end users is processed and classified into one of the predefined ticket categories (e.g., system issue, data accuracy issue improvement request, new functionality request).

During the second year, and through the increased internal testing and external use stemming from the pilot activities, the need for a more detailed and robust process for identifying, reporting, and correcting software bugs was identified. We elaborate on this in the following sections.

5.1. Bug reports during testing

To ensure the quality of the delivered features and data, we are following a multilevel testing approach.

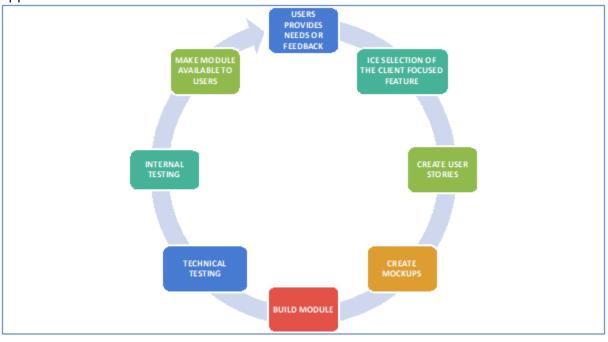


Figure 5: Product development cycle

As one can see in the product development cycle (Figure 5), there are three steps that focus on the testing: technical testing, internal testing and user testing. More specifically, our testing approach includes the following components

- Automated technical testing which is conducted during the implementation
- **Manual human testing** by the software development team during the development based on the user stories (D1.1)
- A dedicated sprint for manual human testing of the new products or features by internal **Quality Assurance teams**
- Testing by a small group of end users (**User Acceptance Tests**) that were involved at the stage of identifying the user stories (focus group members)

All the issues identified during the testing are reported using Jira Software as bug reports. The issue reported by the end users is processed and classified into one of the predefined categories (e.g., system issue, data accuracy issue, improvement request).

5.2. Bug reports by end users

The reported bugs by end users are stored in our internal ticketing system. We use a specific set of fields to organize the identified bugs as presented in the following table.

Field	Value description	
Request text	The actual issue reported by the user	
Туре	Classification of the issue (functionality issue, data accuracy issue, missing data)	
Status	Resolved/ Not resolved	
User	Who reported the issue	
Company	The company of the user	
Date	The date and time the bug was reported by the user	

Table 1: Fields used to store and organise user bug reports

Responsible for collecting and tracking the reported bugs is the Product Manager of each product (Food Inspector, FOODAKAI 2.0, Agrivi 2.0). The list of product bugs is hosted in a CRM's ticketing system (Hubspot) and it can be accessed by all the members of TheFSM team. The HubSpot system was selected as the tool to organize, manage and track all the reported bugs. The ticketing system is automatically linked to the Jira Software system and any reported issue is assigned to product development teams and included in the current sprint.



The bugs (issues) are reported by the end users through three channels: support email, live chat tool, or through live feedback during piloting activities.

For each product we have an escalation matrix which defines when escalation should happen and who should handle incidents at each escalation level. An example of the escalation matrix for FOODAKAI 2.0 product is presented in the following table. Any issue can be submitted to the customer support team using the support email and/or the live chat tool. Any issue can be submitted to the customer support team using the support email and/or the live chat tool. Customer success manager tracks all the issues and escalates them when necessary to the corresponding level.

Escalation level	Responsible	Channel	How/When to Escalate
1	Customer Support Team		Difficulty in using the platform, product or data issues
2	Customer success manager		Training & onboarding issues, reporting issues, contact points, feedback from end-users
3	Head of customer success	<u>m</u>	New service request, feedback from the management, product value issues.
4	Head of FOODAKAI product		Serious issue of the technology that needs time to be resolved or data/ New features request

Table 2: Escalation matrix for FOODAKAI 2.0 product

5.3. Tracking product bugs and errors

Any reported bug (issue) is stored in TheFSM internal ticketing system by adding information about the date, the end user that reported the bug and the type of the issue. The bug is processed and classified into one of the predefined ticket categories (system issue, data accuracy issue). According to our internal agreed-upon SLA, the TheFSM team is acknowledging the receipt of the report within 24h and works on their appropriate reply and resolution within 3 business days. The per-product Product Manager is responsible to track the time from reporting to solving the issue.

The Product manager is working with the software development and data teams for the resolution of the bug. S/He assigns the product bug to one of our software engineers who have a buffer in his/her sprint for bugs resolution. The status of the resolution (To do, In progress, Done) is updated by the software engineer in Jira Software. After the issue is resolved, the software engineer is updating the status of the issue to Done (Resolved) and the status is automatically updated in the ticketing system.

In addition to the bugs reported by users, we are also using a system for logging system errors. More specifically we are using Coralogix¹, a SaaS platform that analyzes log, metric, and security data in real-time and uses machine learning to streamline delivery and maintenance processes. Coralogix can aggregate and analyse all the logs of a product, it automatically notifies the product development team for any error that is logged and sends corresponding alarms and daily reports. Performance monitoring of the product is done using the Scout system².

Using both human experts testing and system logging/monitoring services we ensure that all the bugs and errors are correctly tracked.

5.4. Correcting product bugs

In TheFSM we developed and agreed on a specific process which is used to correct the product bugs that are identified by end users. The steps of this process for each reporting channel are presented in the following table.

Step	Channel 1: Support chat	Channel 2: email
1.	End user reports the bug using the chat tool	End user reports the bug through support email
2.		Product manager receives the report and adds it from the Hubspot conversation to HubSpot tickets module and s/he links the report to the specific user (name, company).
3.	Product manager thanks the user for reporting the issue and informs him/her about the next steps.	Product manager thanks the user for reporting the issue and informs him/her about the next steps.

Table 3: Channels for collecting the feedback



4.	Product manager assigns the issue to a software engineer of the product development team.	Product manager assigns the issue to a software engineer of the product development team.
5.	on the resolution of the bug. S/He deploys the solution on the testing environment and request the internal Quality Assurance team to	Software or/and data engineer starts working on the resolution of the bug. S/He deploys the solution on the testing environment and request the internal Quality Assurance team to check that the solution is working correctly.
6.		After successfully testing and deploying the solution on the production environment, Product Manager sends an email to the end user that reported the bug and informs him/her that the issue was resolved.



6. OUTCOMES OF AGILE DEVELOPMENT PROCESS

This section reports the developments during the second year of TheFSM for the three end-user applications, namely

- **Food Inspector** which deploys and validates the software application that inspectors use in the context of certification scenarios,
- **FOODAKAI 2.0** which further extends and validates the FOODAKAI software application that food companies use in the context of risk monitoring, traceability and prediction,
- **Agrivi 2.0** which further extends and validates the AGRIVI software application that food processors and their contracted suppliers use in the context of supplier data sharing scenarios
- 6.1. Food Inspector Application

This section focuses on the development plan and the outcomes of the agile development process for the Food Inspector application during the second year of TheFSM project.

6.2. Application development plan

The plan for the development of the Food Inspector application is presented in table 1. In the second year, we focused on delivering a functional beta version that was extensively used during the pilots of WP6 and incorporated the updated requirements that will be reported in the second version of D1.1 as well as the recommendations of the second version of D6.3.

Task	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
Company Dashboard												
Inspector Dashboard												
Daily Alerts												
Hazards Dashboard												
Risk Dashboard												
Agrivi 2.0 Integration												
GLOBALG.A.P. PoC												
Beta Version Release and Pilot Testing												

Table 4: Development plan for the Food Inspector Application



6.3. Developments status

During the second year of the project, we focused on gradually delivering the functionalities illustrated in the wireframes and mockups presented during the first version of this deliverable. More specifically, we developed and tested through the piloting activities the following features:

- Develop a first functional version of the Company Dashboard, where the inspector can get an overview of the company that is to be inspected, including: a) certificates and other documents that the company holds, b) previous inspections and recalls that the company has been subjected to, c) an overall risk profile for the company that encompasses all relevant aspects
- Develop a first functional version of the Hazards Dashboard, where the inspector can be informed for the particular hazards associated with a particular ingredient / product
- Develop a first functional version of the Risk Dashboard, where the inspector can be informed for the level of expected risk for a particular ingredient or product
- Establish the integration with Agrivi 2.0 for document exchange prior to an audit and also lay the groundwork for connection with a third-party service (GLOBALG.A.P.)

6.3.1. Search for company profiles prior to inspection

Before a specific inspection, the inspector can search for a specific company to retrieve a succinct company profile (see Company Dashboard in later sections). Using the provided advanced filters, the inspector can also search for companies that meet specific criteria, e.g., companies from Greece that produce meat products, and select any one to delve deeper.

In the following figure, the main screen of the module that can be used to perform the market research is shown. By clicking on a company name, the inspector is redirected to the Company Dashboard.



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DASHBOARD	Company Verification	on			
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A HAZARDS		SHEOARD	COMPANY CHECK	S MY COMPANIES	
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RISK		an new of the second			
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PREDICTIONS		0	Advanced Search Filters		Reset Filter
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	÷	I≣ incident types From	то		
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	Sort by failet.	Show 20 ~			g 1 - 20 out of 26 1 2)
Online - Chail with us	Βρίσκεστε εδώ: Αρχική Εν Ε.Φ.Ε.Τ. και ειδικότερα η Π «Επίσημος Έλεγχος Μικροj	cordon bleu by Hellenic Delicacies SA from Greece ημέρωση Δελτία Τύπου Αθήνα 23 Δεκεμβρίου 2 εριφερειακή Διεύθυνση Κεντρικής Μακεδονίας, Ιδολογικών Κριτηρίων Ασφάλατιος Τροφίριων» έτ φαλοχομι (ποzen cordon bleu) more tags ~	κατά τη διενέργεια ελέγχων στο πλα	ίσιο του Προγράμματος ι προϊόντος με στοιχεία: Hellenic Food Au	

Figure 6: Search Company

6.3.2. Company Dashboard

When the inspector clicks on a company name, the Company Dashboard appears. The main goal of this dashboard is to aggregate all the information that the inspector needs prior to an audit with a specific company. He/she is able to see information that is already aggregated for the specific company, but the inspector will also be able to invite the company to submit more information through an integration link with the Agrivi 2.0 application (see Figure 8 and later sections)



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Meduan 13 0 dients based risk Incidi dification number: 08447 din: Greece tion (my customization): known as: VegLand S.A., V dients & materials: ambers ~ tomatoes ~	High ¹⁵ 0 Low ents based risk Greece country 976000005 greece fegLand SA					
dients & materials (my c sloes						
ab Tests (Above lim	it) ©				Lab Tests	DF
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Pesticide monitoring in tom	atoes from greece	0.013	2019	1		
Pesticide monitoring in tom	atoes from greece	0.890	2019	₽ 1,000x		
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needed		letter	-	0.75 0.5		
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nspections with no a	ction indicated O				 Impection 	
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No inspections were found						
were found	RT Hazards Risk Report					
	the second second			7-years risk l	based on incidents	

Figure 7: Company Dashboard



ertifications ^①					8
Name			Date	Auditor	View
ORGANIC CERTIFICATE MOUNTAIN HERBS MYLONAS (CHRISTOS		2019	ΔΗΩ	VIEW
ORGANIC CERTIFICATE MOUNTAIN HERBS MYLONAS	CHRISTOS		2020	ΔΗΩ	VIEW
ORGANIC CERTIFICATE MOUNTAIN HERBS MYLONAS	CHRISTOS		2021	ΔΗΩ	
ertificates of analysis \mathbb{O}			2021	Auli 18 A	D VIEW
ertificates of analysis ${\mathbb O}$	Date		Agency		
ertificates of analysis ① Name		19			
ertificates of analysis Name Τσάι ανάλυση μικροβιολογική	Date		Agency		View
	Date 17-05-20	19	Agency CADMION		View B VIEW

Figure 8: Documents held by inspected company

6.3.3. Inspector Dashboard

The Inspector Dashboard highlights the most important information that the inspector needs to know about the companies which he/she audits and/or certifies (risk levels, historical incidents record and past inspections). All entries are interactable and the inspector can click on them to get more details (Figure 10). An overview and visualization for the certificate statuses that the companies hold and the distribution and type of audit results will also be made available at later versions of the application. The inspector can add new companies to appear in the dashboard but also to continually monitor them and receive email updates and alerts (Figure 11).



		10										
(Company Ver	ification										
		III COMPANIES DAS	teeno ann 👁			PI COMP	WY CHECK		B . 47	COMPANIES		
	Use the Company	Risk Assessment Dashboard to pri	ioritize your companies based on their food safety perfor	mance. Identify the comp	anies that a	re at high r	isk and focus your audits to areas that are more susceptit	le to risk.				
	Risk assessment tal	ale for my companies O							+ 40	DD COMPANIES	B DOWNLOAD	≡ RISK SET
	Search	Incidents Plak	****************	Fiecalts			PROSECUTION	Warning Letters		Overall Risk S		
.	Company	Bicidents Plas	Ingredients Pilisk	45	Border R	gectors	Inspections 17	Warning LaCors		1267	lore	
•	Lactalla			28	53		15			109		
	Companies Incident	is Risk ©					Companies Ingredients Risk ©					
			Fight 6.075 (III) Law 9.095 (III				INFO		Medium			
							e nagiti				141111	
							eraer.					
	Incidents for my co	mpanies ©					rour-				-	
	Incidents for my con Time	mpanies ©	Enter 30307 (7	Company	Published	Country				Company	Tariats	Country
	Title Deterioration and moul	ds and abnormal smell in wheat by CARGE	L LIMITED from Canada	CARGILL LIMITED	22/12/2021	1+1	Inspections and warning letters for my companies O			Cargli	Published 13/10/2016	-
	Title Deterioration and moul Listeria monocytogene	ds and abnormal smell in wheat by CARGE s in brie cheese by Lactalis Deutschland Gr	11 LAVITED from Canada mEH from Germany	CARGEL LIMITED	22/12/2021		Inspections and warning letters for my companies. If the network of the second se			Cargil Cargil	Puttored 13/10/2016 13/10/2018	-
	Title Deterioration and moul Listeria monocytogene Censels containing glut	ds and abnormal smell in wheat by CARGE s in brie cheese by Lactulic Deutschand Ge an and products thereof in cashese by Carg	LLMITED from Canada neH faits Germany (If from United States	CARGUL LIMITED Lactals Deutschand GmbH Cargil	22/12/2021 19/11/2020 3/1/2020	-	Imprecisions and warning letters for my companies Tom To action indicated in precisions and diversal domains for Cas To action indicated in float part cases after the most of the case of the most of the cases after the cases after the cases of the cases of the cases after the cases of the case of the cases of			Cargil Cargil Cargil	Published 15/10/2016 13/10/2016 13/10/2016	-
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Figure 9: Inspector/Auditor dashboard

Inspection THURSDAY no action indicated in pesticides and chemical contaminants for Cargill Co 13 Announced by: FDA Inspection Classification \mathbb{Z}^{n} OCTOBER Inspection Outcome: no action indicated, pesticides and chemical contaminants 2016 Company: Cargill Origin: Type: Inspection Classification United States OTHER INCIDENTS AND INSPECTIONS FOR CARGILL Title Announced by Туре Date Deterioration and moulds and abnormal smell in wheat by CARGILL LIMITED from Canada incident Ministry of Health, Labour and Welfare 22/12/2021 Japan Cereals containing gluten and products thereof in cashew by Cargill from United States FDA 3/1/2020 incident no action indicated in foodborne biological hazards for Cargill Co FDA Inspection Classification 13/10/2016 Inspection FDA Inspection Classification 13/10/2016 no action indicated in food and color additives petition review for Cargill Co no action indicated in pesticides and chemical contaminants for Cargill Co Inspection classification FDA Inspection Classification 13/10/2016

Figure 10: Inspection details



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	la Consolidated			1	Ť	^
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Milk Co	mpanies			¢.	Ŵ	^
Company	dentifi	ication Number	Plant Location		Ad	ction
Lactalis						Î

Figure 11: Continuously track a new company

6.3.4. Daily Alerts

Based on the companies that the inspector has decided to actively monitor, he/she receives daily personalized email alerts. These alerts highlight important and emerging/increasing incidents and risks that are relevant to the companies he/she monitors and their specific supply chains. An emerging risk is a new risk that has not recently appeared in the supply chain of the relevant industries, and an increasing risk is a known risk whose frequency and number of incidents is increasing lately.



YOUR DAILY INCIDENT ALERTS

TITLE		SOURCE	DATE	MORE
Biphenyl and emons from	chlorpyrifos-methyl in fresh Turkey	RASFF	16-01-2022	Info
Chlorpyrifos	in fresh lemons from Turkey	RASFF	16-01-2022	Info
	c acid unauthorised and I ingredient (fraud) in cherries a	RASFF	16-01-2022	Info
Chlorpyrifos	methyl in lemons from Turkey	RASFF	16-01-2022	Info
Chlorpyrifos	in fresh lemons from Turkey	RASFF	16-01-2022	Info
Chlorpyrifos Furkey	methyl in fresh peppers from	RASFF	16-01-2022	Info
	products thereof and cashew in Spain	RASFF	15-01-2022	Info
nut mix from	MERGING RISKS FOR	REPORT	ED INGREDIENT	S
nut mix from	Spain MERGING RISKS FOR	REPORT	ED INGREDIENT pork meat	S
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6.3.5. Get prepared for audits: Hazards Dashboard

The inspector can remain informed with up-to-date information on the hazards that are relevant to ingredients or products he/she inspects. By using the Hazards Dashboard and searching for a particular ingredient, the inspector can see a set of visualizations on the types of hazards that historically appear in the selected ingredient, corresponding incidents per year, and the geographical origin of the reported incidents connected to the selected ingredient.



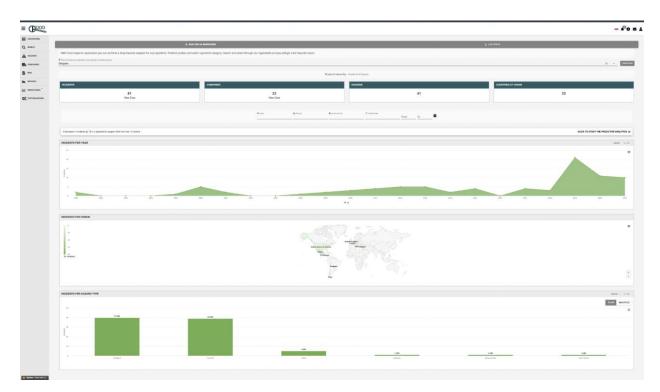


Figure 13: Hazards Dashboard

The hazards type bar chart is highly interactive and the inspector can click on any chart to drill down into more particular hazard types (Figure 14 illustrates this process: chemical > alkaloids > PYRROLIZIDINE ALKALOIDS (PAS)).

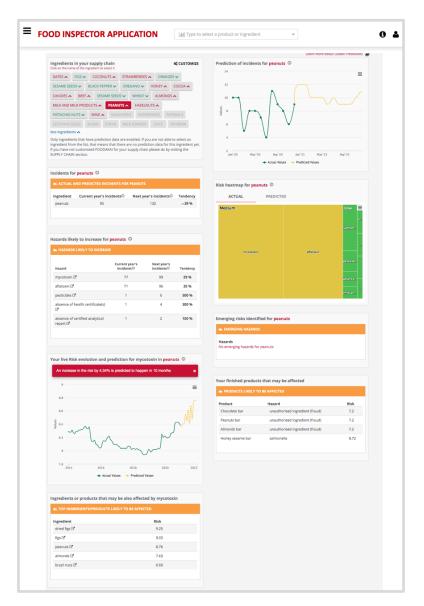




Figure 14: Drill down through historical incidents per hazard

In a subsequent version, the inspector will also be able to see the predictive analytics for the ingredients of the company and to identify increasing and emerging issues that may affect the safety and quality of the company's products.







6.3.6. Get prepared for audits: Risk Dashboard

Apart from the particular hazards, the inspector can also get a numerical representation of the risk associated with each potential hazard, but also overall for a product he/she will be inspecting. By adding the ingredients that comprise a product (Figure 16), he/she is then able to run a comprehensive risk analysis (Figure 17). The risk analysis takes into account all the ingredients that comprise the product, all the relevant hazards and the historical frequency of their incidents, and



presents both an overall risk score for the product as a whole, but also an interactive heatmap that highlights the risk per hazard per ingredient in the product.

					··· 🕫 🖬 🕹 🛓
DASHBOARD	Risk Analysis				
A HAZARDS		RISK		MY PRODUCTS	
	Create here the products and use them in th	Edit Product			
RISK	ADD PRODUCT - save your product to Food inspec	Product Title(*): Cereal bar Shared:(*): Com Product's ingredients:			~
Lill PREDICTIONS	MY PRODUCTS (1)	Ingredient	origin		^
	Search: Sort by: Dr	,≱* required Almonds × ✓	•	1	
	Product	,∳*required Tahini X ▼	•		Actions
	Cereal bar 🖬		<u>w</u> •	-	/##
		∲* required Dried Figs × ▼	* *	1	
			46) 489 W	0	
	COMPANY'S PRODUCTS (2)		SAVE CHAI	NGES	^
	Search: Sort by: Da.	e opuarau			

Figure 16: Add a product for risk analysis

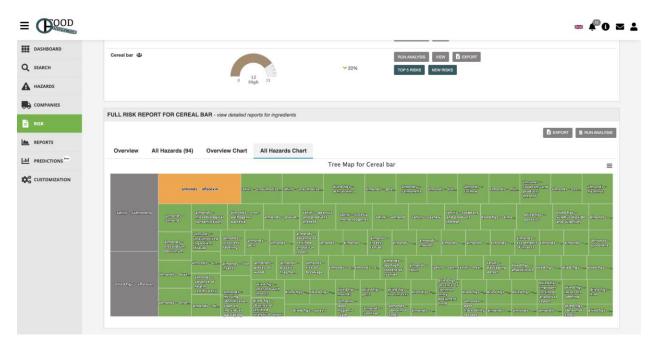


Figure 17: Analyse the level of risk for a product

6.3.7. Data Exchange prior to audit/inspection

Needed documents prior to an inspection are currently made available to the inspector (and the FoodInspector application) through an integration link with the Agrivi 2.0 application through the



TheFSM Platform. The Agrivi 2.0 document storage and sharing features permits the exchange of information about the company to be inspected, and specifically:

- Facilities that they have
- Certificates that they have
- Information about products and ingredients that they are using in the product
- Lab test results and Certificate of Analysis

More specifically, the process for making this information available to the FoodInspector application goes through the following steps:

- 1) Acquisition of a secure authentication token from TheFSM Platform that identifies the request as originating from a verified application (in this case, FoodInspector)
- 2) Request of the available document types from the Agrivi 2.0 application
- 3) Transfer of the actual documents from the Agrivi 2.0 application

				2
ertifications ①				
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ORGANIC CERTIFICATE MOUNTAIN HERBS MYLONAS CHRI	STOS	2019	ΔΗΩ	VIEW
ORGANIC CERTIFICATE MOUNTAIN HERBS MYLONAS CHRI	STOS	2020	ΔΗΩ	VIEW
ORGANIC CERTIFICATE MOUNTAIN HERBS MYLONAS CHRI	STOS	2021	ΔΗΩ	VIEW
ertificates of analysis ()				
	Date	Agency		View
Name	Date 17-05-2019	Agency		View D VIEW
Name Τσάι ανάλυση μικροβιολογική				
ertificates of analysis Name Τσάι ανάλυση μικροβιολογική Τσάι ανάλυση μικροβιολογική Τσάι ανάλυση μικροβιολογική	17-05-2019	CADMION		VIEW

This process is being appropriately extended to allow similar integration between FoodInspector and any other third-party app via the TheFSM Platform. More specifically, the back-end of the FoodInspector application (node.js server) is being extended so that new data types and formats can be plugged-in and presented to the FoodInspector front-end. This extensible back-end is currently being developed and tested by introducing a new integration link between the FoodInspector application and the GLOBALG.A.P. service via the TheFSM Platform, thus providing another data source for certification documents. In a similar fashion, when this functionality is complete, the FoodInspector application will be able to leverage TheFSM Platform to retrieve documents from any application connected to TheFSM Platform.



6.4. FOODAKAI 2.0

This section focuses on the development plan and the outcomes of the agile development process for the FOODAKAI 2.0 application, which implements the Retailer and Manufacturer business use case scenarios presented in D1.1.

6.5. Application development plan (Gantt Chart)

The plan for the developments of the FOODAKAI 2.0 application is presented in table 1. During the second year of the project, we focused on developing new features and improving existing ones that enable remote supplier checking and machine-assisted assessment.

Task	M1 3	M1 4	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
Sourced Ingredient Risk												
Weekly Insights												
My Suppliers Dashboard												
Supplier Reports												
Beta Version Release and Pilot Testing												

Table 5: Development plan for the FOODAKAI 2.0 application

6.6. Developments status

In this section we present and analyse the developments that were completed within the second year of the project for the FOODAKAI 2.0 application.

The FOODAKAI is the food safety intelligence platform that provides risk assessment and predictive analytics services. Within the context of TheFSM project the FOODAKAI application will be extended with functionalities that will allow Retailers and Food Manufactures to perform remote supplier verification.



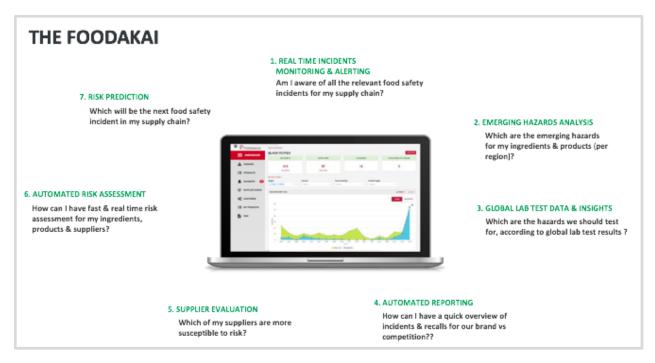


Figure 18: The FOODAKAI platform services

The data that is used for risk assessment and prediction is collected and processed through a big data platform that focuses on data quality and accuracy. Millions of data records published by National Authorities from all around the world are collected and processed following a methodology that includes several steps as presented in the following diagram.

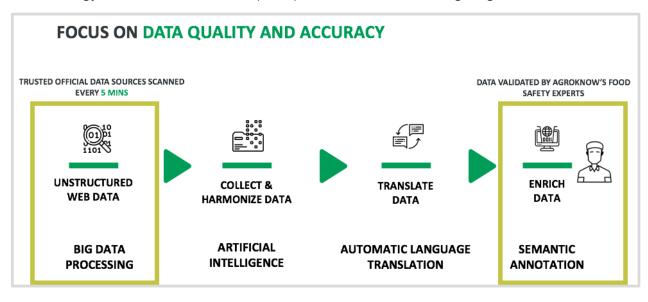


Figure 19: The big data processing workflow



The new features for FOODAKAI 2.0 that were developed during the second year of the project are presented in the following sections. Features developed during the first year are also included for a more complete picture.

6.6.1. My Suppliers Dashboard

FOODAKAI 2.0 has been re-engineered to be directly relevant to the particular suppliers that a company uses. This information then feeds into and personalises multiple aspects of the FOODAKAI 2.0 features and also permits the company to continually monitor its suppliers and get real-time incident and inspection updates through the Suppliers Dashboard.

	Ú.		Search FOODAKAI	Q		₽ 0	M
DASHBOARD		S DASHBOARD	SUPPLIER CHECK		🛤 MY SUPPLIERS		
Q SEARCH	O You can contact us t	o integrate your list of suppliers at su	poort@foodakai.com				
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			arties that you want to continuously monitor. F npany. After creating your list you can always c				
RISK	Company				Sourced Ingredients Milk And Milk Products		
LII PREDICTIONS	Lactalis	X - DUNS or GLN	City, Country				
	Milk Suppliers		O ADD SUPPLIER		ø		~
	Company	Identification (DUNS or GLN)		Plant Location		Actio	m
	Lactalis						
	Meat Suppliers				ø		^
	Company	Identification (DUNS or GLN)		Plant Location		Actio	m
	Cargili					1	
Online - Chat with us							

Figure 20: Add a company as supplier

The Suppliers Dashboard presents an overview of computed risk profiles, and real-time dynamic incidents and inspections for the particular suppliers used by the company.



upplier Verification									
E SUPPLIERS DASHBOARD			SUPPLI	ER CHECK				MY SUPPLIERS	
Use the Supplier Risk Assessment Dashboard to prioritiz susceptible to risk.	e your suppliers based or	n their food sa	ifety perfor	mance. Identify the su	opliers tha	it are at high risk and	d focus your au	idits to areas tha	are more
Step 1	Step 2			p 3		Step 4			
CHECK		ADD		ADJUS	r h	MO	NITOR		
SUPPLIER	s S	JPPLIERS		RISK			ISK		
VALUE Evaluate for suppliers	reign VALUE	Ensure you w niss critical	vill not	ALUE Rank supp	liers		us on supplie ceptible to ris	ers k	
compliance	i. ii	nformation fo uppliers	or your	audits and tests	lab	& pr	revent dents		
Risk assessment table for my suppliers $ \odot $						+	ADD SUPPLIERS	DOWNLO	AD 🗮 RISK SE
Search									
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Cargill Nestle	6 6 -		12		45 66	553	17 84	-	95
T. Marzetti Company	15 6		6		28		18		36
Lactalis	6 3		9		26	53	15		28
Cargill	15 6				3	*		*	23
Givaudan	9		9		15	6	8		18
VegLand	10 6		9		-	1	-	2	17
	12 - - 9		12		4	•	32	•	15
POST HOLDINGS - MICHAEL FOODS - WAKEFIELD WABASH VALLEY PRODUCE INC - DUBOIS	- 9		9		•	•	-	-	10
National Food NW LLC - Arlington Farm	- 9		-		2		-		9
Philadelphia Macaroni Co.	- 6		6		-		7	-	7
Suppliers Incidents Risk O		_		Suppliers Sourced In	gredients	Risk ©			
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High: 36.36% (4)				National Food NW LLC = J	itlington Farm	WARASH VALLEY PROD	NCEINC -	Cargill Phi	ladelphia Macaroni C.
				PONT HIMDINGS - MICH WAREFIELD	AEL FOODS -	5: Marzetti Company			Vegland
	4edium: 36.36% (4)								
Incidents for my suppliers ①				Inspections and war	ning letter	s for my suppliers	D		
Title Afistovia and afistovia B1 and afistovia B2 in dark chocolate with	Supplier	Published		Title	into weither	montures for monits	nancese control-	Supplier	Published
Aflatoxin and aflatoxin B1 and aflatoxin B2 in dark chocolate with pistachios by NESTLE TURKIYE GIDA SANAYI A.S. from Turkey	NESTLE TURKIYE GIDA SANAYI A.S.	22/12/2021	C•	Did not implement adequ	ate written p	a batteri u transmitoring	process controls	VegLand	4/10/2020
Deterioration and moulds and abnormal smell in wheat by CARGILL LIMITED from Canada	CARGILL LIMITED	22/12/2021	1+1	Citation at AMPI	ave control 6	or a hazard when one was	- MOUUU	VegLand	9/2/2019 3/11/2017
Peanuts and products thereof in dark chocolates by Cargill from United States	Cargili	19/11/2021		Citation at AMPI				AMPI	3/11/2017
Spollage in noodles by Nestle India from India	Nestle India	21/10/2021	Ŧ	Citation at AMPI				AMPI	3/11/2017
Spollage in dried noodles by Nestle India Limited from India	Nestle India Limited	18/10/2021	-	voluntary action indicate	d in foodbor	ne biological hazards for A	MPI	AMPI	3/11/2017
Spollage in noodles by Nestle India Limited from India	Nestle India Limited	18/10/2021	-	Citation at T. Marzetti Co	mpany			T. Marzetti Company	29/8/2017
Plastic fragment in breakfast cereals by Cereal Partners Worldwide from	Cereal Partners	18/10/2021		Citation at T. Marzetti Co	mpany			T. Marzetti	29/8/2017
Singapore	Worldwide		_			Maladada		Company	
Spollage in dried noodles by Nestle India Limited from India	Nestle India Limited	18/10/2021	Ξ	voluntary action indicate Company	a in foodbor	ne biological hazards for 1	. Marzetti	T. Marzetti Company	29/8/2017
	Nestle India Limited	10/10/2021	-	voluntary action indicate Company	d in foodbor	ne biological hazards for 1	. Marzetti	T. Marzetti Company	28/6/2017
Spollage in noodles by Nestle India Limited from India Peanuts and products thereof in nut and fruit mixture by Nestlé	Nestlé Professional	9/10/2021							

Figure 21: My Suppliers Dashboard



6.6.2. Import Suppliers

One of the first features that were developed within the context of the project was the possibility to import all the suppliers that a retailer or food manufacturer has.

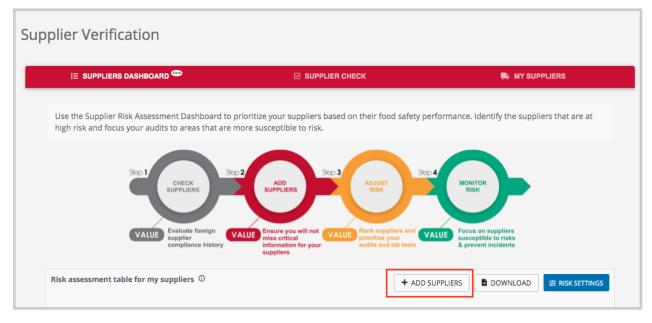
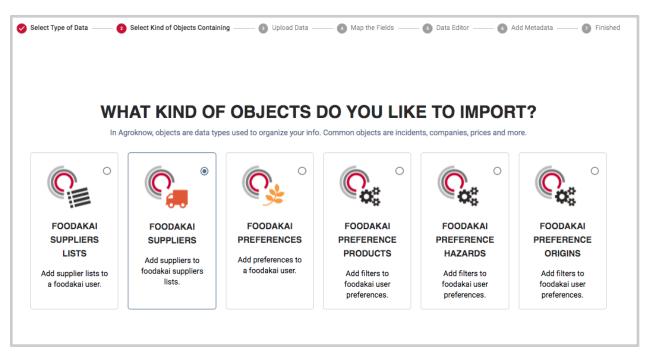


Figure 22: Add suppliers feature that allows the import of hundreds of suppliers

To facilitate the process of importing hundreds of suppliers and their ingredients, the development team of Agroknow has designed and implemented a data importing wizard. The import process includes a step for mapping the properties (columns) of the original file to the GS1 compliant properties of the data model of the TheFSM platform. Values of each property can be also mapped to the ingredient vocabularies used by TheFSM platform.







6.6.3. Supplier evaluation profile

Based on the requirements of Retailers and Manufacturers and the pilot activities, Agroknow team further enhanced the food safety evaluation page that aggregates all the critical information for the food safety profile of a company. The user has access to all the historical recalls and border rejections in which the company was involved as well as the outcomes of the inspections that were conducted in this company by the Authorities. During the second year, new useful visualizations were added and quality-of-life and stability improvements were pursued.



		in a start	1.	ALCONT .		e	15	▲ 32
Medium 13 0 Mediu ed ingredients risk Foedakal Ingre known as: pe Lactalis Lactalis International Sn	dients risk Incide	ents based risk L	Inited States o	ountry ris			62	A 0
dients & materials (FOODAKAI) : and mik products 🤟 dairy products	-							
and miss products and miss products and miss products.	9							
and milk products //								
ento Lactalis, Inc. Lactalis Villarroble alis Puleva S.L. Itambé Storyfield alis Nestle Frischprodukte Schweiz Ag	Farm (United States) Societe Laitiere De	Lactel Skåner Pontivy Gruppo	majariar Ak Gi Galbani S.p.A.	da Mora Lactalis I	evskoslezske Mickarny A.S. nformatique S.n.c. Lactair	Lactalis McLelland () Fromageries de l'E i Hungaria KFT S.a.r.	Jnited Kingde tolle SAS I. Milupa N	m) Parmalat Iurricia S.A.S.
i.o. S.n.c. Delimo A/S Hanilor Gro	up Lactalis Polska	Sp. z e.o. Lactali	s Belgique S.A	mare subs	idiaries 🛩			8
ncidents 0					-	Include Subsidia	tes / Parent C	Irganization
Title	1 2			Country	10			
Nuts in cheese by Lactalis McLelland	Ltd from United King		17/4/2021	63	25			=
Moulds in cream cheese by LACTALIS Denmark	DANMARK A/S from	n incident	12/2/2021	-	20			
Listeria monocytogenes in brie cheese GmbH from Germany	by Lactalis Deutsch	land incident	19/11/2020	-	Values 12			
Hazeinut in fuit yoghurt by LACTALIS			12/11/2019		10			٨
Denmark Incorrect labeling in strawberry yoghu United States	rt by Stonyfield Farm	from incident	11/9/2019				~	VI.
United States Moulds in milk drink by Lactel from Fr		incident	12/7/2019		2003	2010	2015	2020
Lactalis Australia Pty Ltd — Lactalis A	ustralia Mik 1L & 2L	incident	23/6/2019	N/A		· Incolaesia		
Listeria monocytogenes in cheddar ch from United Kingdom	seese by Lactalis Mo	Lefland incident	19/6/2019	83				
spections ©								
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voluntary action indicated in foodborn hazards for Sorrento Lactalis, Inc.	e biological	inspection	23/5/2018					=
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voluntary action indicated in food con standards, labeling and econ for Lacts S.L.U.	position, alls Villamobiledo	inspection classification	16/5/2017	6	1 2			1.
voluntary action indicated in food con standards, labeling and econ for Lacts S.L.U.	position, alls Villarrobiedo,	inspection classification	12/5/2017	•	1			
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Citation at Sorrento Lactalis, Inc.		citation	4/6/2016					
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no action indicated in food composition labeling and econ for Lactalis USA, In	on, standards, c.	inspection classification	26/2/2019		values v			V
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Sorrento Lactalis, Inc.		classification						
A COUNTRY RISK REPORT								
	Hazards Risk	Report						
Country	Hazard				7-years risk based on incli	ients		
United States	milk and produ				Medium (4)			
second pergoden.	man and produ	North Control of Contr			Medium (4)			

Figure 24: An evaluation profile page for a supplier

6.6.4. Sourced Ingredients Risk



During the second year, we further enhanced the supplier risk profile and calculations to also include a risk factor relevant to the overall risk of the supplier based on the particular ingredients that the company imports from them. Along with the other risk factors already present, this new feature further enhances the risk profile of each supplier.



6.6.5. Supplier Reports

This feature allows an interested user to get a thorough numerical report of the company's suppliers per type (e.g., Milk Suppliers). The comprehensive report generated includes a wealth of information on historical incidents and their grouping into country of origin, hazard categories, and timeline evolution. The report can also be exported as a pdf for use in subsequent work in outside applications (e.g., to support a presentation).

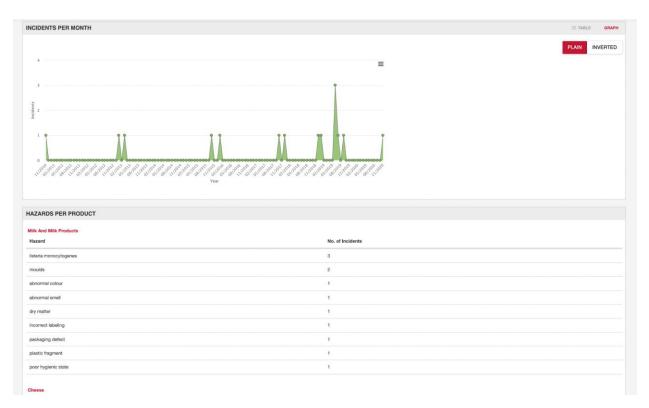


	REPORT		AT MY IN	GREDIENT GROUPS		
Create here the tailor-mad	le reports that you need for your	supply chain, save them	n and share the	m with your colleag	ues.	
🛎 My reports:			Sort B	y • Searc	h	
My Categories		FOODAKA	Al Categories			
🏶 tags	origin	¢ Product		A Hazard		
🚠 groups	announced by	I≡ incident types		From To	0	í
Milk Suppliers	If you have selected sup	pliers, include their subs	sidiaries, altnam	nes and parents in th	he report:	
	0	CREATE REPORT				
πs					1	2
πs			Product	Supplier	1 Date	
ITS			Product brie cheese	Supplier Lactalis Deutschland GmbH	1 Date 19/11/2020	
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6.6.6. Supplier automated risk assessment

During the second year, the Agroknow team further developed the beta version of the supplier automated risk assessment feature. Using this feature, the estimation of the suppliers' risk can be automated, resulting in speed up of the supplier verification process. This helps the user save time from doing all the manual work to combine information from several systems. Thus, the user can focus on the suppliers susceptible to risk and prevent incidents in a more targeted manner.



FOODAKAI supplier risk estimation includes the following parameters



- **Ingredients risk** that is estimated using the Risk Assessment module. This parameter corresponds to the risk of the ingredients that are used by the specific company. The score is the risk that was estimated for the ingredient with the highest risk.
- **Sourced Incidents risk:** this is the risk that is estimated based on the frequency and severity of the incidents (recalls and border rejections) that were reported for this supplier and are relevant to the ingredients that the user's company imports from it
- **Recalls:** The number of food recalls that were reported for the specific company and its subsidiaries by National Authorities from all around the world.
- **Border rejections:** The number of border rejections (import refusals) that were reported for this company and its subsidiaries by National Authorities from all around the world.
- **Inspections:** the number of inspections that the supplier had in which an action was indicated.
- **Warning letters:** the warning letters that were announced by the National Authorities for this company.

Risk assessment tal	ble for my suppliers ①					+	ADD SUPPLIERS	DOWNLOAD = RISK SETT
Search								
Supplier	Incidents Risk	Sourced Ingredients Risk	Foodakai Ingredients Risk	Recalls	Border Rejections	Inspections	Warning Letters	Overall Risk Score
Lactalis	6	9	9	26	53	15	-	118
ADM Company	12	6	15	17	15	8	-	73
Givaudan Corp	9	8	9	15	6	8	*	55
Cargill	15							24

Figure 25: Supplier risk assessment matrix

The automated risk assessment module includes a feature which allows the users to adjust the contribution of each factor to the overall risk score for a supplier.



				Change Supplier Risk Settings	Change Supplier Risk Settings							
Supplier	Incidents Risk	Ingredients Risk	Re	Risk Weights	Naming Letters	Expired Certificates	Overall Risk Score					
Supplier A	2.59	10.01	47	Incidents Risk	3	1	1263.6					
Supplier B	2.76	2.64	51		1		181.4					
Supplier C	2.14	5.48	26	Ingredients Risk	2	1	101.63					
Supplier D	10.71	3	15	Recalls	1		84.71					
Supplier E	5	2.3	2	Border Rejections	3		60					
Supplier F	6.6	2.2	17	Inspections	1		46.6					
Supplier G	2	5.48	4		1	1	45.48					
Supplier H	2	2.5	3	Warning Letters			44					
Supplier K	2	3	1	Expired Certificates			15					



6.6.7. Add a Supplier risk factor

Within the context of TheFSM, we developed a feature that allows the integration of a new parameter for the supplier's risk calculation. This can be done by adding a new column and uploading the data for the suppliers e.g. upload the number of expired certificates.

FOODAK	AI	Search FOODAKAI	Q 🚯 🗹
DARD	Supplier Verification	Change Supplier Risk Settings Risk Weights	
DS	E SUPPLIERS DASHBOARD	Incidents Risk	NY SUPPLIERS
ERS		Ingredients Risk	
	Use the Supplier Risk Assessment Da high risk and focus your audits to are	Recalls	food safety performance. Identify the suppliers that are at
'S		Border Rejections	
	Step 1 CHEC SUPPLI	Inspections	JST Sep 4 MONITOR
MIZATION		Warning Letters	
	VALUE Evaluat supplie compile	Certificates 👌 👕	Regour end tab tests Focus on suppliers susceptible to risks & prevent incidents
	Risk assessment table for my supplier	New Column Name S ADD NEW COLUMN	+ ADD SUPPLIERS
	Search		

Figure 27: Add a new factor for the supplier risk estimation risk weighting feature

In addition, the user can download the risk assessment matrix for its suppliers and use it in internal food safety systems.



6.6.8. Personalised Weekly Insights

Based on the suppliers that a company uses in its supply chain, FOODAKAI sends out a personalized weekly email containing relevant insights. More specifically, the insights include: (a) currently trending hazards for the industry the company is active in, (b) supplier countries that supply ingredients relevant to the company's supply chain and who report an unusually high number of incidents, (c) new and emerging hazards relevant to the company ingredients.



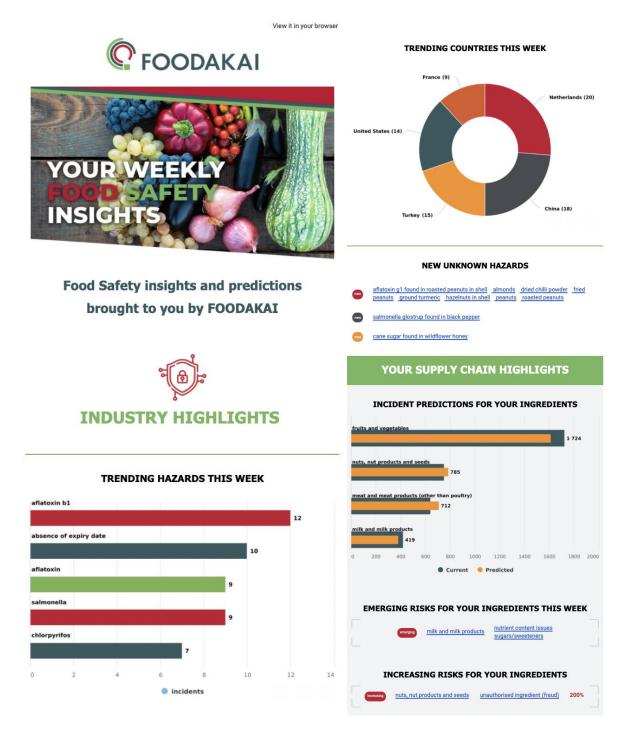


Figure 28: Add a new factor for the supplier risk estimation risk weighting feature

6.7. AGRIVI 2.0

The main goal is to further extend and validate the AGRIVI software application that food processors and their contracted suppliers will use in the context of supplier data sharing scenarios.



6.8. Application development plan (Gantt Chart)

The development plan for the Agrivi 2.0 that we followed during the second year within the context of the TheFSM project is presented in the following table.

Table 6: Development plan for the Agrivi 2.0 application

Task	M1 3	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
User roles and permissions improvements												
Documents improvements												
Further API improvements												
Weather provider change												
Improvements in FieldOps module												
Scouting and traceability improvements												
Product database development												
Beta release and Pilot Testing												

6.9. Developments status

During the second year, we will focus on extending our API capabilities, to further support seamless The FSM platform integration with AGRIVI, and to enable data exchange that covers all business scenarios. User authentication and a complex user permission set-up that supports creation of multiple different user roles that cover all business requirements was our focus in the first year. In our second year, the main focus is going to be on changing the weather provider, to provide our users with an undisturbed service and high quality weather data that supports their



daily operations and decision making. Improvements on data visualization and simplification on data entry are going to be made in terms of improving AGRIVI FieldOps module. That way, users will be able to have data important for short-term decision making available from the AGRIVI home screen.

To support multiple different user roles, mainly the certificator role and access to the right documents, AGRIVI will focus on improvements to our documents module.

Improving traceability is really important. That is why AGRIVI will focus on improving our traceability and scouting features.

Development included extending the AGRIVI software with new options and functionalities in the beta version, namely to:

- Further improvements on the user roles and permission setup
 - New layers of control
- Traceability report and tracking improvements
 - New data available on Reports
 - Ability do to specific traceability reports
- Documents feature improvements
 - Sorting, labelling, filtering, API access
- Field Ops improvements
 - Data for immediate decision making available from the home screen
- Weather provider changes
 - Changing the provider of weather data
- Scouting feature improvements, to support pest and disease tracking with precise location.

6.9.1. Roles and Permissions Administrative Panel

Roles and permissions administrative panel serves the AGRIVI support staff to create a new role for the software. Through the administrative panel, administrator is enabled to:

- Create a new role
- Name the new role
- Select to which AGRIVI accounts this role should be activated (i.e. specific food processing company and farms)
- Define which user permissions should the new role contain
- Enable/disable the new user role



• Edit/delete the new user role

This administrative panel can only be accessed and managed by AGRIVI staff supporting the project.

Home - Administration -	Roles & permissions						
Role:	All accounts/Specific accounts	Product plan		Account search:			
All	All accounts	All	٠	All	*	 S 	+ Create new role

Figure 29: Administrative panel

Consultant (Collaborative A	ocount - 135784.)		Enabled 🖂
Role name:	Consultant	🖍 Edit	Delete
Assigned accounts:	Collaborative Account (135784);		
Account details			
Administration			AI
Alarms			□ Al
Analysis			⊟ Al
Crop management			⊡ Al
Finances			AI
General			AI
Resources			⊟ All

6.9.2. Add User with New Role

This feature enables the end users to create a new user to which the newly created role through the administrative panel will be assigned.

This user will contain only the permissions which were enabled to the new user role to ensure that the new user with access can only see the parts of the software they need to.

This feature is managed by the end user.



↑ Import fr	om file									
First name *	Last name *	Gender	Country	City	Address	Phone	Can login	E-mail *	Password *	Role *
Consultant	Test	N/A ~	Hungary 🗸					consultant@cc		Consulta 🗸
✓ Save										- Manager Administration Farm operation: Advisor Analyst Consultant

Figure 30: Add user feature

Home • Resources • Peo Role: All •	Show/hide archived:	Apply filter 5 Reset filte	1		
+ Add people \$	Manage user seats				Fo Set work cost
Role:	Name:	E-mail:	Phone:	Address:	
Owner	Adam Nowak 🔘	adam.nowak@agrivi.com	+48 798338776	Warsaw	⊜
Manager	Spanish User	spanish.user@agrivi.com			⊜
Administration	Alec Davis	alec.davis@gmail.com			Θ
Analyst	Ann Smith O	annsmith@agrivi.com Warsaw		⊜	
Consultant	External Consultant	consultant@test.com			θ
Worker without access	Allen Adams				0

Figure 31: Manage user feature

6.9.3. Documents feature improvements

To improve access to documentation from users with different user roles, changes will be made to existing documents features.



AGRIVI Crop manager	nent - Wine management -	Finance - Resources	- Analyze -	Field Operation	₹ :	÷ 0		🔁 🗶 🖖 -	
Home • Documents									
+ Add document								:: =	
Labels 🔅	Audit_report_23			Traceability_rep Uploaded 10/5/2021 by Fa TRACEABILITY REPORT	mer 1				
08447976000005	Certificate_of_anal	ysis_1451 🎤	XLS	Certification_1_		_07_2021	/		
AUDIT REPORTS	CERTIFICATES OF ANALYS	SIS 🗙 08447976000005 🗶			84479760000	05 🗙			
	Uploaded 9/6/2021 by Farmer 1	716_07_2021 🧳	¢						
CERTIFICATES OF ANALYSIS 1	AUDIT REPORTS 🗶 084	47976000005 🗶							
Certificates pdf									
COMPANY 0									
TRACEABILITY REPORTS 1									



Additional labelling options will be added to the documents feature, to simplify documents filtering and sorting.

API improvements will be done to support the changes made to the module UI.

6.9.4. Field Ops improvements

To support our users in decision-making, we will be making changes to our existing Field Ops module, to provide our users with a more visual data representation that will help them in the decision making and data overview.

Current AGRIVI Field Ops module:



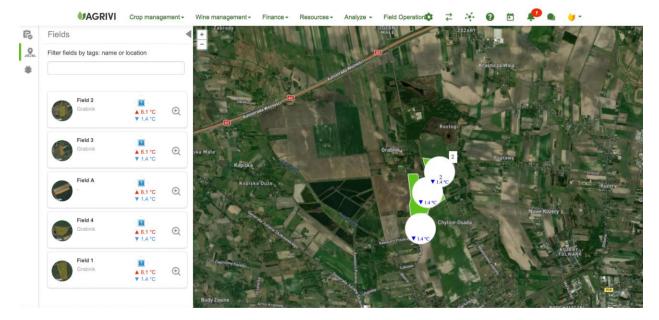
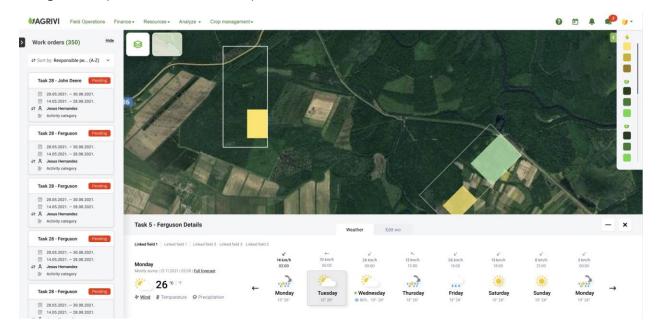


Figure 33: Current Field Ops module



Design for improved AGRIVI Field Ops module:

Figure 34: Improved Field Ops module

6.9.5. Weather provider changes



As AGRIVI current weather data provider DarkSky is shutting its services down at the end of 2022, we are determined to provide our users with an undisturbed service and will be switching our weather data provider to ClearAG.

With this change, we will:

- change our weather provider
- update and consolidate weather information UX
- enlarge our pool of relevant weather data
- ensure that weather IoT data is matching weather data

6.9.6. Scouting feature improvements and Field Ops integration

We will be focusing on improving our scouting feature, mainly to be able to assign exact coordinates (location) to scouting activities, directly from the map in AGRIVI.

Our goal with this feature is to achieve insights with recommendations and scouting records which are easy to record and document.

Q SCOUTING						^
Name:*	Date:*	Fields:*	Scouting method:*	Crop development stage:	Additional data:	
	7/21/2021	None selected	None selected	- +	ß	+
Scouting 2	5/17/2021	2 selected	Field Monitoring	End of flowering	昆	0
Scouting1	5/3/2021	2 selected	Field Monitoring	Flowering	皍	0
Category:*	EMS USAGE	Storage:	Quantity:*	Date:*		^
-	*) [-		• ¢	C		+
No items added ye	ət.	Status on: 7/21/2021				
	rs					^
Title		Size (MB)	Last updated	Labels		
+						
No documents are	found.					

Figure 35: Current Scouting module

Current scouting module in AGRIVI requires a lot of manual data entry, and our aim is to simplify that as much as possible. This is going to be achieved by switching from table-based to mapbased data entry.



6.9.7. Product database development

We are working on increasing the product database and general information about usages of products for specific companies, specific countries and organizations like European Union.

This development has multiple phases but the end goal is for the system to prevent users from applying products not allowed in their respective countries.

Machinery:*	The 1020 is allowed to be	used in Poland				Additional data	:
Brnača	The 1020 is allowed to be For Blueberry in Poland r The 1020 has following	e used on Blueberry in P naximum quantity allowe active substances and	ed of 1020 is 0.5 kg/ I MRLs:		▼12/1/2021	₿	
John Deer	The 1020 is not allowed t	e var. anisopliae strain B o be used in France.	IPESCO 5/F52> 0	, т тід/кд	nouse		
					e)		
			✓ Co	ntinue X Cance		-	



7. CONCLUSIONS

This deliverable presented an agile iterative development process that was developed in the context of TheFSM project and it was adopted to develop the three applications, namely Food Inspector, FOODAKAI 2.0 and Agrivi 2.0. The agile process helped the development teams to be focused on developments that address the user and business requirements defined in WP1. The main goal was to prioritize the developments that are the most impactful for achieving the goal of the project.

In addition to that, this document reported the status and the outcomes of the agile development process for each application. In the case of the Food Inspector application, we delivered a first functional version that was also used and evaluated during the pilots. In the case of FOODAKAI 2.0, we further extended the alpha version and delivered updated functionalities that were also tested by end users during the pilots. For Agrivi 2.0, we focused on analyzing and designing the required initial extension of the AGRIVI software that will further extend the flexibility of the software to support the desired data sharing scenarios for different stakeholders in the value chain.