



D6.4 - Food Safety Risk Assessment Pilot Evaluation Plan



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ACRONYMS LIST

VRE	Virtual Research Environment
WP	Work package
QMRA	Quantitative Microbial Risk Assessment
CV	Controlled Vocabulary
GUI	Graphical User Interface
API	Application Programming Interface
RSS	Rich Site Summary
DOI	Digital Object Identifier
FSK-ML	Food Safety Knowledge Markup Language
FSKX files	Food Safety Knowledge Exchange File
OS	Operating System

EXECUTIVE SUMMARY

This document describes the evaluation procedures and evaluation outcomes performed in the AGINFRA+ project to assess the food safety risk assessment Virtual Research Environments (VREs) and the pilot applications developed for the Food Safety Risk Assessment community.

The evaluation process was performed in alignment with the specific stages of the different VRE piloting phases. During all evaluation phases community experts attended hands-on workshops that allowed them to practically work with the web-based software pilots and to obtain practical experience on the advantages of working with the proposed environments. To collect relevant end-user feedback these evaluation activities always combined introductory lectures with practical hands-on training session for specific VRE features.

Evaluation results were collected via online or printed surveys. Survey questions were aligned with the other AGINFRA+ use-case WPs and were only customized in case the specific settings of the evaluation event required this. A detailed description of the evaluation methodology is described in the Deliverable “Food Safety Risk Assessment Community-Centred Assessment Plan (D6.3)”.

WP6 performed also two additional “validation events” with the final VRE solutions. The feedback received from the end-users in evaluation and validation events clearly shows that the VREs designed for the different Food Safety Risk Assessment communities were very well received and embraced by each targeted scientific community and can therefore be considered a promising infrastructure to promote the open science paradigm, efficient knowledge exchange and scientific collaboration.

TABLE OF CONTENTS

1.	INTRODUCTION	8
2.	PILOT EVALUATION AND VALIDATION – OBJECTIVES AND APPROACH	9
	EVALUATION	10
	VALIDATION	11
3.	PILOT EVALUATION – METHODOLOGY AND MATERIALS	12
3.1	METHODOLOGY FOR FIRST EVALUATION	12
3.1.1	INTRODUCTION	12
3.1.2	EVALUATION PROGRAMME	12
3.1.3	EVALUATION INDICATORS AND SURVEY QUESTIONS	13
3.2	METHODOLOGY FOR SECOND AND THIRD EVALUATION	13
3.2.1	INTRODUCTION	13
3.2.2	EVALUATION PROGRAMME	13
	SECOND PILOT EVALUATION	13
	THIRD PILOT EVALUATION	14
3.2.3	EVALUATION INDICATORS AND SURVEY QUESTIONS	15
3.2.4	USED MATERIALS	15
4.	EVALUATION RESULTS	16
4.1	INTRODUCTION	16
4.2	EVALUATION OUTCOMES – FIRST PILOT EVALUATION	16
4.2.1	EVALUATION DETAILS	16
4.2.2	ASSESSING THE VRE AND ITS COMPONENTS	16
4.2.3	INTERVIEWS	17
4.3	EVALUATION OUTCOMES – SECOND & THIRD PILOT EVALUATION	19
4.3.1	EVALUATION DETAILS	19
4.3.2	INDICATORS – EVALUATION RESULTS	19
4.4	SUMMARY AND CONCLUSIONS	27
4.4.1	GENERAL IMPRESSIONS AND CONCLUSIONS	28
4.4.2	OBSERVATIONS	27
5.	VALIDATION– METHODOLOGY AND MATERIALS	29
6.	VALIDATION RESULTS	30
	ANNEX 1 – FIRST PILOT RAKIP/DEMETER WORKSHOP	37

ANNEX 2 – FIRST PILOT RAKIP WORKSHOP ICPMF10	40
ANNEX 3 - FIRST PILOT RAKIP WORKSHOP	43
ANNEX 4 – SECOND PILOT RAKIP WORKSHOP	45
ANNEX 5 – SECOND PILOT - DEMETER WORKSHOP	50
ANNEX 6 – THIRD PILOT – GLOSSARY WORKSHOP	54
ANNEX 7 – THIRD PILOT - RAKIP WORKSHOP	58
ANNEX 8 – VALIDATION EVENT ORION WEBINAR	66
ANNEX 9 – VALIDATION EVENT RAKIP WORKSHOP	68
ANNEX 10 – VALIDATION EVENT RAKIP WORKSHOP	71

1. INTRODUCTION

This document describes the performed actions and the outcomes of activities to evaluate the WP6 specific AGINFRA+ solutions that were developed to support different user groups (use cases) within the food safety risk assessment community.

The first use case supported data-intensive applications in the area of food safety modelling. This included the extension of the community capabilities to share mathematical models, create simulation results and deploy generated data processing workflows as web-based services. Through the developed VRE-based resources, risk assessors and modellers can share their knowledge (data, mathematical model, software code, simulation results) in a harmonized way. Specifically, community-driven food safety model repositories, which contain mathematical models from the area of predictive microbial modelling and quantitative microbial risk assessment (QMRA), could be developed and maintained through AGINFRA+ resources. Finally, this use case also illustrates the benefits of VRE-based computational resources in computational intensive risk assessment simulations.

In the second use-case supporting the “Emerging risk identification” (DEMETER) community, the main objective was the early identification of emerging risks in the food (and feed) chain. It was tested if the developed VRE could become an important element of the strategy to protect European consumers through timely and effective preventive measures. New data analysis and data visualization solutions (digital technologies) were developed to support this. Specifically, the exchange of knowledge on data analysis workflows that support the identification of emerging food or feed safety issues at an early stage is of high importance. Therefore, this use case tested how a VRE can facilitate the exchange of knowledge on emerging risk identification between risk assessors and how KNIME-based data mining technologies could support to identify those risks. Furthermore, new domain-specific data visualization features were developed.

In addition to these originally planned use cases WP6 promoted the adoption of the AGINFRA+ VRE technology in two additional scientific communities:

The ORIONKnowledgeHub-VRE supports the community of European One Health institutions in their efforts to increase harmonization and interpretation of surveillance data from relevant and diverse disciplines. Specifically, this VRE hosts the first OneHealth EJP Glossary and serves as project management and communication facility for the EJP ORION project.

The Global Foodsource Identifier (GFI)-VRE supports researchers investigating foodborne disease outbreaks and supports a specific community within the COMPARE project (<https://www.compare-europe.eu/>). The VRE provides a resource for sharing microbial typing results from foodborne disease outbreaks to the international community and thus facilitates collaboration and interaction between outbreak investigators, globally. It provides online computational resources like RStudio, DataMiner and Jupyter notebooks to the researchers.

2. PILOT EVALUATION AND VALIDATION – OBJECTIVES AND APPROACH

In order to evaluate the usefulness of the AGINFRA+ prototypes and the developed VREs in the context of specific Food safety risk assessment communities, WP6 developed and implemented an evaluation assessment plan that followed the different pilot VRE development phases. Finally this evaluation phase was followed by additional validation activities.

A core aspect of all assessment activities was, that members of the targeted communities could interact themselves with the developed tools. This was accomplished by organizing workshops with internal and external experts and via webinars, which were also recorded in order to reach out to a greater number of potential users after the event. Table 1 summarizes all the evaluation and validation events organized by WP6 in the course of the AGINFRA+ project.

In addition WP6 managed to convince three communities to use the AGINFRA+ VRE infrastructure already for their day-to-day operations, namely the DEMETER, RAKIP and the ORION communities. In order to not interfere with these “in-production” VREs, WP3 and WP6 set up dedicated trial VREs that were used by workshop participants.

Table 1: Overview of the evaluation and validation events carried out by WP6.

Event type	Title	Date	Targeted community	Annex
1st PILOT evaluation	Workshop – FoodRisk-Labs supporting the AGINFRA+, DEMETER, RAKIP and EFSA-BfR FPA projects	10. - 12.07.2017	DEMETER, RAKIP	1
1st PILOT evaluation	Workshop – Cordoba, Spain, 26 September 2017 ICPMF10 Risk Assessment Modelling and Knowledge Sharing Initiatives (RAKIP/FDA-iRISK®)	26.09.2017	RAKIP	2
1st PILOT evaluation	RAKIP Workshop	22.03.2018	RAKIP	3
2nd PILOT evaluation	RAKIP Workshop	25.03.2019	RAKIP	4
2nd PILOT evaluation	DEMETER Workshop	01.04.2019	DEMETER	5
3rd PILOT evaluation	OH Glossary Webinar	04.09.2019	ORION	6
3rd PILOT evaluation	Workshop “How to benefit from the Risk Assessment Modelling and Knowledge Integration Platform (RAKIP)”	17.09.2019	RAKIP	7
Validation	ORION KnowledgeHub Webinar	06.12.2019	ORION	8
Validation	Workshop “Harmonized exchange of food safety models using web-based services from RAKIP and AGINFRA+ project”	09.12.2019	RAKIP	9
Validation	Workshop “Sharing and	10.01.2020	RAKIP	10

	running simulations of harmonized food risk assessment models”			
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EVALUATION

Within each piloting phase different evaluation events were organized by BfR to promote the adoption of the VREs in their specific research domains and to receive feedback on VRE specific functionalities provided by BfR and the technical WPs until that time. Therefore pilots differed not only in the scale, setup and number of involved evaluators but also in the indicators and metrics applied to collect evaluation results. As described below the assessment in each piloting phase had a distinct range of objectives.

First pilot VRE version evaluation (Intermediate phase, until M18)

The objective of this intermediate pilot execution and evaluation exercises was to provide a status report on AGINFRA+ achievements on providing VRE based research collaboration resources to two independent food safety risk assessment communities (RAKIP and DEMETER) until M18. In this phase, it was evaluated whether the generated AGINFRA+ VRE infrastructure could meet the expectations of the targeted users and could be used to share information, data and data-analysis pipelines developed by different VRE members.

Second pilot VRE versions (summative phase, M22-M30)

The main objective of this piloting phase was to evaluate the VRE prototypes (including community specific functional features) developed until month 24 for the Food Safety use cases. For each target community an expert group tested and evaluated the technical features provided by the technical WPs. Based on the received expert user feedback, the technical features were further optimized by the technical WPs or the development resources were shifted towards features with higher uptake potential for the relevant communities.

Third pilot VRE versions (summative phase, M30-M33)

The third pilot VRE evaluation was performed on the final prototype versions of the VREs, which include the improved/customized technical features developed by BfR and the technical WPs between month 24 and 33. The objective of the evaluation in this phase was to perform evaluations by a broader and more diverse end user groups.

The evaluations in the summative phase were performed along the following set of assessment indicators that took into account the recommendations from the Mid-term Review meeting:

USEFULNESS

This indicator evaluates if the pilot VRE support researchers to perform their work “in the cloud” in a collaborative environment that allows co-development by remote researcher and research teams and that offers performance and scalability in performing.

LEARNING CURVE

This indicator evaluates how much time would be necessary to learn how to master the underlying VRE technology and to use the new pilot VRE functionalities.

PERFORMANCE, SCALABILITY

The pilot should support collaborative research in such a way that performance is (at least) comparable with “traditional environments”. The pilot solution should also offer scalability, meaning that the resources available (for computing, storage etc.) should be able to adapt to the amount and size of the research jobs, the amount of concurrent users etc.

OPENNESS AND FAIRNESS

Openness is an important asset of any environment related to the European Open Science Cloud. This means that it should be easy to add new data and analytics to the pilot VRE and to publish and share resulting workflows, components, and data with other researchers. This relates to how the pilot VREs support in making research data and algorithms FAIR (Findable, Accessible, Interoperable and Reusable).

UPTAKE POTENTIAL

This indicator gives us feedback on how likely it is that the person assessing the pilot would also be willing to use it after the end of the project.

For each indicator, use case and evaluation event, a set of specific questions were designed to take into account the specificities of the different community centred solutions. The questionnaires designed for each evaluation/validation activity and use case are provided in the corresponding Annex. There it is also specified what the assessment method and the available response options were for each indicator.

VALIDATION

The validation of the final food safety pilots were performed following the “The Unified Theory on Acceptance and Use of Technology (UTAUT)” proposed by Venkatesh et al. (2003). In this theory, the word "unified" refers to the integration of eight theories of technology adoption and provides a comprehensive view of the factors affecting users’ adoption behavior. This method is described in the deliverable Harmonized Use Case Validation methods, guidelines and materials (D1.2). For further details, we refer to the aforementioned deliverable.

3. PILOT EVALUATION – METHODOLOGY AND MATERIALS

3.1 METHODOLOGY FOR FIRST EVALUATION

3.1.1 INTRODUCTION

In the first piloting phase three workshops were organized to evaluate the VRE concept and the VREs created so far for the different target communities. In this first piloting phase, the main objective was to introduce the VRE concept to the different communities, to evaluate the acceptance level by the potential VRE users and to collect feedback on relevant customizations that each community requests. The assessment in this phase was therefore focused on the generic core VRE features, especially the information, data and information sharing functionalities. It also covered newly developed software technological resources (Food Safety Knowledge Markup Language – FSK-ML) and software tools (FSK-Lab).

The objective of the assessment in the case of the RAKIP community was to verify that the VRE had the potential to serve as a “Risk Assessment Knowledge Integration” platform in the future. To accomplish this, it was evaluated if the generated AGINFRA+ VRE infrastructure could be used in order to share models in a harmonized format, share data and data-analysis pipelines and perform user-driven computational-intensive simulations in a cloud-based computational infrastructure. Furthermore, the newly integrated support for the open source data analytics platform KNIME in the VRE DataMiner was evaluated.

The objective of the assessment in the case of the DEMETER community was to explore if the VRE has the potential to serve as an “Emerging Risk and Knowledge Exchange Portal” in the future. To accomplish this, it was evaluated whether the generated AGINFRA+ VRE infrastructure could be used in order to share information, data and data-analysis pipelines developed by different VRE members. Among others, it was explored what innovative information visualization features would support the DEMETER community.

3.1.2 EVALUATION PROGRAMME

RAKIP/DEMETER WORKSHOP (Annex 1)

The first workshop was held in Berlin and it was targeted to both RAKIP and DEMETER communities and lasted three days. During the first day, a general introduction into the open source KNIME Analytics Platform was given. The second day consisted of parallel sessions that were focused on the specific resources developed for each target community. The last day was dedicated solely to the RAKIP community.

ICPMF10 RAKIP WORKSHOP (Annex 2)

This event was a pre-conference workshop of the 10th International Conference of Predictive Modelling in Food (ICPMF10) that took place in Cordoba (Spain). In this workshop an introduction and training of selected open-community resources were given, that were designed to overcome the challenge in information exchange in predictive modelling and risk assessment fields. Specifically, the newly developed data standard FSK-ML, controlled vocabularies and open source software code libraries and tools were introduced, along with the open source FSK-Lab software, which allows to share models efficiently. The practical training

session gave participants the opportunity to learn more on the tools developed with support from the AGINFRA+ project and also on 3rd party solutions like FDA-iRISK.

RAKIP WORKSHOP (Annex 3)

This workshop provided an introduction and training on newly developed web-based solutions specifically developed for the RAKIP community. The workshop started with a general introduction of the project for external experts and the theoretical introduction of the developed Markup Languages (PMF-ML and FSK-ML), software tools (FSK-Lab) and web services. After this introduction, a practical hands-on training was carried out including the FSK-Lab and the RAKIP-VRE testing. The last session of the workshop was dedicated to present the programmed tasks to continue improving the presented features and to collect the feedback from the participants.

3.1.3 EVALUATION INDICATORS AND SURVEY QUESTIONS

Since the technical development of several use-case specific VRE features was still ongoing the evaluation did not include the evaluation of aspects like “usefulness”, “usability” or “future development needs”. The feedback of the first piloting phase evaluation events was gathered either via open discussions or via questionnaires. Detailed results are provided in the Annex (1-3) of the corresponding event.

3.2 METHODOLOGY FOR SECOND AND THIRD EVALUATION

3.2.1 INTRODUCTION

The evaluations of the second and third pilot VRE versions were set up as full day workshops or, as described in D6.3, as a webinar organized by BfR that were dedicated to each use-case tailored VRE. In each of these events, the background of the AGINFRA+ project, the general VRE concept and the community-specific VRE platform were introduced first. In the second session, the available technical features of each pilot VRE were introduced and live demonstrated. This session included a practical session for the participants to test the different presented features. Finally, a survey was conducted followed by an open discussion to collect the impressions on the VRE (features). The survey was designed along a set of pre-defined assessment indicators as defined in the community centered assessment plan (Deliverable D6.3).

3.2.2 EVALUATION PROGRAMME

SECOND PILOT EVALUATION

During the second pilot evaluation phase two different workshops were organized by BfR to evaluate the current status of the VRE features developed and implemented until month 24 for each targeted use case in WP6 respectively. In this evaluation phase, the RAKIP_Portal VRE and DEMETER VRE prototypes were trialled by members of the corresponding communities. The objective of these workshops was to thoroughly test the developed prototypes and to collect end user feedback. This feedback was used to inform technical WPs on observed issues and new feature requests.

RAKIP Use case evaluation EVENT (Annex 4)

This workshop was structured in three different modules dedicated to the specific VRE features. First, we presented the AGINFRA project and the main RAKIP VRE features. This included an overview of the social networking features, a demo of the private and shared workspace, the mind map visualization component as a way to represent “Knowledge”, the VRE’s wiki page and a general view of the RAKIP model repository. The second session focused on the demonstration of how the community-driven food safety model repository is supported through the AGINFRA+ resources. This repository contains mathematical models from the area of predictive microbial modelling and quantitative microbial risk assessment (QMRA). In the training session of this module it was also demonstrated live how to run models on the VRE and publish its own models. The last module was focused on the analytical features to generate models in the harmonized data format Food Safety Knowledge Markup Language (FSK-ML) as FSKX files. This format was also developed within the frame of the AGINFRA PLUS project by WP6. Moreover it was also shown how to import these FSKX files to the ARPHA writing tool and create a manuscript. Finally, other analytic (R-Studio, Galaxy) and semantic (VocBench) tools that have been made available in the VRE were also presented.

DEMETER Use case evaluation EVENT (Annex 5)

This workshop followed a very similar approach. First a general introduction to the AGINFRA+ project and the VRE concept was provided. The following session focused on integration of the KNIME Server Workflow Hub via the VRE. This included demo’s on how to share KNIME workflows and use the SiLeBAT NewsRadar service via the KNIME Server. In the next session, the VRE communication tools and innovative knowledge representation features were presented, among others the social networking portlet, private / shared workspaces, the Data Catalogue, the new MindMap portlet, the Wiki and its potential use to link external tools.

The last session focused on the analytical features like the execution of KNIME workflows with Data Miner (DM), the upload of models into the Data Catalogue via DM and other VRE services like Galaxy, R Studio, VocBench, ARPHA WT.

After each session, a hands-on exercise session was carried out for the participants to test the different features presented.

THIRD PILOT EVALUATION

For the third pilot evaluation one workshop and one webinar were carried out to evaluate the final prototype developed for the RAKIP_portal VRE and ORION Knowledge Hub VRE, respectively.

ORION use case evaluation event (Annex 6)

This evaluation event replaced the originally planned webinar for the DEMETER community, as the technological features desired by the DEMETER community were not fully functional at this point of time. As the DEMETER community had developed in the meantime comparable own solutions it was decided to evaluate instead an innovative VRE solution that was developed for the ORION community. Specifically, the newly

developed One Health EJP Glossary that was implemented for the ORION KnowledgeHub VRE were evaluated. This Glossary exploits the DataCatalogue VRE service. As planned for the DEMETER use case this evaluation event was performed as a webinar that included a general introduction into the AGINFRA+ project, a general outline of the technological background and a live demo of the new VRE-based feature.

RAKIP Use case evaluation EVENT (Annex 7)

This evaluation event was organized as a pre-conference workshop linked to the 11th International Conference of Predictive Modelling in Food (ICPMF11) in Braganza, Portugal. This conference joins up a broad scientific community from over the world including food researchers, stakeholders, companies, risk assessors and users of predictive models for food quality, safety and sustainability. Therefore, it was a great opportunity to introduce the RAKIP VRE and get it tested by a broader community of potential end-users, which was one of the objectives of the third pilot evaluation phase. The workshop introduced the AGINFRA+ project, the RAKIP concept, the RAKIP_Portal VRE and showcased also the open source software tools that already support FSK-ML. The workshop had a theoretical/practical design, where the participants had the chance to test the different resources for efficient exchange and re-use of risk assessment models (including predictive models and underlying data) available in the RAKIP_Portal VRE.

3.2.3 EVALUATION INDICATORS AND SURVEY QUESTIONS

The evaluation surveys covered all the indicators described in chapter 2 and were implemented into a VRE-based online survey tool (RAKIP & DEMETER workshops) or a Google Form (ORION Use case). For each indicator, a set of VRE specific questions were designed in order to qualitatively score the VRE or the VRE features. Each Annex contains a table with the designed questionnaire specifying also the assessment method and the response options.

For the third evaluation event of the RAKIP Use case, the survey was even extended to cover also features that were presented in parallel practical sessions during the workshop and the attendees were asked to answer these questions on a printed survey (Annex 7).

3.2.4 USED MATERIALS

All events were supported by presentations, sample models and files created specifically for each of the events. These materials were also shared with the participants.

4. EVALUATION RESULTS

4.1 INTRODUCTION

In this section an overview of the results obtained in the different pilot evaluation phases is provided. Given the different evaluation approaches that were followed in the different phases, the evaluation outcomes have been compiled in two groups. In the first group we present the results of the evaluation for the first pilot phase and in the second group we present the results of the second and third pilot evaluation phase, which shared a more similar evaluation approach.

4.2 EVALUATION OUTCOMES – FIRST PILOT EVALUATION

4.2.1 EVALUATION DETAILS

Event title:	Workshop – FoodRisk-Labs supporting the AGINFRA+, DEMETER, RAKIP and EFSA-BfR FPA projects
Location:	Berlin, Germany
Date:	10 th -12 th of July 2017
Method:	guided walkthrough and review, interview, open discussion
Participants:	15
Event title:	Workshop “Risk Assessment Modelling and Knowledge Sharing Initiatives (RAKIP/FDA-iRISK®)”
Location:	Cordoba, Spain
Date:	10 th of July 2018
Method:	guided walkthrough and review, interview
Participants:	22
Event title:	RAKIP Workshop during the 5 th RAKIP Meeting
Location:	Berlin, Germany
Date:	22 nd of March 2018
Method:	guided walkthrough and review, interview, open discussion
Participants:	15

4.2.2 ASSESSING THE VRE AND ITS COMPONENTS

As a result of the evaluation of pilots available in the intermediate piloting phase it could be stated that the established use-case specific VREs already provide a high number of useful and highly valuable functionalities for the two scientific communities. The high interest of these communities in these new VRE resources already became evident by the number of non-AGINFRA+ scientists that registered as VRE members (DEMETER VRE: 16; RAKIP VRE: 19). Further WP6 also successfully promoted the AGINFRA+ VRE technology in additional scientific communities besides those addressed in the two WP6 use cases. The AGINFRA+ project supported an additional VRE for the ORION project which is funded under the European One Health Initiative research project (31 external members at the end of the first pilot phase). For each of the addressed communities, dedicated introductory workshops were conducted that resulted in an extensive collection of feature requests from the corresponding communities.

4.2.3 INTERVIEWS

As described in section 3.1 evaluation feedback were collected mainly in open discussions or via questionnaires which have been added in the annex (1-3) of the corresponding event.

4.2.4 Comments, remarks and suggestions

In summary the evaluation activities resulted in very positive feedback by the corresponding research communities and the willingness to adopt the VRE technology in day-to-day community work. This manifested also in the high number of non-AGINFRA+ scientists that had registered for the VREs by the time of the end of the first pilot evaluation phase: DEMETER VRE: 16; RAKIP VRE: 19, ORION: 31.

Another important result that guided the summative pilot development phase was the feedback to what extend relevant community-centred feature requests (see Deliverable 6.1) could be addressed by the VRE technology. The following table provides the outcome of this analysis that was jointly performed by two experts from each of the two use-cases:

Requested VRE Feature	DEMETER VRE	RAKIP VRE
Data and Relevant Semantics Needs		
2.1.4_1. Easy access to open scientific literature and other free online information sources on the WWW	Possible	-
2.1.4_2. Easy access to social media data (Twitter, Facebook)	Possible	-
2.1.4_3. Easy access to RSS feeds from community information providers	Possible	-
2.1.4_4. Access to ontologies to support automated knowledge generation and extraction	partly possible	-
2.1.4_5. A service to develop and maintain controlled vocabularies (CV) / ontologies e.g. a combination of an ontology browser with a mind map	partly possible	-
2.2.4_1. A service to develop and maintain controlled vocabularies / ontologies	-	partly possible
2.2.4_2. Online resource to store / upload and create new models	-	possible
2.2.4_3. A service that allow the user to visualize metadata or reconfigure FSKX model files from the model repository / workspace before execution / simulation	-	possible
Data Analytics and Processing Needs		
2.1.5_1. KNIME workflow execution including support for R and Python extensions	Possible	-
2.1.5_2. API access to integrated emerging risk identification services	partly possible	-
2.1.5_3. Should “integrate” / “talk” with EFSA’s IT infrastructure “Zenodo”	Possible	-
2.1.5_4. Execution of a data mining workflow on a high-performance computing infrastructure (if necessary)	partly possible	-
2.1.5_5. Docker functionalities for data mining workflows	not possible	-
2.2.5_1. Need for KNIME workflow execution inside the VRE.	-	possible
2.2.5_2. A service for model execution (simulation)	-	possible
2.2.5_3. A service to use high-performance computing infrastructure in	-	partly possible

case computational expensive simulations need to be performed		
2.2.5_4. API access to model simulation services	-	possible
2.2.5_5. Provide Docker functionalities inside the VRE to guarantee future re-execution of current models.	-	not possible
2.2.5_6. A service to connect to EFSA's data portal "EFSA Knowledge Junction"	-	possible
2.2.5_7. A service that checks if a FSKX model is still executable	-	not possible
2.2.5_8. Creation of URIs for each shared model	-	possible
Data Visualization and Publishing Need		
2.1.6_1. A service to streamline the publishing of models / data mining workflows to the scientific community	partly possible	-
2.1.6_2. A public service to search / filter for emerging risk identification models / workflows in a model / workflow catalogue	partly possible	-
2.1.6_3. Interactive online data and knowledge visualisation features	partly possible	-
2.1.6_4. Support for community-driven curation processes for uploaded emerging risk identification models / workflows	partly possible	-
2.1.6_5. Visualization of Bayesian network models and predictions	not possible	-
2.2.6_1. Interactive visualisation service for models	-	possible
2.2.6_2. A service that read a FSK-ML formatted file with information on the QMRA model input and output parameters	-	possible
2.2.6_3. A service to combine model modules into new models	-	partly possible
2.2.6_4. Establish a system for the curation of models	-	not possible
2.2.6_5. Interactive and user-friendly GUI of the model repository	-	possible
Other Needs		
2.(1/2).7_1. User management system	Possible	possible
2.(1/2).7_2. Data inventory / workspace	Possible	possible
2.(1/2).7_3. Tracing of documents	Possible	possible
2.(1/2).7_4. Software inventory	not possible	not possible
2.(1/2).7_5. Information resource inventory / knowledge base	Possible	possible
2.(1/2).7_6. General messaging dashboard / chat function	Possible	possible
2.(1/2).7_7. Project management, planning and controlling features	Possible	possible
2.(1/2).7_8. Video conferencing / conference calls	not possible	not possible
2.(1/2).7_9. Collaborative online document editor	not possible	not possible
2.(1/2).7_10. Online search and filter of documents	Possible	possible
2.(1/2).7_11. Educational resources	Possible	possible
2.(1/2).7_12. System administration and monitoring front end	partly possible	partly possible
2.(1/2).7_13. Data management policy is important: data storage and calculations should not be done on US server	-	possible

4.3 EVALUATION OUTCOMES – SECOND & THIRD PILOT EVALUATION

4.3.1 EVALUATION DETAILS

Event title: Workshop – RAKIP
 Location: Berlin, Germany
 Date: 25th of March 2019
 Method: pilot application demonstrations, hands-on exercise, on-line survey
 Participants: 19
 No. of responses: 17

Event title: Workshop “AGINFRA+VREs - supporting the DEMETER community”
 Location: Berlin, Germany
 Date: 1st of April 2019
 Method: pilot application demonstrations, hands-on exercise, on-line survey
 Participants: 17 (3 of them via web meeting)
 No. of responses: 8

Event title: Workshop Glossary
 Location: Online
 Date: 4th of September 2019
 Method: pilot application demonstrations, google on-line survey
 Participants: 21 (attending live the webinar)
 Nr. of responses: 6

Event title: Workshop “How to benefit from the Risk Assessment Modelling and Knowledge Integration Platform (RAKIP)”
 Location: Braganza, Portugal
 Date: 17th of September 2018
 Method: pilot application demonstrations, hands-on exercise, on-line and printed survey
 Participants: 40
 No. of responses: 23

Overview on VRE features demonstrated in the different evaluation events

2 nd Pilot RAKIP	3 rd Pilot RAKIP
<ul style="list-style-type: none"> - Social networking - Private / shared workspace - Wiki including Mind Map - RAKIP model repository - Data Miner & Data Catalogue - Running models on RAKIP VRE 	<ul style="list-style-type: none"> - FSK-ML model annotation - RAKIP_portal Data Catalogue - Private & shared workspace - RAKIP model repository - ARPHA Writing Tool - FSK-Lab

<ul style="list-style-type: none"> - Publishing models in Data Catalogue - FSK-Lab - How to create FSKX models - Online generation of FSKX files - ARPHA Writing Tool – FSKX model import - R-Studio, Galaxy, VocBench 	
2nd Pilot DEMETER	3rd Pilot VRE-based OHEJP Glossary
<ul style="list-style-type: none"> - VRE Workspace and data miner - Communication, Data analytics, User management, visualization - Data visualization, text mining, text query - Links to other software solutions (KNIME) 	<ul style="list-style-type: none"> - Search and filter function - Unique ID for terms, search for terms, tagging of terms - Term definitions, references and URL for referencing - Different terms for different sectors

4.3.2 INDICATORS – EVALUATION RESULTS

In this section we report on the results obtained by each evaluation indicator and compare (as far as reasonable) the answers between the second and third pilot evaluations within each use case and among use cases.

Indicator – Usefulness

The following table shows the feedback on specific VRE features, functionalities and tools that were surveyed to assess their usefulness (NA = not applicable / not asked).

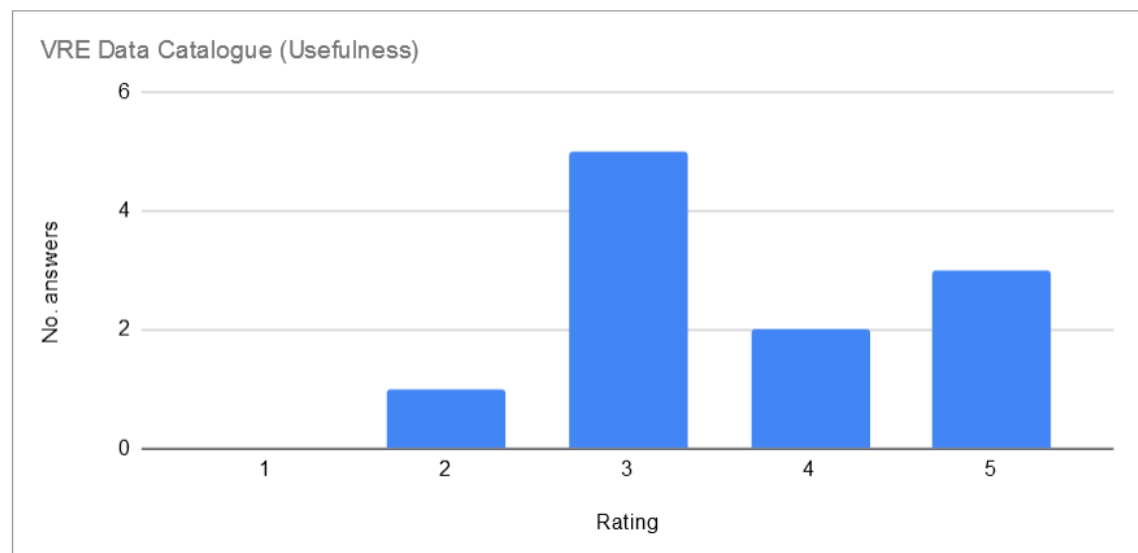
Indicator of the pilot VRE	Answer options	RAKIP		DEMETER	ORION
		2 nd Pilot	3 rd Pilot	2 nd Pilot	3 rd Pilot
Collaboration and communication features	Very useful	71%	76%	100%	80%
	OK	29%	24%		
	Other				
	Not useful				20%
Data analytics and computation features	Very useful	35%	40%	13%	NA
	OK	56%	56%	75%	
	Other	9%	4%	12%	
	Not useful				
Data visualization features	Very useful	18%	NA	25%	NA
	OK	65%		50%	
	Other	6%		12.5%	
	Not useful	11%		12.5%	
Content	Very useful	NA	NA	NA	100%
	OK				
	Other				
	Not useful				
Functionality (e.g. sorting, searching content)	Very useful	NA	NA	NA	80%
	OK				20%
	Other				
	Not useful				

Performance of the work “in the cloud” and support of co-development by remote researcher and research teams	Yes	59%	33%	62.5%	80%
	Maybe	35%	56%	37.5%	20%
	Other	6%	11%		
	No				

In the third pilot evaluation some advanced RAKIP VRE functionalities were surveyed in more detail after a dedicated session during the workshop.

- VRE Data Catalogue

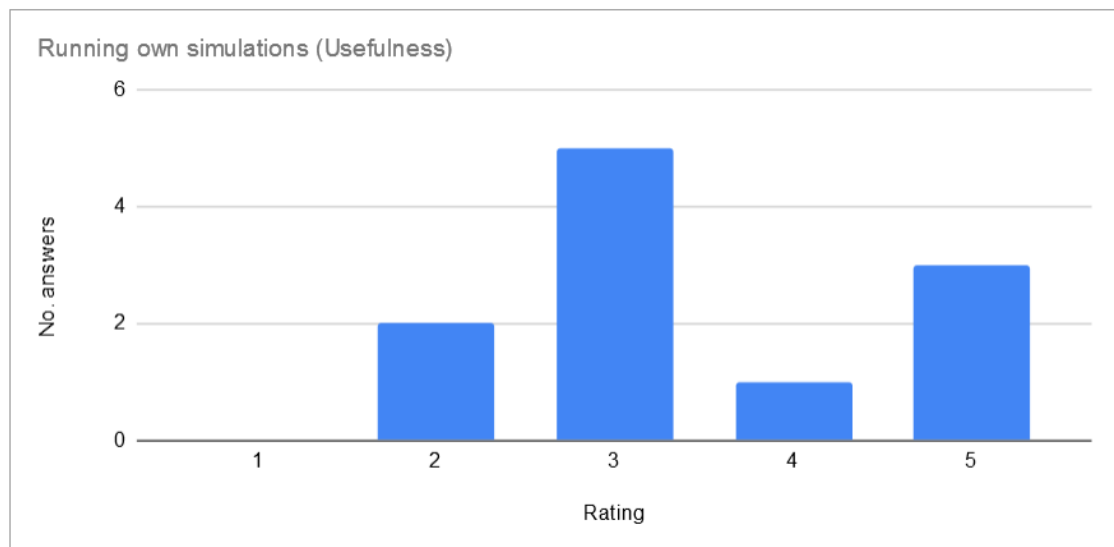
Please rate your user experience (usefulness) for the service to upload your own content to the VRE Data Catalogue?							
Ranking	1	2	3	4	5	not applicable	Mean
Occurance	0	1	5	2	3	0	3.64



Please rate your user experience (usefulness) for the service to upload your own content to the VRE Data Catalogue
<ul style="list-style-type: none"> - A manual so I can try by myself - In both cases, it would be helpful to have a pdf or video tutorial on the steps to upload content, run simulations, overall use of the platform (This is a copy form the last question, as the sentences starts with "in both cases") - Accessibility to register own models - Manual - I just need more time to generalize - Some more guidance (move interactive) on how to work in VRE with models. This session was good introduction. However, some detailed guidance on how to model inputs, modification outputs will be helpful.

- Run own simulations

Please rate your user experience (usefulness) for the service to run your own simulations in the VRE?							
Ranking	1	2	3	4	5	not applicable	Mean
Occurance	0	2	5	1	3	0	3.45

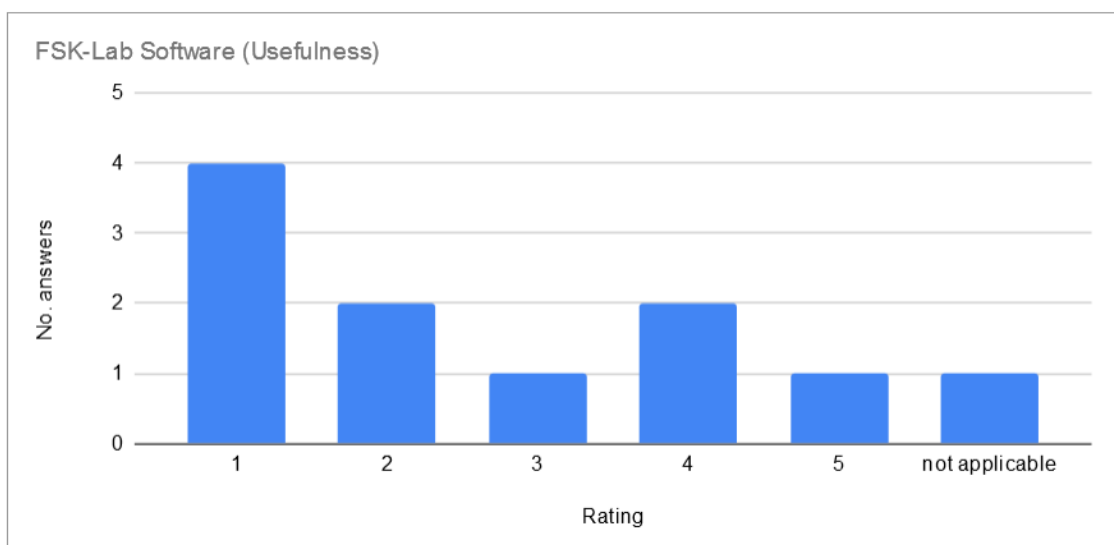


What would you like to see improved?

- In both cases, it would be helpful to have a pdf or video tutorial on the steps to upload content, run simulations, overall use of the platform
- easy to use guide
- support -> who should we contact
- more, clear, slower explanation
- Unfortunately, I did not get the permission and I missed most of the hand-on practices, difficulty to actually see and ... (maybe validate -> evaluate) the usability of the system
- A detailed case study and more time spent on live demo would be helpful

• FSK-Lab software

Please rate your user experience (usefulness) for the FSK-Lab software.							
Ranking	1	2	3	4	5	not applicable	Mean
Occurance	4	2	1	2	1	1	1.25

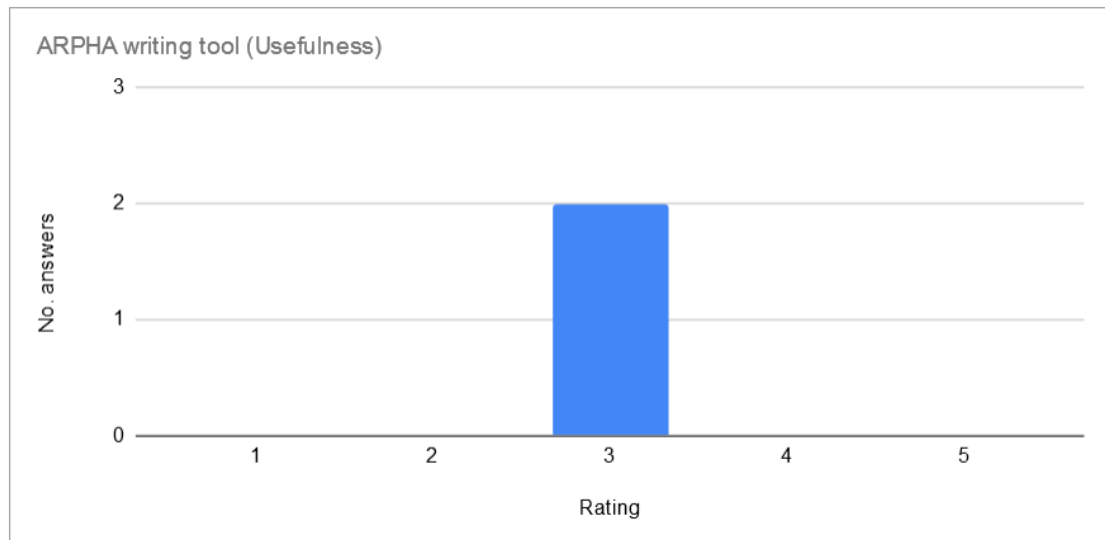


Which functionality should be added?

- My computer tells me I cannot open FSKX-files. So I do not get started. What can I do? Good if you can put info on your website.

- ARPHA writing tool

Please rate your user experience (usefulness) for the FSKX import into the ARPHA writing tool							
Ranking	1	2	3	4	5	not applicable	Mean
Occurance	0	0	2	0	0	0	3



What would you like to see improved?
No answers

Indicator – Learning Curve

The following table shows the results regarding the time investment and the effort to learn how to use the demonstrated features during the evaluations (NA = not applicable / not asked).

Indicator of the pilot VRE	Answer options	RAKIP		DEMETER	ORION
		2 nd Pilot	3 rd Pilot	2 nd Pilot	3 rd Pilot
Effort to learn how to execute data or knowledge visualization procedure or model simulation feature provided in the pilot VREs	Low	18%	NA	37.5%	NA
	Medium	59%		62.5%	
	High	17%			
	Very high	6%			
Effort to learn how to use the RAKIP Catalogue for sharing your data, models or tools & services with the other VRE members	Low	NA	62.5%	NA	NA
	Medium				
	High				
	Very high		37.5%		
Effort to learn how to access, search and filter content in the VRE-based OHEJP Glossary	Low	NA	NA	NA	80%
	Medium				20%
	High				

	Very high				
Effort to learn how to create and share your data processing or knowledge visualization feature via the pilot VRE	Low	NA	NA	37.5%	NA
	Medium			50%	
	High			12.5%	
	Very high				
Effort to learn how to use the VRE-based OHEJP Glossary for your own research, e.g. to search, compare or reference definitions	Low	*Free text	NA	NA	40%
	Medium				
	High				60%
	Very high				
Do you foresee problems in using the core VRE functionalities, e.g. the RAKIP Catalogue?	Very little	NA	37.5%	NA	NA
	Some		37.5%		
	Many		12.5%		
	Not usable		12.5%		

* Use the pilot VRE for your own research, e.g. to develop, run and publish your model / data analysis pipeline with the pilot VRE

Answers provided during RAKIP 2 nd Pilot on “Effort to learn how ...”
<ul style="list-style-type: none"> - Medium - Very long - High effort would be necessary as I am not used to work in such an environment - It depends on the compatibility with the R packages I use. If there is no problem on that side, the extra effort should be small. Otherwise, it can make migration almost impossible. - Not high - Medium effort - I am not a computer person, but see the need of models and combining them. This is my motivation for going into this topic and the tool. I hope my motivation is strong enough to continue. I also hope to convince collaborators back home to trust models so much that they also want to use it. So far, I have the experience that people tend to jump off and skip using models (one said: the fastest way to the false conclusion). - Long - It will not speed up what I am doing, it needs more development to run smoothly - Medium to high

Indicator – Performance, scalability

The following table shows the results regarding the performance and scalability of the demonstrated features (NA = not applicable / not asked).

Indicator of the pilot VRE	Answer options	RAKIP		DEMETER	ORION
		2 nd Pilot	3 rd Pilot	2 nd Pilot	3 rd Pilot
Performance of the pilot VRE compared to other platform(s)	Very good		NA		60%
	Good	41%			40%
	OK	59%		100%	
	Poor				
Scalability of the pilot VRE	Very good	NA	NA	NA	40%
	Good				60%
	OK				

	Poor				
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Indicator – Openness and FAIRness

In the following table the results regarding to the openness of each pilot and its tools are provided (NA = not applicable / not asked):

Indicator of the pilot VRE	Answer options	RAKIP		DEMETER	ORION
		2 nd Pilot	3 rd Pilot	2 nd Pilot	3 rd Pilot
Ease of finding, accessing and reusing datasets/models/ definitions and references	Very good	35%	12%	50%	40%
	Good	18%	44%	50%	60%
	OK	29%	44%		
	Poor	18%			
Ease of finding and assessing and reusing analytics and models / data analysis pipelines / workflows	Very good	30%	NA	12.5%	NA
	Good	35%			
	OK	35%		87.5%	
	Poor				
Ease of comparing terms and definitions between different sectors	Very good	NA	NA	NA	40%
	Good				40%
	OK				20%
	Poor				
Ease of registering and sharing datasets	Very good	29%	NA	62.5%	NA
	Good	24%			
	OK	41%		37.5%	
	Poor	6%			
Ease of registering and sharing analytics and models / data analytics pipelines / workflows	Very good	29%	NA	50%	NA
	Good	29%		50%	
	OK	36%			
	Poor	6%			
Ease of referencing and sharing terms	Very good	NA	NA	NA	60%
	Good				40%
	OK				
	Poor				

Indicator – Uptake potential

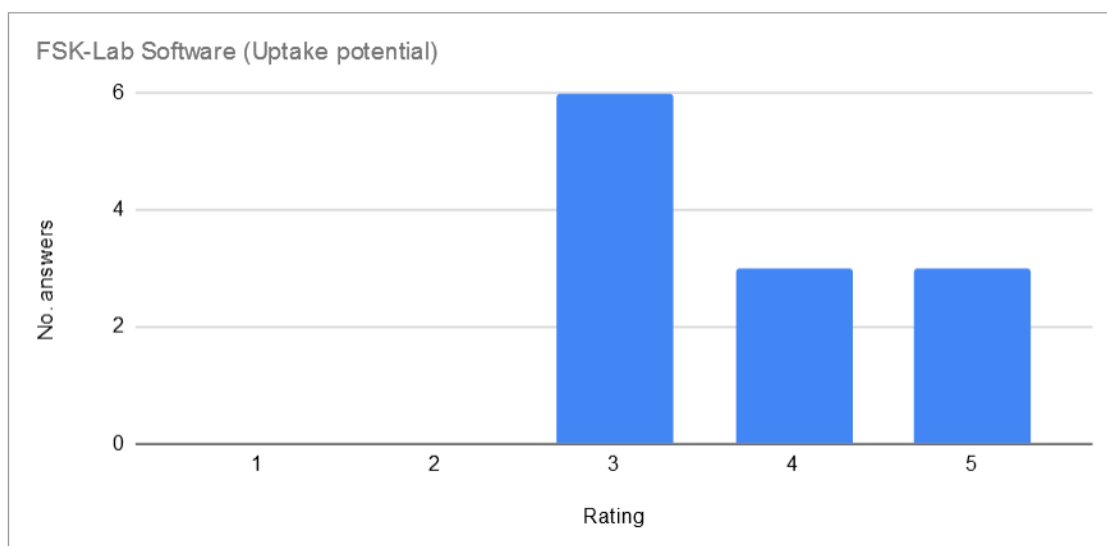
The following table shows the results regarding the uptake potential for the demonstrated VRE.

Indicator of the pilot VRE	Answer options	RAKIP		DEMETER	ORION
		2 nd Pilot	3 rd Pilot	2 nd Pilot	3 rd Pilot
Likelihood of using the VRE in the future for your work	Will use	42%	25%	50%	80%
	May use	53%	75%	50%	20%
	Will not use	5%			
	Other				

As for the usefulness indicator in the third piloting phase some of the RAKIP_Portal VRE core features were subjected to further analysis. Below we show the scores for these features.

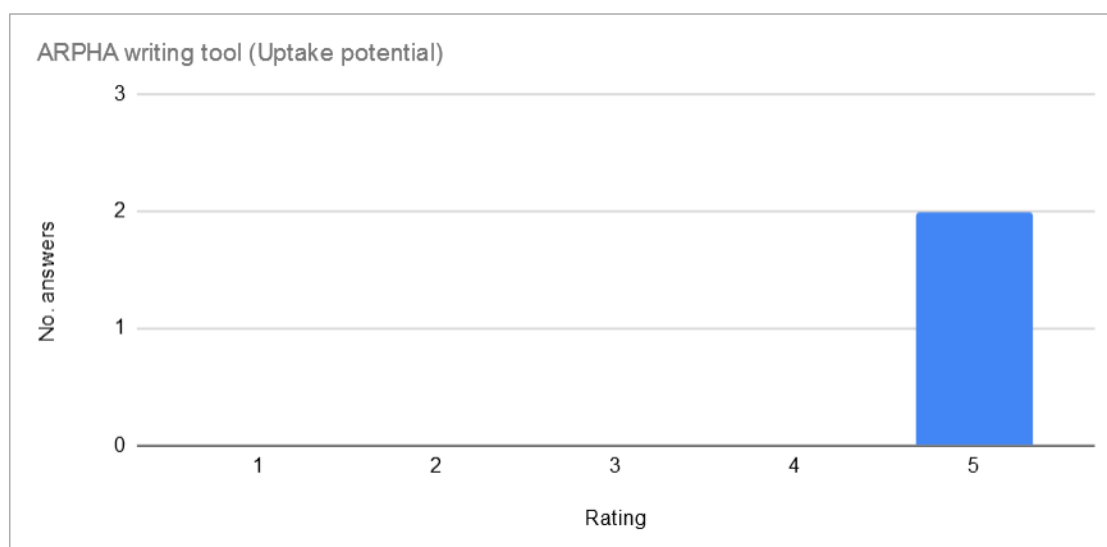
- FSK-Lab software

What is the likelihood that you use the presented FSK-Lab software for your work in the future?							
Ranking	1	2	3	4	5	not applicable	Mean
Occurance	0	0	6	3	3	0	3.75



- ARPHA writing tool

What is the likelihood that you use the ARPHA writing tool for your work in the future?							
Ranking	1	2	3	4	5	not applicable	Mean
Occurance	0	0	0	0	2	0	5



4.4 SUMMARY AND CONCLUSIONS

4.4.1 OBSERVATIONS

Indicator – Usefulness

- The VRE features for collaboration and communication and for data analytics and computation were very well scored in both the second and the third piloting phase. In particular, it was highlighted the resources to share and execute models (RAKIP model repository via KNIME Web server, VRE Catalogue) and the tools provided within the VREs for cloud computing. The social networking tools available in the VRE were also very well received.
- Data visualization features collected slightly worse marks and it was the only feature that was evaluated as not useful by some of the participants (11.8% RAKIP; 12.5% DEMETER). This could be due to the limited options to customize the outcome of the model execution images (RAKIP) or the filtering and visualization limitations of the network graph visualisation tool (DEMETER).
- The usability of the VRE to perform work “in the cloud” and support co-development among researchers and their research teams remotely was also very well rated.
- In the third piloting phase some of the RAKIP_Portal VRE core features were evaluated separately. Specifically, the VRE Data Catalogue and the tools to run own model simulations got a medium high score. The other tool which was presented and live demonstrated more thoroughly was the FSK-Lab software. It got a low rate mainly due to the fact the KNIME software, which is the software that supports it, has already a steep learning curve and a short workshop session is not enough to fully get into it.
- In all the cases participants stressed that some support via manuals, video tutorials or guidelines would be of great help to improve the user experience and be able to exploit all the VRE available tools and resources.

Indicator – Learning Curve

The perception of learning curve varied significantly depending on the VRE features and on the skills of the participants attending the workshops. In general the VRE general features for data/file/ information sharing were rated as easy to learn in medium to short time. While the more advanced analytical features (model run and execution, data analysis pipeline or data processing) and visualization features for DEMETER might need longer time to learn how to use them due to their higher complexity and to get used to new software.

Indicator – Performance, scalability

Despite these difficulties in the learning curve, in all piloting phases the performance and scalability of the VREs compared to other similar resources was very well rated.

Indicator – Openness and FAIRness

These indicators were evaluated for different features of the VRE separately. The easiness to find, access and reuse datasets / models / analytics / workflows was rated from OK to very good and even an improvement between the second and third

piloting phase was observed in RAKIP use case. The same behaviour was observed when the ease of registering and sharing was surveyed. The easiness to find, use, compare and reference terms was also surveyed and very positively evaluated in all the cases.

Indicator – Uptake potential

Finally, the analysis of the answers for the uptake potential demonstrates that all the surveyed communities and use cases show significant interest in adopting the presented pilot VREs and their corresponding features. Giving the fact that the third evaluation of the RAKIP_portal has been performed by participants that had never been in contact with the VRE concept or the concept of harmonized information exchange formats for food safety models the evaluation scores are very encouraging. Similarly the evaluation scores received for the ORION-VRE based OH-EJP Glossary illustrate the high uptake potential of this solution.

4.4.2 GENERAL IMPRESSIONS AND CONCLUSIONS

In general it can be concluded that the feedback from all the three piloting phases was very positive and improved over time together with the maturity of the pilot applications. This is in-line with the strong engagement of the end-user communities in the practical usage of VREs already during the AGINFRA+ project period, for example as a project management tool or as a resource to share files, data, models and knowledge. This is also underlined by the continuous increase in non-AGINFRA+ VRE members. For examples the number of non-AGINFRA+ members in the RAKIP_portal VRE increased from 19 in the first evaluation phase to 40 at the end of the AGINFRA+ project (for the ORION VRE the number increased from 31 to 46).

For the interpretation of specific evaluation results it is important to consider that the three evaluations had to fit to the development status of the pilots and had to serve different purposes (that implied also the use of varying evaluation event formats). Specifically, the second evaluation phase benefitted from the fact that community experts could be invited to attend a full day workshop that allowed them to perform hands-on exercise sessions and that provided enough time to demo a number of new different candidate VRE features, that were considered by WP6 as of potential interest for these communities. In contrast the third evaluation phase had been planned to collect feedback from a larger audience. This naturally led to the need to focus on core VRE functionalities (in order not to confuse participants) and also reduced the available time for hands on testing. As a consequence certain sub-aspects of the different indicators were only accessed if participants had the chance to explore the corresponding features. Despite of these differences it is considered as a very positive outcome that the scoring for indicators assessed in both evaluation phases remained high or improved over the course of the project.

Based on the received evaluation results and the general end-user feedback received after the workshops we conclude that the established VREs provide features that were considered relevant for the corresponding communities and that there is a high likelihood that the VRE technology will be taken up also after the end of the AGINFRA+ project by at least some of the involved food safety risk assessment communities as a new community resource.

5. VALIDATION – METHODOLOGY AND MATERIALS

5.1 METHODOLOGY

5.1.1 Introduction

As explained before it was decided to perform additional validation trials, which are described in the deliverable “Harmonized Use Case Validation methods, guidelines and materials (D1.2)”. These validation activities introduced also new indicators in order to obtain a more holistic feedback from the different end-users across the three end-user communities.

In this phase WP6 performed two workshops targeting the RAKIP community and one webinar for the ORION community.

5.1.2 Evaluation programme

The initial questions prescribed by the Venkatesh et al. (2003) survey instrument were marginally adapted to the specific VRE and target community. All the evaluation indicators and survey questions have been added as supplementary material in the corresponding Annex for each validation event together with the workshop agenda.

6. VALIDATION RESULTS

6.1 Evaluation details

Event title:	ORION Knowledge Hub webinar
Location:	Online
Date:	6 th of December 2019
Method:	pilot application demonstrations, google on-line survey
Participants:	19 (attending live the webinar)
Nr. of responses:	6
Event title:	Workshop “Harmonized exchange of food safety models using web-based services from RAKIP and the AGINFRA+ project”
Location:	Berlin, Germany
Date:	9 th of December 2019
Method:	pilot application demonstrations, hands-on exercise, printed survey
Participants:	21
Nr. of responses:	14
Event title:	Workshop “Sharing and running simulations of harmonized food risk assessment models”
Location:	Athens, Greece
Date:	10 th of January 2020
Method:	pilot application demonstrations, hands-on exercise, printed survey
Participants:	41
Nr. of responses:	41

6.2 Indicators – Evaluation Scores and Interpretation

Table 3 provides an overview on the results received from the validation events performed for the two food safety use cases based on the final pilot VRE solutions. In summary it can be stated, that these results are in line with the general positive feedback received during the three rounds of pilot evaluations. As expected, the received scores for certain indicators differed between the pilot solutions (e.g. “Performance expectancy”) as the different pilots solve different problem classes and community needs.

Table 3: Evaluation metrics with the mean values obtained for each validation event (Val. 1, Val. 2 and Val. 3 refer to the ORION Webinar, the RAKIP workshop hosted in Berlin and the RAKIP workshop hosted in Athens respectively).

Indicator of the pilot VRE	Question	Mean Val. 1	Mean Val. 2	Mean Val. 3
Performance expectancy	1. I would find such a virtual research environment useful in my job	3.50	4.00	4.29
	2. Using such a virtual research environment	2.67	3.29	4.51

	would enable me to accomplish tasks more quickly			
	3. Using such a virtual research environment would increase my productivity	2.67	3.57	4.32
	4. If I used a virtual research environment, I would increase my chances of getting a better position or salary	3.33	2.50	3.61
Effort expectancy	5. My interaction with such a virtual research environment would be clear and understandable	2.67	3.43	3.61
	6. It would be easy for me to become skillful at using such a virtual research environment	4.33	4.00	3.71
	7. I would find such a virtual research environment easy to use	4.33	4.00	3.59
	8. Learning to operate such a virtual research environment would be easy for me	3.67	3.86	3.66
Attitude toward using technology	9. Using such a virtual research environment is a good idea	3.67	4.29	4.54
	10. A virtual research environment makes work more interesting	3.83	3.86	4.15
	11. Working with such a virtual research environment is fun	3.83	3.86	3.68
	12. I would like working with such a virtual research environment	4.00	4.00	4.05
Social influence	13. People who influence my behaviour would think that I should use such a virtual research environment	3.83	3.29	3.71
	14. People who are important to me would think that I should use such a virtual research environment	3.33	3.00	3.63
	15. The senior management of my organisation would be supportive of using such a virtual research environment	3.67	3.57	4.22
	16. In general, my organization would support the use of such a virtual research environment	4.33	4.43	4.10
Facilitating conditions	17. I have the resources necessary to adopt and use a virtual research environment	4.33	3.93	3.78
	18. I have the knowledge necessary to adopt and use such a virtual research environment	4.33	4.07	3.34
	19. The virtual research environment does not seem compatible with other systems I use	2.50	2.21	2.90
	20. In my organisation, a specific person (or group) would be available to assist me with difficulties in using such a virtual research environment	3.33	4.14	3.37
Self-efficacy	21. I could complete a job or task using this virtual research environment if there was no one around to tell me what to do as I go	4.17	3.71	3.12
	22. I could complete a job or task using this virtual research environment if I could call someone for help if I got stuck	3.67	4.14	3.83
	23. I could complete a job or task using this system if I had a lot of time to complete the job for which the software was provided	4.67	4.14	3.56
	24. I could complete a job or task using this virtual research environment if I had in my organisation a facility for assistance	4.50	4.07	3.76
Anxiety	25. I feel apprehensive about using such a virtual research environment	2.67	2.64	2.66

	26. It scares me to think that I could lose a lot of information using such a virtual research environment by hitting the wrong key	2.67	1.79	2.44
	27. I hesitate to use such a virtual research environment, fearing to make mistakes I cannot correct	2.33	1.21	1.95
	28. Such a virtual research environment looks somewhat intimidating to me	2.33	1.71	2.29
Behavioral intention to use the system	29. I intend to use such a virtual research environment in the next 12 months	4.17	3.29	3.41
	30. I predict I would use such a virtual research environment in the next 12 months	4.17	3.14	3.51
	31. I plan to use such a virtual research environment in the next 12 months	4.17	3.07	3.39
Gender	Female	4	6	24
	Male	2	5	16
	Prefer not to say	0	3	1
Average age		39,5	36	27

7. DISCUSSION AND RECOMMENDATIONS

DISCUSSION AND ACHIEVEMENTS

The AGINFRA+ project has introduced as one of its core achievements Virtual Research Environments (VREs) as a collaborative tool for open science in three communities in agri-food research. For the food safety risk assessment communities that were targeted in WP6 of the project, most WP6 and community members were unfamiliar with virtual research infrastructure and the opportunities of using VREs for the whole research cycle when the project started. In the past years, many community members have now heard about the AGINFRA+ project, seen scientific talks and live demonstrations or attended workshops with opportunities to trial the VREs and the community-specific features. A significant number of community members were also involved into the process of prioritization of VRE feature requests and customization of the VRE GUI to the community specific needs, e.g. through attending evaluating workshops (that included hands-on exercises) and webinars. For that six evaluation events were performed for the RAKIP community, one event for the DEMETER community, two events for the ORION One Health community, and one workshop were performed for the RAKIP and DEMETER community together.

As requested by the reviewers during the mid-term review and described in the revised community-centred assessment plan D6.3 the 2nd and 3rd pilot evaluations were performed in an aligned approach for all three end-user communities within the AGINFRA+ project. The feedback collected on the various evaluation indices considered the specific maturity of each pilot application. It also took into account the evaluation purpose and the audience attending the events. This allowed for an active engagement of the corresponding communities and attracted significant attention to the pilots and the AGINFRA+ project. In general, it can be stated that for all WP6 research communities the VRE concept was very innovative. This also implied that significant efforts had to be taken by WP6 to educate community members on basic VRE functionalities (e.g. on how to register to the AGINFRA+ gateway or on how to use an online workspace). During the workshops performed for the second evaluation phase of the RAKIP and DEMETER VREs WP6 benefitted from the fact that several community members became early adopters of the VRE themselves and for example used the established VREs for their daily work. Nevertheless, it must be recognized that the promotion and dissemination of new community-centred VRE functionalities is and will be linked to significant efforts and iterative development cycles, that must include hands-on workshops, creation of tutorials and additional continuous support. Also it must be acknowledged that not all new VRE features developed by the technical WPs were feature complete or available in-time for the corresponding evaluation events, which in-turn influenced the prioritization of features and the re-allocation of development resources during the project.

In sum it can be stated that the work performed in the AGINFRA+ project facilitated to (1) develop novel web-based resources that are relevant to the corresponding communities (2) further improve existing VRE features through extensive testing, end-user feedback and the customization to the needs of the communities and (3) integrate new external resources into the open source VRE framework gCube. As the VREs provide central access points to numerous relevant resources the WP6 pilots could demonstrate that VREs provide resources for relevant steps of a (model-based) risk assessment development cycle. We also observed that community members in general state that

VREs can be a useful tool for digital open science and specifically acknowledge the intrinsic support for FAIR data (findable, accessible, interoperable, reusable) principles. In general, the evaluation and validation results as well as oral feedback were very positive for the AGINFRA+ VREs and the developed pilot applications. We see a broad willingness and enthusiasm of community members to use such environments in future research. These conclusions are also supported by the fact that the board of the International Committee for Predictive Modelling in Food (ICPMF, <http://www.icpmf.org/>) plans to adopt the RAKIP_portal VRE specifically for the preparation of the upcoming ICPMF conference in 2021.

The developed WP6 pilot applications were able to demonstrate the opportunities of collaborative, open science to the food safety risk assessment communities. As a very illustrative scenario the RAKIP_portal VRE pilot showcases how different VRE modules can be connected to support critical steps within the research life cycle, e.g. the creation, testing, sharing and publication of food safety models. Here e.g. the open source desktop software FSK-Lab or web-services from the RAKIP Model Repository hosted on BfR's KNIME server can be used for model creation, the VRE workspace and DataMiner for model testing, the VRE Data Catalogue for model sharing and the ARPHA Writing Tool for model publishing. WP6 also successfully applied the VREs concept to support communities that were not originally foreseen in the planning (e.g. the ORION and GFI communities). We can therefore conclude that the VRE concepts would be a useful resource in many other food safety risk assessment communities. The idea of creating a protected research space with open source resources to collaborate, communicate, share and publish data and knowledge across sectors meets the demand in many research areas, including the true interdisciplinary domain of food safety risk assessment.

Two other WP6 specific features are worth to be highlighted additionally:

- The flexibility to work with heterogeneous mathematical models in a variety of scripting languages. On the one hand it is possible to use language specific programming environments (e.g. RStudio, Jupyter, Galaxy) and on the other hand resources like the open source desktop software KNIME with the FSK-Lab KNIME extension or the DataMiner that both support a wide range of programming languages. A major factor that supports this flexibility is that many of these resources are directly available within the VRE, i.e. no installation is necessary.
- The resources developed to support the harmonized description and exchange of models (FSK-ML) really paved the way to the creation of model repositories like the RAKIP Model Repository or the RAKIP_portal Catalogue holding not only models of diverse types, but also services, data and definitions (glossary terms). Also, the new model import feature developed for the ARPHA Writing Tool adds another unique selling point to the RAKIP_portal VRE. Within the AGINFRA+ project FSK-ML has evolved into a practically applicable information exchange format for food safety models and simulation results that is already supported by several software tools, e.g. the KNIME extension FSK-Lab, the web-services hosted on the RAKIP Model Repository, the R scripting language via the FSK2R package and the web application "Bioinactivation FE". Some of these tools support end users with improved user-friendly interfaces for creating, joining, and reusing of FSK-ML compliant food safety models.

RECOMMENDATIONS

A diverse group of people participated on the WP6 evaluation and validation events. This diversity is in part due to the different settings of the events, e.g. one workshop took place as a satellite event to an international conference, and other events were executed as webinars. Therefore it is not possible to make a categorisation of recommendations per user group, as in many cases evaluators had an interdisciplinary background, and the breadth and depth of their hands-on experience differed. For the delineation of recommendations it seemed however useful to distinguish between recommendations that were collected from evaluators and those collected from persons involved in the VRE pilot development, as the latter ones worked on a daily basis with the VREs when implementing and testing pilot applications.

The end-user perspective:

The following issues were either directly reported as written feedback, or indirectly noted in discussions with evaluators:

- The user experience / usability of certain VRE features could be improved, e.g. by better integration of individual VRE components and services for example the access to the shared file system from the MindMap visualization tool.
- Due to the high number of available VRE features there is a steep learning curve when starting to use VREs. There is a great demand for up-to-date support pages and video tutorials, also for basic VRE features.
- For several VRE features, e.g. Data Catalogue, Visualization features, VocBench, specific feature requests were collected, that could not be addressed within the AGINFRA+ project due to resource limitations. This valuable feedback was documented within the AGINFRA+ ticket system and should be exploited by the technical partners whenever possible.

The developer perspective:

The following issues were either directly reported within the AGINFRA+ ticket system, or indirectly noted in discussions with the developers:

- Some tools that were created as AGINFRA+ results are still external “stand alone” tools, e.g. the semantic search. A direct integration into the community VREs as portlets would be desirable.
- Due to the specific constraints from the language-independent information exchange format FSK-ML it was not possible to have a generic solution that optimize the use of computational resources offered through the VRE (as the model itself is a kind of “black-box”, and e.g. parallelized execution of models requires the proper adaption of model code). This is considered as a field for further research.
- Due to the feature rich VRE backend it is very hard for “community” software developers, that are usually not familiar with the VRE backend infrastructure, to add new functionalities to a VRE.
- From the technical perspective, clarity on how VRE-services are connected is of utmost importance. The developers felt that more detailed and exhaustive

documentation on how services are or can be integrated into the VRE or connected with each other would be beneficial.

- Involved developers reported other technical issues into the AGINFRA+ ticket system. It is recommended to address these issues whenever possible.
- It is acknowledged that certain VRE components have certain technical limitations, e.g. the fact that there is no interactivity possible during the execution of a DataMiner algorithm. It would be great if new technologies could be developed in the future that overcome these limitations.
- It is recommended to also consider general VRE feature proposals even if these are not linked to computational expensive calculations. For example the feature request to include a web meeting feature into the VRE could support the dissemination and adoption of VREs by various scientific communities.

ANNEX 1 – FIRST PILOT RAKIP/DEMETER WORKSHOP

Workshop – FoodRisk-Labs supporting the AGINFRA+, DEMETER, RAKIP and EFSA-BfR FPA projects July 10th to July 12th 2017

Tutors:

- Carolina Plaza-Rodriguez; Miguel de Alba Aparicio, Lars Valentin, Taras Günther, Matthias Filter

German Federal Institute for Risk Assessment (BfR). Unit Food Technologies, Supply Chains and Food Defense. Department 4 -Biological Safety-, Berlin (Germany).

Abstract:

FoodRisk-Labs (<https://foodrisklabs.bfr.bund.de>) is a collection of modular, open-source software tools and community resources specifically designed to support the work of food safety risk assessors and decision makers. The available tools can be applied in the areas of predictive modelling (PMM-Lab), scenario and risk assessment simulations (FoodProcess-Lab), food safety knowledge generation and exchange (FSK-Lab and openFSMR) and food-related outbreak investigations (FoodChain-Lab).

This workshop will provide an introduction and training on the underlying data analytics platform KNIME (www.knime.org) that serve as the technical development framework for many FoodRisk-Lab components. Further the training will introduce PMM-Lab and opportunities to generate web-based services using the commercial KNIME Server extension. Finally the workshop will provide an introduction and training on new software resources promoting the adoption of a new open data standard called “Food Safety Knowledge Markup Language” (FSK-ML). The corresponding software package (FSK-Lab) enables users to encode Risk Assessment models and modules thereof in a harmonized model file format. These standardized model files can be shared via future Risk Assessment Modelling and Knowledge Integration Platforms (RAKIP). During the latter part of the workshop external experts will provide their feedback to BfR supporting the prioritization of software development tasks within the RAKIP and EFSA-BfR FPA WP2 projects.

AGENDA (tentative):

Day 1 (July 10 th 2017) – KNIME	10:00 AM – 5:00 PM
Welcome, Introduction	30 min
Overview on FoodRisk-Labs	45 min
Introduction to KNIME	45 min
Lunch	60 min
KNIME Hands-on training Session I	90 min
Coffee break	15 min

KNIME Hands-on training Session II	90 min
KNIME Community Extensions – Overview	45 min
End of Day 1	
Optional: Joint Dinner	
Day 2 (July 11th 2017) – parallel session “DEMETER / Advanced KNIME Features”	9:00 AM – 4:00 PM
Advanced KNIME features incl. KNIME Server-based services	90 min
Introduction SiLeBAT-NewsRadar and the underlying KNIME workflows	90 min
Lunch	60 min
DEMETER partner hackathon / Hands-on training	180 min
• End of Day 2	
Day 2 (July 11th 2017) – parallel session “Predictive Microbiology / PMM-Lab”	9:30 AM – 5:00 PM
General introduction into Predictive Microbiology	60 min
Introduction to the PMM-Lab KNIME extension	90 min
Lunch	60 min
PMM-Lab: Hands-on training Session I	90 min
Coffee break	30 min
PMM-Lab: Hands-on training Session II	90 min
Other relevant resources	30 min
End of Day 2	
Day 3 (July 12th 2017) – RAKIP workshop “FSK-Lab”	9:00 AM – 4:00 PM
Introduction to the RAKIP project	30 min
Introduction to Food Safety Knowledge Markup Language (FSK-ML)	30 min
Introduction and installation of FSK-Lab KNIME extension	30 min
Coffee break	15 min
FSK-Lab: Hands-on training Session I	90 min
Lunch	60 min
FSK-Lab Hands-on training Session II	90 min
Summary and Discussion	60 min
Farewell	15 min

Relevant Feedback

➤ **FSK-Lab Hands-on training**

A practical hands-on training was carried out including:

- Import FSK_Lab
- Example workflows
- The model from FSSP on *Listeria monocytogenes* growth coded by Leticia in R was implemented in FSK-Lab, and it was run properly.

➤ Next steps and development plans

A set of talks were carried out in order to describe the next steps and development plans

- RAKIP portal (VRE)
- Controlled vocabulary management (Google)
- FSK-Lab joiner nodes / ICRA connector / C++ libraries
- RAKIP Initiative (roadmap)

➤ Discussion with the external experts

- **Participant 1 (external):** He gives a positive opinion on the project, but he is sceptical in respect to people sharing their models into the RAKIP platforms due to responsibilities derived from the misuse of the models by third parties. He pointed that the models should have a clear disclaimer of their purpose to avoid this misuse.
- **Participant 2 (external)::** She thinks that RAKIP is a great initiative. She is currently re-implementing models into MicroHibro, and she knows the workload involved in the re-implementation of models from the articles.
- **Participant 3 (external)::** He has been working more in the ontologies description, but he has the same point of view of Aricia.
- **Participant 4 (internal)::** He thinks is a great initiative. He has a suggestion in relation to the metadata definition. Each of the controlled vocabularies used, should be accompanied by a definition of each of the terms, in order to facilitate the usability of the platform by the end-user.
- **Participant 5 (external)::** He thinks that RAKIP is a promising project. He also commented about the Knowledge junction platform by EFSA that is a new EFSA community to share scientific models used by EFSA.

ANNEX 2 – FIRST PILOT RAKIP WORKSHOP ICPMF10

Workshop – Cordoba, Spain, 26 September 2017 ICPMF10 Risk Assessment Modelling and Knowledge Sharing Initiatives (RAKIP/FDA-iRISK®)

WORKSHOP:

“Risk Assessment Modelling and Knowledge Sharing Initiatives (RAKIP/FDA-iRISK®)”

Chairs:

Matthias Filter² and Fernando Pérez-Rodríguez³

Tutors:

Yuhuan Chen¹; Paw Dalgaard⁴; Maarten Nauta⁴; Laurent Guillier⁵; Carolina Plaza Rodríguez²; Leticia Ungaretti Haberbeck⁴; Virginie Desvignes⁵; Miguel de Alba Aparicio², Matthias Filter²

¹ U.S. Food and Drug Administration; Center for Food Safety and Applied Nutrition; Office of Analytics and Outreach Division of Risk and Decision Analysis; Risk Analysis Branch; College Park, MD 20740

² Federal Institute for Risk Assessment (BfR). Unit Food Technologies, Supply Chains and Food Defense. Department 4 - Biological Safety-, Berlin (Germany).

³ Department of Food Science and Technology, International Campus of Excellence in the AgriFood Sector (ceiA3), University of Córdoba. Córdoba (Spain).

⁴ Technical University of Denmark. National Food Institute (DTU Food). Kemitorvet, Buildings 201-204 on Lyngby Campus, DK-2800 Kgs. Lyngby (Denmark).

⁵ French Agency for Food, Environmental and Occupational Health & Safety (ANSES). 14 rue Pierre et Marie Curie 94701 Maisons-Alfort. Cedex (France).

Abstract:

Food safety as a global challenge requires efficient knowledge transfer between academia, business operators and governmental agencies. Currently, a rich variety of useful models, software tools and databases exists, but exchange of information between these resources is so far extremely difficult and time consuming.

This ICPMF pre-conference workshop will provide an introduction and training on predictive modelling and risk assessment resources generated in Europe and North America, such as the joint RAKIP project by BfR, DTU and ANSES, and the FDA-iRISK project by FDA and RSI, publically available through JIFSAN. Development of these new, open, community-driven / community-oriented resources help to overcome the challenge in information exchange. Specifically, the newly developed data standard “Food Safety Knowledge Markup Language” (FSK-ML), controlled vocabularies and open source software code libraries and tools will be introduced, along with data extension and import utility features in FDA-iRISK, which enable users to upload external data in a familiar format (e.g., csv) and to integrate an existing model through shared dose-response, consumption, or risk model libraries. The practical training session will give participants the opportunity to learn recent progress that makes it easy to share their own data, predictive models or modules of Risk Assessment (RA) with the scientific community in a harmonized way. Further, participants will learn how RA modules or predictive microbial models can be combined, adapted and used in simulations with freely available software tools like FSK-Lab, FDA-iRISK, R and others.

AGENDA:

Introduction	2:00 PM - 4:00 PM
Welcome	10 min (F. Perez Rodriguez, UCO)
Community driven Food Safety Model Repositories - vision and status	30 min (L. Guillier, ANSES)
FDA-iRISK®: recent developments and next steps	30 min (Y. Chen, FDA)
New resources for harmonized model annotation and exchange	25 min (M. Filter, BfR)
Demo the RAKIP achievements in the area of predictive microbial modelling	25 min (L. Haberbeck, DTU)
Coffee break	4:00 PM – 4:15 PM
Parallel live demo user trainings (DTU / ANSES / BfR / FDA)	4:15 PM – 6:00 PM
Parallel - FDA-iRISK demo / training	3 x 30 min
Parallel - FSK-Lab demo / training	3 x 30 min
Parallel - RAKIP portal demo / training	3 x 30 min
Summary and Outlook	15 min

Results from questionnaires distributed after the RAKIP workshop on 26th September 2017 during the 10th International Conference in Predictive Modelling in Foods, held in Córbona, Spain. The numbers # are correspondent to the numbers in the questionnaires' copies bellow.

1. Which are the tools that you use to perform a risk assessment?

- #1: My own R scripts with mc2d and fitdist (*probably fitdistrplus*) packages, Excel and papers from literature.
- #2: @Risk (not very frequently) and Model Risk.
- #3: DMRI predict, FSSP, Combase.
- #4: Combase.
- #5: For farm to fork assessments:
 - @Risk-myself
 - I collaborate with people who use Multirisk.
- Single steps and XXXX:
 - R (Not myself, but colleagues I collaborate with)

2. How do you use tools/databases for predictive microbiology/risk assessment?

- #1: I have not used them.
- #2: Combase, PMP, FSSP.
- #3: Find shelf life for products (meat) (Listeria).
- #4: For rapid risk assessment in the event of an incident (e.g. inappropriate shelf life).
- #5: Find real data with real variability in terms of strains, matrix and storage conditions. Farm-to-fork overall risk assessment. Backwards and Forward.

3. Would it be interesting for you to be able to download/upload the models from one tool to be used in another tool? Why (not)?

- #1: I am not sure. I like to write my own models so that I know I understand where they came from and

how reliable they are.

#2: I hope, I would be able.

#3: Yes, to compare the software models.

#4: I'm not that advanced in my use of models.

#5: Yes. Work done and implement; any context maybe relevant for me to.

For STARTEC (see presentation): It is a framework that gain value if it is filled with data and models.

4. Do you think that RAKIP Web Portal can be useful for you?

#1: Yes, as a repository of examples

#2: Yes, also for educational purposes.

#3: Yes, very interesting.

#4: Yes, for understanding models created/used by others. It's not directly part of my job to create models myself.

#5: I came too late to the workshop to see. I suppose it will be useful.

5. (if yes) In which situation would RAKIP Web Portal be useful for you?

#1: If I was dealing with an unfamiliar situation (in processing, for example) and want an example. If a similar question to my own was available.

#2: Cooperation generally, with industry.

#3: Share data and models. Compare software.

#4: As above (question #4).

#5: No answer.

6. In your opinion, can your colleagues be interested in this model repository? Would you agree to promote the use of RAKIP model repository or the concepts of the RAKIP Initiative?

#1: I think my group would be interested in RAKIP. If the tool could be used by a non-coding audience, just

to demonstrate a model, I would be more likely to promote it.

#2: After certain (probably longer) time.

#3: Yes

#4: Yes ☐

#5: To my collaborators I will tell: Experience so far: Want to use the systems.

- They can/have been trained for/have experience with

- Are taught at universities, in order to ease training of new staff.

7. Do you have other related issues that you think are missing in our initiative?

#1: Data from the original challenge studies used for dose-response – useful for meta-analysis. I'm not sure

what is or isn't available! Perhaps you should record a lecture or seminar with examples and make it available online.

#2: Left blank.

#3: Left blank.

#4: I don't understand how you validate the quality of the models, i.e. are they "correct"? How does a naïve

user evaluate the quality of the models created by others? What help can you get for parameterizing models, e.g. when you don't have info or ever understand what the parameters means!

#5: I came too late to have the overview.

ANNEX 3 - FIRST PILOT RAKIP WORKSHOP



Agenda

Thursday, 22nd March 2018 (10:00 – 17:00h)

Venue: BfR, Alt-Marienfelde 17-21; D - 12277 Berlin, Room: 11, Building 8.

10:00	Arrival, coffee	
10:15	Welcome, agenda of the day, minutes and updates since last meetings	BfR, all
11:00	Live demo FSK-Lab and RAKIP VRE including hands-on training	Miguel, Taras, Tasja, all
12:30	Lunch break	All
13:30	<ul style="list-style-type: none"> Further changes in the metadata cardinality? Practical example on a model metadata schema. Procedure for maintenance of metadata schema Procedure for curation of models in RAKIP repository 	Octavio, All
14:30	Leticia's research results	Leticia
15:00	Coffee break	
15:15	<ul style="list-style-type: none"> RAKIP Initiative – road map document RAKIP disclaimer 	All
16:00	<ul style="list-style-type: none"> Planning and next steps meeting at DTU in June workshop and abstract for FoodMicro2018 SRA Other abstract submissions (EFSA conference?) 	All
17:00	Closure	

Relevant Feedback

1. **Live demo FSK-Lab**

- In the future: parameter script will disappear, as default values are provided within the model metadata. A parameter script will be auto-generated by FSK-Lab based on given metadata.
- New feature: model metadata can be read directly from a personal Google Sheet file that is compliant to Octavio's template.
- In the future: FSK-Joiner node allows to join two FSK objects. The joined model is considered as a “new model” with it's own metadata and annotation (which can be provided in the Model Editor node)
- In the future: FSK- Editor: adaptive GUI based on model class selection.

2. **RAKIP VRE**

- To clarify distinction between RAKIP and BfR's work in EFSA-FPA the next RAKIP portal will be based on the RAKIP VRE, that connects via REST to BfR KNIME Server.
- Old RAKIP links in the FoodRiskLabs web page will be redirected to the VRE.
- ANSES Extranet still remains the infrastructure for project management.

3. **Further changes in metadata cardinality and procedures for maintenance of metadata schema and curation of models in RAKIP repository:**

ANNEX 4 – SECOND PILOT RAKIP WORKSHOP

RAKIP WORKSHOP

Tutors:

Matthias Filter, Lars Valentin, Ahmad Swaid, Miguel de Alba Aparicio, Taras Günther, Marcel Fuhrmann, Estibaliz Lopez de Abechuco, Thomas Schüler, Tasja Buschhardt

German Federal Institute for Risk Assessment (BfR). Unit Food Technologies, Supply Chains and Food Defense. Department 4 -Biological Safety-, Berlin (Germany).

Venue:

BfR, Location Alt-Marienfelde, House 8; Room: 009
Alt-Marienfelde 17-21
D - 12277 Berlin, https://www.bfr.bund.de/en/location_alt_marienfelde-7243.html

Workshop Objective:

For the AGINFRA+ project this workshop serves as an evaluation event where the new features in the RAKIP Virtual Research Environment (VRE) will be presented and feedback is collected from members of the RAKIP community.

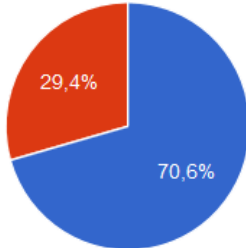
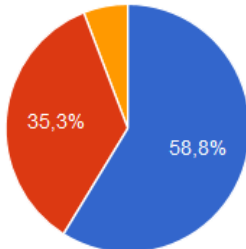
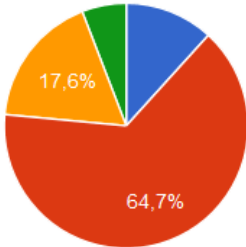
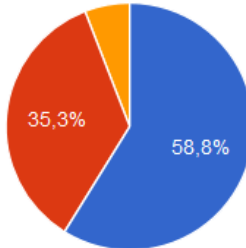
AGENDA

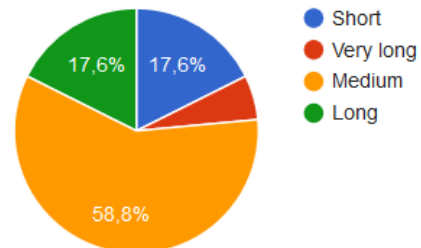
25 th March 2019	Duration	Start
1.: Welcome, Introduction, Technical Setup	15 min	09:30
2.: General introduction to Virtual Research Environments and AGINFRA+ project	15 min	09:45
3.: RAKIP VRE features - I	75 min	10:00
- Social networking		
- Private / shared workspace		
- Wiki including Mind Map		
- RAKIP model repository		
- Exercise I: RAKIP portal on KNIME Server		
Coffee break	15 min	11:15
4.: RAKIP VRE features - II	60 min	11:30
- Introduction to Data Miner & Data Catalogue		
- Running models on RAKIP VRE		
- Publishing models in Data Catalogue		
- Exercise II: Use VRE to publish models		
Lunch	60 min	12:30
5.: RAKIP VRE features - III	90 min	13:30
- FSK-Lab - How to create FSKX models		
- Online generation of FSKX files		
- ARPHA Writing Tool – FSKX model import		
- Other features: R-Studio, Galaxy, VocBench		
Coffee break	15 min	15:00
6.: Exercise III: Online creation of FSKX files, ARPHA WT, VRE	60 min	15:15
7.: Summary and feedback	30 min	16:15

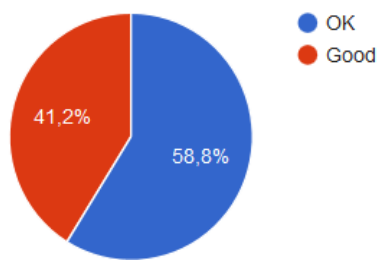
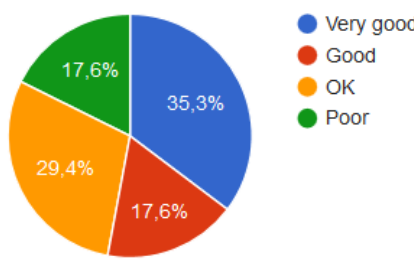
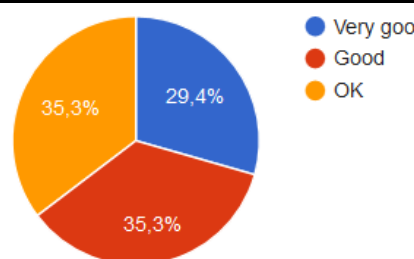
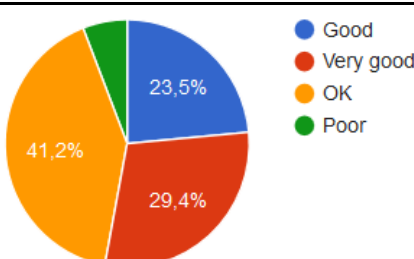
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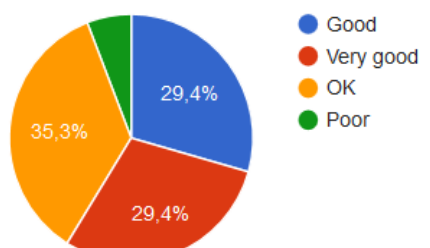
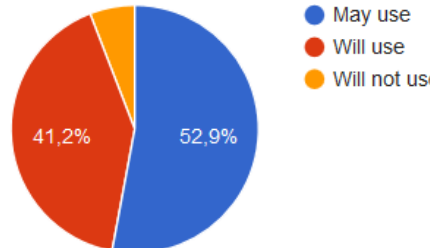
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Table 4.1: Evaluation metrics used and results for the second pilot VRE version in the RAKIP use case.

Indicators	Evaluation questions	Assessment method Options	Answers
USEFULNESS	<ul style="list-style-type: none"> How do you assess the usefulness of the pilot VRE with regard to the following aspects: <ul style="list-style-type: none"> Collaboration and communication? 	Qualitative scoring Not useful OK Very useful Other	 <ul style="list-style-type: none"> very useful OK
	<ul style="list-style-type: none"> How do you assess the usefulness of the pilot VRE with regard to the following aspects: <ul style="list-style-type: none"> Data analytics? 	Qualitative scoring Not useful OK Very useful Other	 <ul style="list-style-type: none"> OK very useful Other...
	<ul style="list-style-type: none"> How do you assess the usefulness of the pilot VRE with regard to the following aspects: <ul style="list-style-type: none"> Data visualization? 	Qualitative scoring Not useful OK Very useful Other	 <ul style="list-style-type: none"> not useful OK very useful Other...
	<ul style="list-style-type: none"> Do you think that the pilot VRE can help to perform your work “in the cloud” and support co-development by remote researcher and research teams? 	Qualitative scoring No Maybe Yes Other	 <ul style="list-style-type: none"> Yes Maybe Other...
	<ul style="list-style-type: none"> Which VRE features presented are considered as relevant for your research? 	Qualitative scoring Free text	<ul style="list-style-type: none"> ARPHA WT FSKX model repository Model repository Cloud computing and annotation RStudio, Dataminer Curation and visualization Sharing of mathematical models in a normalized format. Cloud computing. Possibly, communication in a social network format.

			<ul style="list-style-type: none"> - RAKIP Model Repository, Data Miner, R Studio, Data Catalogue, ARPHA writing tool - Arpha WT - Several, the overview of models are good, the combining options are useful but I see also a risk of combining models which should not be combined, how to publish a model in the journal, several other things. What I believe is missing, is the justification of choices which are not mathematical. Actually, a survey like this may be used as a decision tree which can be used for this purpose. - The possibility to share and run models, with the required documentation behind it. - DataMiner
LEARNING CURVE	<ul style="list-style-type: none"> • How do you estimate the effort to learn how to execute a data or knowledge visualization procedure or model simulation feature provided in the pilot VRE? 	Qualitative scoring Short Medium Long Very long Other	 <p>Legend: Short (blue), Very long (red), Medium (orange), Long (green)</p>
	<ul style="list-style-type: none"> • How do you estimate the effort to use the pilot VRE for your own research, e.g. to develop, run and publish your model / data analysis pipeline with the pilot VRE? 	Qualitative scoring Free text	<ul style="list-style-type: none"> - Medium - Very long - High effort would be necessary as I am not used to work in such an environment - It depends on the compatibility with the R packages I use. If there is no problem on that side, the extra effort should be small. Otherwise, it can make migration almost impossible. - Not high - Medium effort - I am not a computer person, but see the need of models and combining them. This is my motivation for going into this topic and the tool. I hope my motivation is strong enough to continue. I also hope to convince collaborators back home to trust models so much that they also want to use it. So far, I have the experience that people tend to jump off and skip using models (one said: the fastest way to the false conclusion). - Long - It will not speed up what I am doing, it needs more development to run

			smoothly - Medium to high
PERFORMANCE, SCALABILITY	<ul style="list-style-type: none"> How do you rate the performance of the pilot VRE compared to the platform(s) you are used to work with? 	Qualitative scoring Poor OK Good Very good	 <ul style="list-style-type: none"> OK Good
	<ul style="list-style-type: none"> How do you rate the scalability of the pilot VRE? 	Qualitative scoring Free text	<ul style="list-style-type: none"> Don't know OK No comments Medium Guest Good Highly Good Scalable ? I have not much to compare with good (too complicated) ? OK
OPENNESS AND FAIRNESS	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the following perspectives? <ul style="list-style-type: none"> Ease of finding and accessing and reusing datasets 	Qualitative scoring Poor OK Good Very good	 <ul style="list-style-type: none"> Very good Good OK Poor
	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the following perspectives? <ul style="list-style-type: none"> Ease of finding and assessing and reusing analytics and models 	Qualitative scoring Poor OK Good Very good	 <ul style="list-style-type: none"> Very good Good OK
	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the following perspectives? <ul style="list-style-type: none"> Ease of registering and sharing datasets 	Qualitative scoring Poor OK Good Very good	 <ul style="list-style-type: none"> Good Very good OK Poor

	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the following perspectives? <ul style="list-style-type: none"> Ease of registering and sharing analytics and models 	Qualitative scoring Poor OK Good Very good	 <p> ● Good ● Very good ● OK ● Poor </p>
UPTAKE POTENTIAL	<ul style="list-style-type: none"> What is the likelihood that you would use a system as the one demonstrated in the pilot in the future for your work? 	Qualitative scoring Will not use May use Will use Other	 <p> ● May use ● Will use ● Will not use </p>

ANNEX 5 – SECOND PILOT DEMETER WORKSHOP

Workshop “AGINFRA+VREs - supporting the DEMETER community” 01.04.2019

Tutors:

Matthias Filter, Lars Valentin, Taras Günther, Estibaliz Lopez de Abechuco, Thomas Schüler

German Federal Institute for Risk Assessment (BfR). Unit Food Technologies, Supply Chains and Food Defense. Department 4 -Biological Safety-, Berlin (Germany).

Venue:

BfR; Location Jungfernheide, Room JFH-A3-B6022 (6th floor)

Max-Dohrn-Str. 8-10; D - 10589 Berlin

<https://www.bfr.bund.de/en/location-jungfernheide.html>


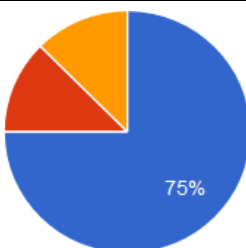
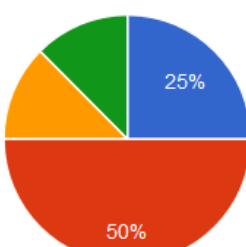
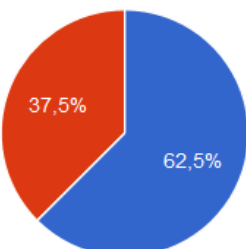
Workshop Objective:

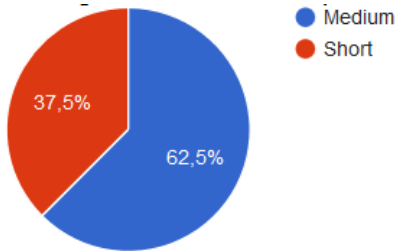
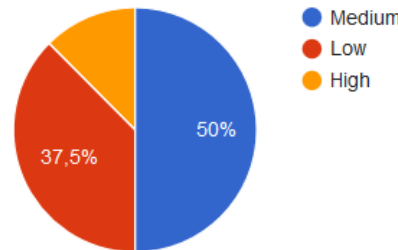

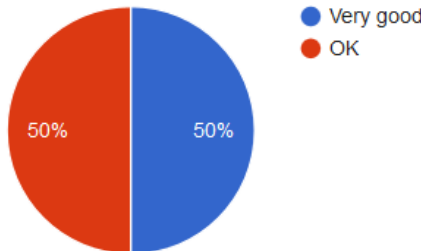
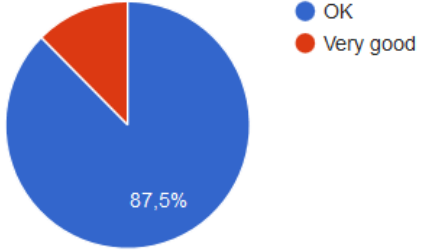
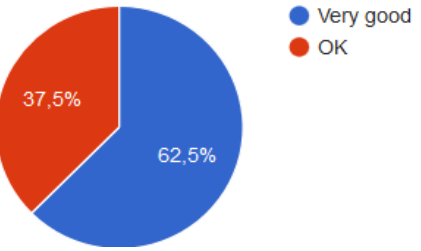
For the AGINFRA+ project this workshop serves as an evaluation event where the new features in the DEMETER Virtual Research Environment (VRE) will be presented and feedback is collected from members of the DEMETER community.

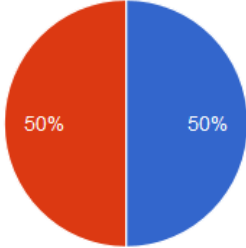
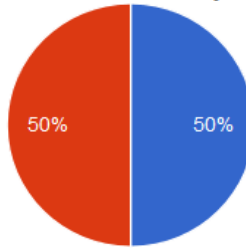
AGENDA

1 st April 2019	Duration	Start
1.: Welcome, Introduction, Technical Setup	15 min	11:15
2.: General introduction to Virtual Research Environments and AGINFRA+ project	15 min	11:30
3.: KNIME Server Workflow Hub via VRE	75 min	11:45
- VRE start page -> login to KNIME Workflow Hub		
- Demo BfR KNIME Server Workflow Hub + public KNIME WF Hub		
- Demo sharing KNIME WFs via KNIME Server		
- Demo SiLeBAT NewsRadar		
- Hands-on Exercise I		
Lunch break	60 min	13:00
4.: RAKIP VRE features - I	90 min	14:00
- Social networking		
- Private / shared workspace		
- Demo MindMap		
- Demo Wiki inkl. FoodAkai		
- Demo Data Catalogue incl. publishing own knowledge		
- Hands-on Exercise II		
Coffee break	30 min	15:30
5.: RAKIP VRE features - II	60 min	16:00
- Execution of KNIME workflows with Data Miner in VRE		
- Upload models into Catalogue via DM		
- Other VRE services: Galaxy, R Studio, VocBench, ARPHA WT		
- Hands-on Exercise III		
6.: Summary and feedback	30 min	17:00
End		17:30

Table 5.1: Evaluation metrics used and results received for the second pilot VRE version in the DEMETER use case.

Indicators	Evaluation questions	Assessment method Options	Answers
USEFULNESS	<ul style="list-style-type: none"> How do you assess the usefulness of the pilot VRE with regard to: <ul style="list-style-type: none"> - Collaboration and communication? 	Qualitative scoring Not useful OK Very useful Other	 <ul style="list-style-type: none"> very useful
	<ul style="list-style-type: none"> How do you assess the usefulness of the pilot VRE with regard to: <ul style="list-style-type: none"> - Data analytics? 	Qualitative scoring Not useful OK Very useful Other	 <ul style="list-style-type: none"> OK very useful Other...
	<ul style="list-style-type: none"> How do you assess the usefulness of the pilot VRE with regard to: <ul style="list-style-type: none"> - Data visualization? 	Qualitative scoring Not useful OK Very useful Other	 <ul style="list-style-type: none"> Very useful OK Other... Not useful
	<ul style="list-style-type: none"> Do you think that the pilot VRE can help to perform your work “in the cloud” and support co-development by remote researcher and research teams? 	Qualitative scoring No Maybe Yes Other	 <ul style="list-style-type: none"> yes Maybe
	<ul style="list-style-type: none"> Which VRE features presented are considered as relevant for your research? 	Qualitative scoring Free text	<ul style="list-style-type: none"> - Storage hub and data miner - Communication, Data analytics, User management, visualization - Data visualization, text mining, text query - Data analytics, data visualization - Common workplace, links to other software solutions (KNIME)

Learning Curve	<ul style="list-style-type: none"> How do you estimate the effort to learn how to USE a data processing or knowledge visualization feature provided via the pilot VRE? 	Qualitative scoring Short Medium Long Very long Other	
	<ul style="list-style-type: none"> How do you estimate the effort to learn how to CREATE and SHARE your data processing or knowledge visualization feature via the pilot VRE? 	Qualitative scoring Short Medium Long Very long Other	
Performance, Scalability	<ul style="list-style-type: none"> How do you rate the performance of the pilot VRE compared to the platform(s) you are used to work with? 	Qualitative scoring Poor OK Good Very good	
Openness and FAIRness	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the perspective: <ul style="list-style-type: none"> ease of finding, accessing and reusing datasets? 	Qualitative scoring Poor OK Good Very good	
	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the perspective: <ul style="list-style-type: none"> ease of finding, assessing and reusing data analysis pipelines / workflows? 	Qualitative scoring Poor OK Good Very good	
	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the perspective: <ul style="list-style-type: none"> ease of registering and sharing datasets 	Qualitative scoring Poor OK Good Very good	

	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the perspective: <ul style="list-style-type: none"> ease of registering and sharing data analytics pipelines / workflows? 	Qualitative scoring Poor OK Good Very good	 <ul style="list-style-type: none"> Very good OK
Uptake potential	<ul style="list-style-type: none"> What is the likelihood that you would use a system as the one demonstrated in the pilot in the future for your work? 	Qualitative scoring Will not use May use Will use Other	 <ul style="list-style-type: none"> Will use May use

ANNEX 6 – THIRD PILOT OHEJP GLOSSARY WORKSHOP

OHEJP Glossary Webinar

4th September 2019 from 10:00 to 11:00 AM via
https://svasweden.adobeconnect.com/ejp_orion/

Tutors:

Matthias Filter, Tasja Buschhardt & Taras Günther


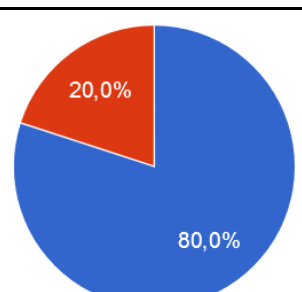
Agenda:

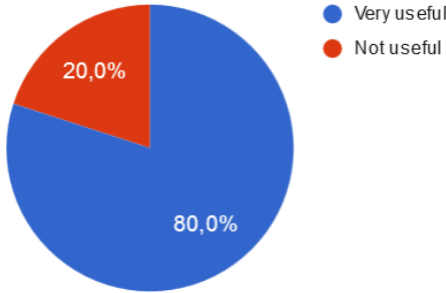
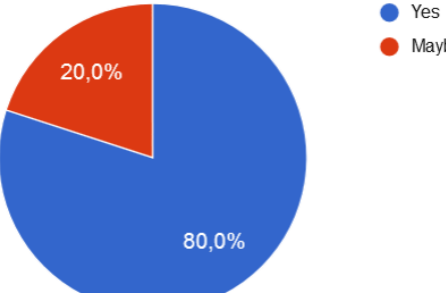
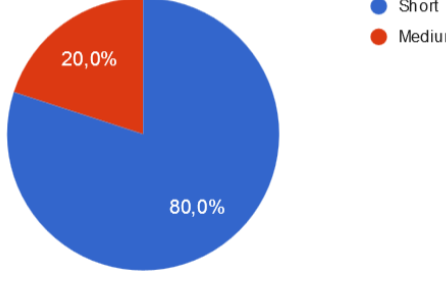
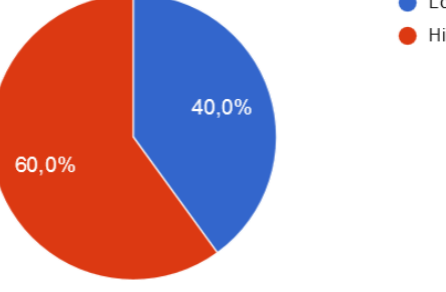
1. Welcome, Introduction of Speakers, Agenda
2. Introduction to EJP & AGINFRA+ Projects
3. OHEJP Glossary - Background
4. OHEJP Glossary - Technical Concept & Live Demo
5. OHEJP Glossary - Summary & Future Perspectives
6. Q&A & Feedback

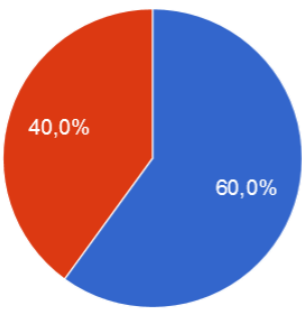
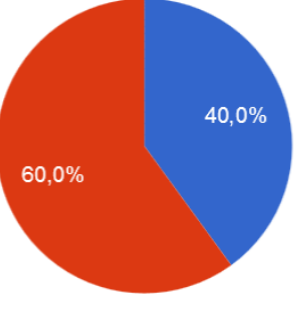
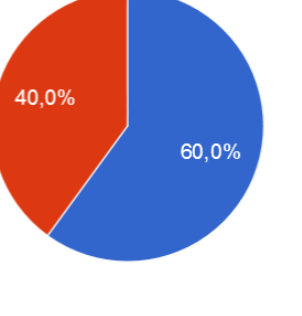
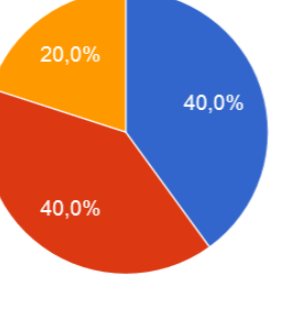
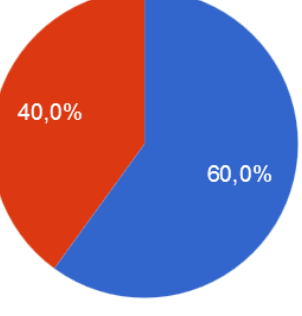
Summary:

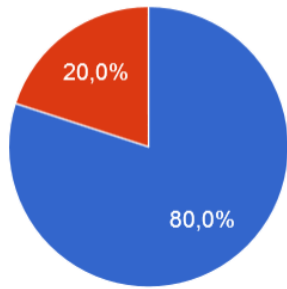
The OHEJP Glossary was presented.

Table 6.1: Evaluation metrics used in the second pilot VRE version for VRE-based OHEJP Glossary use case and graphical representation of the answers provided.

Indicators	Evaluation questions	Assessment method	Answers
Usefulness	<ul style="list-style-type: none"> How do you assess the usefulness of the VRE-based OHEJP Glossary with regard to the following three aspects: <ul style="list-style-type: none"> - Content? 	Qualitative scoring <i>Not useful</i> <i>OK</i> <i>Very useful</i> <i>Other</i>	 <p>100,0%</p> <p>● Very useful</p>
	<ul style="list-style-type: none"> How do you assess the usefulness of the pilot VRE with regard to the following aspects: <ul style="list-style-type: none"> - Functionality (eg. sorting, searching content)? 	Qualitative scoring <i>Not useful</i> <i>OK</i> <i>Very useful</i> <i>Other</i>	 <p>20,0%</p> <p>80,0%</p> <p>● Very useful ● OK</p>

	<ul style="list-style-type: none"> How do you assess the usefulness of the pilot VRE with regard to the following aspects: <ul style="list-style-type: none"> Collaboration and communication? 	Qualitative scoring Not useful OK Very useful Other	
	<ul style="list-style-type: none"> Do you think that the VRE-based OHEJP Glossary can help to perform your work “in the cloud” and support co-development by remote researcher and research teams? 	Qualitative scoring No Maybe Yes Other	
	<ul style="list-style-type: none"> Which features presented in the VRE-based OHEJP Glossary are considered as relevant for your research? 	Qualitative scoring Free text	<ul style="list-style-type: none"> Search and filter function unique ID for terms, search for terms, tagging of terms Term definitions, references and URL for referencing Different terms for different sectors
Learning Curve	<ul style="list-style-type: none"> How do you estimate the effort to learn how to access, search and filter content in the VRE-based OHEJP Glossary? 	Qualitative scoring Short Medium Long Very long Other	
	<ul style="list-style-type: none"> How do you estimate the effort to use the VRE-based OHEJP Glossary for your own research, e.g. to search, compare or reference definitions with the VRE-based OHEJP Glossary? 	Qualitative scoring Low Medium High Other	

Performance, Scalability	<ul style="list-style-type: none"> How do you rate the performance of the VRE-based OHEJP Glossary compared to the platform(s) you are used to work with? 	Qualitative scoring Poor OK Good Very good	 <p>60,0% 40,0%</p> <p>Very good Good</p>
	<ul style="list-style-type: none"> How do you rate the scalability of the VRE-based OHEJP Glossary? 	Qualitative scoring Poor OK Good Very good	 <p>40,0% 60,0%</p> <p>Very good Good</p>
Openness and FAIRness	How open do you think the OHEJP Glossary and its tools are from the following three perspectives: <ul style="list-style-type: none"> Ease of finding and accessing definitions and references? 	Qualitative scoring Poor OK Good Very good	 <p>60,0% 40,0%</p> <p>Very good Good</p>
	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the following perspectives? <ul style="list-style-type: none"> Ease of comparing terms and definitions between different sectors? 	Qualitative scoring Poor OK Good Very good	 <p>40,0% 40,0% 20,0%</p> <p>Very good Good OK</p>
	<ul style="list-style-type: none"> How open do you think the pilot and its tools are from the following perspectives: <ul style="list-style-type: none"> Ease of referencing and sharing terms? 	Qualitative scoring Poor OK Good Very good	 <p>60,0% 40,0%</p> <p>Very good Good</p>

Uptake potential	<ul style="list-style-type: none">What is the likelihood that you would use a system as the one demonstrated in the VRE-based OHEJP Glossary in the future for your work?	<p>Qualitative scoring</p> <p><i>Will not use</i></p> <p><i>May use</i></p> <p><i>Will use</i></p> <p><i>Other</i></p>	 <p>80,0%</p> <p>20,0%</p> <p>Will use</p> <p>May use</p> <table><thead><tr><th>Category</th><th>Percentage</th></tr></thead><tbody><tr><td>Will use</td><td>80,0%</td></tr><tr><td>May use</td><td>20,0%</td></tr></tbody></table>	Category	Percentage	Will use	80,0%	May use	20,0%
Category	Percentage								
Will use	80,0%								
May use	20,0%								

ANNEX 7 – THIRD PILOT - RAKIP WORKSHOP

Workshop “How to benefit from the Risk Assessment Modelling and Knowledge Integration Platform (RAKIP)”

Place: 11th International Conference on Predictive Modelling in Food (ICPMF11), Braganza (Portugal)

Date: 17/09/2019

Tutors: Matthias Filter (MF), Maarten Nauta (MN), Laurent GUILLIER (LG), Estibaliz Lopez de Abechuco Garrido (ELAG), Lars Valentin (LV), Tasja Buschhardt (TB)

Objectives:

1. **RAKIP VRE** as free **community resource** to share data, new models or new services / tools - even can be used to make announcements to the community
2. **FSKX format works** for exchanging models between various tools and services

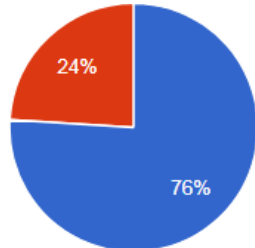
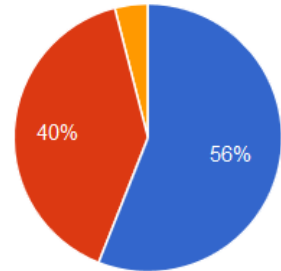
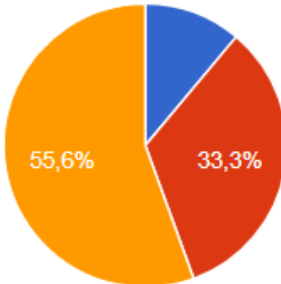
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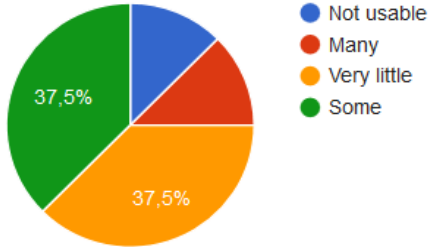
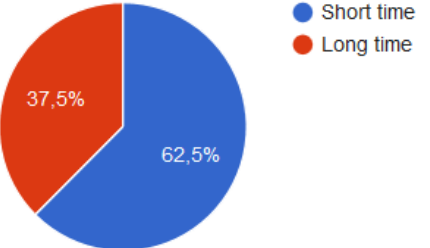
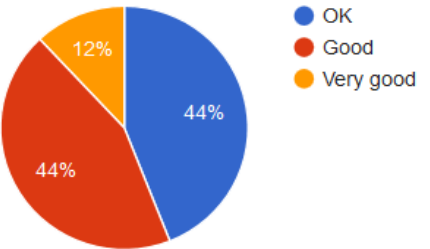
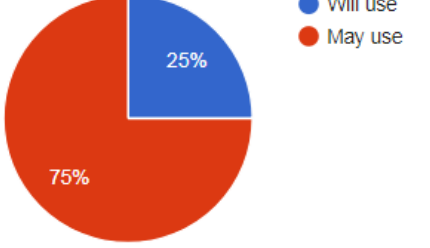
08:30	Preparation & Set-up
09:30 – 09:45	Welcome and introduction of tutors Housekeeping issues, Agenda, registration links for RAKIP trial VRE
09:45 – 10:45	Theory
09:45 – 10:00	What is RAKIP & AGINFRA+? Who is behind RAKIP? RAKIP's unique selling points. The potential of RAKIP in the food safety risk assessment community
10:00 – 10:15	Consistent knowledge annotation: terms and concepts, metadata, FSK-ML, FSKX
10:15 – 10:30	User groups (Modellers, researchers, risk assessors and managers) Overview on RAKIP Resources: Virtual Research Environment (VRE) DataCatalogue, private & shared workspace RAKIP KNIME Server ARPHA-WT FSK-Lab (KNIME desktop)
10:30 – 10:45	Case study live demo (VRE intro & news & DataCatalogue & execution of model in VRE (& RAKIP portal) inkl. introduction of topics for break out sessions
10:45 – 11:15	Coffee break
11:15 – 12:15	Hands-on exercises:
11:15 – 11:40	"How to enter the VRE & how to search, find, download models from the VRE - Data catalogue"
	Break out sessions:
	Main room 11:45 - 12:15 Session 1
	1. How to perform own simulations/predictions with a model of interest in the RAKIP VRE (only)?
	2. How to upload own content into the VRE Catalogue?
	3. How to generate new FSKX models online?
	Room 2 11:45 - 12:15 Session 2
	1. Introduction to KNIME + FSK-Lab (LV: help with installing FSK-Lab)
	2. How to read, customise, run & combine models with FSK-Lab (R)?
	Room 3 11:45 - 12:15 Session 3

1. How do FSK-ML compliant models support knowledge-sharing and publishing? - Demo VRE right-click feature - Demo
2. Demo and Exercise ARPHA-WT

12:15 – 12:30 Summary & Outlook: RAKIP Initiative, development plans, -> link to posters **Feedback** of participants on RAKIP VRE Also: Sheets on each table to ask questions specific for the features presented

Table 7.1: Evaluation metrics used in the second pilot VRE version for RAKIP use case and graphical representation of the answers provided.

Indicators	Evaluation questions		Answers
Usefulness	<ul style="list-style-type: none"> How do you rate the usefulness of the pilot VRE with regard to the following aspect: <ul style="list-style-type: none"> Collaboration and information exchange? 	Qualitative scoring Not useful OK Very useful Other	 <ul style="list-style-type: none"> very useful OK
	<ul style="list-style-type: none"> How do you rate the usefulness of the pilot VRE with regard to the following aspect: <ul style="list-style-type: none"> Data analytics & computation? 	Qualitative scoring Not useful OK Very useful Other	 <ul style="list-style-type: none"> OK very useful Other...
	<ul style="list-style-type: none"> Do you think that the pilot VRE can help to perform your work “in the cloud” and support co-development by remote researcher and research teams? 	Qualitative scoring No Maybe Yes Other	 <ul style="list-style-type: none"> Other... Yes Maybe

	<ul style="list-style-type: none"> Which presented VRE feature do you consider as most relevant for your research? 	Qualitative scoring Free text	FSK-Lab Here most of the participants got the question wrong because most of the answers are „Yes“ or „Maybe“ <ul style="list-style-type: none"> - RAKIP catalogue, VRE catalogue - Model repository
Learning Curve	<ul style="list-style-type: none"> Do you foresee problems in using the core VRE functionalities, e.g. the RAKIP Catalogue? 	Qualitative scoring Not usable Many Very little Some	
	<ul style="list-style-type: none"> How much time would it take you to learn how to use the RAKIP Catalogue for sharing your data, models or tools & services with the other VRE members? 	Qualitative scoring Short time Long time	
Openness and FAIRness	<ul style="list-style-type: none"> How do you rate the RAKIP VRE from the perspective of "Ease of finding, accessing and reusing datasets and models"? 	Qualitative scoring Poor OK Good Very good	
Uptake potential	<ul style="list-style-type: none"> What is the likelihood that you will use the RAKIP VRE in the future for your work? 	Qualitative scoring Will not use May use Will use Other	

In the evaluation procedure carried out during third pilot phase for the food safety modelling community the survey was extended to some specific features of the VRE in order to get a more detailed feedback. These features were presented in dedicated practical sessions during the workshop and the attendees were asked to answer the printed questionnaire. Table 4 shows the questionnaire that was designed to evaluate these features.

Table 7.2: Evaluation metrics used in the third pilot VRE version to evaluate specific resources deployed in the VRE for RAKIP use case.

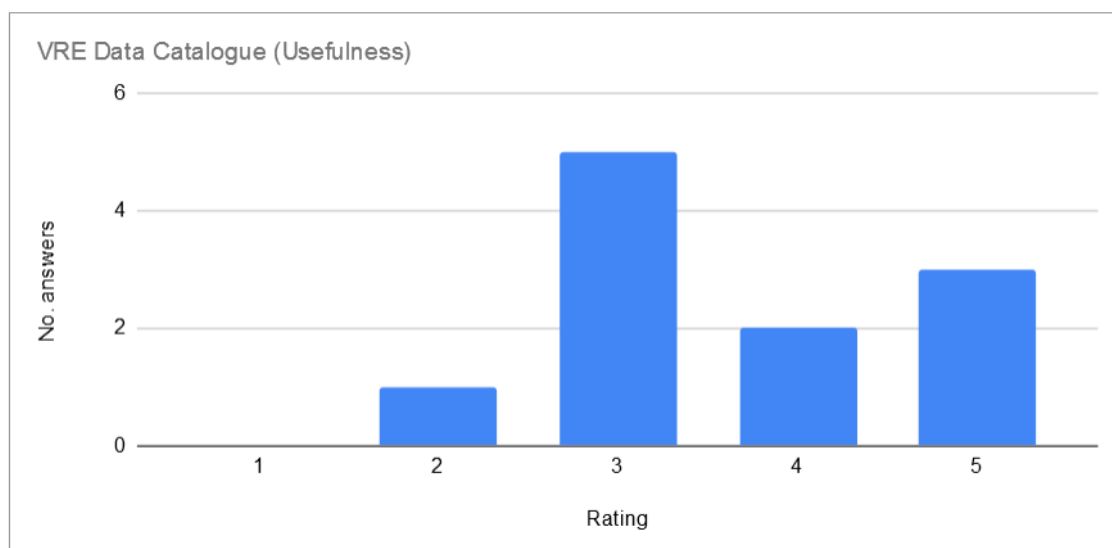
VRE feature	Indicator of the pilot VRE	Rationale and evaluation questions	Assessment method / Options
Advanced RAKIP VRE functionalities	Usefulness	Please rate your user experience (usability) for the service to upload your own content to the VRE Data Catalogue?	Qualitative scoring From 1 (insufficient) to 5 (very high)
		What would you like to see improved?	Qualitative scoring Free text
		Please rate your user experience (usability) for the service to run your own simulations in the VRE?	Qualitative scoring From 1 (insufficient) to 5 (very high)
		What would you like to see improved?	Qualitative scoring Free text
FSK-Lab desktop software	Uptake potential	What is the likelihood that you use the presented FSK-Lab software for your work in the future?	Qualitative scoring From 1 (insufficient) to 5 (very high)
	Usefulness	Please rate your user experience (usability) for the FSK-Lab software. Which functionality should be added?	Qualitative scoring From 1 (insufficient) to 5 (very high) Qualitative scoring Free text
FSK-ML for knowledge sharing/publishing	Uptake potential	What is the likelihood that you use the ARPHA writing tool for your work in the future?	Qualitative scoring From 1 (insufficient) to 5 (very high)
	Usefulness	Please rate your user experience (usability) for the FSKX import into the ARPHA writing tool. What would you like to see improved?	Qualitative scoring From 1 (insufficient) to 5 (very high) Qualitative scoring Free text

Advanced RAKIP VRE functionalities

Info 1= very low, 3 = moderate, 5= very high

Please rate your user experience (usability) for the service to upload your own content to the VRE Data Catalogue?

Ranking	1	2	3	4	5	not applicable	Mean
Occurance	0	1	5	2	3	0	3.64

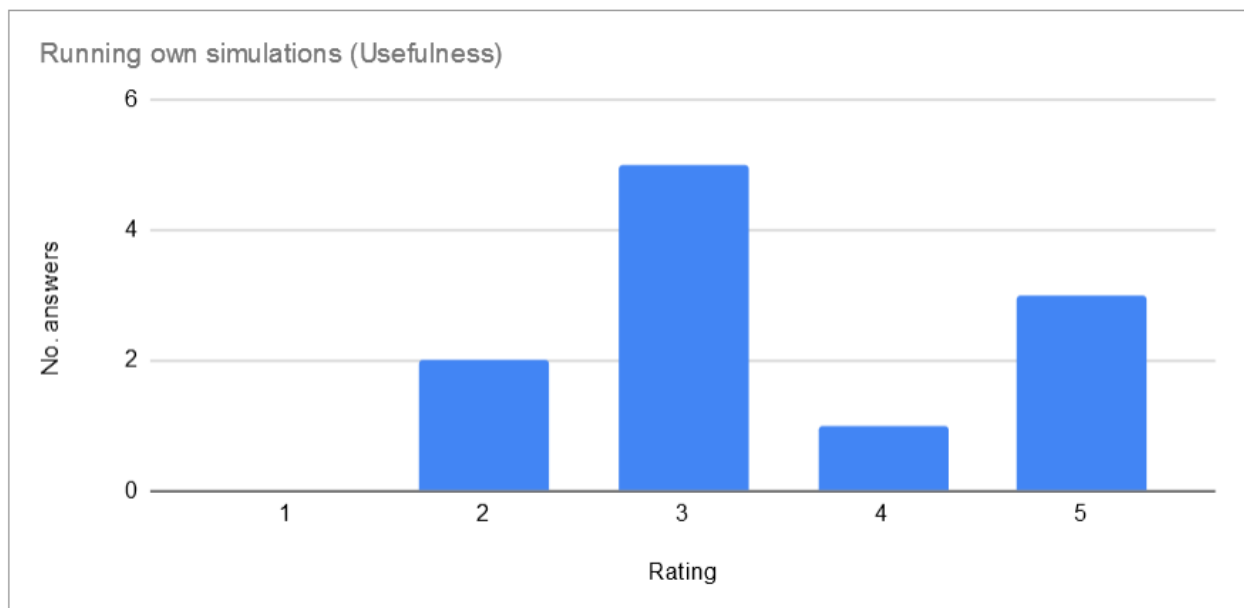


Please rate your user experience (usability) for the service to upload your own content to the VRE Data Catalogue?

- A manual so I can try by myself
- In both cases, it would be helpful to have a pdf or video tutorial on the steps to upload content, run simulations, overall use of the platform (This is a copy form the last question, as the sentences starts with "in both cases")
- Accessibility to register own models
- Manual
- I just need more time to generalize
- Some more guidance (move interactive) on how to work in VRE with models. This session was good introduction. However, some detailed guidance on how to model inputs, modification outputs will be helpful.

Please rate your user experience (usability) for the service to run your own simulations in the VRE?

Ranking	1	2	3	4	5	not applicable	Mean
Occurance	0	2	5	1	3	0	3.45



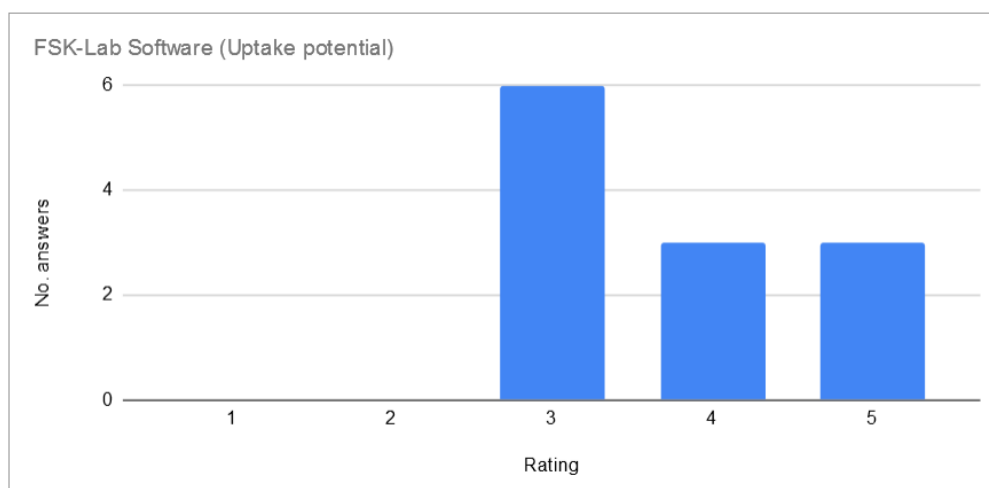
What would you like to see improved?

- In both cases, it would be helpful to have a pdf or video tutorial on the steps to upload content, run simulations, overall use of the platform
- easy to use guide
- support -> who should we contact
- more, clear, slower explanation
- Unfortunately, I did not get the permission and I missed most of the hand-on practices, difficulty to actually see and ... (maybe validate -> evaluate) the usability of the system
- A detailed case study and more time spent on live demo would be helpful

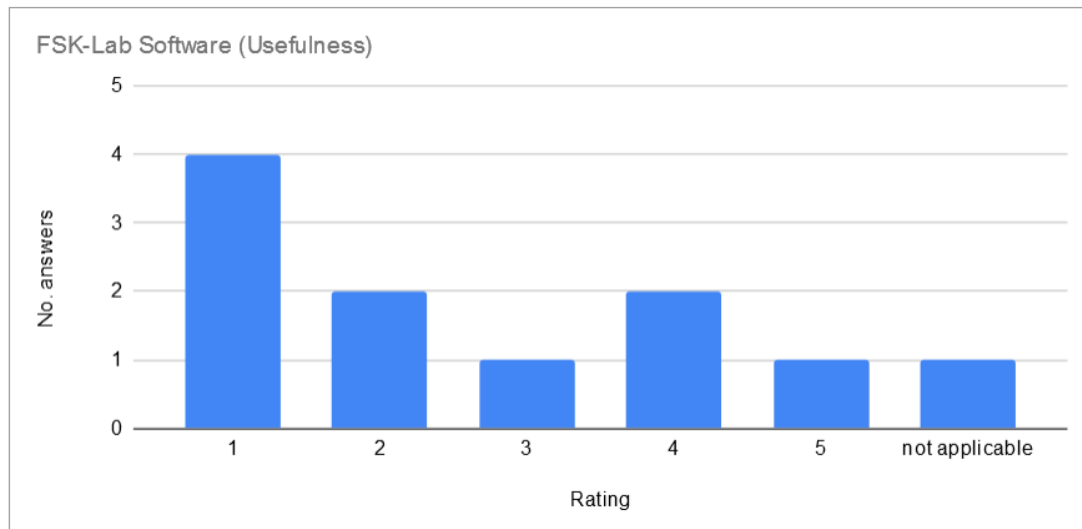
FSK-Lab desktop software

What is the likelihood that you use the presented FSK-Lab software for your work in the future?

Ranking	1	2	3	4	5	not applicable	Mean
Occurance	0	0	6	3	3	0	3.75



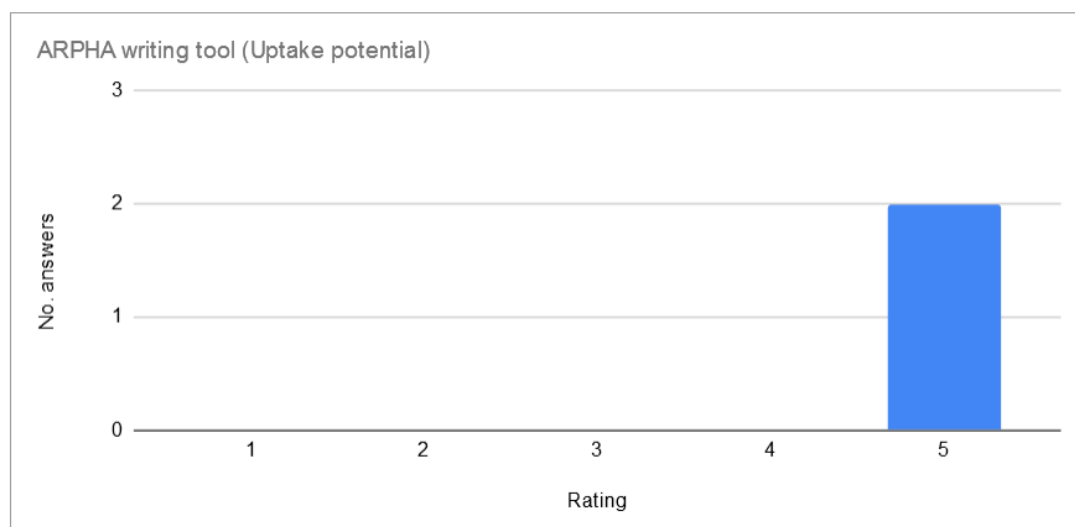
Please rate your user experience (usability) for the FSK-Lab software.								
Ranking	1	2	3	4	5	not applicable	cannot be rated (non unique asterisks)	Mean
Occurance	4	2	1	2	1	1	0	1.25



Which functionality should be added?
- My computer tells me I cannot open FSKx-files. So I do not get started. What can I do? Good if you can put info on your website.

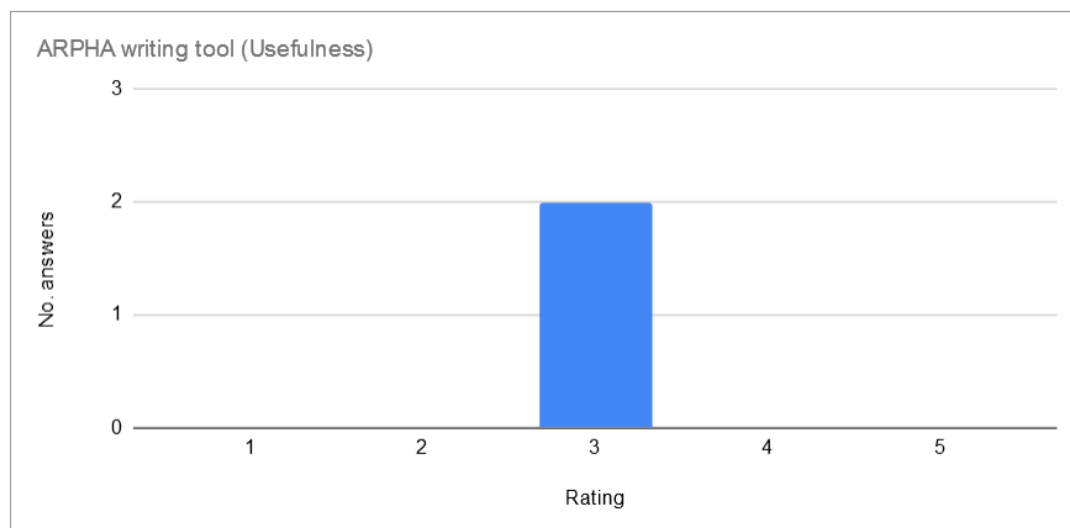
ARPHA Writing tool - FSK-ML for knowledge-sharing/publishing

What is the likelihood that you use the ARPHA writing tool for your work in the future?								
Ranking	1	2	3	4	5	not applicable	cannot be rated (non unique asterices)	Mean
Occurance	0	0	0	0	2	0	0	5



Please rate your user experience (usability) for the FSKX import into the ARPHA writing tool

Ranking	1	2	3	4	5	not applicable	Mean
Occurance	0	0	2	0	0	0	3



What would you like to see improved?

No answers

ANNEX 8 – VALIDATION EVENT “ORION WEBINAR”

ORION KnowledgeHub webinar

6th December 2019 from 1:00 to 4:00 PM via
https://svasweden.adobeconnect.com/ejp_orion/

This webinar has the following agenda:

1:00 – 1:15 PM Welcome, Agenda, Introduction to the ORION project (ORION Coordination)
 1:15 – 1:45 PM The One Health Surveillance (OHS) Codex Framework and its components (WP1)
 1:45 – 2:15 PM The OHS Knowledgebase (WP2-Epi)
 2:15 – 2:45 PM The OHS NGS Handbook (WP2-NGS)
 2:45 – 3:15 PM The OH Integration Idea Catalogue (WP2-Int)
 3:15 – 3:45 PM The OHS Harmonization Tools (WP3)
 3:45 – 4:00 PM Question & Answers (ORION Coordination)

Summary:

The OHEJP Glossary was presented as one of the new components of the OHS Codex that was presented by WP1.

Table 8.1: Results of the validation of the final pilot VRE version using the UTAUT: The Unified Theory on Acceptance and Use of Technology” (Venkatesh et al., 2003) approach for ORION use case.

Indicator of the pilot VRE	Question	Rating (No. answers per rating option)					Mean
		1	2	3	4	5	
Performance expectancy	1. I would find the OHEJP Glossary useful in my job.	0	0	1	2	3	3.50
	2. Using the OHEJP Glossary would enable me to accomplish tasks more quickly.	0	0	2	3	1	2.67
	3. Using the OHEJP Glossary would increase my productivity.	0	0	2	3	1	2.67
	4. If I used the OHEJP Glossary, I would increase my chances of getting a better position or salary.	2	0	4	0	0	3.33
Effort expectancy	5. My interaction with the OHEJP Glossary would be clear and understandable.	0	0	2	3	1	2.67
	6. It would be easy for me to become skillful at using the OHEJP Glossary.	1	0	1	0	4	4.33
	7. I would find the OHEJP Glossary easy to use.	0	0	0	1	5	4.33
	8. Learning to operate the OHEJP Glossary would be easy for me.	0	0	0	2	4	3.67
Attitude toward using technology	9. Using the OHEJP Glossary is a good idea.	0	0	0	2	4	3.67
	10. The OHEJP Glossary makes work more interesting.	0	0	3	1	2	3.83
	11. Working with the OHEJP Glossary is fun.	0	0	3	1	2	3.83
	12. I would like working with the OHEJP Glossary.	0	0	2	1	3	4.00
Social influence	13. People who influence my behavior would think that I should use the OHEJP Glossary.	0	0	3	1	2	3.83
	14. People who are important to me would think that I should use the OHEJP Glossary.	0	0	2	2	2	3.33
	15. The senior management of my organisation	0	0	0	2	4	3.67

	would be supportive of using the OHEJP Glossary.						
	16. In general, my organization would support the use of the OHEJP Glossary.	0	0	0	1	5	4.33
Facilitating conditions	17. I have the resources necessary to adopt and use the OHEJP Glossary.	0	0	0	1	5	4.33
	18. I have the knowledge necessary to adopt and use the OHEJP Glossary.	0	0	0	1	5	4.33
	19. The OHEJP Glossary does not seem compatible with other systems I use.	4	1	1	0	0	2.50
	20. In my organisation, a specific person (or group) would be available to assist me with system difficulties.	0	2	2	1	1	3.33
Self-efficacy	21. I could complete a job or task using the OHEJP Glossary if there was no one around to tell me what to do as I go.	0	0	1	1	4	4.17
	22. I could complete a job or task using the OHEJP Glossary if I could call someone for help if I got stuck.	0	0	0	2	4	3.67
	23. I could complete a job or task using the OHEJP Glossary if I had a lot of time to complete the job for which the software was provided.	0	0	2	0	4	4.67
	24. I could complete a job or task using the OHEJP Glossary if I had in my organisation facility for assistance.	0	1	1	0	4	4.50
Anxiety	25. I feel apprehensive about using the OHEJP Glossary.	4	1	0	0	1	2.67
	26. It scares me to think that I could lose a lot of information using the OHEJP Glossary by hitting the wrong key.	4	0	2	0	0	2.67
	27. I hesitate to use the OHEJP Glossary for fear of making mistakes I cannot correct.	4	2	0	0	0	2.33
	28. The OHEJP Glossary looks somewhat intimidating to me.	4	2	0	0	0	2.33
Behavioral intention to use the system	29. I intend to use the OHEJP Glossary in the next 12 months.	0	0	1	1	4	4.17
	30. I predict I would use the OHEJP Glossary in the next 12 months.	0	0	1	1	4	4.17
	31. I plan to use the OHEJP Glossary in the next 12 months.	0	0	1	1	4	4.17
Gender	Female Male Prefer not to say	4 2 0					
Average age		39.5 years old					

ANNEX 9 – VALIDATION EVENT RAKIP WORKSHOP

Workshop “Harmonized exchange of food safety models using web-based services from RAKIP and the AGINFRA+ project”

Date: 09.12.2019

Tutors:

Estibaliz Lopez de Abechuko Garrido (ELAG), Esther Sundermann (ES), Lars Valentin (LV), Miguel de Alba Aparicio (MdAA), Thomas Schüler (TS), Tasja Buschhardt (TB), Matthias Filter (MF)

Venue:

BfR; Location Jungfernheide, Room: B 0058

Max-Dohrn-Str. 8-10; D - 10589 Berlin

<https://www.bfr.bund.de/en/location-jungfernheide.html>

Key lessons:

1. Introduction to the RAKIP Initiative and the RAKIP model repository (see <https://foodrisklabs.bfr.bund.de/rakip-web-portal/>)
2. Introduction to the Food Safety Knowledge Markup Language (FSK-ML) and to tools and services supporting its adoption
3. Introduction to Virtual Research Environments (VRE) and VRE-based services developed within the AGINFRA+ project (see <http://plus.aginfra.eu/>)

AGENDA:

Time		Presenter
13:00 - 13:10	Welcome and introduction of tutors, housekeeping issues, and agenda	TB, MF
13:10 - 13:25	Theory: <ul style="list-style-type: none"> • Introduction to the RAKIP & AGINFRA+ projects • The RAKIP concept for harmonized food safety knowledge exchange • Virtual Research Environments – the AGINFRA+ experience • The RAKIP and AGINFRA+ vision 	MF
13:25 - 13:40	<ul style="list-style-type: none"> • Introduction to FSK-ML – a harmonized knowledge exchange format for the foods safety domain 	ES
13:40 - 13:55	<ul style="list-style-type: none"> • Overview on available tools and resources that build on / support adoption of FSK-ML 	ELAG
13:55 - 14:30	Live demo: <ul style="list-style-type: none"> • The RAKIP_portal VRE: <ul style="list-style-type: none"> - Data Catalogue - Running models on RAKIP_portal VRE • RAKIP Model Repository: <ul style="list-style-type: none"> - Repository overview: filter/search options, details view, model download - Model execution: simulation creation, report view, and download of model with new simulation settings - Edition of FSK-ML compliant models 	MF ELAG

	<ul style="list-style-type: none"> - Upload of FSK-ML compliant models - Online creation of FSK-ML compliant models • ARPHA Writing Tool: <ul style="list-style-type: none"> - FSK-ML compliant model import 	ES
14:30 - 14:45	Break	
14:45 - 15:45	Hands-on exercise <ul style="list-style-type: none"> • RAKIP Model Repository <ul style="list-style-type: none"> - Access the repository via FoodRiskLab-web page - Select a model from the RAKIP Model Repository and execute it with own simulation settings - Download an FSK-ML compliant model - Edit the FSK-ML compliant model - Upload an FSK-ML compliant model • ARPHA Writing Tool <ul style="list-style-type: none"> - Create an account - Upload an FSK-ML compliant model to the AWT - Edit the draft of the publication 	All
15:45-16:00	Feedback	

The initial version of the Venkatesh et al. (2003) instrument was adapted to the specific VRE and target community.

Table 9.1: Results of the validation of the final pilot VRE version using the UTAUT: The Unified Theory on Acceptance and Use of Technology” (Venkatesh et al., 2003) approach.

Results

Indicator of the pilot VRE	Question	Rating (No. answers per rating option)					Mean
		1	2	3	4	5	
Performance expectancy	1. I would find the RAKIP Portal useful in my job	0	0	4	6	4	4.00
	2. Using the RAKIP Portal would enable me to accomplish tasks more quickly	0	2	7	4	1	3.29
	3. Using the RAKIP Portal would increase my productivity	0	1	6	5	2	3.57
	4. If I used the RAKIP Portal, I would increase my chances of getting a better position or salary	3	2	5	2	1	2.50
Effort expectancy	5. My interaction with the RAKIP Portal would be clear and understandable	0	2	4	3	4	3.43
	6. It would be easy for me to become skilful at using the RAKIP Portal	0	0	4	6	4	4.00
	7. I would find the RAKIP Portal easy to use	0	0	4	6	4	4.00
	8. Learning to operate the RAKIP Portal would be easy for me	1	0	3	6	4	3.86
Attitude toward using technology	9. Using the RAKIP Portal is a good idea	1	0	1	4	8	4.29
	10. The RAKIP Portal makes work more interesting	1	0	2	8	3	3.86

	11. Working with the RAKIP Portal is fun	0	0	5	6	3	3.86
	12. I would like working with the RAKIP Portal	1	0	2	6	5	4.00
Social influence	13. People who influence my behaviour would think that I should use the RAKIP Portal	1	4	3	2	4	3.29
	14. People who are important to me would think that I should use the RAKIP Portal	1	4	4	2	2	3.00
	15. The senior management of my organisation would be supportive in using the RAKIP Portal	2	0	1	5	5	3.57
	16. In general, my organization would support the use of the RAKIP Portal	0	1	1	3	9	4.43
Facilitating conditions	17. I have the resources necessary to adopt and use the RAKIP Portal	1	1	2	4	6	3.93
	18. I have the knowledge necessary to adopt and use the RAKIP Portal	0	1	2	6	5	4.07
	19. The RAKIP Portal does not seem compatible with other systems I use	2	9	2	0	1	2.21
	20. In my organisation, a specific person (or group) would be available to assist me with system difficulties	2	0	1	2	9	4.14
Self-efficacy	21. I could complete a job or task using the RAKIP Portal if there was no one around to tell me what to do as I go	0	2	2	8	2	3.71
	22. I could complete a job or task using the RAKIP Portal if I could call someone for help if I got stuck	0	1	1	7	5	4.14
	23. I could complete a job or task using the RAKIP Portal if I had a lot of time to complete the job for which the software was provided	0	2	1	4	7	4.14
	24. I could complete a job or task using the RAKIP Portal if I had in my organisation facility for assistance	0	2	1	5	6	4.07
Anxiety	25. I feel apprehensive about using the RAKIP Portal	4	3	3	2	2	2.64
	26. It scares me to think that I could lose a lot of information using the RAKIP Portal by hitting the wrong key	8	4	0	1	1	1.79
	27. I hesitate to use the RAKIP Portal for fear of making mistakes I cannot correct	10	2	1	0	0	1.21
	28. The RAKIP Portal looks somewhat intimidating to me	9	1	3	1	0	1.71
Behavioral intention to use the system	29. I intend to use the RAKIP Portal in the next 12 months	1	2	5	4	2	3.29
	30. I predict I would use the RAKIP Portal in the next 12 months	2	2	5	2	3	3.14
	31. I plan to use the RAKIP Portal in the next 12 months	1	4	5	1	3	3.07
Gender	Female	6					
	Male	5					
	Prefer not to say	3					
Average age		36 years old (2 n.a.)					

ANNEX 10 – VALIDATION EVENT RAKIP WORKSHOP

Sharing and running simulations of harmonized food risk assessment models

On Friday 10th of January, Agroknow in collaboration with the Laboratory of Microbiology and Food Biotechnology of the Agricultural University of Athens (AUA) organised a workshop in the postgraduate programme of Food Science and Human Nutrition, and particularly in the department of "Quality Management Systems and Food Safety" of the Agricultural University of Athens in order to present the demonstration scenario by the name "Sharing and running simulations of harmonized food risk assessment models" and to collect validation feedback using the provided by the Coordinator questionnaire. Thirty-eight (38) postgraduate students and three (3) teachers participated in the workshop. The gender of the majority of respondents was female and the average age was 27.

The used agenda, is based on the example agenda for a lightweight, remove validation trial that has been illustrated in the "Harmonised Use Case Validation Method, Guidelines & Materials".

Particularly, the used agenda follows:

Time	Topic	Presenter /Facilitator
Introduction 09:30-10:00	Digital science tools in food & agriculture: the AGINFRAplus digital infrastructure	Panagis Katsivelis (Agroknow)
Demo: 10:00- 10:30	"Digital science tools for microbial risk assessment: the food safety case" Introducing the AGINFRAplus Food Safety Risk Assessment Software Demonstration Scenario (video)	
Q&As: 10:30-10:45	Discussion about the BfR Software Demonstrator	Panagis Katsivelis (Agroknow)
Wrap up: 10:45-11:00	Distribution of the questionnaires to collect feedback from participants Closing	Eva Bozou (Agroknow)

As illustrated in the table above, during the workshop, that lasted 1 hour and a half, a presentation of AGINFRA+ project e-infrastructures (VREs and tools), general objectives and outcomes was performed along with the demonstration of a special video that BfR created in order to describe all the functionalities of their VRE tools. A few questions were answered and through the wrap up the questionnaire, that has been provided by the Coordinator, were distributed to the stakeholders to express their opinion on VREs exploitation and usability.

Based on the given answers of the questionnaires, most of the asked stakeholders consider of using such a virtual research environment as a good idea and that would enable them to accomplish tasks more quickly. Also, they confirmed that the senior management of their organisation would be supportive of using such a virtual research environment but it is not certain if a specific person (or group) would be available to assist them with difficulties in using such a virtual research environment. So, even though most of them believe that this tool is a user friendly one, the vast majority would hesitate to use it without surveillance, fearing to make mistakes they could not be able to correct. Finally, stakeholders expressed the desire to use a similar VRE tool in the next 12 months.

Table 10.1: Results of the validation of the final pilot VRE version using the UTAUT: The Unified Theory on Acceptance and Use of Technology” (Venkatesh et al., 2003) approach.

Indicator of the pilot VRE	Question	Rating (No. answers per rating option)					Mean
		1	2	3	4	5	
Performance expectancy	1. I would find such a virtual research environment useful in my job	0	1	5	16	19	4.29
	2. Using such a virtual research environment would enable me to accomplish tasks more quickly	0	0	1	18	22	4.51
	3. Using such a virtual research environment would increase my productivity	0	0	5	18	18	4.32
	4. If I used a virtual research environment, I would increase my chances of getting a better position or salary	0	3	16	16	6	3.61
Effort expectancy	5. My interaction with such a virtual research environment would be clear and understandable	0	0	19	19	3	3.61
	6. It would be easy for me to become skillful at using such a virtual research environment	0	0	18	17	6	3.71
	7. I would find such a virtual research environment easy to use	0	0	19	20	2	3.59
	8. Learning to operate such a virtual research environment would be easy for me	0	2	16	17	6	3.66
Attitude toward using technology	9. Using such a virtual research environment is a good idea	0	0	2	15	24	4.54
	10. A virtual research environment makes work more interesting	0	1	6	20	14	4.15
	11. Working with such a virtual research environment is fun	0	3	13	19	6	3.68
	12. I would like working with such a virtual research environment	0	1	10	16	14	4.05
Social influence	13. People who influence my behaviour would think that I should use such a virtual research environment	0	2	14	19	6	3.71
	14. People who are important to me would think that I should use such a virtual research environment	0	4	12	20	5	3.63
	15. The senior management of my organisation would be supportive of using such a virtual research environment	0	0	6	20	15	4.22
	16. In general, my organization would support the use of such a virtual research environment	0	0	9	19	13	4.10
Facilitating	17. I have the resources necessary to adopt	0	2	14	16	9	3.78

conditions	and use a virtual research environment						
	18. I have the knowledge necessary to adopt and use such a virtual research environment	0	8	17	10	6	3.34
	19. The virtual research environment does not seem compatible with other systems I use	2	11	19	7	2	2.90
	20. In my organisation, a specific person (or group) would be available to assist me with difficulties in using such a virtual research environment	1	7	17	8	8	3.37
Self-efficacy	21. I could complete a job or task using this virtual research environment if there was no one around to tell me what to do as I go	1	7	21	10	2	3.12
	22. I could complete a job or task using this virtual research environment if I could call someone for help if I got stuck	0	1	12	21	7	3.83
	23. I could complete a job or task using this system if I had a lot of time to complete the job for which the software was provided	1	3	14	18	5	3.56
	24. I could complete a job or task using this virtual research environment if I had in my organisation a facility for assistance	0	3	13	16	9	3.76
Anxiety	25. I feel apprehensive about using such a virtual research environment	4	16	14	4	3	2.66
	26. It scares me to think that I could lose a lot of information using such a virtual research environment by hitting the wrong key	8	16	9	7	1	2.44
	27. I hesitate to use such a virtual research environment, fearing to make mistakes I cannot correct	16	13	10	2	0	1.95
	28. Such a virtual research environment looks somewhat intimidating to me	10	15	11	4	1	2.29
Behavioral intention to use the system	29. I intend to use such a virtual research environment in the next 12 months	4	4	11	15	7	3.41
	30. I predict I would use such a virtual research environment in the next 12 months	2	5	11	16	7	3.51
	31. I plan to use such a virtual research environment in the next 12 months	3	5	14	11	8	3.39
Gender		24 Female 16 Male 1 Prefer not to say					
Average age		27 years old					