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Opening Up Access to Scientific Information

Cornelia Helmstedt, Nikos Manouselis, David Martín-Moncunill, Vassilis Protonotarios, Miguel-Angel Sicilia, Christian M. Stracke, George Adamides, Pascal Aventurier, Petros Belsis, Jenny Beyer, et al.

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Stracke / Manouselis / Sicilia (Eds.)

Opening Up Access to Scientific Information

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and Open Access to Scientific Information



**Christian M. Stracke /
Nikos Manouselis /
Miguel-Angel Sicilia (Eds.)**

Opening Up Access to Scientific Information

**Recommendations for Improving Virtual
Repositories and Online Communities**



Stracke / Manouselis / Sicilia

Opening Up Access to Scientific Information

Recommendations for Improving Virtual Repositories and Online Communities

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Final Recommendations developed by the VOA3R consortium

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Contact to the editors:

Christian M. Stracke: christian.stracke@uni-due.de

Nikos Manouselis: nikosm@agroknow.gr

Miguel-Angel Sicilia: msicilia@uah.es

Information about VOA3R online: <<http://www.voa3r.eu>>.

Information about the VOA3R Repository online: <<http://www.voa3r.cc.uah.es>>.

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Executive Summary

Opening up the access to scientific information is an increasing demand and crucial need for researchers and also for all citizens, communities and societies: VOA3R, the European initiative for the Virtual Open Access Agriculture & Aquaculture Repository, has established the online platform connecting digital libraries and facilitating virtual communities with unique opportunities for sharing scientific and scholarly research related to agriculture, food, and environment.

This publication presents the main outcomes and recommendations of VOA3R, the European initiative for the Virtual Open Access Agriculture & Aquaculture Repository. This flagship project supported by the European Commission facilitated, improved and sustained the open access to all European and international digital contents, scientific information and research results as well as their online discussion and exchange.

The main recommendations derived and drawn from the selected five key tasks and activities (quality management, elicitation of the user requirements, social networking services, content population, and evaluation by experiments and trials) were presented in brief: They were also identified by the evaluation of the experiments and trials and their relation between the two dimensions required efforts (indicated by the realization type from easy to difficult) and expected effects (indicated by the impact from short- to long-term) were indicated in a first overview. That allows also other and future initiative to benefit from the achieved VOA3R results and insights.

VOA3R has achieved successfully its objectives and went beyond them, also analysed and evaluated through the experiments and trials: VOA3R could establish the online platform connecting digital libraries and facilitate services and social networking including virtual communities.

Thus, it can be summarized that VOA3R provided and continuously provides through the sustainability strategy unique opportunities for sharing scientific and scholarly research related to agriculture, food, and environment.

For open access to the best scientific information in Europe and worldwide!

1. Open Access and Scientific Information - Introduction

Opening up the access to scientific information is an increasing demand and crucial need for researchers and also for all citizens, communities and societies: VOA3R, the European initiative for the Virtual Open Access Agriculture & Aquaculture Repository, has established the online platform connecting digital libraries and facilitating virtual communities with unique opportunities for sharing scientific and scholarly research related to agriculture, food, and environment.

Research, science and learning are important and reflected topics for a very long time from the beginning of discussions and theories about research and learning processes: In Europe, Plato's Allegory of the Cave is one of the earliest examples for discussing and teaching research and scientific information. Their debate continued during the introduction of the first universities in the Middle Age and of the school systems in the 18th century. During the last years and the upcoming so called "digital age", many discussions took place (also in the fields of school and higher education, learning for work and at workplaces as well as non-formal and informal learning) due to the two main changes covering all sectors, branches and levels of the society:

1. Globalisation and
2. worldwide internet establishment

These two factors are leading to global markets, worldwide networking, communication and competition, as well as to the digitalisation of services and systems with the introduction of internet-based services, hardware and software within all parts of our lives. They were and are still changing all societies and in particular the research, science as well as learning in schools, universities, at work and online (cf. Stracke 2012).

The European Union has identified the challenges and opportunities by these global changes and published several communications and framework for the future European society and its research and scientific information: Based on the Lisbon Declaration, the former vision of the Information Society called i2020 and the established Bologna Process (European Commission 2005), the European Commission has reviewed and analysed the impact of the globalisation, the internet and the information technologies in general leading to current new communications and policies: The Digital Age for Europe and EUROPE 2020 are reflecting these movements with special emphasis on the potentials for the

European citizens and communities (European Commission 2010a and 2010b). Most recently the European Commission launched the communication on "Towards better access to scientific information: Boosting the benefits of public investments in research" (European Commission 2012) also highlighting the need for openness and transparency.

This publication presents the main outcomes of VOA3R, the flagship project supported by the European Commission to facilitate, improve and sustain the open access to all European and international digital contents, scientific information and research results as well as their online discussion and exchange. It focuses on the main outcomes from the quality management, elicitation of the user requirements, social networking services, content population, and evaluation by experiments and trials as selected VOA3R key tasks and activities:

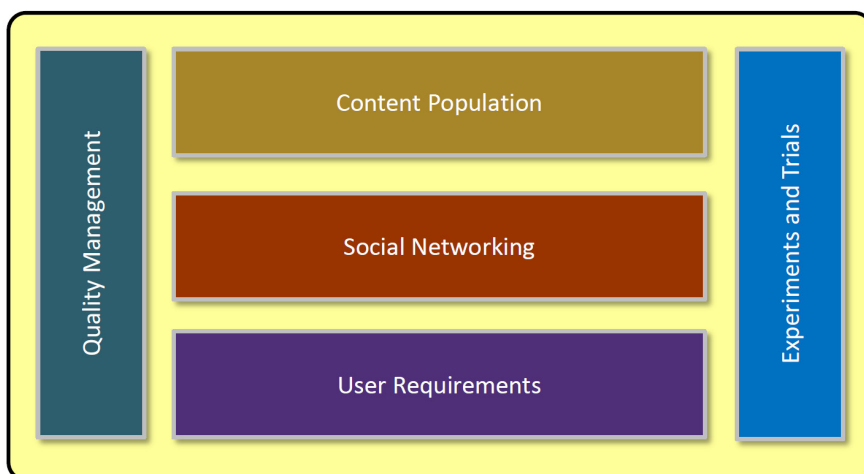


Figure 1: Selected VOA3R key tasks and activities

In particular the recommendations derived and drawn from these selected key tasks and activities and identified by the evaluation of the experiments and trials are highlighted and summarized that also other and future initiative can benefit from the achieved VOA3R results and insights.

For open access to the best scientific information in Europe and worldwide!

Christian M. Stracke, Nikos Manouselis, Miguel-Angel Sicilia
and the whole VOA3R Consortium

2. Quality and Risk Management for Open Virtual Repositories and Online Communities

The general objective of the VOA3R project is to improve the spread of European agriculture and aquaculture research results by using an innovative approach to share open access research products. This has been achieved by carrying out innovative experiments with open access to scientific agriculture and aquaculture contents and by developing and providing services to integrate existing open access repositories and scholarly publication management systems by means of a federation approach.

The VOA3R platform re-uses existing and mature metadata and semantics technology to deploy an advanced community-focused integrated service for the retrieval of relevant open content and data that includes research (which represent a principal information need expression for practitioners). The service enables researchers to formulate their information needs in terms of elements of the scientific methods established in their field (variables, techniques, assessment methods, kinds of objects of interest, etc.) combined with topical descriptions as expressed in metadata. The community approach enables the enhancement of information seeking with extended evaluation elements (as for example, ratings, public reviews, social tagging and links to supporting or conflicting reports) that complement and go beyond the traditional, anonymous peer review process which results are not made available openly.

The technology used has itself become open source, so that the model of the service can be adopted by enterprises (including SMEs) or other kinds of institutions as a value-added, community-oriented model for open access content.

Thus, the VOA3R project has addressed complex and ambitious tasks requiring a continuous quality management with quality assurance and risk assessment accompanying the design and development of the planned outcomes and leading to a continuous improvement cycle. The following sub-chapters discuss and select the appropriate quality management approach for VOA3R implemented and adapted for achieving best project outcomes with high quality.

For a complete, detailed overview about the quality plan and quality tools developed and implemented for the VOA3R project, we refer to deliverable D1.2 Quality Plan; available for download at www.voa3r.eu.

2.1. Quality Management

Quality Management is introduced and implemented to receive specific benefits for organizations, processes and products. International ISO quality standards like e.g. ISO 9001 are often used and preferred because only international ISO standards are de-jure formal standards developed in consensus by the national delegations from the countries participating in the unique international standardization committee ISO. ISO was created and approved by the United Nations and currently 163 countries are member states of ISO (cf. <http://www.iso.org/iso/home.htm>). Thus, international ISO standards guarantee acceptance worldwide.

The quality standards themselves cannot guarantee high quality and a successful outcome but are comprehensive and valuable instruments to ensure excellent quality management and development. The proper implementation and adaption is the key aspect to achieve sustainable, efficient and effective outcomes (cf. Stracke 2006).

Within the VOA3R project the international ISO quality standard Reference Framework for the Description of Quality Approaches (RFDQ) ISO/IEC 19796-1 has been used to guarantee a perfect course of the project. ISO/IEC 19796-1 is a quality standard following the principles of quality management with a continuous improvement cycle like ISO 9001. It is the unique ISO quality standard developed for learning, education and training in general and it has been adapted to the specific needs of developers and providers of online services and digital resources in many implementations and projects.

Its application is possible and proven for processes, products and organizations not only limited to the field of learning, education and training. As a flexible and adaptable quality standard, ISO/IEC 19796-1 can be used for many purposes and was introduced and performed successfully in numerous projects and organizations: In particular the adaptation to the field of online services and digital resources (as in the VOA3R project) can be realized easily and provides specific benefits because a specific quality standard is still lacking for this field.

The ISO quality standard RFDQ has been used successfully and proven its applicability in numerous adaptations worldwide (cf. Stracke 2010). Therefore RFDQ was selected as basis for the overall quality management and evaluation in VOA3R.

To achieve a holistic quality development the needs and requirements of all stakeholders of the current educational scenario have to be considered as explained above. This perception is also valid for the adoption and introduction of the reference process model: A strong procedure systematically planned is needed for adapting the reference process model of the standard ISO/IEC 19796-1 to a specific organisation including all stakeholders.

The introduction of the reference process model of the quality standard ISO/IEC 19796-1 can be simplified divided into the following two main steps:

1. Creating a context-specific quality profile:

The term quality profile defines a selection of processes of the 38 overall processes of the reference process model which are relevant for the specific context of usage and thus need to be considered. All processes of the process model need to be analysed by involving the different perspectives of the stakeholders (i.e. all partners from the VOA3R consortium) with the aim to identify the relevant and applicable processes. For all processes which are considered to be not applicable to the given situation, a justification for this choice needs to be provided during the analysis phase. This analysis procedure ensures that first the stakeholders get to know the reference process model in general, that second they start to get a better understanding of the processes of their daily business and that third they get a first insight into the complex field of quality development and how to break it down into small and manageable parts. Only a subset of the 38 processes of the generic process model will be applicable in most of the cases, but of course situations might occur where all of the processes will remain part of the individual quality profile. Discussing the process model with all stakeholders ensures that a well-fitting quality profile as an individual model of the processes with regard to the current situation is developed which is on the one hand complete and on the other hand not excrement.

Within VOA3R, this quality profile of the selected processes was achieved in close discussions and cooperation with all partners (see Figure 2 below).

2. Specifying the individual process descriptions:

After the development of the individual quality profile this originated individual model has to be filled with project-specific descriptions of each of the selected processes according to the description model of the standard ISO/IEC 19796-1.

First, every process needs to be described and thus defined. In this phase the description and the thoughts about the VOA3R project processes contribute to raising quality awareness on the level of each involved actor as well as on the

level of the whole VOA3R consortium and how to integrate quality measures into the project processes. The definition and selection of appropriate quality means as well as the commitment and general agreement on corresponding instruments, measures and metrics need special attention. They are the base for the realisation of the objectives and outcomes of each process ensuring their measurements. Quality development is an on-going and continuous process: Therefore the quality profile (which means the individual selection of processes from the process model which have been considered to be important for the VOA3R project) as well as the process descriptions of each of the selected processes have to be analysed and evaluated according to their appropriateness. The more experience a partner and the consortium are gaining in quality development and quality management, the more appropriate and complete the results of the used methods and instruments of quality management will become leading to a continuous improved quality development.

Within VOA3R, this specification of the selected processes was achieved in close discussions and cooperation with all partners, the final result is the Quality Management System for VOA3R (see Figure 3 below for a process example).

The processes in Figure 2 represented by the grey marked boxes are important processes and aspects within the VOA3R project whereas the processes represented by the boxes with the white background were identified by the VOA3R consortium as not relevant for VOA3R.

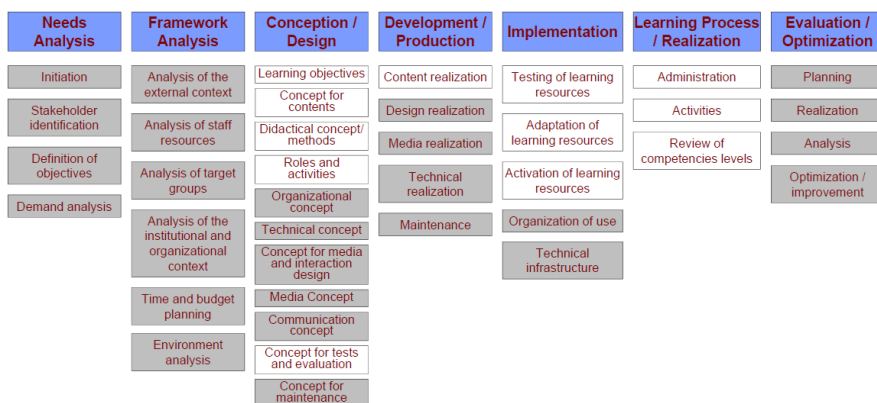


Figure 2: Reference Process Model of ISO/IEC 19796-1: The selected VOA3R processes

The Quality Management System for the development and evaluation of the whole VOA3R consortium project is compliant with the first international ISO Quality Standard RFDQ (ISO/IEC 19796-1). This standard was developed by the International Standardization Committee ISO/IEC JTC1 SC36 WG5 "Quality Assurance and Descriptive Frameworks" (cf. <http://www.sc36.org>).

The following Figure 3 serves as example how the definitions and descriptions for the selected processes establishing the VOA3R quality management system by following and keeping compliance with the international ISO quality standard ISO/IEC 19796-1 RFDQ have been adapted.

The definitions and descriptions of all processes were derived from the Description of Work (DoW) of the VOA3R and were amended and completed in close cooperation with the whole consortium. The first draft of all definitions and descriptions of the VOA3R processes were distributed to all project partners and their feedbacks were integrated into the final version of the quality management system. If required, further discussions with the partners responsible for specific processes and tasks took place to specify and complete all the definitions and descriptions of the VOA3R processes. This procedure was very helpful to ensure the involvement of the partners and to identify gaps of lacking interim steps and responsibilities that could be filled completed for all processes.

For the complete list of the processes, we refer to deliverable D1.2 Quality Plan accessible at www.voa3r.eu.

The quality management approach selected for VOA3R was developed and implemented by the University of Duisburg-Essen and regularly realized by workshops and discussions with all consortium partners during the meetings as well as by the two instruments (the deliverable questionnaire and the meeting questionnaire) both completed every six months: Their analysis identified several issues and recommendation that could be reflected and improved by all involved consortium partners leading to improved developments and better outcomes (see also chapter 2.3 Recommendations from Quality Management below).

ID	Category	Process	Description	Relation
NA		Needs Analysis	Identification and description of requirements, demands, and constraints of a project	
Sub-processes				
Sub-aspects		NA.1 Initiation – vision setting, desired goals, expectations and outcomes NA.2 Stakeholder Identification- UAH, AUA, UDE, GRNET, SLU, UHASSELT, ICROFS, INRA, CULS, ACTAInfo, ARI, CINECA, TEIA, ACTA NA.3 Definition of objectives-to improve the spread of European agriculture and aquaculture research results by using an innovative approach to sharing open access research products. NA.4 Demand Analysis-		
Objective		To describe the needs and demand leading to a project		
Method		See following sub-processes		
Result		Documentation of goals, objectives, needs, and requirements of a project		
Actors		See following sub-processes		
Metrics / Criteria		See following sub-processes		
Standards		ISO/IEC 19796-1		
Annotation / Example		See following sub-processes		

Figure 3: VOA3R Process Model: Needs analysis (NA)

2.2. Risk Assessment

Risk Assessment within the VOA3R project has been important to identify potential project risks and to deal with these risks; in particular on tactical, strategic and operational level. In addition a special focus has been put on content integration as this item was identified as one of the most important and critical factors within VOA3R.

Risk management in VOA3R has taken place at three levels:

1. **At the strategic level:** has concentrated on the relation between the project and the consortium with its environment. Risk management at this level has been under the responsibility of the Project Manager.
2. **At tactical level:** has concentrates on the WPs' contribution to the project objective. Risk management at this level has been under the responsibility of the Quality Assurance Manager.
3. **At operational level:** has concentrated on the activities within the WPs, which have been under the responsibility of each WP leader.

The initial identified risk factors covering all three levels, are the following (cf. VOA3R Grant Agreement Annex I, Description of Work):

- **Complexity:** the activities may be too complex to realize.
- **Scope:** the total set of activities may be too large for the partners to realize and/ or manage.
- **Capacity:** one or more of the partners may not be able to honor its commitments without the others having the capacity to fill the gap.
- **Reliability:** the project methods and strategies applied could be inappropriate to realize the intended outcomes.
- **Validity:** the outcomes may not reflect the real needs and priorities of the stakeholders.
- **Sustainability:** the project outcomes may not lead to a sustainable outcome.

Combining these levels with the identified risks lead to the framework presented in Table 1, forming the outset for further elaboration in the QA plan of the project.

	<i>Complexity</i>	<i>Scope</i>	<i>Capacity</i>	<i>Reliability</i>	<i>Validity</i>	<i>Sustainability</i>
<i>Analysis unit</i>	Strategic level (Overall project activities)					
	Tactical level (WP progress in view of project objectives)					
	Operational level (WP-internal progress)					

Table 1: Risk Assessment framework

Each of the cells has been detailed in terms of:

1. **Identified and quantified risks:** the main risks related to the particular analysis unit and risk factor.
2. **Contingency indication:** the likelihood of an identified risk.
3. **Impact:** the importance of the identified risk, in terms of affecting the project's proper implementation.
4. **Monitoring mechanism and 'owner' (responsible):** the procedure followed for monitoring the risk and the partner(s) responsible for it.
5. **Quantified threshold level:** a quantified (as much as possible) indicator of a threshold below which action should be taken.
6. **Action:** line of action to be taken by risk 'owner' and/or the consortium when threshold is overstepped.

The risk assessment management approach was developed and implemented by the University of Duisburg-Essen and regularly realized by questionnaires and discussions with all consortium partners during the meetings as well as by the two instruments (the SWOT Analysis and the RA questionnaire) both completed every six months: Their analysis identified several issues and recommendation that could be reflected and improved by all involved consortium partners leading to improved developments and better outcomes (see also chapter 2.3 Recommendations from Quality Management below).

2.3. Recommendations from Quality Management

The VOA3R project has successfully handled the complex and ambitious tasks requiring the continuous quality management of VOA3R. Quality assurance and risk assessment accompanied the design and development phases of the planned developments and outcomes and led to a continuous improvement cycle.

Use Quality Standards and Instruments

Within the VOA3R project the international ISO quality standard ISO/IEC 19796-1, the Reference Framework for the Description of Quality Approaches (RFDQ), has been used to guarantee a perfect course and progress of the project during the lifetime. ISO/IEC 19796-1 is a quality standard following the principles of quality management with a continuous improvement cycle like ISO 9001. It is the unique ISO quality standard developed for learning, education and training in general and it has been adapted to the specific needs of developers and providers of online services and digital resources by VOA3R.

Its application is possible for processes, products and organizations not only limited to the field of learning, education and training as demonstrated in many implementations. As a flexible and adaptable quality standard, ISO/IEC 19796-1 can be used for many purposes and was introduced and performed successfully in numerous projects and organizations: In particular the adaptation to the field of online services and digital resources (as in the VOA3R project) could easily be realized and provided specific benefits for VOA3R because a specific quality standard is still lacking for this field.

Start Quality Management from the Beginning

Through the direct presentation at the kick-off meeting including lively discussions and workshops, the quality management was implemented as the first project activity accompanying and monitoring the design and development of all other project tasks and activities. The ISO quality standard RFDQ has again revealed as comprehensive and valuable instrument to ensure excellent quality management and quality development from the beginning: It has been used successfully and proven its applicability not only for the VOA3R purposes and every other learning, education and training activity in general but also for online services and digital resources in many implementations and projects.

Involve all Stakeholders

To achieve a holistic quality development all VOA3R stakeholders have been involved from the beginning and their needs and requirements have been considered. Most important is to raise their awareness and acceptance for quality management by demonstrating the benefits. The proper implementation and adaption has been the key aspect to achieve sustainable, efficient and effective developments and outcomes during the project lifetime. The inclusion of all project partners and stakeholders could be gained by interactive workshops and discussions during the consortium meetings and project events: For example, the idea for the triple approach including the international association for maintaining the VOA3R metadata application profile was born during such an internal workshop session facilitated by the quality management.

Combine different Approaches

Quality management and risk assessment have implemented a variety of different approaches and instruments in close collaboration with all project partners: This set of approaches and instruments was also evaluated and continuously improved during the project lifetime. The instruments were modified and improved based on their feedback and expressed requirements and preferences.

Quality management started with distinct questionnaires for different purposes and interviews as well as workshops and discussions during the meetings as foreseen in the VOA3R Description of Work and was repeated and updated regularly.

Risk assessment within the VOA3R project has been important to identify potential project risks and to deal with these risks. In addition a special focus has been put on content integration as this item was identified as one of the most important and critical factors within VOA3R. Risk assessment was addressing all identified relevant aspects and covering all three levels (tactical, strategic and operational). Combining these levels with the identified risks led to the VOA3R Risk Assessment framework (cf. Table 1).

The successful implementation and utilisation demonstrates the value of the Quality Management and Risk Assessment framework not only for VOA3R, but for various re-usage scenarios and adaptations in the fields of online services and digital resources in many implementations and projects.

All major issues and critical developments could be identified very early through this combination of the different instruments by quality management and risk assessment.

Enable Cooperation on Opportunities

Finally, quality management can strongly support the broad dissemination and sustainable exploitation by facilitating internal debates and exchanges based on SWOT analyses and the reflection of the received feedbacks and their evaluation. In particular the focus on potential opportunities was very constructive and exciting for the VOA3R project partners leading to many proposals for the long-term realization and maintenance of the VOA3R portal, services and their further promotion and marketing:

The following figure provides an overview and first indication about the recommendations from quality management (Q1: "Use Quality Standards and Instruments", Q2: "Start Quality Management from the Beginning", Q3: "Involve all Stakeholders", Q4: "Combine different Approaches" and Q5: "Enable Cooperation on Opportunities") and their relation between the two dimensions:

1. Required Efforts (indicated by the realization type from easy to difficult)
2. Expected Effects (indicated by the impact from short- to long-term)

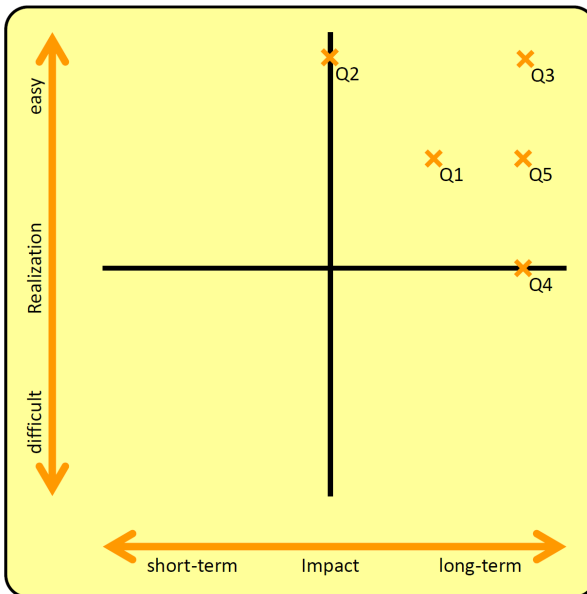


Figure 4: Recommendations from Quality Management: Efforts and Effects

To conclude the VOA3R Quality Management and Risk Assessment framework have proven their applicability as comprehensive and valuable instruments to ensure excellent quality management and risk assessment not only for VOA3R, but for every other learning, education and training activity as well as for online services and digital resources in many implementations and projects.

3. Setting up the Stage: Identifying User Requirements

During the lifetime of the project, most VOA3R partners organised a number of events involving stakeholders (meetings, workshops, interviews, etc.) in order to develop a comprehensive analysis of the requirements for the VOA3R platform from the viewpoint of the different user communities. The results and recommendations for the implementation of the VOA3R platform were documented for providing feedback that would serve as the basis for system design and implementation.

The primary stakeholders of the VOA3R portal can be categorized in the next groups:

- Researchers and Academics were the main target user group and the service provides them with a community oriented interaction place supporting information seeking tasks in which they are able to express their needs precisely using elements and criteria specific to their research work and methods. The service also provides them with social and community features including support for the different milestones in their research process, from the initial ideas to the final archiving of research reports, and going through assessment of research results by peers.
- Practitioners (e. g. entrepreneurs, SMEs, industry, scientific communities, and associations) were provided with interfaces tailored to applied needs, thus connecting outcomes of research with practical needs and alleviating the difficulties they find in their information seeking tasks related to the jargon and formal aspects that are inherent to scholar's communication.
- Students were a special case of users, who played both the role of practitioners and researchers, depending on their educational level and the purpose of their information seeking tasks.

3.1. Identification of User Requirements

The requirements identified by the VOA3R project were in accordance with the needs of different user categories of the system. In particular, it was needed to review and analyse requirements that were related to the "producers" of scientific and scholarly content (i.e. researchers, academics) and the potential

“consumers” (i.e. students, entrepreneurs, industry, policy makers, scientific communities, associations). Moreover, the social features of the system needed to be identified and validated and coupled to the main requirements.

Requirements analysis encompasses those tasks that go into determining the needs or conditions to meet for a product, taking account of the possibly conflicting requirements of the various user groups.

Requirements analysis is critical to the success of a development project. Requirements must be documented, actionable, measurable, testable, related to identified business needs or opportunities, and defined to a level of detail sufficient for system design. For the identification of user needs the the following activities have been carried out:

- Eliciting requirements: the task of communicating with stakeholders and users to determine what their requirements are.
- Analysing requirements: determining whether the stated requirements are unclear, incomplete, ambiguous, or contradictory, and then resolving these issues.
- Recording requirements: Requirements might be documented in various forms, such as natural-language documents, use cases, user stories, or process specifications.

The main axes on which the identification of the user requirements was based are the following:

- **Stakeholder identification:** the main user groups of the VOA3R portal are scholars (researchers/stakeholders), practitioners and students. Other, secondary, stakeholders include librarians, system administrators, related systems (such as open access repositories that will be federated through the VOA3R portal), etc.
- **Requirements documentation:** all identified requirements, suggestions and issues identified by project partners where documented and served as the basis for an internal live document, in the form of WIKI pages, used as a communication and collaboration tool by all partners in order to reach a common consensus of the goals, objectives and procedures for the requirements validation.
- **Stakeholder engagement:** it was clear that strong engagement should be sought for the validation of identified requirements, with representatives from all (three) main user-groups. In that sense, most

partners organised events for getting input and feedback from academics, experts, researchers, practitioners and students from all participating countries. The WIKI pages provided guidelines for alternative scenarios for these events, being mainly in three forms: (a) workshops, (b) interviews (face-to-face or online) and (c) online survey. The main groups engaged through these events are:

- Academics in fields related to the project
- Researchers in fields related to the project
- Open Access / Metadata / Semantics Experts
- Key authorities (advisor, consultant, etc.)
- Practitioners
- Students (undergraduate and postgraduate)
- Academic and vocational training providers
- Library personnel

3.2. Recommendations from User Requirements

Based on the analysis of the feedback received during the stakeholders' meetings which were held during the whole lifetime of the project, the following key recommendations were identified:

Open Access

Most of the participants are in favour of Open Access. Some concerns have risen in respect to preservation of copyright and accreditation of published data. Also it is of great importance to preserve the quality of data. Structure and quality assurance of material are also important.

Ratings

It has been generally thought of not so useful, "rather time consuming". Comments have to be reliable, by someone who knows the topic; in small communities negative comments are hard to be expressed. Moderation is also

necessary to exist. Comments somehow need also to be rated. In certain occasions, a second review may be requested after publication. References could be rated also; still there has to be a reliable way to consider rating of references.

Social Dimension

In general the researchers maintain positive attitude towards the creation and maintenance of their public profile. There should be a mechanism to search for people with different options. Researchers should be able to exchange research specific data such as list of publications, online CV, email and other similar information. The system should not require continuous updating of personal information. Moderation of the network tool seems also an important aspect for many researchers. Users should be able to create and manage groups. It would be interesting if existing profiles in other systems could be reused.

Usability

Provide facilities to rank results according to times downloaded, times printed or some other metric to show usefulness. The system should also provide information about current theses, reports or other similar information. Search agent that provides updates would also be useful. Bookmarking also and links basket is useful feature. Some users believe there is no need for reuse of old searches, while others find useful a task to trace old search or browsing results. Tagging papers with metadata options seems also very helpful. Personalized options were also much appreciated. Finally advanced search options also seem to be very helpful.

The following figure provides an overview and first indication about the recommendations from user requirements (U1: "Open Access", U2: "Ratings", U3: "Social Dimension" and U4: "Usability") and their relation between the two dimensions:

1. Required Efforts (indicated by the realization type from easy to difficult)
2. Expected Effects (indicated by the impact from short- to long-term)

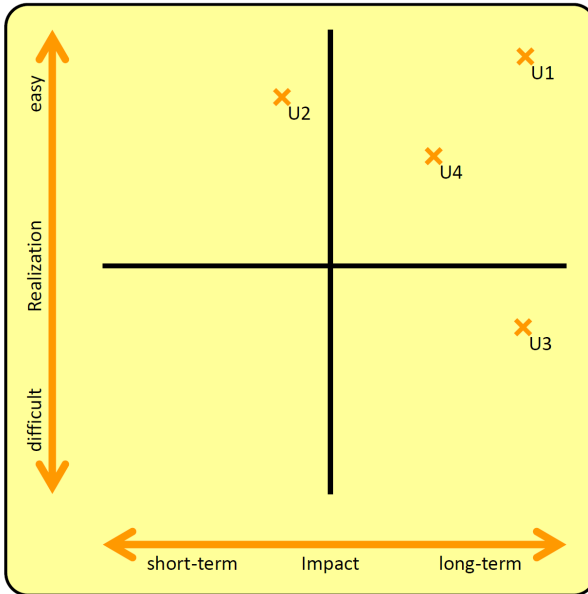


Figure 5: Recommendations from User Requirements: Efforts and Effects

In addition, many other features were mentioned and addressed that can only be listed here, among them: The metadata must say what kind of data is stored. Searching via maps for Environmental Scientists and practitioners could be very helpful especially if you could re-use images, diagrams and maps. Pictures and tables of taxonomies could also be very useful for Agriculture scientists. Annotations could be useful but for self-use. Exporting references also seems interesting option. Videos, animations, slides and other supporting material seems also interesting option. It would also be interesting to provide graphical views of relations between topics and authors. Include best practices and links to related publications. Let users develop blog focused on specific topics and create an easy way to search and find information.

4. Social Networking for Researchers, Students and Practitioners

VOA3R key idea is to enhance the utility of traditional digital repositories by the integration of social networking services, achieving to create an advanced community-focused platform for sharing open access research products.

The following chapter presents the innovative interfaces developed for locating resources and how they are linked to the social functionalities developed for VOA3R. It is important to notice that VOA3R has not only included the “typical” social functionalities but also implemented new innovative features oriented for the different main user groups of the platform: Researchers, Practitioners and Students.

4.1. Innovative Interfaces for Searching for Resources and further

Users can locate resources in VOA3R by:

- Using a text based search engine with different filtering options which vary according to the user profile selected.
- Searching for authors.
- Browsing by different categories.
- Using a “navigational” visual interface. (Navigational Interface)
- Using a “timeline” visual interface. (Timeline View)
- Using a “map” visual interface. (Map View)

“Navigational Interface”, “Timeline View” and “Map View” are the innovative searching interfaces developed for VOA3R, which make use of the metadata to allow search and display results using visual interfaces.

4.1.1. Navigational Interface

Navigational interface allows searching publications using the AGROVOC thesaurus terminology. The user can navigate through the AGROVOC terminology and add terms to the search just by "drag and drop" terms to the different areas of the interface.

To navigate the user should drag and drop terms to the small area at the upper left (see section **a** within Figure 6 below), and then new related terms will appear in the big area at the upper right. The arrows show if the terms are "narrower", "broader" or "related" (see section **b** within Figure 6 below).

To start searching the user will just need to "drag and drop" terms to the area below the "Searching by" text (see section **c** within Figure 6 below). As many terms as wanted can be added; search results will show publications containing one or more selected terms.

For a quick search of a term, the user can employ the autocompletable text box and new terms will appear (see section **d** within Figure 6 below).

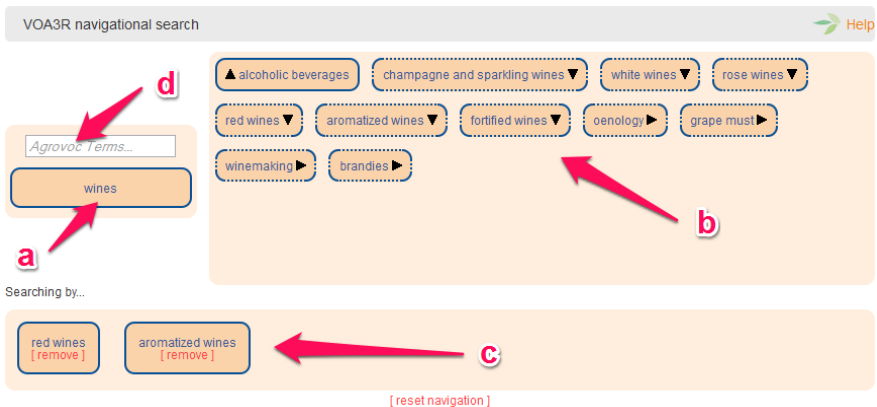


Figure 6: Navigational Search

Navigational interface displays semantic information in a very intuitive visual way allowing a complete different approach to the usual textual search one.

4.1.2. Timeline View

Timeline View shows resources categorised by date using a visual timeline interface. It is split into 3 sections (see sections **b/c/d** within Figure 7 below), which can all be moved by clicking and dragging the mouse.

By writing a topic from the AGROVOC thesaurus terminology in the search box publications related to this search term will be displayed in the central time-line area (see section **c** within Figure 7 below).

The top bar lets the user to quickly jump to the approximate time period he is interested in (see section **b** within Figure 7 below), the small blue lines indicate that there exist resources related to that date. The central area can also be “moved” to scan more slowly (see section **c** within Figure 7 below). The bar at the bottom of the interface shows the period in which the user is searching and also allows to easily jumping by month (see section **d** within Figure 7 below).

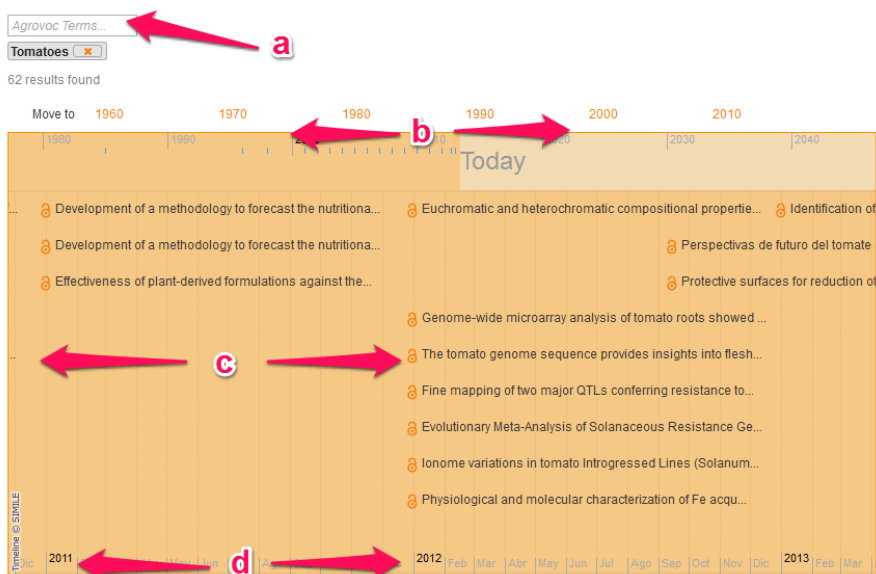


Figure 7: Timeline View

Timeline view is a very good tool to get a first idea about the volume of publications on different topics according to a period and to locate resources in a specific time period.

4.1.3. Map View

Map view shows VOA3R’s publications geolocalised regarding the author’s country and city. It works only with claimed publications in which an address has been specified, so results will be increasing as authors start to claim publications. As shown in the previous interfaces, users should use the text area (see section a within Figure 8Figure 7 below) to introduce an Agrovoc term and results will be displayed in the map (see section b within Figure 8Figure 7 below). User can choose between different visualization options for the map (see section c within Figure 8Figure 7 below).

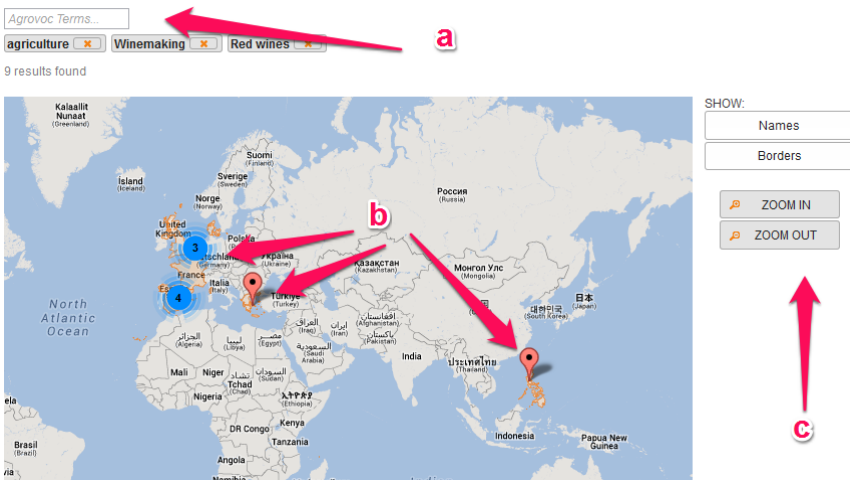


Figure 8: Map View

By using this interface users will be able to find other active users - since they have claimed publications – which are working in specific topics and have published about them.

4.2. Linking Social Services and Resources

When a user locates a resource of her or his interest, she or he can not only “use it” but directly start different “social actions” involving it. The following image highlights these “social features” that allow users to:

The screenshot shows a resource page for "Utegygm i staden" by Kronqvist, Tove, dated 2013. The page includes an abstract, keywords, and expert annotations. Red arrows labeled a through h point to various social service buttons: a (Add to my personal collection), b (Share this), c (Report abuse), d (Claim publication), e (Search), f (Discuss about this resource), g (Promote this resource), and h (Add annotation). The page also features a "Mark as useful" section with 1 practitioner vote and a "Content Rating" section with 0 votes.

Figure 9: Linking Social Services and Resources

- a) Add resources to their personal collection.
- b) Share the resource in the most important social networks.
- c) Claim publications.
- d) Mark the resource as useful (for practitioners needs).
- e) Rate the resource.
- f) Start a discussion about a resource in VOA3R communities.
- g) Promote a resource in VOA3R communities.
- h) Add annotations and improve the information about the resource.

4.2.1. Personal Collections

The personal collection feature allows not only to bookmark resources and have them permanently quickly accessible (see section **a** within Figure 10Figure 7 below) but also suggest resources according to the bookmarks (see section **b** within Figure 10Figure 7 below).

The screenshot shows a user interface for 'My bookmarks'. At the top, there is a header 'My bookmarks' with a green arrow icon. Below it, a message states 'You have 3 bookmarks in your personal collection'. A list of three bookmarks follows:

1. [Combining optical satellite data and airborne laser scanner data for vegetation classification](#) ✕
2. [Linking forest management, policy and biodiversity indicators – a comparison of Lithuania and southern Sweden](#) ✕
3. [Utegyrn i staden](#) ✕

 A red arrow labeled 'a' points to the second bookmark. Below the bookmarks is a section titled 'You might be interested in:'. A red arrow labeled 'b' points to the first recommendation, 'Landscaping paradise?'. This recommendation includes a date (2012), a star rating (5 stars), authors (Janäng, Marie, Melin, Emelie), keywords (landscape architecture), language (en), and a description. Below this is another recommendation, 'Participatory public art projects in run down residential areas - a discussion on how to run the process', which also includes a date, star rating, authors, keywords, language, and description.

Figure 10: Personal Collections

4.2.2. Sharing in other Social Networks

VOA3R allows sharing the resources in the most important social networks as shown in Figure 11.

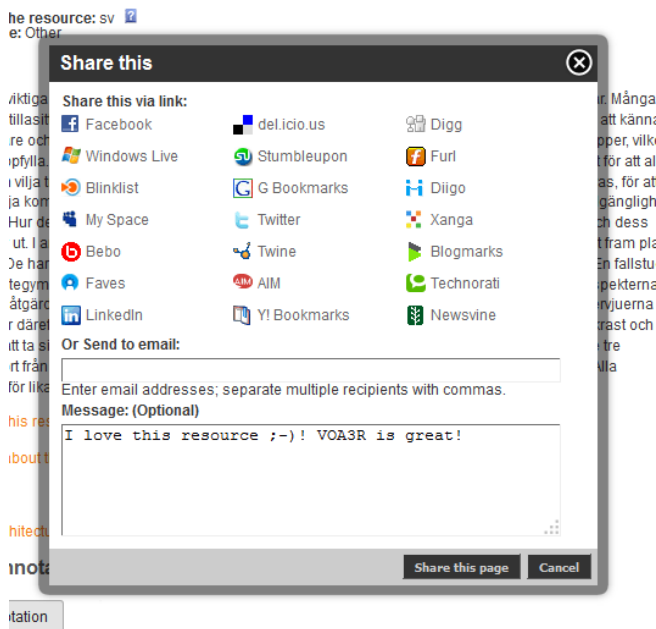


Figure 11: Sharing in other social networks

4.2.3. Claim Publication

Claiming a publication in VOA3R is as easy as clicking the “Claim” button. The system will use the information stored in the user profile to include all the authors’ data. As previously mentioned this information will be used in other portal features as the “Map View”.



Figure 12: Claim Publication

As seen in section **b** within Figure 12, an authority review is needed to confirm the process.

4.2.4. Useful for

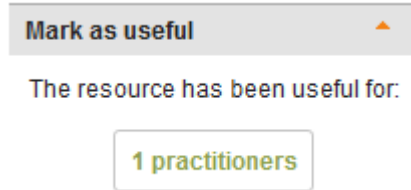


Figure 13: Useful for

The “useful for practitioners” button shown in Figure 13 allows users to indicate that a resource contains practical information for users with this profile. This information could be used to filter searches.

4.2.5. Promote Resource

This feature allows to directly promoting a resource in the wall of any existing VOA3R community.



Figure 14: Promote Resource

4.2.6. Start a Discussion

While “promote” feature will just make noticeable a resource by referencing it in a VOA3R Community wall, “Start a Discussion” will start a discussion about the resource, allowing the communication to provide feedback about it.



Figure 15: Start a Discussion

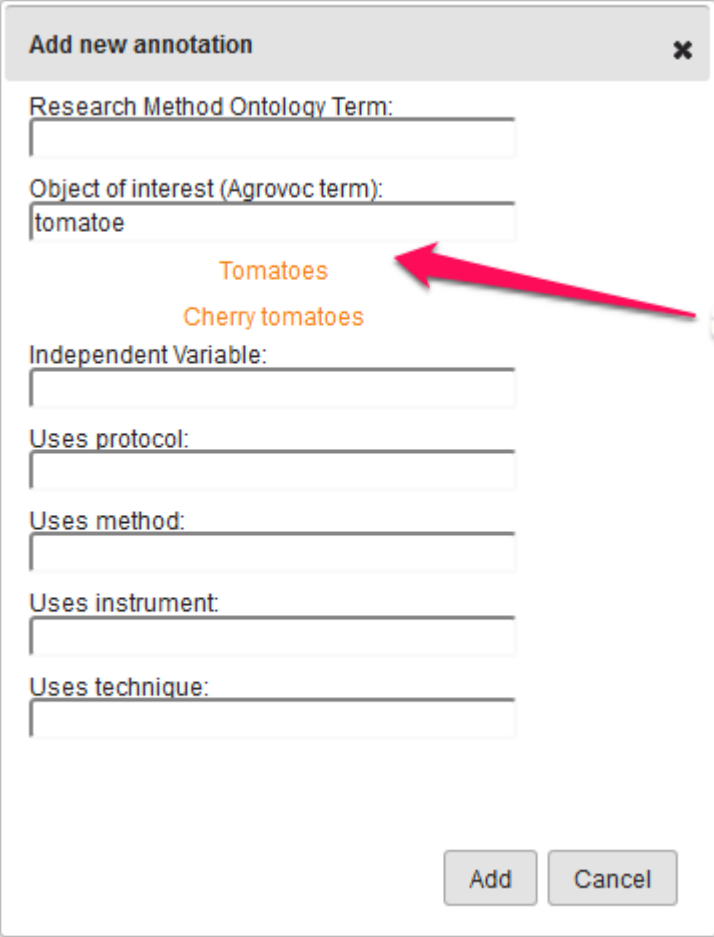
4.2.7. Content Rating

VOA3R uses only a typical “Rating system” to allow users to rate its resources due to the identified and analysed user requirements and the recommendation (see chapter 3.2 Recommendations above) indicating that ratings are quite difficult to realize with huge amount of efforts and need continuous maintenance. In general the users did not appreciate complex ratings and expressed that they do not see a specific need for ratings. Consequently a simple five star system was implemented to allow basic ratings as first indications.

4.2.8. Experts Annotations

By using this feature experts could add annotations to the resource, adding additional semantic information.

As seen in section a within Figure 16, the system will auto-suggest terms from the ontology to complete the annotations.



The image shows a screenshot of a web application interface. A modal dialog box titled "Add new annotation" is open. It contains several input fields for adding semantic information. The "Object of interest (Agrovoc term):" field is filled with "tomatoe". Below this field, two suggestions are displayed: "Tomatoes" and "Cherry tomatoes". A red arrow points to the "Tomatoes" suggestion. The dialog also includes fields for "Research Method Ontology Term:", "Independent Variable:", "Uses protocol:", "Uses method:", "Uses instrument:", and "Uses technique:". At the bottom of the dialog are "Add" and "Cancel" buttons. The background shows a blurred text snippet in Swedish.

Figure 16: Experts Annotations

4.3. Specific Social and Semantic Features

VOA3R social aspects have been customized to provide a look & feel according to the target user groups. Some of these details can be seen highlighted in the following figure which shows the user's home page.

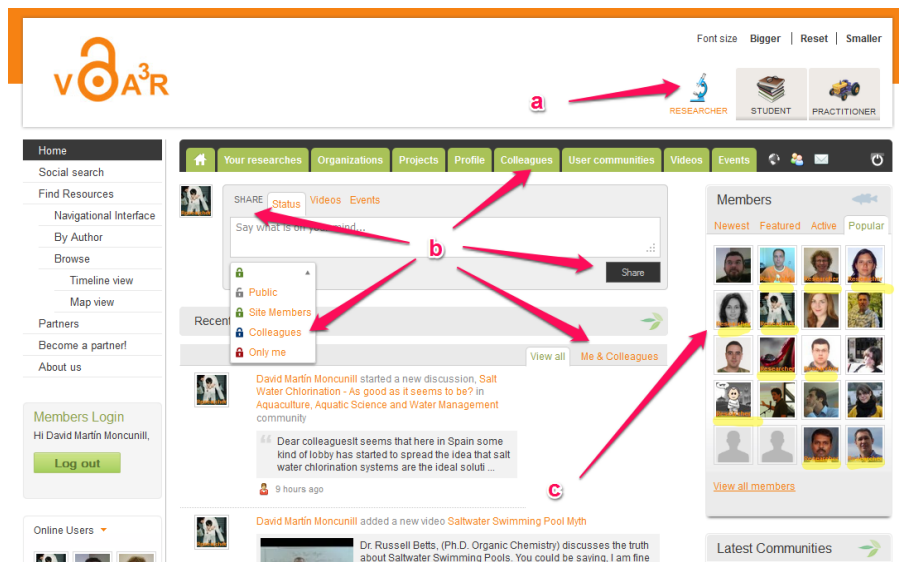


Figure 17: Specific Social & Semantic features

- Profile selector tabs allow to quickly switch the view according to the user profile. This affects not only the social part but also some details in searching interfaces (see section a within Figure 17).
- The language used are harmonized with the platform purpose: “Colleagues” instead of “friends”, “Share”, “What is on your mind” or the privacy selector, are some examples of this.
- Researchers are highlighted with the “Research” text in orange.

Font size **Bigger** | **Reset** | **Smaller**

RESEARCHER STUDENT PRACTITIONER

Text based search Help

Search Keyword:

Advanced search:

Search for:

Natural search All words Exact Phrase

Ordering field: Ordering: **Practitioner**

Show FULLTEXT result first

Filters:

By repository:

By language:

By date: from to

Indigenous knowledge

densitometer

Digital ultrasound backfat indicator

dilatometer

Electronic microscope

Elemental analyser

flame photometer

Fluorescence microscope

fluorimeter

Gas Chromatography (GC) sampler

growth chamber

Harvesting machines

Indigenous knowledge

infrared spectrometer

Interviews

Kjeldahl apparatus

manometer

mass spectrometer

Near Infrared Reflectance Spectrometer

nephelometer

Optical microscope

Figure 18: Textual search specific options when practitioner profile is active

4.3.1. Your Researches

“Your Researches” functionality is an innovative social feature that allows users to specify the status of a task related with researching issues in which they are working.

The interface helps to complete the definition (see Figure 19 and section **a** within Figure 20) of the task by using auto-suggest terms from the ontology. This means that all the information stored is semantic information, the research data complies with the *CERIF* schema, is intended to serve *CERIF* compatible databases and can be exposed as RDF, following EuroCRIS¹ recommendations on exposing Linked Open Data for research information.

¹ <http://www.eurocris.org>

Ilse A. Rasmussen
 I am presently conducting an on-line validation trial for the national editors of Organic eprints
[Researches](#) [Videos](#) [Send message](#)

SHARE [Message](#)
 Say what is on your mind...

9 Communities 47 Colleagues 82 Activities 1 Organizations 1 Projects

About Me

Basic Information	Contact Information	Education
About me Ilse	Address Blichers Allé 20, P.O. Box 50	College / University Faculty of Life Sciences Copenhagen, Denmark
	State Tjele	Graduation Year 1989
	City / Town Tjele	
	Country Denmark	
Website	http://www.icrofs.org/Pages/About_ICROFS/Ilse_A_Rasmussen.html	

VOA3R specific information
 Researcher specific field
 Organic agriculture

Certif Profile
 Gender: Female
 URI: http://www.icrofs.org/Pages/About_ICROFS/Ilse_A_Rasmussen.html
 Key words:
 Organic agriculture, Research
 Research interests:
 Organic Agriculture

Property	Value
certif:gender	f
foaf:homepage	< http://www.icrofs.org/Pages/About_ICROFS/Ilse_A_Rasmussen.html >
dc:identifier	#B08181302b3e6201302bb7eae60001
certif:internalIdentifier	#B08181302b3e6201302bb7eae60001
certif:keyword	Organic Agriculture, Research
rdfs:label	Ilse A. Rasmussen
certif:linksToOrganisationUnit	< http://voa3r.cc.uah.es:8080/dataset/resource/pers_orgunit/ICROFS-Ilse_A_Rasmussen-uuid >
certif:linksToProject	< http://voa3r.cc.uah.es:8080/dataset/resource/proj_pers/VOA3R-Ilse_A_Rasmussen-uuid >
certif:name	Ilse A. Rasmussen
certif:researchinterests	Organic Agriculture
dc:subject	Organic Agriculture, Research
rdf:type	certif:Person
certif:url	< http://www.icrofs.org/Pages/About_ICROFS/Ilse_A_Rasmussen.html >

[View all 47 colleagues](#)
 Communities [View all](#)

Virtual Open Access Agriculture and Aquaculture Repository (VOA3R)
 © 2010-10 - 2011-12
[View all](#)

Figure 19: Your Researches I

The user can complete the information about the steps (see section **b** within Figure 20), description (see section **c** within Figure 20) and progress (see section **d** within Figure 20).

Once all the information is included, it can be shared in a “twitter like” way (see section **e** within Figure 20). This activity is stored and shown by date like a small twitter timeline (see section **e** within Figure 20). Any colleague could see this information looking to the user profile.

Suggested people (see section **g** within Figure 20) and resources (see section **f** within Figure 20) regarding the user research profile are also showed in the interface.

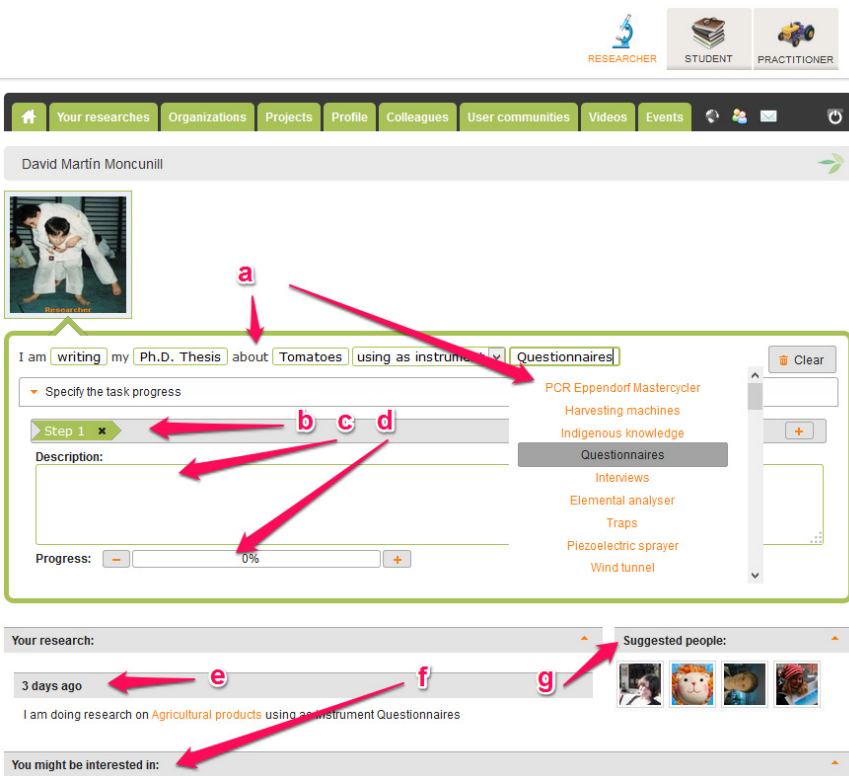


Figure 20: Your Researches II

4.3.2. Practitioner Needs

“Practitioner Needs” is the twin feature of “Your Researches” but adapted to practitioner needs.

The screenshot displays the 'Practitioner Needs' interface. At the top, there are three tabs: 'RESEARCHER', 'STUDENT', and 'PRACTITIONER'. Below these is a navigation menu with options: 'Practitioner needs', 'Organizations', 'Projects', 'Profile', 'Colleagues', 'User communities', 'Videos', and 'Events'. The user's name, 'David Martín Moncunill', is shown next to a profile picture and a red 'a' icon. The main form area is titled 'Practitioner Needs' and contains a text input field with the text 'I am investigating irrigation methods for a specific crop about plant nutrition'. A dropdown menu is open, showing suggestions: 'animal feeding', 'plant nutrition', 'animal nutrition', 'plant growth', 'animal growth', and 'soil health'. Below the text input is a 'Specify the task progress' section with a 'Step 1' dropdown and a 'Description:' field. A progress bar shows '0%'. At the bottom, there are sections for 'Practitioner Needs:' and 'Suggested people:'.

Figure 21: Practitioner Needs

It has the same features as the one offered for researchers, but it is using another ontology to fit with the practitioner profile.

4.4. Recommendations from Social Networking

The VOA3R consortium has made a great effort during these 3 years to develop social functionalities which could be used by its key user groups to spread and facilitate open access research.

Simplify Features

As seen in this chapter, VOA3R has developed several innovative interfaces and functionalities, useful for this objective. Surprisingly, one of the problems detected in the portal is that it has too many features.

We have noticed that some researchers do not use some features because they do not understand how to use them – even thinking they are bugged- or just did not notice about them.

Make Features easier to understand

On the other side, and as seen during the VOA3R Workshop at the LINQ conference (www.learning-innovations.eu), once these featured are explained, researchers show great interest in their innovative aspects and the possibilities they offer.

Offer different Interfaces

The VOA3R platform really needed to do changes in this area to facilitate gathering information from its users, since some of its interfaces only work properly when users provide certain information – e. g. to get recommended items the system needs to know the user preferences and ratings.

According to what has been exposed, next work was focusing in assessing what are the key features for users and how they use them, to re-design the portal and the way its features are displayed.

Our first approach to plan and manage these changes was:

1. Obtain feedback from existing users about which are the most interesting features in VOA3R portal, according to their experience: A first usability evaluation was realized during the pilot and validation trials
2. Employ the results coming from the usability evaluation to plan and schedule the desirable changes in the portal, taking into consideration other factors like costs, effort, time, etc.
3. Taking this information as a starting point, further usability studies should be conducted to reach conclusions about how VOA3R portal functionalities should be presented to the users.

The following figure provides an overview and first indication about the recommendations from social networking (S1: "Simplify Features", S2: "Make Features easier to understand" and S3: "Offer different Interfaces") and their relation between the two dimensions:

1. Required Efforts (indicated by the realization type from easy to difficult)
2. Expected Effects (indicated by the impact from short- to long-term)

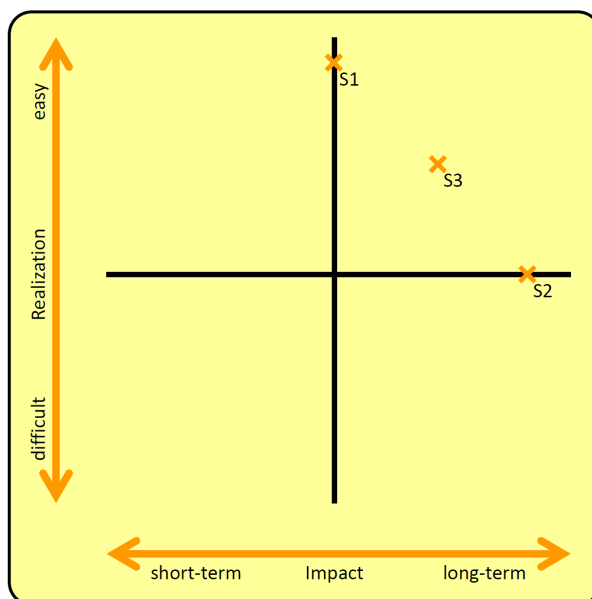


Figure 22: Recommendations from Social Networking: Efforts and Effects

The experience gathered was used to develop best practices in the area. To combine features in different interfaces and to make more noticeable, understandable and usable the most innovative portal features, are the two main ideas to be considered in the future re-design of the VOA3R portal, in its adaptation as open source and in the development of similar portals.

5. Content Population Methodology

One of the core activities within the VOA3R project was the “population of the VOA3R federation with scientific content [...] described with semantically rich and interoperable metadata” as defined in the VOA3R Description of Work (DoW). More specifically, this activity referred to the aggregation of metadata records providing bibliographic information about resources related to agricultural research. The metadata records included among others a URL pointing to the actual resource on the dedicated page of each repository or collection. In this direction, the workflow was defined and detailed which should be followed by all members of the VOA3R federation in order to contribute to the population of the VOA3R aggregator with scientific content.

Aggregated metadata records from the repositories of the VOA3R content providers were exposed through the VOA3R portal (www.voa3r.eu) and were made available to all users of the portal.

5.1. The Overview of the Content Population Methodology

Among the bibliographic references aggregated by VOA3R, the following document types were identified:

- Theses (undergraduate, MSc, PhD)
- Scientific papers
- Reports
- Datasets
- News items
- Monographs
- Online courses
- Multimedia files (images, presentations, videos)

Metadata describing the aforementioned types of resources were aggregated from open access institutional repositories, open access archives and research

archives (e.g. the ones containing datasets). The European Union (EU) is investing in a series of policies regarding Open Access Research and is funding research projects that are closely working on open access issues. EU considers the support of open access to be a crucial factor for its “ability to enhance its economic performance and improve its capacity to compete through knowledge”. In addition, according to the EU website for Science in Society (<http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1294&lang=1>) “Open Access can also boost the visibility of European research, and in particular offer small and medium-sized enterprises (SMEs) access to the latest research for exploitation”. In this context, VOA3R supported the Open Access initiative.

The content population tasks of VOA3R were organized in four different phases:

1. **Controlled Testing Phase:** During the testing phase, all content providers used the VOA3R Confolio tool (<http://voa3r.confolio.org>), which provided a controlled environment for all VOA3R content providers to get familiar with the VOA3R metadata application profile, create metadata records and identify issues both related to the VOA3R Confolio tool and to the VOA3R metadata application profile.
2. **Phase 1:** VOA3R content providers with existing repositories provided the VOA3R-compliant OAI-PMH targets for their metadata to be harvested and available through the VOA3R portal.
3. **Phase 2:** VOA3R content providers with no digital repositories selected appropriate repository tools and annotated their resources using the VOA3R metadata application profile.
4. **Phase 3:** External and affiliated content providers were connected to the VOA3R network and their metadata were harvested and made available through the VOA3R portal.

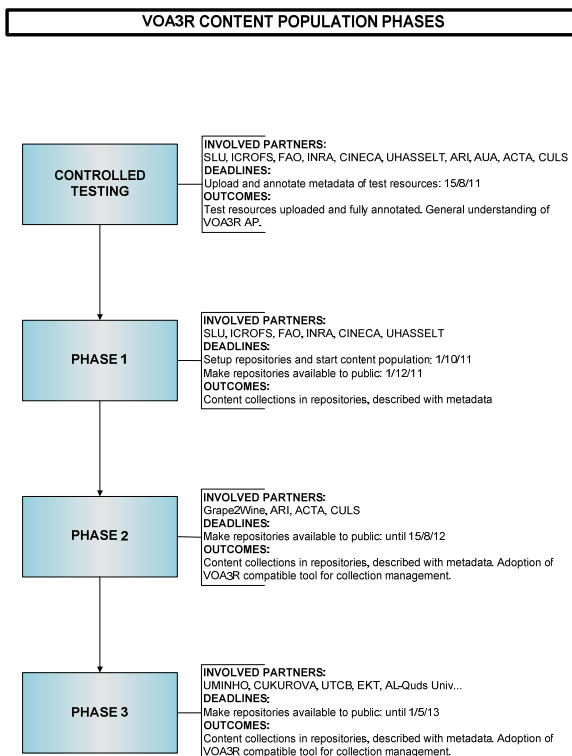


Figure 23: The four phases of the VOA3R content population

Each content population phase of VOA3R consisted of four main steps, which are the following:

1. **Uploading/ Integration** – In this first step, the resource or the hyperlink that links to the resource must be uploaded, along with some basic annotation of the resource with metadata.
2. **Enrichment** – This second step refers to the enrichment of the basic metadata description of a resource with additional metadata.
3. **Validation** – In this step the metadata is validated against some predefined criteria before it is published.
4. **Quality Review/ Assessment** - This last step refers to the quality evaluation of both the content and the metadata describing this content, with the use of some criteria check grids.

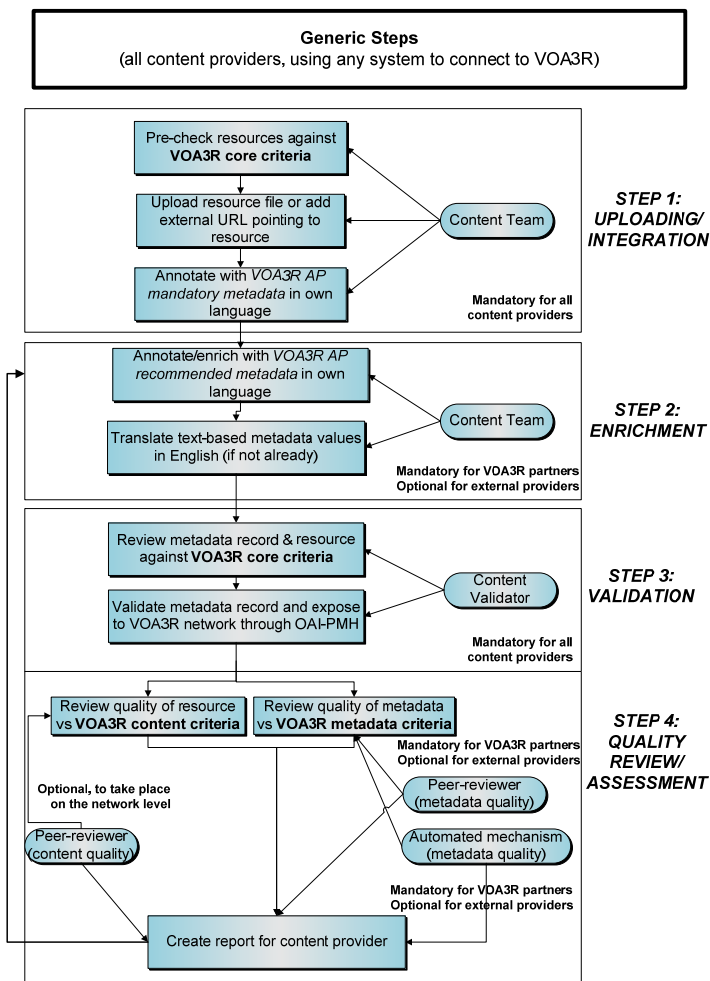


Figure 24: VOA3R Content Population Generic Steps

By the end of the project, more than 2,6 million records were harvested from overall 26 different repositories, covering 94 different languages.

The progress of the content population process was documented in three reports, each one covering a different period of the project.

5.2. The challenges and experiences of content population

The content population tasks of the VOA3R project proved to be challenging for various reasons.

1. The work related to the content population was affected by the outcomes of almost all the Work Packages of the project (such as the user requirements affecting the type of content to be available through the portal, the domain representation modelling and the development and revisions of the VOA3R metadata application profile for the annotation of bibliographic resources, the VOA3R portal affecting the way that the semantically enriched metadata records are displayed, the user trials for providing feedback related to the metadata aggregation status and the dissemination and affiliation activities for engaging additional content providers external to the project). This means that any deviation in one of the other work packages had a direct impact on the work done in the context of content population.
2. The mapping of different metadata schemas to the VOA3R metadata application profile seemed to be a task harder than initially expected.
3. The use of various repository tools (e.g. Eprints, AgriOcean DSpace, DSpace, Confolio, AgriDrupal etc.) did not allow for a common component facilitating the exposure of VOA3R metadata records to be developed and applied in all cases; instead, development had to take place individually for each type of tool.
4. The quality of the metadata records was not consistent between different repositories, even after the exposure of metadata in a common format (VOA3R AP).
5. Content providers with no technical support and background had issues coping up with the advances in the context of content population.
6. In the case of aggregators, it was not easy to achieve the number of metadata records initially planned, due to the fact that individual agreements had to be signed with each content provider.
7. The integration of metadata describing resources from Web 2.0 web sites, such as YouTube (videos), Flickr (images) and Slideshare (presentations) faced unforeseen issues, such as the low quality of

metadata aggregated, the high number of irrelevant resources and the need for manual revisions and enrichment before these metadata records become available through the VOA3R portal.

Despite these challenges, all the content population tasks of VOA3R were successfully completed with the valuable collaboration between the partners involved under the coordination of GRNET as the WP leader.

5.3. Recommendations from Content Population

Based on the experience gained with the content population tasks during the three years of the VOA3R project including two and a half years of content population activities, it became obvious that the coordination and implementation of the content population activities were a complex task.

Expect Heterogeneity and Quality Issues

The heterogeneity of the data sources and the status of the repositories led to issues that had to be solved in a short period. Handling such high numbers of metadata proved to be challenging both for the partners and for the technical infrastructure of the project, while metadata quality issues were identified even shortly before the end of the project, mainly due to last-minute revisions in the repositories of the content providers. All of them could be solved but were leading to huge efforts in particular in the phase 3 while integrating and federating the external content providers.

Close Collaboration between Content Providers and Technical Partners

A positive aspect of this experience was the collaboration between the content providers and the technical partners, which resulted in solving the issues in the most appropriate way. As expected, content providers with limited experience in technical issues needed more support, which was provided in various ways, such as exchanging emails on the issues, Skype calls and flash meetings, dedicated discussions during project meetings etc. In all cases, documentation, handbooks and detailed guidelines facilitated the completion of the content population tasks.

Offer Affiliations with Benefits

In order to ensure the timely and accurate completion of the content population tasks, communication with the partners responsible for relevant tasks (such as the development and revision of the VOA3R metadata application profile, the development of the portal for correctly displaying the semantically enriched metadata records, the organization of user trials for ensuring the metadata-related aspects) were introduced in the questionnaires and the affiliation plan: Thus, it could be guaranteed that it is attractive for potential content providers outside the project to join the VOA3R community, to become affiliated partner of VOA3R including signing a Memorandum of Understanding and to become federated and harvested by using the VOA3R metadata application profile. This communication required extended coordination of partners and tasks in order to finally achieve the optimal results in each case.

The following figure provides an overview and first indication about the recommendations from content population (C1: "Expect Heterogeneity and Quality Issues", C2: "Close Collaboration between Content Providers and Technical Partners" and C3: "Offer Affiliations with Benefits") and their relation between the two dimensions:

1. Required Efforts (indicated by the realization type from easy to difficult)
2. Expected Effects (indicated by the impact from short- to long-term)

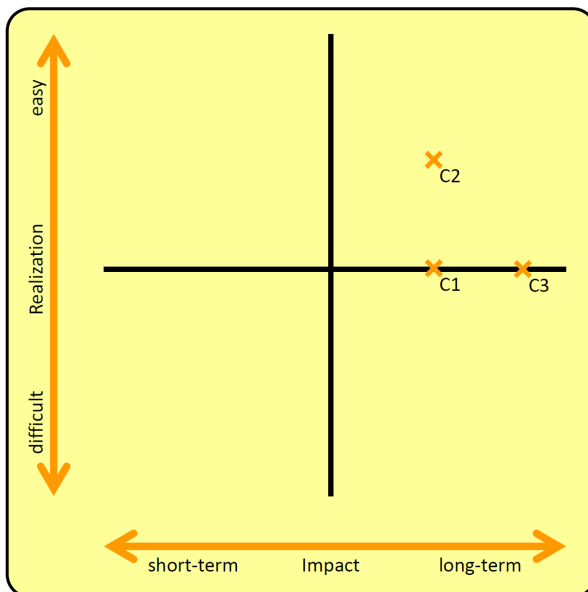


Figure 25: Recommendations from Content Population: Efforts and Effects

It can be summarized the chosen content population methodology was not improved and appreciated by the internal content providers but also very beneficial to achieve the project objectives and to involve external content providers.

6. Controlled Experiments, Piloting and Validation

The central question the VOA3R Consortium has to answer at the end of the project lifetime is: “How is the quality of the project results and outcomes?”

This question includes many aspects including appropriateness, fulfilment of the work plan and the grade how satisfied different stakeholder groups are with different lifecycle services, the portal, with its content, components and metadata etc.

To answer this question, the VOA3R Consortium has successfully conducted different types of evaluation activities and implemented several methods following the evaluation and validation plan developed according to the Quality Assurance and Risk Assessment Handbook (D1.2) based on and compliant with the ISO quality standard RFDQ (ISO/IEC 19796-1):

- Controlled Experiments
- Pilot Trials
- Valisation Trials

The experiments and trials developed by the University of Duisburg-Essen have been conducted by the VOA3R partners to continuously improve the VOA3R platform and to get the best possible feedback from the defined five stakeholder groups:

1. Research Communities
2. Students
3. Practitioners
4. Content Providers
5. General Public / Various Stakeholders.

To facilitate the communication about the Controlled Experiments, Pilot Trials and Validation Trials, their names have been changed and adapted in the following way:

Pilot & Validation Trials (Names according DoW)	Pilot & Validation Trials (New names by consensus)
Pilot Trials on Integrated and Federated Components	Technical Testing: Usability
	Technical Testing: Debugging
Pilot Trials on the VOA3R Portal	User Trials
Pilot Trials on Integrated Content	Content Providers with Repository
Pilot Trials on Populated Content	Content Providers without Repository
Pilot Trials on Metadata	Workshop on Metadata Quality

Table 2: New Names Pilot & Validation Trials

These new names will also be used in this publication. Thus the VOA3R Consortium has executed the following 9 different experiments and trials:

- Controlled Experiments for Reviewing Lifecycle Services
- Controlled Experiments for Publication Lifecycle Services
- Controlled Experiments for Semantic Search Services
- Technical testing: Usability
- Technical testing: Debugging
- User Trials
- Content Providers with Repository
- Content Providers without Repository
- Workshop on Metadata Quality.

6.1. The Triple Approach: Experiments, Pilots and Validation Trials

In particular there have been two kinds of trials in 3 phases as illustrated in the following figure:

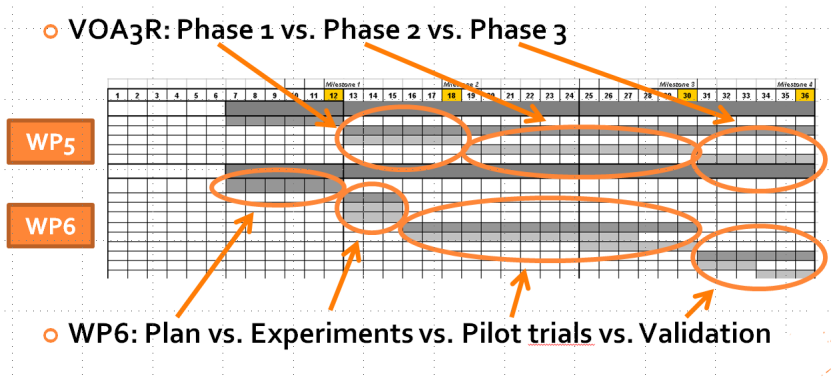


Figure 26: Overview Evaluation Activities (WP6) vs portal Development (WP7)

1. Controlled Experiments (Phase1)
 - Controlled Experiments for Reviewing Lifecycle Services
 - Controlled Experiments for Publication Lifecycle Services
 - Controlled Experiments for Semantic Search Services

2. Pilot Trials (Phases 1 & 2) and Validation Trials (Phase 3)
 - Pilot Trials on Integrated and Federated Components
 - Pilot Trials on the VOA3R Portal
 - Pilot Trials on Integrated Content
 - Pilot Trials on Populated Content
 - Pilot Trials on Metadata

The three evaluation activities Controlled Experiments, Pilot Trials and Validation Trials can be summarized and characterized as followed:

- **Controlled Experiments:** A controlled experiment is an experimental setup designed to test hypotheses. It has one or more conditions (independent variables) and measures (dependent variables). A randomised controlled trial is an experiment in which participants are assigned at random to different conditions, in order to test in an objective way which of several alternatives is superior. A pilot study is a trial run of an experimental procedure, not expected to produce valid research data. Controlled experiments embody the best scientific design for establishing a causal relationship between changes and their influence on user-observable behaviour. (cf. Kohavi et al. 2007) Controlled experiments are carried out under controlled conditions, not necessarily in a real use context, but in a "laboratory" or "experimental" setting controlled by the researchers.
- **Pilot Trials:** A Pilot Trial is a formative test used for initial testing and conducted after the pilot trials to validate the results of the former pilot trials. It is a specific process of initial testing a product, plan, or person over a certain or predefined period of time. In our case, we test the suitability of the services and processes for the objectives of VOA3R. This is carried out with real users in real usage settings. The pilot trials help in refining the design of the services and processes and their optimization.
- **Validation Trial:** A Validation Trial is a summative test used for final testing and conducted after the pilot trials to validate the results of the former pilot trials.

6.2. Controlled Experiments

According to Blandford (2008) a controlled experiment is an approach that has been adopted from research methods in Psychology. Controlled experiments are a widely used approach to evaluating interfaces and styles of interaction, and to understanding cognition in the context of interactions with systems. The question they most commonly answer can be framed as: Does making a change to the value of variable X have a significant effect on the value of variable Y?

For example X might be an interface or interaction feature, and Y might be time to complete task, number of errors or users' subjective satisfaction from working with the interface. Controlled experiments are more widely used in Human-

Computer-Interface (HCI) research than in practice, where the costs of designing and running a rigorous experiment typically outweigh the benefits.

Blandford (2008) also gave her readers some important hints about how to organize and how to conduct controlled experiments. Summing up there are four important stages we have to pay special attention to:

1. Choose the participants that will take part in our controlled experiments before we move on.
2. Design the experiment itself.
3. Assemble the materials and apparatus that are required.
4. Create a formal procedure that describes what the participants do during a controlled experiment. This procedure will also allow other people to replicate the controlled experiment.

Controlled experiments have been the evaluation method conducted in phase 1. In particular there have been:

- **Controlled Experiments for Reviewing Lifecycle Services:** Within the controlled experiments the focus has been on services for reviewing lifecycles. The aim was to have a look at different reviewing processes and to point out their advantages and disadvantages. In the second part of the controlled experiments the focus has been on the development of alternative peer review lifecycles. The participants have been asked to fill out the questionnaires and to present their ideas concerning alternative models. During the controlled experiments, the peer-reviewing lifecycle services were not yet integrated into the VOA3R platform: Thus, they were evaluated by external experiments for defining and improving the planned services for the VOA3R platform.
- **Controlled Experiments for Publication Lifecycle Services:** The second type of controlled experiments focused on publication lifecycle services. Participants have been asked to examine the reference model for the publication lifecycle that was developed within the VOA3R project. In the first part they have been asked to write down the advantages and disadvantages whereas the second part focussed on alternative models. Participants have developed alternative publication models in working groups and the results helped to optimize and finalize the reference model for the publication lifecycle. During the controlled experiments, the publication lifecycle services were not yet integrated into the VOA3R

platform: Thus, they were evaluated by external experiments for defining and improving the planned services for the VOA3R platform.

- **Controlled Experiments for Semantic Search Services:** Furthermore there have been controlled experiments on semantic search services. Within these experiments the information architecture and interface models from task 3.1.3 and its other outcomes for alternative rendering, querying and linking through innovative visualization and interface have been examined.

6.3. Pilot Trials

The pilot trial on the VOA3R portal focused on the platform as a whole and aimed at evaluating all the provided services and tools. The conductors of the trials wanted to find out how they can improve and optimize the VOA3R platform.

This task has analysed the project outcomes gathered in the phases 1 and 2: The integrated and federated platform components (task 4.2), the developed VOA3R portal (task 4.3) and the connection and interlinkage of the agriculture and aquaculture repositories and contents by the content integration (task 5.2.1) and the content population (task 5.2.2) from internal partners.

The VOA3R consortium has executed and reported 13 user trials. Overall more than 180 stakeholders have provided their feedback to the portal in its different development stages. Every pilot partner has applied the piloting tools and analyzed the gathered feedback based on the guidelines provided by the University of Duisburg-Essen. The results of the pilot testing led to a direct improvement of the portal and its feature.

The integrated evaluation report (D6.2) documents and summarizes all testing and evaluation activities and following improvements of the project results raised by the controlled experiments and pilot trials with the user communities.

6.4. Validation Trials

In contrast to the Pilot Trials, the Validation Trials were designed as bigger events with internal and external user communities. As planned the Validation Trials used and benefited from the same questionnaire of the Pilot Trials to allow a better comparison of the trial results.

The evaluation activities have strongly been related to the development phases of the portal. The Validation Trials have taken place in the last period of the project (phase 3) from March 2013 to May 2013. Despite this short time period the VOA3R Consortium has conducted and reported 15 validation trials reaching more than 200 participants from all targeted stakeholder groups.

To facilitate improvement based on the gathered results at this late stage of the project, the VOA3R partners conducting the validation trials have not only summed up the validation results in a report for the WP6 Workpackage leader, but also sent the results to the technical partner for immediate consideration.

6.5. Recommendations from Experiments and Trials

The Controlled Experiments, Pilot and Validation Trials were accompanying the whole project lifecycle and all development processes: Thus, covering such a long period many diverse issues and recommendations were analysed and identified from the continuous evaluation by the University of Duisburg-Essen: They were communicated to the Project Management Board to take the appropriate actions and major issues were discussed with all consortium partners during consortium and virtual online meetings. The following list presents the key recommendations that are also relevant and interesting for other projects and future initiatives.

Focus on Open Access

First of all, the all user groups and also the content providers were stating and emphasizing that they prefer a strong and strict focus on Open Access: In particular our main target group, the researchers were claiming that Open Access is important for the visibility of their research results and consequently for their reputation. This is a simple and expectable evaluation result that nevertheless has to be underlined and pointed out as key message by the users.

Improve Usability of the Online Portal

Most pilot trials and validation trails were conducted as user trials due to the majority of feedbacks and requests from the users already collected during the controlled experiments. Main concerns were raised around the functionalities and features provided by the VOA3R portal with its connection of online repositories and related services including the social networking: Too many features are contra-productive but can be appreciated after explanations. The solution can be the provision of different interfaces (cf. chapter 4 above).

Two specific requests are following as they were repeated by many users and considered as key features to raise the acceptance rate.

Enable Publication of own Research Results

The users and in particular the researchers as main target group want to publish their own research results that are not yet included in other repositories (so called "orphan papers"): Through such a functionalities the VOA3R portal would increase the attractiveness for researchers that are measured by publications and therefore searching for such opportunities.

Facilitate Peer-reviews

A second functionality requested by many researchers is related to the potential publication of own research results: If uploaded the publications should not only be accessible and visible but other users (i. e. researchers) should also be able to review them and to provide comments and feedbacks including discussions through the social networking services. Such communication would support the future research and publications.

Choose different Sustainability Strategies

Finally it became more and more evident during the whole pilot and validation trials within the interviews, discussions and workshops that different sustainability strategies can provide different benefits and that they should be combined for best long-term maintenance and exploitation beyond the project lifetime. Consequently sessions within the last three consortium meetings were organized to discuss the options and opportunities. In the end, an integral and sophisticated triple approach was selected combining the complementary responsibilities in public-private-partnership for a profit/non-profit scheme:

1. Maintenance of scholarly metadata aggregators by FAO as an institution operating in the public space that has it as one of its core missions and mandates.
2. Maintenance of the Social network by AgroKnow as a private specialized enterprise with a specific interest related to its core business.
3. Networking and community building by a non-profit association that will allow open and democratic participation of any interested party with common interests: Therefore VOA3R has launched the initiative for the International Council for Open Research and Open education (ICORE).

The following figure provides an overview and first indication about the recommendations from experiments and trials (E1: "Focus on Open Access", E2: "Improve Usability of the Online Portal", E3: "Enable Publication of own Research Results", E4: "Facilitate Peer-reviews" and E5: "Choose different Sustainability Strategies") and their relation between the two dimensions:

1. Required Efforts (indicated by the realization type from easy to difficult)
2. Expected Effects (indicated by the impact from short- to long-term)

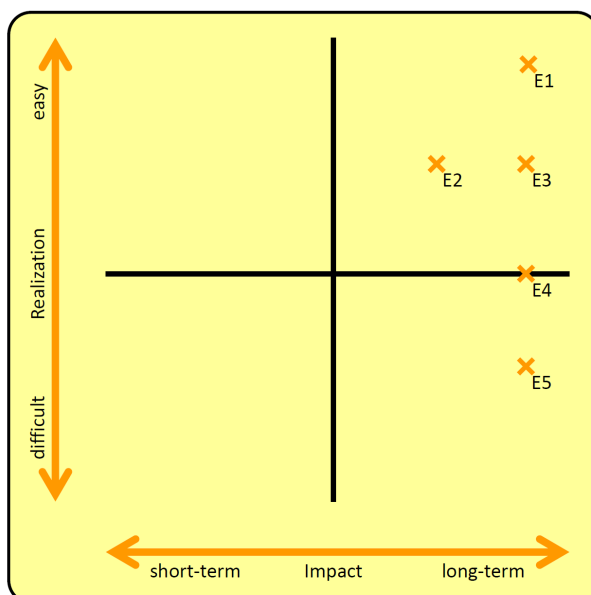


Figure 27: Recommendations from Experiments and Trials: Efforts and Effects

We can conclude from all the formative and summative tests to evaluate the results through the experiments, pilot and validation trials that the project outcomes are of high quality. Thus, it can be stated on the one hand the VOA3R Consortium successfully applied the evaluation framework for the VOA3R developments and services to make agricultural and aquacultural contents more accessible, usable and exploitable.

On the other hand the triple approach: Experiments, Pilots, Validations revealed to be a valid, suitable and helpful combination and sequence of methods for the evaluation of the VOA3R portal, services and communities as well as of open access repository federations in general.

7. Summary and Future Outlook

This publication presents the main outcomes and recommendations of VOA3R, the European initiative for the Virtual Open Access Agriculture & Aquaculture Repository. This flagship project supported by the European Commission facilitated, improved and sustained the open access to all European and international digital contents, scientific information and research results as well as their online discussion and exchange.

The main recommendations derived and drawn from the selected five key tasks and activities (quality management, elicitation of the user requirements, social networking services, content population, and evaluation by experiments and trials) were presented in brief: They were also identified by the evaluation of the experiments and trials and their relation between the two dimensions required efforts (indicated by the realization type from easy to difficult) and expected effects (indicated by the impact from short- to long-term) were indicated in a first overview. That allows also other and future initiative to benefit from the achieved VOA3R results and insights.

VOA3R has achieved successfully its objectives and went beyond them, also analysed and evaluated through the experiments and trials: VOA3R could establish the online platform connecting digital libraries and facilitate services and social networking including virtual communities.

Thus, it can be summarized that VOA3R provided and continuously provides through the sustainability strategy unique opportunities for sharing scientific and scholarly research related to agriculture, food, and environment.

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9. About the VOA3R Project



<http://www.voa3r.eu>

VOA3R: Virtual Open Access Agriculture & Aquaculture Repository: Sharing Scientific and Scholarly Research related to Agriculture, Food, and Environment.

The general objective of the project is to improve the spread of European agriculture and aquaculture research results by using an innovative approach to sharing open access research products.

The target end user communities are:

- Researchers/academics,
- Practitioners and
- Students

Open access to scientific/scholarly content removes the access barriers related to copyright retention to the outcomes of research. The VOA3R platform deploys an advanced, community-focused integrated service for the retrieval of relevant open content and data that includes explicit models of the scholarly methods and procedures used and of the practical tasks targeted by applied research which represent a principal information need expression for practitioners. The main outcome of VOA3R is a Virtual Open Access Agriculture & Aquaculture Repository for Sharing Scientific and Scholarly Research related to Agriculture, Food, and Environment.

The VOA3R platform will offer innovative and semantic interfaces and services that enable researchers to:

- formulate their information needs in terms of elements of the scientific methods established in their field (variables, techniques, assessment methods, kinds of objects of interest, etc.) combined with topical descriptions as expressed in metadata ;
- browse concepts and topics using graphical representation ;
- experiment an alternative publishing process ;
- use social functions/criteria like ratings, public reviews, social tagging.

Open access to scientific/scholarly content removes the access barriers related to copyright retention to the outcomes of research is most important for learning innovations and quality today!

More information about the VOA3R project is at

<http://voa3r.eu/>

**10. Annex:
Authors, Consortium Members and Consortium
Partners**

All authors and consortium members in alphabetic order

11. Authors



Helmstedt, Cornelia

University of Duisburg-Essen, Campus Essen
Information Systems for Production and Operations
Management
Germany

Cornelia.Helmstedt@icb.uni-due.de

Cornelia Helmstedt is Scientific Researcher at the University of Duisburg-Essen (UDE). She studied Educational Sciences and Roman Linguistics at the Leibniz University in Hannover. Since 2010 she is working in the fields of Lifelong Learning at the UDE in the Department "Information Systems for Production and Operation Management" (WIP). She has got a strong background and expertise in evaluation and in leading, coordinating and contributing to research projects (SEVAQ+, CerOrganic, Concede, OrganicEdunet, COMPATeGov, OERtest). Currently she is responsible for the research activities in the VOA3R, AGRICOM and Inspiring Science projects.



Manouselis, Nikos

Akro-Know Technologies (AK)
Greece

nikosm@ieee.org

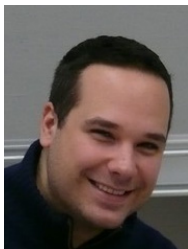
Nikos is a co-founder and the CEO of Agro-Know. He has a diploma in Electronics & Computer Engineering, a M.Sc. in Operational Research, and a M.Sc. in Electronics & Computer Engineering, all from the Technical University of Crete, Greece. He also holds a PhD on the application of metadata technologies in the domain of agriculture, from the Informatics Laboratory of the Agricultural University of Athens (AUA), Greece.

Nikos has extensive experience in designing and implementing large scale initiatives and project coordination related to open data and applications for agricultural education, research and innovation. He has been involved in the conception and implementation of several European projects such as the eContentplus Organic.Edunet, CIP PSP VOA3R, CIP PSP Natural Europe, CIP PSP Organic.Lingua, FP7 agINFRA and FP7 SemaGrow. He is also often consulting

organisations that want to deploy initiatives related to metadata repositories and aggregations (such as the Greek Research & Technology Network, the Computer Technology Institute & Press "Diophantus", the University of Alcalá in Spain, and the ARIADNE Foundation in Belgium).

Whenever he finds some time, he gets involved in several editorial activities, as well as relevant scientific events. He is also trying to contribute to the supervision of PhD students that work on topics related to metadata and repositories, as well as accept invitations to serve as an external examiner in relevant PhD theses. Furthermore, he is serving as an evaluator of research proposals for various bodies and has given a number of invited talks or lectures. He has over 140 publications in scientific journals, book volumes, and conference proceedings. Most of them can be discovered through his profile in Google Scholar. Some of his presentations can be found in his Slideshare page.

Nikos is currently devoting much of his energy into transforming the Learning Repositories Task Force (AgLR-TF) into a global Green Learning Network that can boost the adoption and usage of digital educational resources in agriculture. He is also interested in ways in which open agricultural data can be the base upon which a new business ecosystem may be formed to facilitate agricultural and technological innovation. This is explored by putting in use engaging collaboration and interaction formats during events such as the Green Ideas series.



Martín-Moncunill, David

Universidad de Alcalá (UAH)
Spain
d.martin@edu.uah.es

David Martín Moncunill is a Computer Engineer from Universidad de Alcalá. He worked in the banking industry (payment methods) from 2008 to 2012 as Website Project Leader & Social Media Manager. He moved to IERU research group (University of Alcalá) on May 2012 to start a career as researcher and obtain a PhD. Currently he is actively collaborating in VOA3R and Organic.Lingua EU funded projects. His preferred areas are usability and IT project management; his research interests include semantic web, semantic interoperability, accessibility and knowledge representation. He is also helping in teaching labours, teaching software engineering subject and has also developed a course about usability called "Usability 101" which is currently teaching.

**Protonotarios, Vassilis**

Greek Research & Technology Network (GRNET)

Greece

vprot@agroknow.gr

Dr. Vassilis Protonotarios has a 5-year bachelor, a 2-year MSc and a 4-year PhD in Agricultural Biotechnology, all from the Department of Agricultural Biotechnology of the Agricultural University of Athens (Greece). He has professional experience in the field of Organic Agriculture as an officer in the Directorate of Organic Agriculture of the Greek Ministry of Food and Rural Development and he is the Greek National Editor of Organic Eprints. He has been working with metadata, content population and aggregation tasks and digital repositories since 2009, in the context of various EU-funded projects, such as Organic.Edunet, Organic.Lingua, VOA3R, afINFRA, CerOrganic and Organic.Balkanet. He has been involved in these projects as a scientific associate of Agricultural University of Athens, Greek Research & Technology Network (GRNET), Agro-Know Technologies and the University of Alcalá (Spain).

**Sicilia, Miguel-Angel**

University of Alcalá (UAH)

Spain

msicilia@uah.es

Miguel A. Sicilia obtained a University degree in Computer Science from the Pontifical University of Salamanca in Madrid, Spain (1996) and a PhD from Carlos III University in Madrid, Spain (2002). From 1997 to 1999 he worked as assistant professor at the Pontifical University, after which he joined the Computer Science Department of the Carlos III University in Madrid as a lecturer, and being a member of the development team of a personalization engine. Currently, he works as a full-time professor at the Computer Science Department, University of Alcalá (Madrid).

**Stracke, Christian M.**

University of Duisburg-Essen
European Institute for Learning, Innovation and Cooperation
Germany
christian.stracke@uni-due.de

Christian M. Stracke is Coordinator of European and international research and cooperation and Team Leader for E-Learning, QM and Competence Development at the University of Duisburg-Essen (see: www.wip.uni-due.de) and Adjunct Professor for E-Learning at the Korean National Open University (see: www.knou.ac.kr/engknou2/). As an internationally recognized expert and innovator, his main working fields are innovative and technology-enhanced learning (TEL), impact measurement and competence modelling as well as quality management (QM), evaluation and standardisation in learning, education and training (LET). He is elected ISO Convener of the international Standardisation Committee SC36 and elected Chair of the European Standardisation Committee for LET (CEN TC 353). He is author and editor of numerous books, handbook chapters, articles, and standards on learning innovations and quality. Christian M. Stracke is invited keynote speaker, PC member at many international conferences and has initiated and established. LINQ, the annual international conferences on Learning Innovations and Quality (see: www.learning-innovations.eu). He has studied educational sciences and gained extensive experience in leading large scale projects and in consulting and supporting institutions and public authorities to develop long-term policies and to introduce and improve learning innovations and quality. Many research projects were coordinated and supervised as quality manager by him including ODS (15.3 Mio Euros, see: www.opendiscoveryspace.eu) and Q.E.D. (budget: 4.0 Mio Euros, see: www.qed-info.de) as two of the biggest e-Learning projects next to many other obtained European research and development projects funded by the EC. He has founded ICORE, the International Council for Open Education and Research (see: www.ICORE-online.org) and eLC, the European Institute for Learning, Innovation and Cooperation (see: www.elc-institute.org) as well as QLET, the Quality Portal for LET (www.qualitydevelopment.eu). He is Co-initiator and Board Member of the German E-Learning Association D-ELAN merged into the Working Group "Learning Solutions" of BITKOM, the biggest ICT association worldwide (see: www.bitkom.org/en).

VOA3R Consortium Members



Adamides, George

Ministry Of Agriculture, Natural Resources and Environment
of Cyprus (ARI)
Cyprus
adamides@arinet.ari.gov.cy

George Adamides holds a BSc and an MSc in Computer Science from Western Michigan University. Currently he holds the position of Senior Agricultural Research Officer and is the Head of the Rural Development Department of the Agricultural Research Institute in Cyprus. He has been active in various research fields and was involved in numerous European research programs. His research interests are the adaptation of ICT in agriculture, Human-Computer Interaction and recently the interaction of farmers with agricultural robotics. In 2008 he has started his PhD studies at the Open University of Cyprus in the area of human-robot interaction, with emphasis on agricultural robotics user interface.



Aventurier, Pascal

Institut National de la Recherche Agronomique (INRA)
France
pascal.aventurier@avignon.inra.fr

EDUCATION

- Master of Science (Information and Communication Sciences) - University of Grenoble, St. Martin-d'Hères, France, 1990
- Bachelor of Science (Applied Mathematics and Social Science) - University of Paris VII – Diderot (Paris), France, 1989

Pascale is currently team leader of the Regional Scientific Information Group (4 people) at the INRA research center in PACA (Avignon, Sophia Antipolis), France. Since 2010, he has co-led the Open Access and Information Technology work groups for the INRA Scientific Information Division. Both projects include a study of the social networking and project management aspects of documentary information systems. Further, he is collaborating with researchers on the VOA3R project, studying information distribution (through the re-use of existing and

dated metadata and semantics technology) and conducting user trials with researchers on the VOA3R portal. He is also working on organic agricultural ontology, in the Organic.Lingua project. Both of these are European Union FP7 projects. Since 2012, I am also working on linked open data (various projects) and open data research.



Belsis, Petros

Technological Educational Institute of Athens (TEIA)
Greece
pbelsis@aegean.gr

Petros Belsis holds a B.Sc. degree in Physics, from National and Kapodistrian University of Athens, Department of Physics, and a B.Sc. degree in Computer Science from Technological Education Institute of Athens, Department of computer science. He also holds a M.Sc. in Information Systems from the Department of Informatics, Athens University of Economics and Business, Greece and a Ph.D. in Information and Communication Systems Engineering from the Department of Information and Communication Systems Engineering, School of Sciences, University of the Aegean, Greece. He has participated in several projects funded by EU, relative to Information Systems Security, Security schemes for coalitions of autonomous systems, Knowledge Management, Cross Lingual Content Based Information Retrieval, etc. He has worked as a multimedia programmer and his teaching experience covers both mid and higher education levels. His research interests include text categorization, Information Systems Security, Knowledge Management. His published scientific work includes several international conference and journal papers.



Beyer, Jenny

University of Duisburg-Essen
Germany

Jenny Beyer was working as Scientific Researcher at the University of Duisburg-Essen within the Quality Team for Quality Management in VOA3R, she holds a

Bachelor in English and German Studies (including a two months study in Georgia, USA), from the Ruhr University of Bochum where she has also worked as e-Tutor, now she starts working again as online journalist for a private enterprise.



Biniari, Katerina

Agricultural University of Athens (AUA)
Greece
kbiniari@aua.gr

Ass. Professor, Agricultural University of Athens Katerina Biniari is Assistant Professor of the Laboratory of Viticulture of the Department of Crop Science at Agricultural University of Athens. She is involved in the use of ampelographic and molecular methods for the identification and discrimination of grapevine varieties and rootstock varieties and in the use of cultural methods and techniques in the vineyard, in grapevine physiology, in vitro culture and in grapevine propagation. At the same time, she has participated in numerous scientific programs and in some of them she has contributed as a scientific coordinator. She has participated in many scientific congresses and symposia as a member of scientific and organizing committees and with oral presentations. She is teaching General Viticulture and Ampelography.



Bouza, Despoina

Agricultural University of Athens (AUA)
Greece
desph@aua.gr

Despoina Bouza is an Agriculturist - Enologist and work is a special, administrative, technical and teaching staff of the Laboratory of Viticulture of the Department of Crop Science at Agricultural University of Athens. She is involved in grapevine propagation. She has previous experience teaching Viticulture and Enology in technical schools (T.E.I.). She has a degree of Master of Science in Viticulture and Enology and she has participated in many scientific programs.

**Ciotoli, Fabio**

Consorzio Interuniversitario (CINECA)

Italy

f.ciotoli@ceneca.it

IT Knowledge Infrastructure Specialist, involved in Internal and European Project, R&D: skills in the areas of programming languages and computational paradigms of softwaredesign, the architecture of computer systems, operating systems, information systems, distributed systems and computer networks, the technologies for the safety of information, artificial intelligence, computer systems and real-time control, organization, management and optimization of the processes of technological innovation. Research fields: Knowledge infrastructures, Ontology design, Crosswalks infrastructures design, Rule based monitoring of SOA and SAAS, AI, DROOLS and Reasoning Model design.

**Engel-Vermette, Sebastian**

University of Duisburg-Essen, Campus Essen

Information Systems for Production and Operations
Management

Germany

sebastian.vermette@icb.uni-due.de

Sebastian Engel-Vermette is a research associate for third-party projects at the department of Information Systems for Production and Operations Management at the University of Duisburg-Essen. His responsibilities include communications and marketing for said projects, as well as for conferences with which the department is involved. His personal research interests focus on migration and societal integration concepts and their corresponding media and political discourse within Europe, especially in Germany.



Ghiradi, Nicola

Consorzio Interuniversitario (CINECA)

Italy

[n.ghirardi@cineca.it](mailto:n.ghirardi@ cineca.it)

Nicola is working in the "Knowledge and Information Management" in CINECA where he is collaborating in projects in the area of Scholarly Communication, Open Access, Linked (open) Data and Digital Libraries and Archives. In these projects he deals with data integration, modeling and sharing using Linked (open) Data technologies and graph databases. CINECA builds innovative services based on (graph) data analysis and data visualizations. Nicola has also been working in several important European Union funded projects such as Arrow and ArrowPlus (www.arrow-net.eu) dealing with digital objects rights management and VOA3R (www.voa3r.eu), a project about the spreading of open access research. Personally he is also interested in open government, data journalism and cinema.



Koutoumanos, Anastasios

Technological Educational Institute of Athens (TEIA)

Greece

anastasios.koutoumanos@gmail.com

Dr Anastasios Koutoumanos holds a Ph.D. in Software Engineering (2000) and a diploma in Electrical and Computer Engineering from the NTUA (1995). His research is focused on the field of Advanced Learning Technologies and specifically on the use of new information and communication technologies and media for the design and implementation of learning environments. He has been selected as an expert for participation in the Information Society Standardization System of the European Committee of Standardization (CEN/ISSS) Learning Technologies Workshop's Project Team and has participated in several European Commission funded projects as a primary researcher. As an entrepreneur and consultant he has motivated and helped organisations of both the private and public sector (banks, publishing houses, adult learning institutes, defense industry) to employ ICT-based training techniques and programmes.



Leck Jensen, Allan

International Center for Research in Organic Food Systems (ICROFS)

Denmark

AllanL.Jensen@agrsci.dk

Dr. Allan Leck Jensen (Ph.D. in Information and Communication Technology) is specialized in Applied Information and Communication Technology. He has worked on implementation of agricultural research results in operational internet-based applications on pc, pda or mobile and on developing internet-based collaboration platforms. He has also been involved in decision support under uncertainty, modelling and online dynamic databases.



Le Hénaff, Diane

Institut National de la Recherche Agronomique (INRA)

France

lehenaff@versailles.inra.fr

Diane Le Hénaff is an information management project officer at INRA (France) and team leader, involved in VOA3R as content provider and dissemination manager. Responsible for the Inra Open Access policy since the last 4 years, she has set up an ambitious service-orientated policy for the institutional Inra Open Archive (called ProdInra). She is also member of international working groups on open access and metadata expert and part of the executive board of the E-LIS international open archive. Access her publications: prodinra.inra.fr/au/20568G



Masselin-Silvin, Sylvie

Acta Informatique (ACTAInfo) and ACTA (ACTA)
France

masselin@acta-informatique.fr

After graduating in agricultural engineering from the National Institute of Agronomy Paris-Grignon in 1983, Sylvie Masselin-Silvin initially pursued research at INA-PG on the theme of modeling the performance of animals. In 1987, she joined the Institut Technique de l'Élevage Bovin (ITEB) where she worked as a researcher on the modelisation and prediction of cow lactation curves. In 1990, she joined the IT department of the Association de Coordination Technique Agricole (ACTA) where she shares her time between informatics (installation of computers and networks, and assistance and training for users), statistics (statistical methods and data processing), and working on R&D projects as ACTA Informatique has been partner in a number of national and EU funded R&D projects dealing with data harmonisation and exchange, traceability, IT usage in agriculture.



Mathiesen, Camilla

International Center for Research in Organic Food Systems
(ICROFS)
Denmark

Camilla.Mathiesen@icrofs.org

Camilla is the information officer at ICROFS and plans, produces and carries out the dissemination and communication from ICROFS coordinated projects, activities and results. She has experience in communicating about scientific research regarding agriculture and sustainability via her work at ICROFS. Here she is in charge of the various communication channels of ICROFS, such as newsletters, webpages, posters, leaflets etc. She has a journalistic degree from the Danish School of Journalism and holds a Master's degree in European Studies from Aarhus University.



Ninou, Elizabeth G.

Technological Educational Institute of Athens (TEIA)
Greece

lisninou@yahoo.com

Elizabeth G. Ninou is an agronomist researcher specialised in the area of applied physiology and biodiversity conservation. She has a deep knowledge of scientific issues related to agronomy and plant genetic resources.

She owns a PhD from the Aristotle University of Thessaloniki, in the field of crop physiology under water deficiency and its interaction with nitrogen translocation to the growth of snap bean.

She is working to the Technological Educational Institution of Thessaloniki and Aristotle University of Thessaloniki as a laboratory assistant tutor. She has a long teaching experience to issues related to agriculture and she is interested in the improvement of teaching methods and learning processes in the above issues. She has worked on several research programs related to water deficiency, biodiversity of cereals and the preservation of genetic variability of local landraces, (N.AG.RE.F., Greek Gene Bank, Norm 6.3/Action B, in the Framework of the Operational Program of Rural Development-Reconstruction of Country side, Ministry of Rural Development and Food). She is collaborating with TEIA to VOA3R research project (<http://voa3r.eu/>).

She has publications to peer reviewed journals belonging to the citation index (see: www.scopus.com/scopus/home.url). She has published research results in international and national conferences and a pilot study related to *in situ* conservation of crop wild relatives in Greece. Her main research interests are water and nitrogen management in crop production, study and protection of plant genetic resources. She is very interested in the improvement of education and learning processes and the spread of research results in agricultural sciences.

**Rodriguez Toquero, Xenia**

University of Duisburg-Essen, Campus Essen
Information Systems for Production and Operations
Management
Germany

Xenia.Rodriguez@icb.uni-due.de

Xenia Rodriguez Toquero is Finance- and Project Manager, working at the University of Duisburg-Essen, Campus Essen. Before managing the WACOM (Water Competences Model) Project and supporting the eCOTOOL (eCompetences Tools) Project she studied Business Economics (Bachelor of Science) at the University of Duisburg-Essen, Campus Essen (2011). Her research interests are E-Learning, Competence- and HR-Management with regard to cultural and international Challenges as well as the Corporate Governance Debate (Master Studies at the University of Wuppertal since 2012).

**Sánchez Alonso, Salvador**

Computer Science Department, University of Alcalá
Spain

salvador.sanchez@uah.es

Dr. Salvador Sánchez-Alonso obtained a MSc in Computer Science from the Pontifical University of Salamanca in 1997, a degree in Library Science from the University of Alcalá in 2011 and a PhD. in Computing in 2005 from the Polytechnic University of Madrid. He worked as an assistant professor at the Pontifical University of Salamanca from 1997 to 2000 and again from 2002 to 2005. Salvador has also worked as a software engineer at a software solutions company during 2000 and 2001 in the UK. From 2005 he is an associate professor of the Computer Science Department of University of Alcalá. His research interests include Learning objects reusability, Metadata, Ontologies, Web Engineering and Object-Oriented Technologies. He has been part of successful EU projects such as LUISA or Organic.Edunet, the Leonardo DaVinci transfer of innovation projects Organic.Mednet and Organic.Balkanet, and currently is the Project Coordinator of the Organic.Lingua CIP-PSP project.



Scipione, Gabriella

Consorzio Interuniversitario (CINECA)

Italy

g.scipione@ Cineca.it

Gabriella Scipione is a Technical Project Manager at CINECA, where she leads the “e-Publishing and University Libraries” Team. She has been involved in a number of significant EU-funded projects over the last 10 years. Her team focuses on persistent identifiers, metadata management, rights management, digital archive, open access. She is technical coordinator and development teams’ leader in the Arrow and ArrowPlus projects. Actually she is also involved on the Scholarly Communications projects, such as VOA3R working on an integrated service for the retrieval of relevant open contents from Italian Universities' Research Information Systems.



Sgouropoulou, Cleo E.

Technological Educational Institute of Athens (TEIA)

Greece

csgouro@teiath.gr

Cleo Sgouropoulou concluded her doctoral studies on Electrical and Computer Engineering at the National Technical University of Athens. She is currently an Assistant Professor of Educational Technology and IT Didactics at the Department of Informatics of the Technological Educational Institute of Athens. Her research interests lie in the field of Learning Technologies, and especially in the development of data models for interoperable Information Systems. C. Sgouropoulou has been a member of the European Standardization Committee (CEN) Workshop on Learning Technologies (WS-LT) since 2000, and has participated in several of its standardization projects. More specifically, she has contributed to the development and of the following CEN Workshop Agreements: "CWA 14645: Alternative Language Versions of a Learning Resource in IEEE LOM", "CWA 14926: Guidelines for the production of learner information standards and specifications", "CWA 15455: A European Model for Expressing Learner Competences", "CWA 16133: Guidelines on a European Learner Mobility

Model", "CWA 16132: European Learner Mobility Achievement Information Model (EuroLMAI)" and "CWA 16131: Europass Diploma Supplement Application profile of the EuroLMAI ". C. Sgouropoulou is the coordinator of the Greek Mirror Committee TC48/WG3 and the Head of the Greek delegation of the Hellenic Organization for Standardization (ELOT) to CEN TC353 "ICT for Learning, Education and Training". She is currently the Vice-Chair of CEN TC353 and coordinates standardization activities on the "European Learner Mobility Model". Apart from her focused activities in the field of Learning Technologies standardization, Dr Sgouropoulou has participated as a researcher in many national and Europeanfunded projects related to e-Learning, and has published several articles in international journals and conference proceedings, as well as book chapters.



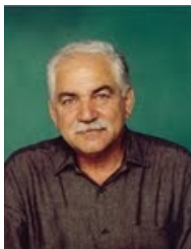
Stavrakaki, Maritina

Agricultural University of Athens (AUA)

Greece

maristavr@gmail.com

Maritina Stavrakaki is an Agriculturist and a PhD Student of the Laboratory of Viticulture of the Department of Crop Science at Agricultural University of Athens. She is involved in the use of ampelographic and molecular methods for the identification and discrimination of grapevine varieties and rootstock varieties. She has a degree of Master of Science in Viticulture and Enology. Over the last few years, she has participated in various scientific programs with the Laboratory of Viticulture. Her previous experience includes teaching Viticulture both at the Agricultural University of Athens and at the National and Kapodistrian University of Athens and working as an agriculturist at the Hellenic Ministry of Rural Development and Food. She has participated in many scientific congresses and symposia with oral presentations. She has research and teaching skills and she is fluent and full proficient in English, French, Italian and elementary proficient in German.

**Stavrakakis, Manolis N.**

Agricultural University of Athens (AUA)
Greece

Manolis N. Stavrakakis is Professor and Director of the Laboratory of Viticulture, Department of Crop Science at the Agricultural University of Athens.

Among the research and educational fields of his scientific career, both the description, identification and discrimination of Greek grapevine varieties (initially using the ampelographic method, afterwards with the use of biochemical markers and recently with the use of molecular methods) and the implementation of the clonal selection to highlight the most valuable clones of the Greek vineyard hold a significant position. For these issues, he has published a great number of scientific papers.

At the same time, he has contributed as a scientific coordinator in solving important problems regarding the Greek viticulture, with the elaboration and implementation of various studies and research programs. These include: the genetic and ampelographic study of Greek grapevine varieties involved in the production of the Malvazia wine, the determination of the degree of genetic similarity of the Moschata grapevine varieties, the recording, the ampelographic and genetic study of Greek varieties on the verge of extinction, the reformulation study of the Cretan vineyard, the integrated program of restoring the damages caused by frost at Tirnavos vineyard in 2002, the regeneration study of the grapevine regions of Peloponnese which were affected by the devastating fires in the summer of 2007 etc.

Among other things, he has participated as a coordinator or member in interscientific and research committees, as well as in working groups which dealt with issues of the viticulture and vitiviculture sector and he has served as national representative at the International Organization of Vine and Wine (O.I.V.).

**Tannhäuser, Anne-Christin**

University of Duisburg-Essen, Campus Essen
Information Systems for Production and Operations
Management
Germany

Anne.Tannhaeuser@icb.uni-due.de

Anne-Christin Tannhäuser has been working as international project manager at the Department “Information Systems for Productions and Operations Management” at the University of Duisburg-Essen since December 2012. She earned a Magister Artium degree in Educational Sciences and Linguistics from the University of Leipzig in 2007. She was trained at the Max Planck-Institute for Human Development, Berlin, in the use of qualitative and quantitative research methodologies. For 5 years, starting in 2008, she has been working for several projects in the field of education, innovation and ICT at national and European level for the University of Iceland and a non-profit research center in Italy (Scienter SLR). Anne-Christin Tannhäuser has been and is involved in multilateral research endeavors coordinating evaluation activities, communication of scientific results and overall management of projects with the above focus. She is also a freelance consultant collaborating with the European Foundation for Quality in E Learning (EFQUEL) and coordinates the "International Journal for Quality in Learning (INNOQUAL)".

**Tsetsekas, Charilaos A.**

Technological Educational Institute of Athens (TEIA)
Greece

htset@telecom.ntua.gr

Charilaos A. Tsetsekas received the Dipl.-Ing. and Ph.D. degrees in Electrical and Computer Engineering from the National Technical University of Athens, Greece, in 1997 and 2002 respectively. From 1997 until 2003 he was a research associate in the Telecommunications Laboratory of NTUA, where he participated in many European and national research projects and published a number of papers in the field of telecommunications and networking. From 2004 to 2008 he was Head of Network Design in a Greek telecommunications provider, while since 2007 he has been a teaching and research associate at TEI Athens. His current

research interests include knowledge management and learning systems. Dr. Tsetsekas is a member of the Technical Chamber of Greece.



Tsiflidou, Effie

Greek Research & Technology Network (GRNET)
Greece

effie.tsaki@gmail.com

Effie Tsiflidou is a librarian – archivist and has graduated from the Department of Archive and Library Science, Faculty of the [Ionian University, Greece](#). She is attending a Master's degree in "Information Science" of the Dept. of Archive and Library Science, [Ionian University, Greece](#). In 2006 she worked in the library of the [European University Institute of Florence](#). During the periods of April – July 2007 she worked in the Documentation of the archives of [General State Archives](#). From December 2009 to July 2010 she worked in the library of the [University of Ioannina](#). From January 2011 up to today, she is working as an information scientist for Greek research & Technology Network (GRNET) and Agro-Know Technologies.



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