Final Report Summary - VALERIE (VALorising European Research for Innovation in agriculture and forestry)

Executive Summary:
VALERIE provides a new gateway to aggregated knowledge for innovation in agriculture and forestry

The VALERIE project (www.valerie.eu) has created the digital advisory tool ask-Valerie.eu. This platform helps practitioners and advisers in agriculture and forestry to find and share documents that respond to their specific queries. It covers a series of thematic subdomains with a focus on sustainability and profitability. These include sustainable soil and water management, integrated pest management, recycling of biomass, supply chain optimisation, and ecosystem and social services from agriculture and forestry. A ‘community’-facility enables sharing of retrieved documents, and users can also suggest new documents, add new terms to the vocabulary, or find experts/advisers on specific topics.

The platform (www.ask-Valerie.eu) now gives access to approx. 80,000 documents in about 50 repositories selected by experts (status February 2018). All documents are accessed at their original URL and pertain to CORDIS, various Horizon 2020 Thematic Networks, the European Innovation Partnership for Productive and Sustainable Agriculture (EIP-AGRI), and many national and regional repositories, mostly in VALERIE partner countries. The document base covers scientific and non-scientific sources with a focus on concise practical documents, and also includes innovation factsheets prepared by VALERIE itself. Domain coverage can be extended by including new vocabularies and document collections that represent new thematic subdomains.

ask-Valerie.eu is also integrated as a support tool on the EIP-AGRI platform (https://ec.europa.eu/eip/agriculture/en/search/site/) where it accepts search terms originally submitted to the EIP-AGRI search facility, and subsequently offers full ask-Valerie.eu functionality. The tool can be modulated as a widget for integration into other platforms, too, for example to suit thematic networks and operational groups active under the EIP-AGRI umbrella.

The backbone to ask-Valerie.eu is the VALERIE vocabulary, dedicated to the domain of sustainable and profitable agriculture and forestry, published on ‘foodvoc.org’. This vocabulary or ontology organises terms in a taxonomy (e.g. ‘wheat’ and ‘barley’ are species of ‘cereal’), and defines synonyms as well as closely related concepts (e.g. ‘Phytophthora’ is related to ‘potato’). It fulfils various roles. Firstly, it is used to take an index (‘fingerprint’) of all documents in the document base to enable quick retrieval upon a given user query. Secondly, ask-Valerie.eu uses the ontology to help users articulate their query: it offers auto-completion during typing. Next, a ‘query editor’ suggests alternative search terms that may help to widen, narrow down or redirect the original query. Finally, concepts that represent ‘solutions’ (innovations) are linked to the particular problem they aim to resolve. This allows the query editor to mimic the role of the adviser interacting with the practitioner. For example, for a specific crop disease it points to innovations (methods, products, etc.) that may help to control the disease. Documents retrieved are ranked and presented with their titles and text snippets, and with the logo of their owner, all of which link to the original document and its host webpage.
The VALERIE-ontology was composed and modelled in a bottom up iterative process, with domain experts and stakeholders in ten varied case studies. Currently, it consists of 10,377 terms, 12,071 hierarchical relations, 3383 ‘related to’-relations and 700 problem-solution relations. Moreover, the 10,377 terms have been translated into various languages. This resulted in approx. 50,000 synonyms and translations, which makes the VALERIE-ontology comparable in size to large established vocabularies such as DBPedia (11k concepts) and NAL thesaurus (13.5 k concepts). The VALERIE-ontology, however, is centred on innovations in the specific domains of agriculture and forestry. ask-Valerie.eu currently supports English, French, Italian, Spanish, Polish, Finnish and Dutch, and can easily be expanded into other languages.

A co-innovation approach working with case study stakeholders was at the core of the project. This enabled contributions to the ontology and iterative testing of ask-Valerie.eu during its development. It also facilitated research translation through the articulation of the innovation needs and testing of solutions by practitioners.

Research outputs from case studies and the development of the tool have been disseminated through project flyers and leaflets, the agriculture and forestry trade press, local workshops, national conferences and workshops, and the web. Outcomes from the VALERIE-project will help close the innovation gap that exists between research and farming/forestry practice, and will valorise scientific knowledge produced in the EU. By giving access to concisely summarized knowledge for innovation, VALERIE contributes to making agriculture and forestry practices more sustainable and more productive.

VALERIE presents an entirely new concept to mobilize science to increase public goods provision by agriculture, and to capture the users’ perspective for integration into science and policy activities. Both ask-Valerie.eu and the VALERIE case studies may inspire new stakeholder communities in Europe to utilize the web-semantics tools and approaches offered by the project.

Project Context and Objectives:
There is a compelling need for research to play a significant role for the future, in meeting the challenges of increased demand for food balanced against the need to deliver other ecosystem services. If this role is to be fulfilled, outreach and translation of research for innovation must be drastically enhanced. Many EU and nationally funded research projects in the fields of agriculture and forestry provide excellent scientific results but outreach into practice remains limited. The VALERIE project responds to the challenge of boosting innovation by facilitating the uptake of knowledge, and its integration into innovative field practices.

VALERIE project ran from January 1, 2014 to December 31, 2017, with the aim of meeting the following objectives:
• Review and summarize knowledge for innovation in agriculture and forestry, within six thematic domains (WP2);
• Translate research outcomes for innovation into end-user content and format (for farmers, advisers and enterprises in the supply chain) (WP2-3);
• Mobilise stakeholders in case studies, to assess technical and economic viability of innovative solutions, to reveal knowledge gaps and barriers to uptake (WP3);
• Use modern web technology (‘web-semantics’) to help stakeholders articulate their needs and retrieve knowledge for their specific context, through an iterative process (WP2-3-4);
• Establish and document the above approach (articulate-retrieve-translate) as a new stakeholder-driven method, for easy implementation in fresh cases beyond this project (WP2-3-4);
• Set up a Communication Facility (now called ask-Valerie.eu) that takes full account of empirical knowledge, vocabularies, innovation demands, and the communication means used by stakeholders (WP3-4-5);
• Ensure the successful and future-proof embedding of the Communication Facility into the EIP-AGRI platform (WP5);
• Ensure the integration of feedback from the SCAR, EIP-AGRI and selected EU projects and other representatives of stakeholder categories into the VALERIE project and its end products (WP4-5-6);
• Inform national AKIS representatives and farmers’ unions and the wider audience about the project’s ambitions, activities and results (WP6)
Core to the approach was the iterative cycle of identifying specific knowledge demands in varied case studies with stakeholders (WP3), modelling domain knowledge in the form of an ontology (WP4), finding and summarising relevant knowledge and feeding it back into case studies (WP2, WP3), and collecting stakeholder feedback for the next iteration, that is, to articulate knowledge demand more precisely, expand the ontology, retrieve better matching information, etc. (WP3, WP6). This cyclic process supported and guided the development in WP4 (back-end) and WP5 (front-end) of what is now called ask-Valerie.eu the search and communication platform that was earlier referred to as the Communication Facility.

Project Results:
2 Extracting and summarizing knowledge (WP2)

2.1 The VALERIE document base
The knowledge domain addressed by VALERIE in all its activities comprises the following themes:
• Crop rotation, soil cover management and integrated pest management (Theme 1)
• Eco-system and social services in agriculture and forestry (Theme 2)
• The management of agricultural soils as integrated agro-ecological system (Theme 3)
• Water management in agriculture (Theme 4)
• Integrated supply chain services and tools, innovative farm management (Theme 5)
• Recycling and smart use of biomass and food waste, in particular waste generated during primary production (Theme 6)

To carry out the task of extracting and selecting knowledge and make it available for users, we have extensively worked on VALERIE’s document base. In contrast to more generic search engines, VALERIE does not use the entire web as its source of information. Rather, we have selected sources containing documents related to agriculture and forestry that meet certain usefulness and relevance criteria. VALERIE’s document base is actually an index that links to scientific and practical documents derived from various sources, and in multiple languages (Italian, English, French, Finnish, Spanish, Polish and Dutch). All documents in this document base are annotated using the VALERIE ontology (see WP4 paragraph for more details). The document base consists of various types of documents, as described below. The documents are not actually stored in www.ask-Valerie.eu document base (they remain at their original location). Rather, the system keeps an index of all ontology terms that occur in each document, along with text fragments (‘snippets’) from those documents.

We have two types of documents in www.ask-Valerie.eu:
1) Documents from selected repositories (“collections”). These repositories include collections of scientific articles published in agricultural and forestry journals; collections of articles published in trade journals; repositories of practical fact sheets; and repositories of research project outcomes, like CORDIS. This represents the vast majority of documents.
2) Mini-factsheets prepared by the VALERIE project team itself. For precisely identified innovations, we have prepared a limited number of mini-factsheets. While few in number, these are documents of high relevance in the document base in the sense that they aim to present a concise overview of a certain innovation, its principles and purpose, and of related key documents. See Section 2.2.

For more details on the whole document collection, See Section 2.4.

2.2 List of innovations
In VALERIE, one way to summarise knowledge from research projects is to identify and document innovations in agriculture and forestry. For VALERIE, an innovation is “a practice, a solution or a tool that can be implemented to address a specific problem for a farmer, a forester, or an advisor”. The list of innovations contains the innovations that we have identified for the six project themes (subdomains), along with the issue or problem it aims to address for the farmer. These ‘problem-solution pairs’ were implemented as special relations in the VALERIE ontology (WP4) to facilitate the easy identification of innovations by users seeking a remedy through the ask-Valerie.eu platform.
Further, describing these innovations in the form of mini-factsheets represents an effective means of summarising outcomes from agricultural and forestry research for VALERIE users and the wider community of advisers and practitioners. More details about the identification of innovations can be found in the periodic reports, and in particular in the deliverable D2.262 “Definitive version of catalogue of potential innovations from research programs (by theme as well as for cases)”.

By the conclusion of the project in December 2017, our list contained 508 innovations. There are 121, 19, 136, 92, 87, and 53 innovations in Theme 1, 2, 3, 4, 5 and 6, respectively. Of these innovations, 371 are connected at least to one research project (mostly European projects FP5, FP6, FP7, or Horizon 2020).

2.3 Preparation of mini-factsheets

Mini-factsheets are short documents containing an overview of the innovation, links to practical (e.g. factsheets, guidelines, manuals) and scientific documents describing the innovation, links to projects where the innovation was studied or developed, the ‘field issues’ that the innovation aims to address/resolve, and the related concepts (terms taken from VALERIE’s ontology to facilitate searches within ask-Valerie.eu). Mini-factsheets deliver content in a concise format, and include references for further reading. The time required to prepare a complete factsheet (2-4 pages with a thorough innovation description) would not have permitted to address the large number of innovations covered. More details about the mini-factsheets can be found in the deliverable D2.262 “Definitive version of catalogue of potential innovations from research programs (by theme as well as for cases)” and in previous periodic reports.

Our document base now contains 256 mini-factsheets. Mini-factsheets could not be written for all innovations as this activity competed with the identification of suitable documents for annotation, and with the further improvement of the ontology, both crucial to the successful completion of the VALERIE project. Examples of compiled mini-factsheets are given in the deliverable D2.262.

2.4 Identification and annotation of document collections

Throughout the project but with more emphasis during the later period, we identified and analysed the content of important repositories and annotated all or part of their documents. This process of annotation or indexing resulted in a database that stores the occurrence of all ontology terms per document, along with text snippets. Here we report on the outcome of this activity. In total, documents were collected from 50 repositories (mostly public), and about 80,000 of these were annotated. More repositories can be added, thus www.ask-Valerie.eu can serve as a gateway to results from European and national research in agriculture and forestry.

2.4.1 CORDIS for FP5-FP6-FP7-Horizon 2020 projects

CORDIS is the European Commission’s public online repository to disseminate information on EU-funded research projects. Thanks to the collaboration with Dr. Karl Ferrand (Head of Sector - CORDIS Content Publications Office of the European Union Directorate C - Dissemination and Reuse EU Bookshop and CORDIS Unit) and Georgios Tasiopoulos, we have annotated the Results in Brief and the Report Summaries of agricultural and forestry FP5, FP6, FP7 and Horizon 2020 projects (2586 documents).

2.4.2 EIP-AGRI (European Innovation Partnership)

The EIP-AGRI platform (“the one-stop-shop for agricultural innovation in Europe” http://ec.europa.eu/eip/agriculture/) contains various useful publications for VALERIE, like the reports from Focus Groups, some brochures (e.g.: “Thematic Networks under Horizon 2020”), workshop reports (e.g. “Opportunities for agriculture and forestry in the circular economy”, “Building new biomass supply chains for the bio-based economy”, “Biosecurity at farm level”), and factsheets. Of this collection, 202 documents, referring to approximately 75 unique documents and their translations in various languages, were annotated to be used in the VALERIE document base.

2.4.3 OrgPrints

OrgPrints (http://orgprints.org/) contains about 19,000 open access documents on organic food and farming, together with information about organisations, projects and facilities. We have annotated 10,256 documents from this source.

2.4.4 Horizon 2020 EIP-AGRI Thematic networks

Thematic networks bring together various actors around a well-defined theme (e.g. precision agriculture and robotics),
involving participants from both science and practice. We have annotated 167 documents from the following networks: 4D4F, AgriSpin, Agriforvalor, EuroDairy, OK-Net Arable, SmartAKIS and WINETWORK. Only networks with online accessible documents related to agriculture and forestry were included, and this list covers them all (status late 2017).

2.4.5 National repositories

Finland. We have annotated documents from two repositories. The first one is Metsäteho (185 documents annotated); it contains factsheets focusing on many practical forest operational aspects, educational material and reports mostly related to technical aspects on forest operations. Most of the material is especially made for stakeholders working in wood procurement and wood production operations. The second one is Jukuri (4867 documents annotated), an open repository of the Natural Resources Institute Finland (LUKE). Jukuri contains information on publications of LUKE’s staff. A growing number of publications is available to download. Information on research institute publications that were merged into LUKE is available already and the coverage will improve over time. Because LUKE is a merger of several institutes, a large variety of topics is covered: agriculture, forestry, fisheries, game and wildlife management, Finnish National Statistics.

France. From France we have annotated documents from three repositories. EcophytoPIC (http://ecophytopic.fr/) is an official platform, ordered by the French Department of Agriculture and centralizing information on Integrated Crop Protection (ICP). The platform is structured around a transversal platform, dealing with generic principles of ICP, and six specific platforms dedicated to the main types of crop production (e.g. arable crops, arboriculture, viticulture, vegetable crops). More than ten partners collaborate to the information supply for this platform. A scientific council decides what can be published on the webpage every year. We have annotated 164 documents from this source.

Innovations agronomiques (http://www6.inra.fr/ciag/Revue) is an online scientific journal, published by INRA with articles in French. It deals with various topics, one for each volume, and presents results from all the INRA community, from economics, genetics, agronomy and so on. A special issue presents the results of a development-oriented projects set, funded by the French Department of Agriculture (CASDAR projects), every year. These articles benefit from a Creative Commons license. We have annotated 772 documents.

Terres Inovia (http://www.terresinovia.fr/) is one of the most important French technical institutes and a partner of the VALERIE project. Its webpage offers practical and technically-oriented documents. We have annotated 344 documents.

Italy. The practical and scientific documents produced by Italian authors are scattered in a number of repositories, as a result of having many Institutions involved in research and extension (e.g. Universities, CREA, CNR-National Research Council), and many funding programs (European, national, and regional). In VALERIE we focused our attention on practical documents, as these sources in Italian are much appreciated by stakeholders. These are the sources from which we have annotated documents:

Websites of regional rural development and information agencies. The 20 Regions in Italy are the first-level administrative divisions of the country. Some of the regions have developed agricultural document repositories with tens or hundreds of documents, produced as a result of research or dissemination projects. We have annotated a total of 4092 documents from these sources: Arsial, Assam, Emilia Romagna, Ersaf Lombardia, Regione Basilicata, Regione Piemonte, Regione Toscana, Sardegna Agricoltura, and Veneto Agricoltura.

Trade journals. Many Italian trade journals report research results with practically-oriented articles, which are useful for farmers and advisors. We have annotated 2764 abstracts from the “Informatore Agrario” and 1476 articles from “Terra e Vita”, two trade journals published weekly.

Other repositories. We have annotated documents also from other sources, the most important being two research and extension institutions (CRPA and CRPV: 376 documents).

Note: CREA (Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria) is the main Italian research body on agriculture, forestry and food (supervised by the Ministry of Agriculture, Food, and Forestry). Its institutional repository (https://air.crea.gov.it/) shows that most of the documents in Italian are published on the two journals cited in the previous paragraphs (2597 on “Informatore Agrario” and 473 on “Terra e Vita”). We therefore did not activate a dedicated annotation of this repository.

The Netherlands and Belgium. The Dutch collection by the previous levy board for arable farming, now transformed into Branche Organisatie Akkerbouw, is named Kennisakker. From this repository we annotated 423 documents. The main Dutch
collection for practitioners and agriculture colleges is Groen Kennis Net (GKN). This is a very large repository (0.5 million
documents) of which we annotated a limited section (41,794 documents). We have also annotated 32 documents from the
Belgian Coordination Centre for Applied Research and Extension on Organic Agriculture (CCBT).
Poland. We annotated 255 documents from the IUNG research repository (Institute of Soil Science and Plant Cultivation).

United Kingdom. The most important UK repositories from which we have annotated documents are Farming Futures (2497
documents), the Forestry Commission (467), the Parliament research briefings (291), the Scottish Environment Protection
Agency (184) and the UK Irrigation Association (124).
Other countries. We have annotated 173 documents from the International Plant Nutrition Institute (IPNI).

2.5 Knowledge gaps and research needs identified
One of the objectives of the VALERIE project was to identify knowledge gaps and research priorities for more sustainable and
productive agriculture and forestry in Europe. To reach this objective, for each theme studied in VALERIE we have identified
the gaps and priorities from scientific reviews. Reviews were found by consulting bibliographic databases using keywords to
restrict the search within each theme, together with additional keywords (e.g. “research gaps”, “research needs”, “review”).
The most relevant documents appearing in these lists were selected for subsequent detailed analysis. Information derived
from scientific reviews on the six themes was integrated with gaps and priorities indicated by European projects and
VALERIE’s expert panels.
Each identified gap or priority was reported with a name, a description of some hundred words, and references to the
documents that were used to identify the gap. The results of this analysis are reported in the deliverable D2.272 “Final list of
knowledge gaps and priorities”.

3 Case studies on innovation (WP3)
3.1 Stakeholder-driven (co-innovation) approach in case studies
Ten case studies (CS) on innovation provided the platform for the iterative stakeholder-driven co-innovation approach which
underpins WP3. They mobilised stakeholders, with their empirical knowledge and innovation needs. The research team worked
- with the stakeholders to apply, test and refine screened research outputs, evaluating their innovation potential in the
local context, assessing the viability of solutions and exposing barriers and bottlenecks that limit their uptake. This took place
with a series of case study meetings (approx. four formal meetings together with a series of informal meetings) with selected
stakeholders.

There was great diversity in the CS with respect to different contexts: locations, stakeholder types, problems and stakeholder
goals in settings, stakeholder expectations, requirements and research issues. This diversity was complicated by CS being at
different stages in the WP3 process due to local stakeholder and logistical reasons. The WP3 team accommodated this by
providing structured support with standardised guidelines to CS partners for CS research, but allowed flexibility in the way
that partners engaged stakeholders and planned and carried activities. Throughout the process, CS partners have continued to
draw in CS partners and stakeholders into the development and evaluation of ask-Valerie; and into implementing and
analysing trials. The stakeholders have particularly appreciated the concrete outcomes of the trials.

The approach is based on regular interaction with stakeholders in CSs in a series of participatory activities oriented towards
action research and co-innovation. The stakeholders in each CS identify innovation issues and articulate these into research
needs; project experts search and propose innovation solutions as factsheets, papers etc.; then stakeholders screen, evaluate
and refine these solutions in trials for their innovation potential and feedback to project experts who refine solutions. These
cycles of interaction progressed throughout the project period. Stakeholders have applied and tested the potential of selected
innovation solutions in their local context. The trial results were collected and fed back into the iterative process and provided
co-created empirical knowledge, which was integrated into ask-Valerie.

As well as identifying research needs and testing solutions, the CS also supported the development of ask-Valerie.eu by
collecting ontology terms, commenting on the functionality of ask-Valerie, and testing prototypes and providing feedback to
WP4/5. This was initiated with an early prototype of ask-Valerie.eu shown to stakeholders, while the feedback exchange
between CS and WP4 intensified when more developed versions were tested.

3.2 Testing of ask-Valerie.eu in case studies

ask-Valerie.eu has been developed through a series of iterations involving progressive stages of design and development by WP4 and WP5, following feedback from the CSPs and CS stakeholders over the project period. This feedback has prompted significant re-design of the tool, by mid-2017 four versions of ask-Valerie.eu had been produced. A series of technical tests and demonstrations of the software (versions 1-4) was undertaken in the second and third CS meetings with stakeholders facilitated by CS partners; and with CS partners in project meetings and dedicated workshops facilitated and analysed by WP3 and WP4.

Stakeholder involvement in the development of ask-Valerie.eu continues to provide useful feedback. Three areas have been developed:

- Document base - following CS feedback, more national repositories in national languages were added, as well as practically oriented documents
- Improving ontology – the CSP recognised the importance of the ontology, they identified missing terms and highlighted the need to revise the structure and the relations, they also translated terms in the ontology to allow use of ask-Valerie.eu in different languages
- ask-Valerie.eu community - opportunities to make ask-Valerie.eu more interactive so that a user community can interact and share knowledge were discussed with CS partners at the final project meeting. A prototype user interface was also tested.

Revisions in the language and the document base have led to significant improvements according to CS partners, whilst issues raised about functionality (searching and ranking) and presentation of results have been progressively addressed in each version. Stakeholders particularly appreciated the ability to search and access documents in different languages in later versions, although they still regard expanding the document base by linking to more national repositories as a priority.

3.2.1 Version 4 of ask-Valerie.eu was tested in summer 2017. Following discussions at the project meeting (Jan 2017) a test protocol was developed and conducted to evaluate the usefulness of ask-Valerie.eu by comparing it with a widely used search engine (Google). The CS target stakeholder group for the exercise were advisors and technicians rather than farmers or forest owners. The purpose of the test was to:

- Get feedback from the advisors and technicians on how useful the outputs (according to stakeholders’ own criteria) identified by ask-Valerie.eu and Google were in answering their queries.
- Compare the usefulness of the results identified by ask-Valerie.eu and Google.

3.2.2 Testing of Version 4 of ask-Valerie.eu took place in all 10 of the CSs using standardised protocols. A total of 22 advisors/technicians performed and provided feedback on 61 search engine queries using ask-Valerie.eu and Google. Results were presented for each CS with an analysis of the test record sheets and given to WP4-WP5 team as feedback. This series of tests was reported in Deliverable 3.6.1. This activity and report corresponds with the DOW’s A3.7 Case study meetings with all user groups – feedback and final reflections as the main task. User groups per se did not emerge in the CS stakeholder communities, it was decided therefore to orientate the report towards ask-Valerie.eu testing in the wider stakeholder community.

3.3 Reporting on case study trial outcomes

Each CS identified topics (1-3 in each CS) for a field trial in stakeholder meetings, they were based on research outputs provided by domain expert factsheets and internal negotiation. The aim of the trials was to test and screen research outputs in the local context and at farm level. In most cases the trials were conducted on stakeholders’ fields. These ranged in scope, format and length from formal scientific trials to less formal demonstration plots, and in one case a field trip. Some CS developed existing research ideas while others pioneered new research. For many the innovation was as much about the overall approach of involving stakeholders as it was about producing rigorous scientific outputs. In Period 1 the trial plans were provided by CS partners for each CS using guidelines provided by the WP3 team and according to allocated budgets. These
were implemented in Period 2. In Period 3 data was collected and analysed and standardised trial reporting sheets were completed by CS partners.

Based on the trial reporting sheets WP3 together each CS partner compiled a trial/demonstration leaflet. These are 2-4 page illustrated leaflets in pdf format which will be used to disseminate the main trial findings. They follow the same template and describe the stakeholder involvement in the trial process as well as the main research findings. Where appropriate they are accompanied by annexes containing more detailed or results/analysis or supplementary guides/material. Stakeholders were keen to share their findings with others working on similar issues. They also favored short precise factsheet or technical note format. Their preferences helped to steer the design of the leaflets.

The trial sheets are uploaded to the Valerie.eu project website, annotated and added to ask-Valerie, and collated in Deliverable D3.7.1. See Section 3.6 for the full list of Case Study Trial leaflets.

3.4 Collating case study research outputs
Towards the final stage of the project, there was collation of research outputs generated by the co-innovation process in the ten Valerie Case Studies (CS) in six countries. This was presented in Deliverable 3.7.1. In the stakeholder driven (co-innovation) methodology, research outputs were created as tangible outputs at different stages of the process:

- Identifying innovation issues. Monitoring the process, feedback, adaptation with the Dynamic Research Agenda.
- Translating research outcomes with innovation potential into formats for use by end-users (farmers, advisers, and enterprises in the supply chain) creates factsheets.
- Testing and refining research outputs in CS settings creates trial plans, reports and leaflets, in some CS, videos, expert presentations, manuals were created as other forms of dissemination

These outputs and the process of completing them were described in detail in Deliverables D3.6.1. and D3.7.1.

3.5 Barriers and enablers to research uptake
This final deliverable from WP3 (D3.7.2) addresses the contextual factors that influence the application of research knowledge in the field. Although the focus of VALERIE has been on providing knowledge from research for innovation, it is acknowledged that land managers operate and are situated in a wider context and their actions and ability to utilise innovations are influenced by multiple factors. Scientific knowledge is only one component of the agricultural innovation system and there are farm level and wider systemic challenges to be considered. Social, institutional, economic and political factors affect both the conduct of agricultural science and the translation of research results into farming practices.

The main aim of the report was to examine the barriers and enablers to utilisation of research outputs in CS. The report collates and analyses the results from stakeholder and CS partner assessment of barriers and enablers in CS. These assessments were carried out in CS in June-Nov 2017 by consulting stakeholders in meetings or dedicated interviews. The results are supplemented with a commentary for each case study drawn from previous case study meeting reports, and Case Study Partner interviews.

The term barriers has been used to understand how to realise potential in terms of diffusing new sustainable practices, behaviours and technologies, together with understanding how to enable the potential through incentive and policy measures. Barriers and enablers operate at different scales - farm, landscape, region etc. and come from different parts of the Agricultural Innovation System.

Drawing on different bodies of literature a framework was developed around six key themes, and this provided the basis for the CS activity where the main objective was to reveal social, economic and cultural barriers to research uptake. Based on the analytical framework, a set of guidelines were prepared for use in the CS. Each CS partner was provided with these guidelines to carry out the consultation with stakeholders.

It is evident from the findings that the utilisation of innovation derived from research is constrained or enabled by a number of factors, this is in line with Agricultural Innovation Systems thinking which situates farmers and foresters in a system where social, economic, ecological, market and institutional drivers influence innovation.
3.6 Case Study Trial leaflets
The Case Study Trial leaflets can be accessed at the following links:

- Potato brown spot issues in the supply chain in northern Poland: testing the susceptibility of potato varieties to Tobacco Rattle Virus (English version)
- Demonstrating the use of wood ash as a forest fertilizer on mineral forest soils in the Joensuu area, Finland (English version)
- Sustainable innovative practices in the central region of France: a focus on soil structure assessment in the field (English version)
- Using LiDAR to inform joint forest management planning with a forest owners group in Roncal, Navarra, Spain (English version)
- Demonstration of combined cropping of wheat and lentils (English version)
- The use of leaf treatment on the infection rate of neck rot in Onions in The Netherlands (English version)
- Sampling for quality assessment and improvement for a wheat supply chain in Alessandria, Italy (English version)
- Fusarium Head Blight Sensitivity of bread wheat variety in Alessandria, Italy (English version)
- Evaluation of biostimulants in the bread wheat value-chain, Alessandria, Italy (English version)
- Cover crop experiences of farmers in Alessandria, Italy (English version)
- Maize and Tomato drip irrigation in Alessandria, Italy (English version)

4 Creating the linked open data infrastructure (WP4)

4.1 Three pillars
The main aim for WP4 was to build the three pillars that are the innovative power of the search and communication system baptised ask-Valerie.eu: (i) the ontology which codifies domain knowledge from experts, (ii) the infrastructure of the document base so documents from various repositories can be made available to the target audience, and (iii) the software that allows ask-Valerie.eu to act as a digital advisor in the field of agronomy and forestry.

The development of these three components -- the ontology, the annotated document base and the back-end services supporting ask-Valerie.eu -- is an iterative process whereby we learn from previous cycles. During the project several iterations have taken place, each starting with work on the three components and ending with user feedback sessions. Such sessions were held earlier in Loddington (UK; 2015), in Helsinki (FI; 2015), one in Turin (IT; 2016), two in Amsterdam (NL; 2015-16), one in Toulouse (FR, 2017) and one in Brussels (BE, 2017), and in parallel two dispersed sets of user feedback sessions were held in the various (local) case study meetings. Moreover, additional local efforts were given to improve the structure and quality of the VALERIE-ontology at several moments in the course of the project. Based on the user feedback in the later stages, various components of the back-end software have been adapted, and the system was scaled to enable working with the expanding ontology and document set. Recent improvements include the presentation of document source logos alongside the search result / text snippets, the autocompletion function, synonyms are shown in the term editor, and the ranking of the results.

4.2 Creating the VALERIE ontology on Productive and Sustainable Agriculture and Forestry
The principles and advantages of structuring information with the help of ontologies are resumed briefly. An ontology defines a set of representational primitives (concepts) and relations between these primitives (Gruber 2009). These concepts include information about their meaning in the form of the name(s) or possibly an extended textual description of the concept. Multiple alternative names (labels) can be attached to one concept, allowing for the definition of synonyms and translations (e.g. agricultural technology has synonyms agrotechnology and field technology; and it has translations maatalousteknologia in Finnish, technika rolnicza in Polish, technologie agricole in French and tecnología agrícola in Spanish). Different types of relations can be defined, such as is-a relations providing for the creation of hierarchies (e.g. agricultural technology ‘is-a type of’ technology). Concepts are often identified by unique identifiers allowing for the disambiguation between them (e.g. Vertisol as in the WRB classification and Vertisol in the USDA classification, which are similar but slightly different concepts). Other relations between concepts can be defined, such as ‘soil is related to biodiversity’. Once established, the ontology allows annotation (indexing) of documents to make them ‘findadable’ by search engines, and allows to support users in formulating a
Continuing from the ontology established early in the project, we improved it steadily by organising new expert sessions, in which the focus was either on improving the hierarchical structure or on improving the ‘related-to’ structure of the ontology. Additional terms and synonyms were added and branches/sections of the ontology were restructured. One major step in the ontology development was the addition of problem-solution pairs, thereby strengthening the possibility to find innovations for certain problems. Examples are the following triples:
“stream bank erosion” - has innovation – “stream bank stabilisation”
“stream bank stabilisation” - has innovation – “tree planting”

What we see is that a solution in one triple can be the problem in the next triple, thus generating chains of innovations-solution pairs. This unique feature of the VALERIE ontology is exploited by the ask-Valerie.eu ‘query editor’ to quickly identify potential solutions to a given problem.

The above activities have led to several versions of the ontology, each was published at the time on ‘foodvoc.org’ and versions were successively replaced by the latest version once that became available.

In December 2017, the final version of the VALERIE-ontology was delivered. It consists of 10,377 terms, 12,071 hierarchical relations, 3383 ‘related to’-relations and 700 problem-solution relations. Moreover, the 10,377 terms have been translated into seven languages (Dutch, Italian, French, Spanish, Polish, Finish and for botanical terms in Latin). This results in 49,850 synonyms and translations. This makes the VALERIE-ontology comparable in size to large established generic vocabularies such as DBPedia (11k concepts) and NAL thesaurus (13.5 k concepts). With this important attribute: the VALERIE-ontology is centred around innovations in the specific domain of agronomy and forestry. Ontologies on comparable domains are e.g. ASFA (fisheries, 2 k concepts), Biotechnology Glossary (biotechnologies, 1 k concepts), GEMET (environment, 1 k concepts), or Plant ontology (2k concepts). Of course larger generic ontologies, such as Agrovoc (32 k concepts) and larger specific ontologies such as the protein ontology (316 k concepts) exist, but VALERIE is with its 10 k concepts a considerable vocabulary in the ‘nature’ domain.

The VALERIE-ontology represents an important part of the domain expert knowledge that is used by the ask-Valerie.eu computer system to help practitioners find their answers to the questions they have in the field of agronomy and forestry.

4.3 Document Base
The ontology described in the previous paragraph is the first pillar of ask-Valerie.eu. The document base is the second pillar. The document base consist of collected PDF-documents from various sources. These represent scientific documents, EU project reports, EIP-Agri documents and practical documents from national resources. The document repository consists of some 80,000 documents obtained from 51 different sources, including thematic networks (all TN that hosted document collections in 2017), such as FERTINNOWA, OK-Net Arable, Smart-AKIS, large generic sources such OrgPrints, Groen Kennisnet, Jukuri university library, and practical factsheet repositories, such as Ecophytopic, Food & Farming Futures and Emilia-Romagna. See also explanations under WP2. The logos are presented with snippets of the retrieved documents (on request of some collection contributors).

One of the participants in the final evaluation of the ask-Valerie.eu tool sighed with relief: “finally I have all the regional factsheet repositories just one mouse-click away”.

4.4 Document Annotation
Each of the documents in the document set selected by the domain experts was annotated automatically using the domain ontology by a computerised process where the PDF documents were first parsed after which occurrences of the concepts (using all synonyms) in the text were identified and marked as annotations. For documents to be used in ask-Valerie.eu they must first be annotated. “Annotation” means that words or sentences in a text are marked, and stored in a database as linked to terms of the ontology. Documents are annotated automatically by a software tool called AnnA that was developed in the VALERIE project.

4.5 Iterative improvements to ask-Valerie.eu
The steps outlined above (creation of the domain ontology, selection of the document set, automatic annotation) are pre-
processing steps conducted by domain experts or by software services. These steps formalise the domain knowledge in terms of the ontology and prepare the documents for automatic interpretation. This will allow ask-Valerie.eu to answer the user’s question. Auto-completion and specific features of the query editor (see also WP5) support this process.

The auto-completion function - to support users when entering their queries - has been developed into stepwise more versatile versions. When a user starts entering for example the search term “unif”, the auto-completion function will not only autocomplete by adding more characters (such as uniformity), but also with concepts where “unif” is at the beginning of any word in the concept, such as “application uniformity”, “sprinkler uniformity” but not “Viburnum prunifolium” (because unif is not at the beginning of the word prunifolium).

A second improvement is that for each search result, the logo of the document source is shown in the user interface. This was a feature that was asked for by the document source owners, but also the users of the community facility were satisfied with this improvement. A third change with respect to earlier versions is the improved query editor. Not only are now all synonyms (in the selected languages) visible, but also the problem – innovation pairs that have been defined in the ontology. This change makes it possible for the users to better understand the context of the search terms, thereby enabling a better formulated search question.

4.6 ask-Valerie.eu: multiple languages
One of the key assets of ask-Valerie.eu is its multi-linguality. For every user, it is possible to log in and indicate which languages he/she understands. The user can then ask queries in each of these languages, and will receive relevant documents in these languages. The user interface itself is automatically set to the preferred language, as indicated in the language selection pane. The auto-completion service of ask-Valerie.eu responds to the set profile by offering only auto-completion on terms in the selected languages and in Latin (for the botanical terms). VALERIE partners, in particular those representing our target audience, are positive about the potential that ask-Valerie.eu offers to find relevant scientific and practical results applicable to their own situation, and in their own language.

5 Implementing ask-Valerie.eu as a web-application (WP5)
5.1 Stepwise development of ask-Valerie.eu front end
The development of ask-Valerie.eu progressed from the first version of the front end through several iterations to the latest version defined as Deliverable D544. The front end has been integrated with the back-end services created in WP4, which also evolved iteratively throughout the process. The system has been successfully presented and tested in several feedback and dissemination events. Even though the features of ask-Valerie.eu increased, the user interface was kept as simple as possible. During feedback workshops, users have expressed their appreciation for this simple appearance. The current tool gives users easy access to an extensive knowledge base.

Over the consecutive reporting periods, the ask-Valerie.eu platform has gradually evolved from an initial Version 1 where only single terms could be searched, with language support only covering English and only limited interactions in terms of switching to suggested terms or terms that occur in the results. By the project’s closing, the front-end was connected to Version 5 of the back-end services. Across the various stages, domain experts, case study partners and case study stakeholders have been involved to give their feedback on the features as presented by ask-Valerie.eu.

The final version allows the user to configure both the language of the user interface and the language for performing the search in the knowledge base (preferred language and other languages). The language support enables to cross languages, i.e. allowing a user to search in French and obtain relevant results across different languages, e.g. also in Spanish. In addition to expanding the scope of language support, the user now can ask questions in ‘natural language’ sentences and the system identifies relevant terms (that occur in the ontology) within the questions, to provide results from the document base.

5.2 Term editor or query editor
ask-Valerie.eu proposes an extended term editor (also named ‘query editor’) that empowers users to refine their query using terms and relations from the ontology. Terms can be broadened (wheat to cereal) or narrowed (cereal to wheat), or related terms can be included in the query, or specific solutions (innovations) to a given challenge can be sought. Through its
successive stages, the query editor has become a versatile instrument that suggests new terms to refine the user’s query, by using the structured knowledge hidden in the ontology. Another recent improvement to the presentation of results is that the front end latest version displays the logos of the document sources with each search result. This allows the user to quickly see which sources (libraries) contributed to ask-Valerie.eu from which source a specific search result stems, and it enables visiting the home page of the document repository by a simple click. The auto-completion functionality has also been extended over time, and now also operates on words that occur beyond the first part of a term. See also details under WP4.

5.3 Integrating ask-Valerie.eu in the EIP-AGRI platform
The embedding of ask-Valerie.eu into the EIP-AGRI platform was prepared in regular meetings of the VALERIE TC (Technical Committee) with the EIP-AGRI team including Mr Cossu (DG AGRI), Mrs Brinkman and others, and Mr Sagliocco (consultant, Engineering’s Software Laboratory, Rome). Various integration options proposed by the VALERIE TC were jointly studied, from which the one that offers a ‘search also on ask-Valerie.eu’ facility alongside the hosting page’s search box was finally chosen as preferred. To implement this option, a widget was created that transfers the original search terms entered in the EIP-AGRI search box to ask-Valerie.eu and thus enables use of ask-Valerie.eu full functionality. See https://ec.europa.eu/eip/agriculture/en/search/site/. The option involved stripping ask-Valerie.eu from its former login shell, allowing for smooth access from the host page without registration. This adaptation of the VALERIE software as developed prior to 2017 required a level of restructuring. The widget can be configured concerning the language setting of the search process (both UI and content) and enables an editor of a website to give the users access to ask-Valerie.eu. The code snippet below could be used to integrate the widget in form of an iframe within a website.

```html
<iframe style="border: 1px dotted #666666;" src="http://ask-valerie.eu/#/search/preffered=en&other=en,it&ui=it_IT" width="470px" height="150px" frameborder="0"></iframe>
```

The ask-Valerie.eu tool can be found also at its own web address: www.ask-Valerie.eu.
Hosting of the tool will be secured during 2018 by Wageningen Food and Biobased Research (WFBR).

5.4 Some more impressions of the ask-Valerie.eu user interface
The following screenshots illustrate the state of ask-Valerie.eu by the close of the VALERIE project in December 2017.

5.5 Introductory videos on ask-Valerie.eu
With the feature set becoming more stable, introductory videos have been created to give the users a quick introduction to the system and to collect feedback. These empowered both dissemination activities and case study meetings by providing a quick, self-explaining introduction to the system. They cover the following features of ask-Valerie.eu:

- Login
- Search auto-completion & results
- Term editor
- Bookmarking results
- Saving questions
- Languages (UI)
- Inter-language search
- Contribute documents & terms

Besides the work in the ten case studies, such video presentations and other feedback sessions were held nearing the completion of the project, events including:

- Valerie annual meeting, Toulouse, 23–26 Jan. 2017
- Agri-Tech East Workshop with SmartAKIS, 14 September 2017
- VALERIE symposium at COPA-COGECA, Brussels, 14 November 2017
- SCAR SWG AKIS 4, 6th meeting, Oct 2017, Lisbon
- Progetti multi-attore per la ricerca e l’innovazione in agricoltura: un’opportunità di dialogo, Milano, 11 December 2017, “
5.6 Community features in ask-Valerie.eu

In addition to the knowledge base with the embedded interaction features, an evaluation of community platforms has been performed identifying a suitable candidate to expand the interactive features around a more people-oriented approach. The VALERIE platform has been set up as a community prototype and was successfully tested and positively evaluated among project partners for technical performance. The platform has not, however, been extensively used or established with stakeholders or other external staff.

Based on partner feedback, modules were added that promote sharing of documents, allow the sharing of thoughts and comments around specific topics, enable the adding of documents to the VALERIE document base, add terms to the ontology, and that help people find advisers or other practitioners with innovation needs similar to their own. The current implementation allows for user profiles, connecting to other social media (Facebook, Twitter, LinkedIn, Share on Google), sharing documents, as planned in the original project plan.

Potential Impact:

Achievements and Outlook

The VALERIE project (www.valerie.eu) has created ask-Valerie.eu. This platform helps practitioners and advisers in agriculture and forestry to find and share documents that respond to their specific queries. It covers a series of thematic subdomains with a focus on sustainability and profitability. These include sustainable soil and water management, integrated pest management, recycling of biomass, supply chain optimisation, and ecosystem and social services from agriculture and forestry.

The portal www.ask-Valerie.eu now gives access to approx. 80,000 documents selected by experts. These documents originate from CORDIS, Horizon2020 Thematic Networks, EIP-AGRI, and selected national and regional repositories. The document base covers 50 scientific and non-scientific sources, and can be further expanded.

More specifically, VALERIE supports the activities of the European Innovation Partnership EIP-AGRI by providing ask-Valerie.eu as a highly interactive search and communication webtool for advisers and practitioners in sustainable agriculture and forestry. The tool is now available on the EIP-AGRI platform (https://ec.europa.eu/eip/agriculture/en/search/site/). It can also be modulated as widget for integration in additional platforms, for example to suit thematic networks and operational groups active under the EIP-AGRI umbrella.

Backbone to ask-Valerie.eu is the dedicated multi-language domain vocabulary developed in VALERIE. Its successive versions were published on ‘foodvoc.org’, and cover English, French, Spanish, Italian, Dutch, Polish, Finish - and Latin for botanical terms. This resulted in approx. 50,000 synonyms and translations, which makes the VALERIE-ontology comparable in size to large established vocabularies such as DBPedia (11k concepts) and NAL thesaurus (13.5 k concepts). The ontology is used in ask-Valerie.eu to index documents and to support users in refining and tailoring their queries through suggestions offered in their preferred language. While the current VALERIE ontology covers a limited set of thematic subdomains and languages, it can serve as a solid starting point for expansion into other segments of the agriculture-forestry-food domain and into other EU MS languages, and including practitioners vocabularies. This way, it has the potential to become a cornerstone for systems that facilitate access to knowledge for innovation in the wider agriculture-forestry-food domain, and that may underpin knowledge sharing between practice, science, policy making, and the wider public.

Outcomes from The VALERIE-project will help close the innovation gap that exists between research and farming/forestry practice, and will thus valorize scientific knowledge produced in the EU. By giving access to concisely summarized knowledge
for innovation, it will contribute to making agriculture and forestry practices more sustainable and more productive.

VALERIE presents an entirely new concept to mobilize science to increase public goods provision by agriculture, and to capture the users’ perspective for integration into science and policy activities. Facilitating this very process is at the heart of the EIP-AGRI and Horizon 2020 programming. Through its case studies, VALERIE has set a new approach for articulating the specific needs and empirical knowledge by practitioners, and for integrating these into scientific activities. The VALERIE case studies demonstrate how a long term dialogue between scientists, producers and other stakeholders can be organized effectively. Both ask-Valerie.eu and the VALERIE case studies will inspire new stakeholder communities in Europe to utilize the modern tools and approaches offered by the project.

The outputs generated by VALERIE are geared to strengthening the innovation chain, by enhancing communication between all actors involved, and by injecting precisely tailored and up-to-date knowledge into the innovation process. This will be especially so for the innovation domains closely connected with the sustainability themes elaborated in this project, but can easily be extended to broader array of thematic domains.

Our workshops with various stakeholder categories have also confirmed the importance of linking VALERIE outcomes to regional and national initiatives; of making ask-Valerie.eu available at national webpages via the National Contact Points; of cross-border interaction among advisory services; and of expansion into more EU languages. All these options remain to be explored via new initiatives beyond the VALERIE project lifetime.

Dissemination and exploitation (WP6)
Overview
Following its dissemination and exploitation plan (D611), VALERIE has provided relevant and timely information to interested parties, with an established website and a structured set of activities.

The project’s ambitions and intentions were disseminated through VALERIE Newsletters, flyers, case study leaflets and the website (www.valerie.eu); and throughout 2017 also through regular announcements via ‘Twitter’ social media. The VALERIE final symposium held at the COPA-COGECA offices in Brussels on 14th November 2017 provided the opportunity to present final project outcomes, and for farmer union, SCAR/SCAR Foresight Working Group on Forest Research and Innovation (FWGFRI), SCAR SWG-AKIS (Agricultural Knowledge and Innovation System), EU project and EIP-AGRI representatives to provide feedback on VALERIE progress and achievements. It was also an opportunity to discuss in more general terms the issue of knowledge exchange and access to information for innovation in agriculture and forestry. The main messages were captured in a “Final Report on Feedback from Major Clients”. Project outputs were presented, including the ask-Valerie.eu tool, and speakers were invited to present their experience on the subject of effective knowledge exchange for innovation in agriculture and forestry.

A full overview of dissemination activities and events to collect feedback on VALERIE progress can be found on the project webpage, specifically in the deliverables D611 (Detailed Dissemination Plan), D621 (VALERIE Web content Report), D623 (Conference Articles, Presentations and Workshops Report), D624 (Trade and Scientific Articles Report), D671 (Initial Report on Feedback from Major Clients), D691 (Mid-term Stakeholder Feedback Report), and D692 (Final Report on Feedback from Major Clients).

Each of the work packages published a series of deliverables ‘for public’ (PU) dissemination, all of which can be downloaded from the project webpage.

Selected aspects and events towards the end of the project period are highlighted below.

Stakeholder engagement
Dissemination and communication activities were carried out with stakeholders with an interest in agriculture and forestry
across the six VALERIE themes through newsletters, workshops, conferences, case study activities and articles in the trade press. This activity was principally carried out within the six partner countries: Finland, France, the Netherlands, Spain, Italy and the United Kingdom), but also extended to Poland through case study meetings (as part of the ‘sustainable potato supply chains’ case study) and south western Europe through the AGRI-Innovation Summit in Portugal and other dissemination routes, including social media (Twitter: @Valerie_project).

Newsletters were sent to stakeholders in each partner country, who included:

- Information press: press/information officers; specialised websites; knowledge exchange (KE) hubs; and specialised e-letters
- Farmers’ associations/unions/cooperatives
- Levy boards
- Non-governmental Organisations (NGOs) and charitable trusts
- Farm Advisory Services (private)
- Farm consultancy associations
- Trade associations
- Commercial companies: agricultural companies (e.g. agro-chemical, seed and machinery suppliers); breeders; large distributor companies; precision farming companies
- Education: universities and agricultural colleges
- Government authorities: departments dealing with agriculture, forestry and resource protection
- Research community: public and private sector
- National Societies
- Policy commentators

Interactions with EIP-AGRI representatives
The VALERIE team had frequent meetings with EIP-AGRI representatives with a view to discussing opportunities for integrating ask-Valerie.eu in the EIP-AGRI platform, and for sustaining ask-Valerie.eu after the project period. Interactions were focussed on the various technical options for integration. For more details, see Section 5 in this report.

ask-Valerie.eu
The ask-Valerie.eu tool was launched on the EIP-AGRI platform in early 2018 at https://ec.europa.eu/eip/agriculture/en/search/site/.

It can also be accessed at its own webpage (www.ask-Valerie.eu).
More details are given in Sections 4 and 5 in this report.

VALERIE brochure translation and newsletters
The VALERIE brochure, translated into seven European languages, and VALERIE newsletters were posted on the project website and distributed to delegates at workshops and conferences including the AGRI-Innovation Summit in Lisbon, Portugal in November 2017. During the later project stage, VALERIE newsletters were developed and sent to stakeholders in all partner countries in winter 2016-17 and autumn 2017. The newsletters describe the challenges, aims, objectives of VALERIE, present the ten case studies, and focus on specific case studies and themes. In addition, practical newsletters explaining project progress were developed for dissemination among case study partners and translated into Spanish, French, Dutch, Polish, Finnish and Italian.

VALERIE website and social media
The VALERIE website describes the aims and objectives of the project and presents the six themes and project partners (‘About Valerie’ and ‘About Us’); and provides descriptions of the ten case studies in terms of the themes covered, locations, main land uses, stakeholders, key issues and contacts (‘Case Studies’). VALERIE ‘News’ is updated regularly and ‘links’ are provided to other relevant projects and websites. The VALERIE brochure, newsletters, research papers, trade press articles, ask-Valerie.eu tool flyers and case study leaflets, and all public deliverables are made available in the ‘downloads’ section.
Announcements of project progress and events were posted on social media (twitter: @Valerie_project) along with developments in agriculture and forestry relevant to knowledge exchange and the six VALERIE themes.

Case Study Trial leaflets
The ten case studies in VALERIE all produced outcomes of direct relevance to practitioners. These were disseminated in the form of ‘Case Study Trial leaflets’ detailing the co-innovation trials carried out in the field with stakeholders. A full list of Case Study Trial leaflets are listed in Section 3.6 of this report.

VALERIE Symposium 2017
On the 14th November 2017 a final symposium was held with different groups of stakeholders and clients at the COPA-COGECA offices in Brussels to present the aims, objectives and methodology of the VALERIE project and invite feedback on project achievements and how to ultimately integrate outputs and results into national Agricultural Knowledge and Innovation Systems (AKIS) and EU information/dissemination tools. The symposium was targeted at:
• Representatives of the Standing Committee on Agricultural Research (SCAR) and the SCAR FWGFRI; and leaders of major EU projects on AKIS
• Representatives of national and regional farmer unions, AKIS Working Groups and the European Innovation Partnership (EIP)

There were opportunities for discussion and feedback throughout the symposium and in a final afternoon session delegates discussed two questions in separate working groups, one focusing on the content of the knowledge and information platform and a second focusing on processes to ensure future support:
• Content (how to ensure end users get the best content):
  What is the most suitable format for ‘translating’ research outcomes into practical outputs? Do the issue-solution pairs used in ask-Valerie, VALERIE factsheets and org-prints provide a good structure?
• Process (how to ensure sustainability of such a platform):
  What needs to be done to make a knowledge platform such as ask-Valerie.eu work in the long run? What strategies can be used and what resources are needed to develop a community of users, e.g. how could users contribute towards maintaining such system?

The outcomes from the workshop were captured in a “Final report on Feedback from Major Clients” (D6.692). Some of the discussion points are summarised below.

The opinion provided at the final symposium built on previous feedback gathered at the VALERIE initial (2014) and mid-term (2016) stakeholder meetings, which included the importance of multi-linguality; separating scientific information from guidelines for practice (factsheets, manuals); connecting to existing repositories of documents for practice; linking to what’s going on in the regions; connecting Rural Development Programme (RDP) national pages to ask-Valerie.eu; and cross-border interaction among advisers:
• Search results need to be concise and prioritise simple, practical information (e.g. factsheets), less focus on scientific literature
• Simple information should be ranked highest. Would it be possible to rank scientific or practical documents highest depending on user preference (selected in user profile)?
• The welcome page should be in the local language and users should be able to select the languages with which they wish to work (i.e. the documents that are recovered by ask-Valerie.eu)
• It was suggested that ask-Valerie.eu should be linked to other decision support tools as well as connected to existing networks and co-operatives
• The use of ask-Valerie.eu will depend on the user’s confidence and ability with technology, but farmers & advisors will use it if ask-Valerie.eu is seen as trustworthy and provides useful, accurate information
• Agricultural colleges were identified as a key area to promote ask-Valerie.eu since students are at ease with technology and more likely to engage with and use ask-Valerie.eu

It has been possible to incorporate the majority of these suggestions within the timescale of the VALERIE project, including the
highlighting of text fragments to provide concise information on document content; providing source information associated with each text fragment so that users can prioritise scientific or simple, practical information; multi-lingual selection functionality; the ability to connect to existing networks and co-operatives using a widget or dynamic link; the selection of documents by experts in agriculture and forestry to increase users’ confidence in the content; and the ability of the tool to recognise colloquial and simple terms.

VALERIE at the AGRI-Innovation Summit, Lisbon, November 2017
Julie Ingram and Paul Newell Price represented the VALERIE project at the AGRI-Innovation summit at the Lagoas Park Hotel in Porto Salvo, near Lisbon on 11th and 12th October 2017. Over 500 delegates shared experiences and visions of innovation in European agriculture through twenty parallel interactive sessions covering five themes and additional Wrap-Up and Conclusion plenary sessions.

The five themes were:
• Resource Use (Adaptation and Mitigation)
• Management of farming, food and forestry systems & valorisation of the territory
• Agriculture 4.0 and rural development
• Digitizing rural economies
• Innovation –shaping the future

In each parallel session, representatives from Operational Groups (OGs), FP7 and Horizon 2020 (H2020) projects presented their own materials. This was followed by small group discussions to identify and describe the most innovative approaches from all the posters and summarise their key principles for reporting back at the end of the session. The interactive nature of these sessions was appreciated by the delegates, provided an opportunity to learn more about a wide variety of OGs and H2020 projects and resulted in some useful outputs. There were clearly many opportunities for the ask-Valerie.eu tool to support future innovation by improving access to knowledge.

Selected VALERIE publications

Scientific Journals
  o Abstract: The challenge of the work presented here is to make innovative research output in the agronomy and forestry domain accessible to end-users, so that it can be practically applied. We have developed an approach that consists of three key-elements: an ontology with domain knowledge, a set of documents that have been annotated and meta-annotated, and a system (ask-Valerie) that is based on a dialogue to represent the interaction between end user and system. We show that the dialogue-metaphor is a good way of modelling the interaction between user and system. The system helps the user in formulating his question and in answering it in a useful way. Meta-annotations of key-paragraphs in the document-base turn out to be relevant in assessing in one glance what the content of a document is. End-users are very enthusiastic about the possibilities that ask-Valerie.eu offers them in translating scientific results to their own situation.

• EU Standing Committee on Agricultural Research (SCAR) report
  o The VALERIE project and VALERIE’s search and stakeholder engagement tool appear in the EU SCAR (Standing Committee on Agricultural Research) report on “Agricultural Knowledge and Innovation Systems Towards the Future: A Foresight Paper”. In chapter 5, “The Role of E-Science in Agriculture: How E-Science Technology Assists Participation in Agricultural Research”, the development of ask-Valerie.eu is presented as a key step in improving the flow of information between practitioners and researchers.
  o Follow the link: https://ec.europa.eu/research/scar/index.cfm?pg=home;
  o Chapter 5 - ‘The Role of E-Science in Agriculture: How E-Science Technology Assists Participation in Agricultural Research’:

Introduction: The objective of this chapter is to analyse how e-science can increase the participation of practitioners and
researchers in agricultural research, and hence increase the mutual impact of such research. In this chapter, we discuss the need for participation, and define four types of participation that are possible in agricultural research. We sketch the form that these types of participation can take in agricultural research, and the relevance of e-science for these participations. For each type of participation, we select relevant cases that already exist in agricultural domains, and discuss the e-science technology involved. The focus is on participation, and as such we will not include e-science tools that do not directly facilitate participation, such as high performance computing, algorithms for precision agriculture, lab management systems, visualisation, etc. Based on what we have discovered, we will identify a number of issues and opportunities relating to the use of e-science in agriculture. Finally, we will conclude with the steps that can be taken to more fully realise the potential of e-science for encouraging participation in agricultural research. Most of the material in this study is based on an analysis of available information on the Web and from literature. We have also built on our experiences with e-science in projects such as the EU FP7 Valerie project and the Dutch COMMIT/eFoodLab project.


Abstract: European research projects in agriculture and forestry produce excellent scientific papers. Most of them could contribute to the development of new innovations in Europe but their adoption is still limited. The European project VALERIE (Valorising European Research for Innovation in Agriculture and Forestry), wanted by the European Commission, aims at improving the transfer of EU research results in terms of concrete innovations for farmers and advisors in agriculture and forestry, facilitating their integration in management practices. The main output of the VALERIE project will be a smart web research assistant (ask-Valerie.eu) which will be able to mimic the interaction between experts and users for answering concrete questions. Indeed, this tool should be able to help the user to write and develop his request and then to propose a list of relevant documents, using in particular results from EU projects, selected among an expert-selected document base. ask-Valerie.eu will be available online at the end of the project. At this stage, a beta version of askValerie.eu is available and included in a testing process by VALERIE’s partners. The web browser is based on an ontology containing currently about 6200 concepts and the document data base already contains about 4300 documents. By developing the askValerie.eu tool, some key issues have been raised and are discussed, notably dealing with access to information, available documents format and matching between research products and needs of stakeholders.


Abstract: Many excellent results are obtained in agricultural and forestry research projects, but their practical adoption is often limited. The aim of the European project VALERIE is to increase the transfer and application of innovations produced by research in agriculture and forestry, by facilitating their integration into management practices. The project is still ongoing and the results illustrated in this paper are still temporary and subject to being improved. Here we present the methodology used in VALERIE to extract and summarise knowledge for innovation from research documents with the aim of making it available to final users through ask-Valerie.eu; we also report on current progress. The tasks associated with extracting and summarising knowledge are centred on: i) ontology; ii) a document base; and iii) a system (ask-Valerie.eu) that allows users to effectively search the document base. Ontology defines a set of concepts and the relations between them. The VALERIE ontology is built by experts in the agricultural and forestry domain and contains 6169 concepts (21st October 2016). The document base is the collection of documents in which the system searches. The VALERIE document base includes scientific
and practical documents derived from various sources, written in any of a number of languages. All documents contained in the document base are annotated using the ontology: each term (a word or a short phrase) in the document that matches a concept in the VALERIE-ontology is linked to that concept. Annotation is an automated process that takes place whenever a document is added to the document base. The document base contains 4278 documents (October 2016). Among them, there are 201 mini-factsheets written by members of the VALERIE project, each describing an innovation with: a short description of the innovation, a list of correlated projects, and some links to scientific and practical documents. ask-Valerie.eu searches documents and fragments of text from the document base that address the user’s query. ask-Valerie.eu Accepted paper mimics the dialogue between a practitioner and an expert and achieves this functionality by: i) supporting the practitioner in articulating the question (it completes terms that the user starts to type and suggests other possibly relevant terms); ii) expanding the query using synonyms; iii) extracting and ranking text fragments from the documents.


Abstract: Scientific research continues to play a significant role in meeting the multiple innovation challenges in agriculture. If this role is to be fulfilled, provision needs to be made for effective translation of research outputs, where translation is understood to be the process whereby science becomes part of useful knowledge for decision making. There is increasing interest in enhancing translation in the European agricultural innovation, research and policy context, and specifically in making it a more collaborative process. This new attention calls for a reorientation of how the concept is understood, theorised and operationalised. This paper considers these needs and specifically asks how can interactive innovation approaches be integrated with science-driven approaches to enhance translation; and how can this help to reveal the constituent translation processes? An interactive stakeholder methodology is described drawing on three agricultural case studies examined in the xx project which aims to make translation of existing bodies of scientific knowledge more effective. Analysis to date shows how this interactive methodology enables a communicative and reciprocal set of translation processes to evolve which comprise: identification, prioritisation, articulation, searching, retrieval, extraction and synthesis, and evaluation of innovation issues and solutions. These insights allow us to move beyond an understanding of translation as science- or innovation-driven to envisaging co-translation, where multiple processes interact in a fluid middle-ground, and where the actors involved develop the capacity to jointly analyse innovation issues and solutions. From the perspective of the EU’s policy ambitions to stimulate collaborative translation, operationalising translation needs re-thinking with respect to requirements for new mind-sets and skills, and in particular for committed and well-resourced intermediaries who can foster these multi-actors approaches.


Abstract: In a context of highly fragmented woodlands' ownership, joint forest management implies a reduction of transaction costs for its members and improves the coherence of forestry actions at the landscape scale. Increasing the size of the management unit improves market positioning, permits a more technical management, and improves environmental sustainability in aspects that require spatial coordination. A review of relevant literature on forest owners' groupings and the lessons learned from case studies in Navarra (Spain) have been analysed from a social capital perspective. Twelve challenges are identified, for which technical recommendations are offered. We navigate through decision-making procedures, geographical cohesion, legitimacy and trust building, transparency and internal communication, trade-offs in efficiency and equity, local idiosyncrasy, management committee dynamics, risk aversion vs. flexibility, legal aspects, joint motivations and long-term vision, and intermediary's efficiency. Existing policy tools help in overcoming some of the economic and technical aspects. However, internal governance challenges require a concerted effort from participating forest owners.

Articles in trade journals, industry magazines & web-sites
• EFIMED Network News, April 2015

Background details and current progress on the Sustainable Forest Management and Ecosystem Services case study was
included in an article written for the April 2015 issue of the EFIMED Network News.

- EIP-AGRI Agrinnovation magazine, September 2015
  - An article giving a short introduction to VALERIE was included in the 2015 issue of the annual Agrinnovation magazine on the EIP-AGRI network.

- Navarraforestal: number 37 (versión en castellano), December 2015
  - The Sustainable Forest Management and Ecosystem Services case study was featured in an article written for the December 2015 issue of Navarraforestal: number 37 (in Spanish).

- Sustainable Forest Management and Ecosystem Services, VALERIE Case study update in March 2016.
  - Details and news from the VALERIE project and The Sustainable Forest Management and Ecosystem Services case study were posted on The Union of Foresters of Southern Europe (USSE) website:
    - A VALERIE project summary can be found here [in English](https://www.valerie.eu) and here [in Spanish](https://www.ask-valerie.eu).
    - The case study and VALERIE news were posted here [in Spanish only](https://www.valerie.eu).

  - A field trip organised by the VALERIE Finnish case study, ‘Sustainable Forest Biomass: Recycling of Wood Ash’ took place on 8th June 2016. A group of stakeholders and researchers spent a rainy Wednesday in the North Karelian forests discussing the use of recycled wood ash from various perspectives. There was a demonstration of spreading wood ash for use as a fertiliser and people could witness with their own eyes the positive influence of wood ash on forest growth.
  - Details of the field trip were posted on Facebook [here](https://www.facebook.com/pages/European-Forest-Institute-EFI/146786162041660) and published as a newspaper article (in Finnish) in the ‘Karjalainen’, the newspaper from North Karelia. A short version of the Finnish newspaper article can be found on the web at: [http://www.karjalainen.fi/uutiset/uutis-alueet/talous/item/107932-tuhka-paketoitien-rakenteen-matalammaksi](http://www.karjalainen.fi/uutiset/uutis-alueet/talous/item/107932-tuhka-paketoitien-rakenteen-matalammaksi).

- EU Research & Innovation web-site, 31st August 2017
  - The ask-Valerie.eu tool could speed up innovation in agriculture by making innovative research outputs and best practices more easily accessible to farmers and foresters, says the EU Research & Innovation web-site: [https://ec.europa.eu/research/infocentre/article_en.cfm?artid=45517](https://ec.europa.eu/research/infocentre/article_en.cfm?artid=45517)

- Article pending in Farmers Weekly (UK) and France Agricole (France) on the VALERIE project and companion cropping in oilseed rape from the “Innovative Arable Cropping” case study.

List of Websites:
www.valerie.eu
www.ask-valerie.eu

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