Vision Paper

Developing High Impact: The Future EU-wide Open Source Knowledge Reservoir for Agriculture and Forestry

This vision paper is aspirational. It reflects a 5-year vision on an EU-wide open source knowledge reservoir for agriculture and forestry practices based on outputs of H2020 Thematic Networks. The vision is based on an ideal world and is not designed to investigate the feasibility of achieving the desired elements. The presented vision results from the outputs from the EURAKNOS H2020 project and discussion with the project's Strategic Innovation Board.

Introduction

In the Agricultural Knowledge and Innovation System (AKIS), innovation in agriculture and forestry is built on the sharing and exchanging of knowledge between all key actors such as policy makers, farmers, foresters, advisors, researchers, educators, farmers' organizations, cooperatives, associations, SMEs (small and medium sized enterprises) and media. In the AKIS, some actors are mainly knowledge generators or multipliers, and others knowledge users. In the frame of strengthening the national AKISs, open access to agriculture and forestry related data and information objects enables transnational knowledge flows and exchange between relevant actors.

H2020 Thematic Networks[1] (TNs) are funded through Horizon 2020 – the European Commission's main 2014-2020 funding programme for research and innovation and may interact through the agricultural European Innovation Partnership, EIP-AGRI[2]. TNs collect practice-oriented knowledge in animal and plant production, and cross sectoral themes such as rural development to share innovative solutions, best practices and methodologies. The main aims of TNs is collecting and translating this thematic knowledge into easily understandable end-user material which provide informative recommendations, guidelines and solutions e.g. in the form of leaflets, practice abstracts, factsheets, and audio-visual outputs including videos, photos and podcasts. This material should be made available within and beyond the lifespan of the project through the main dissemination channels which farmers and foresters often use. Collecting ready-for-practice materials in an easily accessible and user-friendly common EU-wide knowledge reservoir (KR) would provide a single point of access for practitioners to discover information, giving more accessibility, longevity and visibility to resources, and stimulating interest in the implementation of knowledge and innovative practices in farming and forestry. Thus, agriculture and forestry practitioners are the main target end-users for the open source system proposed in this vision paper.

The EURAKNOS H2020 project is connecting all H2020 Thematic Networks and exploring the feasibility and sustainability of setting up such an EU-wide open source KR. In frame of this, the project's Strategic

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[1] https://ec.europa.eu/eip/agriculture/en/publications/eip-agri-brochure-thematic-networks-under-horizon
[2] https://ec.europa.eu/eip/agriculture/en/about/thematic-networks-%E2%80%93-closing-research-and

Innovation Board has reflected on the features and functionalities of such a system within 5 years during a foresight exercise that was held in Bruges on January 31st 2020.

A 2020 Vision on a common EU-wide knowledge reservoir for agricultural and forestry practices

This vision paper aims broadly to address the question: *What should an open source KR for agriculture and forestry look like, and what do we need and want from it?* The paper will discuss achieving high impact, the needs of target end-users in terms of interactivity and content, and ways to secure the longevity of such a system.

The proposed KR platform will serve two main purposes:

- To be a tool for TNs to network and share opportunities and solutions to the agricultural or forestry challenges which they sought to address
- To be a destination for agriculture and forestry actors including farmers, foresters, educators and advisors to easily find and access relevant networks and information so that they can opt to implement it in their own systems.

Achieving High Impact

It is not enough to simply collate TN resources into one place: internet users have a myriad of options to find information e.g. using search engines. The proposed KR platform is to be a high impact system, meaning that it provides access to meaningful, practice-oriented knowledge to targeted actors, improving the processes of seeking and implementing information relevant to agriculture and forestry. To achieve high impact, the system must first attract TNs to provide their resources to the KR system, then end-users to engage with the information.

The system should function as a living structure, constantly being updated and enhanced. To ensure that TNs are engaged and willingly adding content, the platform will need to achieve a unique selling point: to be the unique common EU agricultural and forestry KR which end-users value and use ("Agri-Wikipedia"). Target users, TNs, and their networks should be involved throughout the co-creation process of the KR through participatory and validation exercises and consultations. The sense of co-ownership and responsibility to an open source KR will add to the likeliness to use and share knowledge, as well as to disseminate the added value out into agricultural society.

It is necessary to focus on well-defined target groups for the system to be successful, including niche markets. The content and relevant structures of the KR must be relevant to farmers, foresters, educators and advisors as the main end-users seeking information on specific areas related to agriculture and forestry activities. This should not mean that only sectorial themes will be tackled: themes like approaches for intergenerational renewal, short supply chain, or social innovation attract great interest from practitioners.

All users, including farmers, must be aware of the KR platform, attracted to try the KR platform, and experience the system positively such that they become a return user and recommend the platform to others so that the valuable and trustworthy content it contains can be further spread and utilised. This process requires that end-users perceive the KR platform to have intrinsic value by improving end-user experiences of searching for and accessing agricultural or forestry knowledge.

Providing a Positive User Experience

For the KR to go beyond being simply a comprehensive collection of resources from past and ongoing EU TN projects, it is essential that the platform enables users to quickly and easily find relevant knowledge. The platform itself should be easy to find and access, e.g. through personal recommendations or specific networking activities aimed at promoting the KR, and more general visibility e.g. through being a top result for relevant search terms within existing search engines. The KR should be available as both web and

mobile app platforms. The KR should also reduce the time spent searching for accurate, relevant and high-quality practice-oriented information by utilizing a well-structured content framework based on an end-user-oriented ontology and problem-solving approach. Existing tools can provide inspiration; the open source KR system should function similarly e.g. with a search function which filters and prioritizes results. First time users should be able to use all functions of the KR platform with great ease, requiring that the platform is available in all local languages.

Although the platform will be available for use by anyone regardless of registration, the option should be available for end-users to create an individual profile which allows the interface and its functionalities to be tailored and adapted to suit their needs according to their areas of interest and their required level of engagement, setting their own filters and preferences. It should be possible to store and personalize the KR experience for different end-users and to develop user journeys with knowledge pathways based on individual demands. It should also be possible for the KR to make connections with meteorological and market data, which farmers use on a daily basis, as a useful feature which may add to the popularity and functionality of an open source KR. When a platform is more personalized it encourages the user to feel more comfortable operating the system, which in turn leads to a higher level of engagement. To better address users' needs, analytics and interactions should be incorporated in a feedback mechanism and used for further development and improvements of the open source KR system and to provide content suggestions based on commonalities between user profiles. In this way, an individual's experience can be tailored beyond the overarching 'farmer', 'forester', 'student', 'educator' and 'advisor' user typologies.

Delivering Useful Content

Content will be obtained and regularly uploaded from past, present and future H2020 TN projects. In broad terms, the platform should contain up-to-date technical and practice-oriented information conveyed using appropriate (jargon-free) language which is easily understood and can be adapted for practice according to the end-user's context and specific needs. Materials might also include comprehensive information about recent policy and sector developments as these will impact practice. The content should be classified by sector and organized around a decision support framework which targets the knowledge needs of farmers, foresters, educators and advisors as the key end-users. The structure of the content should be organized by the problems facing each sector: if a user is seeking a solution to a problem, they cannot search for the answer if they do not know what the solution is. The information resource materials themselves can take several forms in order to visualize information e.g. text-based reports, guidelines, fact sheets and practice abstracts; infographics; podcasts; and videos. Wherever possible, open access documents should be accessible via the KR platform, while respecting and acknowledging intellectual property rights.

Quality control is extremely important. Wherever possible, automated systems should be taken full advantage of, including with respect to facilitating the upload of content to the KR platform. An easy, automated method for adding new content from projects requires interoperability of data and information systems. Furthermore, automation cannot do everything, and it is necessary to have a human element of moderation to ensure that uploaded materials are appropriate, relevant and inoffensive. (An) appropriate administrator(s) should be selected who can ensure there is suitable quality control on content that is uploaded. It is critical that content is carefully monitored to avoid providing ineffective information which may lead to lower levels of engagement. Incorporating a user feedback system will allow reviews from end-users could help to assess the quality and validity of materials once uploaded. This feedback system should include an option to flag information as outdated, inefficient or obsolete, and suggest new solutions and materials which they find relevant.

The main working language of the platform and its contents will be English. However, to further ensure an optimal personalized experience, it is essential that end-users can access the platform and its contents in their own native language. This will be achieved through automated systems, incorporating integrated user

learning so that the technology is able to improve grammatical mistakes and translate sector-specific terms when prompted by the user. Although this may currently be difficult to achieve, it is anticipated that automated language translators will become ever-more accurate in the near future.

Although meant as an inclusive and pluralistic framework, this proposed system may be more oriented to farmers and foresters who are more digitally skilled. To be as inclusive as possible, educators, advisors and facilitators should be strongly valued as end-users who also interact with and educate other groups of farmers and foresters. Therefore, information should be made readily available as training materials for further dissemination and exploitation by advisors and educators such as teachers at vocational schools, technical colleges and agricultural universities using a problem-based learning approach with new learning methodologies. It would also be possible to connect with adult learning and lifelong learning programs including farmer learning groups and Operational Groups.

Although the focus should be on creating a digital (online) platform, equally important is that the open source KR should facilitate virtual as well as physical interactions, meetings and exchanges. The platform would also connect and display the events of various institutions so that users can search by topic and location to choose the most local and/or relevant activity to attend from a comprehensive list. Furthermore, with appropriate permissions in place, registered users can share their contact details and areas of interest/expertise for other users to search and connect with other individuals to foster and facilitate peer-to-peer and farmer-to-advisor networking as part of an interactive community experience.

Attaining a Self-Sustaining System

The EU knowledge reservoir for agriculture and forestry should be a self-supporting open source system which links knowledge collected and co-created from all AKIS levels (regional, national, international) and all types of projects including TNs and other multi-actor projects, as well as Operational Groups under EIP-AGRI and projects known by National Rural Networks. The proposed online knowledge resource must fit and perform within the existing innovation system (AKIS or AIS) which is about relationships, interconnections and knowledge flows. The use of the system will be driven by its level of interest, functionality and impact. Networking and knowledge sharing by users of the platform who perceive the KR to have intrinsic value will make other practitioners aware of the open source KR, creating a ripple effect that will motivate increased engagement. To further attract increased use of an EU-wide open source common KR for agriculture and forestry, it should connect to other communication and dissemination channels such as advisors' websites, farmers' organization websites, project websites, paper-based promotional materials (e.g. flyers, posters), various social networks, newsletters and news emails, press releases, agricultural press materials (both print media and online) etc.

A joined-up approach and concerted effort is likely to benefit all parties, hence establishing a better functioning AKISs in all member states. The European Commission may in time see an interest in the KR as an instrument linking AKIS between member states with a view to keep a critical mass of agriculture/forestry related knowledge public[3]. This could help counter current trends to privatize knowledge within companies to strengthen their commercial position, an approach which is becoming more and more common in the agricultural chain. A similar conclusion about the need for retaining public knowledge can be drawn from Foresight exercise done by the Strategic Working Group's AKIS of the Standing Committee for Agricultural Research (SCAR) during its 3rd Mandate.

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[3] See EIP guidelines 4.6: " *The emphasis of the "experimental" aspects of Art. 35 / measure 16 is on creating knowledge which is freely available for the use of all, also in the case private funding would be used*". EIP Operational Groups funded under the CAP as well as Horizon 2020 and Horizon Europe multi-actor projects must disseminate practice-oriented knowledge

A clear business model is needed, taking into consideration intellectual property rights. The common EU-wide knowledge reservoir provides a standardized approach and would act as a marketplace for an exchange of benefits between the broad TN and agricultural practitioners' community. This added value would warrant public funding to cover the platform's overheads. However, this funding is not guaranteed. If necessary to overcome a gap in public funding, allowing paid advertisements to feature on the platform is to be considered, as these could compromise the neutrality of the resources and knowledge content included in the platform, as well as the user experience.

Although policy makers are not a key target end-user group, they can use the KR platform to access information to understand the problems facing agriculture and forestry, and policy should be developed based on this understanding. As such, content for the open source KR will, on the one hand, be developed based on the regulatory framework set out for farmers and foresters, and on the other hand, policy makers can make use of the KR to understand the challenges and opportunities these sectors are being confronted with. This improved understanding may contribute to closing the gap between these groups of actors, as well as with other key actors in agricultural and forestry innovation. This may result in better understanding and collaboration between policy makers and the agricultural sector, including all interrelated fields (agri-food chains, consumers, environment, biodiversity, climate, bio-based industries, rural areas, etc.).

The future EU Common Agricultural Policy (CAP)[4] highlights the importance of digitalisation of agriculture and rural areas. The proposals for the new CAP include the development of strategic plans in which member states outline how they intend to meet the nine CAP objectives using CAP support instruments while responding to the specific needs of their farmers and rural communities. According to the proposal, the member states have to address the cross-cutting objective of fostering and sharing of knowledge, innovation, and digitalisation in agriculture and rural areas, and encouraging their uptake (Article 5), as well as a specific objective to enhance market orientation and increase competitiveness, including greater focus on research, technology and digitalisation (Article 6b). Most importantly, member states are asked to put forward in their CAP strategic plans a strategy for the development and better interconnection of their AKIS, and the use of digital technologies in agriculture and rural areas. Member states will need to highlight the elements of the CAP strategic plan that support the modernization of the agricultural sector (Article 102), closing gaps between science and practice and improving knowledge flows according to the CAP cross-cutting objective. Strategic approaches to ICT in agriculture and rural areas will be key to foster the digitalisation of the EU's agricultural and rural areas and systematically enhance knowledge flows.

National KRs are increasingly being developed in member states. National CAP networks can play an important role in strengthening the national AKISs through digitalisation and assisting in defining functionalities, use of coding and IT language, and facilitating the interoperability between the different KRs and the connection to an EU-wide common agriculture and forestry KR. In this way, the digital asset can adhere to the "FAIR principles"[5], meaning that resources are Findable, Accessible, Interoperable, and Reusable. CAP networks could also play a role in providing translation of ready-for-practice materials into and from local languages which contribute to agricultural innovation and rural developments. An EU-wide open source system should be promoted by National Rural Networks as well as local authorities and policy makers as a destination to store and organize resources from projects to help ensure their impact and legacy.

Conclusion

An EU-wide open source KR for agriculture and forestry will provide agriculture and forestry practitioners with a valuable 'one stop shop' for their knowledge needs. By co-creating a user-friendly interface with

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[4] https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en
[5] https://www.go-fair.org/fair-principles/

useful, practice-oriented content, relevant information will be more easily found and implemented by end-users. Going beyond providing a digital resource, notably by facilitating networking activities both online and in-person, will provide opportunities for improved learning from the content of the KR. Moreover, the KR platform's networking facility will make it easier for TN participants to engage in cross-exchanges and collaborations. This will help to foster an interactive EU-wide agriculture and forestry community, providing substantial EU added-value by initiating and supporting knowledge flows across Europe and beyond. Thus, costs will be reduced and overlaps between member states will be avoided.

This community based on the EU wide open source KR may also help policy makers, ensuring that policy and practice work hand-in-hand to achieve the best outcomes in practice. This vision is extremely compatible with AKIS strategies[6] to strengthen links between research, practice, education and farm advisors, to enhance interactive innovation and support digital transition in agriculture. It will also substantially contribute to the United Nations Sustainable Development Goals[7], particularly those seeking to end hunger and promote industry, innovation and infrastructure. The common KR platform will be an interactive tool which enables a joined up approach to addressing common problems.

Acknowledgements

The Strategic Innovation Board (SIB) of EURAKNOS are gratefully acknowledged for their support, input and comments for the development of this Vision Paper especially at a meeting in Bruges, Belgium, January 31, 2020.

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Nevena Alexandrova, FAO
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