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DIVINE -
DemonstratIng the Value of agri data sharIng for boostiNg data Economy in agriculture

Deliverable D1.3

Title: Project Report Year 2

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Revision History

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30/09/2024	6	Deliverable finalisation and preparation of version to be submitted.	ICCS

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1 Executive Summary

The current document constitutes the deliverable D1.3 “Project Report Year 2” of the DIVINE project. Herein, the progress made during the second year of the project by all the partners of the consortium is presented. This deliverable is the output of Tasks 1.1, 1.2, 1.3, 1.4 and 1.5, reporting activities related to administrative coordination, technical management, agricultural coordination, risk management, quality assurance and innovation management, as well as data and ethical management, planning and assessment, which took place during the second year of DIVINE. The Project Management Handbook where all the management, administrative and communication protocols are described is also integrated into the current report.

More specifically, the current status of the work performed both on a work package (WP) level and holistically towards achieving the objectives of the project is presented against the initial planning of the respective activities and following the feedback from the activities that took place during the first year. For all the tasks of each work package, progress made along with significant results achieved during the second year of the project are reported. Moreover, potential risks, deviations from the Description of Action and corrective actions taken, if needed, are described. Then, planning of next steps and actions in the next period is reported. In the end, deliverables submitted, and milestones achieved in the reporting period are listed.

Overall, during months 13-24 of the DIVINE project, we have made significant progress relative to our identified project objectives, as discussed below. In addition, each WP has undertaken its various tasks without significant variation from the Description of Work, while the project risks were minimal during this reporting period. The project has embarked on its technical activities and piloting work and has achieved a substantial level of dissemination and communication of results. Finally, the success of the activities of DIVINE during its second year is largely attributed to the unobstructed communication and collaboration among the partners of the consortium irrespectively of the highly diverse background of each one of them.

2 Introduction

DIVINE aims to demonstrate the value of agri-data sharing to boost the data economy in agriculture. To achieve this, specific objectives have been set, including the establishment of an ecosystem to aggregate public and private agri-data and connect existing agri-data spaces; the adaptation of information models to enable agri-data interoperability; the exploitation of facilities to ensure transparency, trust and sovereignty, traceability and usage monitoring in data sharing; the establishment of an assessment framework for cost-benefit analysis of agri-data sharing and providing decision support tools to stakeholders in agriculture; the adaptation of agri-data sharing governance models and policies; the adoption of a multi-actor approach; the adaptation of data-driven business models for agri-data exploitation; and the assessment of the impact, the efficiency and the performance of the ecosystem through specific pilots.

The work that needs to be performed towards achieving these objectives has been divided into 7 interdependent WPs, which in turn are decomposed into 31 tasks, according to the DoA. All the WPs have launched their activities during the first year of the project. Some tasks have progressed to a mature stage while others are still at their infancy, in line with the timeline set in the DoA. All of them are connected with WP1 which corresponds to the management and the coordination of the entire project, encompassing tasks about administrative coordination, technical management, agricultural coordination, risk management, quality assurance and innovation management, as well as data and ethical management, planning and assessment. The current deliverable D1.3 “Project Report Year 2” is the output of WP1 tasks, and its purpose is to document the progress of DIVINE against our stated objectives, and to highlight planned vs achieved activities on a per WP / Task level.

During the second year of the DIVINE project, significant progress has been made producing important results, towards achieving the objectives and the milestones of the project without many deviations from the DoA. All the preparatory technical activities planned during the reporting period have been successfully performed, enabling the unobstructed launch of the 4 DIVINE pilots thanks to the effective communication and collaboration among the partners of the consortium. The respective preliminary achievements have also been disseminated and communicated to large, targeted groups of stakeholders. Some minor deviations from the DoA and the respective corrective actions taken due to unforeseen risks and challenges encountered during this period are justified and are taken into consideration throughout the planning of the next steps for the upcoming period of the project.

3 Planned versus Completed Work on Overall Project Objectives

3.1 Objective 1

3.1.1 Description

Establish an **ecosystem** to aggregate private and public agri data that interconnects existing agri data spaces, thereby enabling the sharing of data among stakeholders.

3.1.2 Status

The ADSE aims to create a common environment for data exchange in the agricultural sector. A major achievement has been the development of a common agricultural data model that ensures semantic interoperability. This model allows data from different agricultural sources to be easily integrated and exchanged, encouraging collaboration and innovation across the supply chain. In addition, the system's modular architecture supports both generic and pilot-specific requirements, ensuring flexibility and scalability. Finally, parts of the ADSE architecture have been deployed to support the execution of pilot round 1, while a prototype dashboard has been developed to facilitate the visualisation of the ADSE data sources.

3.2 Objective 2

3.2.1 Description

Analyse and adapt **information models** in the agriculture sector to enable data interoperability across existing agriculture data spaces, Farm Management Information Systems (FMIS), and Agricultural Knowledge Information Systems (AKIS).

3.2.2 Status

The progress made towards achieving Objective 2 is reflected on the continuous research for the identification and comparison of various existing information models aimed at enhancing data interoperability across agricultural data spaces, Farm Management Information Systems (FMIS), and Agricultural Knowledge and Innovation Systems (AKIS). Specifically, related activities focused on identifying and adopting or adjusting relevant ontologies and data models to facilitate and enhance semantic interoperability within the DIVINE AIM+. Moreover, AIM+ has been extended to incorporate new ontologies that ensure DIVINE pilots are interoperable and integrated with the model. Cross-WP activities have been conducted to provide marshalling/unmarshalling of pilot data using AIM+. Work on the establishment of API, connectors, and messaging for the data is under way. Technical/Syntactic interoperability are addressed by the DIVINE activities carried our regarding data management and integration.

3.3 Objective 3

3.3.1 Description

Enhance the ecosystem with facilities ensuring increased **transparency** in: data sharing, data **trust** and sovereignty, data traceability and usage monitoring.

3.3.2 Status

The ADSE emphasises secure data sharing and is working to integrate advanced identity management and access control mechanisms. These features are essential to ensure that data is only accessed by authorised parties, maintaining both security and transparency in the ecosystem. These advances ensure that the system meets the trust and transparency requirements that are critical to its success. Moreover, the policies related to the agri-data sector have been analysed and systematically mapped. This comprehensive analysis has significantly contributed to the achievement of Objective 3, as well as to EO2 – increased transparency, and EO3 – increased data sharing. By clearly illustrating and clarifying the regulatory landscape, policies are now more transparent and easier to understand, which fosters greater stakeholder participation. In this respect, the ADSE has integrated key European regulations, including GDPR and the Data Governance Act (DGA). These compliance features ensure that data privacy, security, and sovereignty are maintained throughout the ecosystem, fostering trust among users and stakeholders. Additionally, KeyRock Identity Management's integration with OpenID Connect (OIDC) ensures secure access to the SOCS, with a controlled process for user verification. This feature enhances the trust and security of the platform, ensuring that only authorised stakeholders can participate, maintaining data sovereignty and privacy within the collaboration space. Finally, effort has been put into facilitating the integration of the above into securing APIs, connectors, and services.

3.4 Objective 4

3.4.1 Description

Establish an **assessment framework** for cost-benefit analysis of agri data-sharing (economic, societal, environmental, climate-related, etc.) and based on these provide **transparent awareness and decision support facilities** to farmers and other stakeholders in the agriculture sector.

3.4.2 Status

Activities tackling this objective in Y2 resulted in drawing a clear landscape of all aspects related to agricultural data analytics and fusion, knowledge extraction - supporting benchmarking and KPI monitoring in agricultural settings. This aimed for the facilitation of transparent decision support

facility development for farmers and other agri stakeholders and finally for the implementation of the means for these stakeholders to define their criteria for the required decision making or benchmarking and to offer their feedback regarding the decisions and recommendations produced, as well as the estimations or predictions made by the system. Moreover, in Y2, the Consortium evaluated the benchmarking system, the input data required have been collected by the pilots, and the farmers have been provided with cost/benefit benchmarking tools. Moreover, a detailed benchmarking report quantifying the benefits of agri data sharing was conducted, while the user experience focused task delivered a self-service dashboard framework (catering web and mobile devices) capable of integrating a number of service front-ends, transformation operators and visualisation widgets. More specifically: implementation of targeted analytics algorithms over the collected raw data driven by the pilot requirements has progressed; the related SW has been integrated in ADSE to support the creation of a benchmarking system that can be used at farm level to estimate, correlate and forecast various agri specific KPIs; transparent decision support facilities have been implemented, exploiting the availability of data collected from various sources and spaces to address the needs of the DIVINE pilots and agri stakeholders. In this respect, stakeholder needs have been considered through the development of user personas and user flow workshops designed to identify and map user journeys for a variety of stakeholders. Finally focusing on users experience aspects, the developed Dashboard facilitates data analytics, benchmarking and decision support to support pilot actions and it is now customisable tailored to the their individual needs by means of interlinking multiple visualisations or manipulating service outcomes in different ways.

3.5 Objective 5

3.5.1 Description

Analyse and adapt agri data-sharing **governance models and policies** to enable their use by public and government services; mechanisms to monitor the impact of these models will be built into the ecosystem.

3.5.2 Status

Among the tasks carried out by the project we can highlight the fact that, while some tasks focused on getting a rather theoretical approach to data governance models, others focused on the practical implementation of it. What results from such an approach, is the fact that while the research and analysis of the related policies allows for a clear and less technical explanation of the current EU landscape, the pragmatic tools delivered by the project is able to create a real link between data governance models and data sharing platforms. The outputs of these activities are recorded in three deliverables produced in Y2, i.e., Validated agri data sharing policy recommendations – Release 1; Development & integration of agri data sharing governance models, policies and regulations – Release 2; and Agri data sharing policy framework adoption manual and guidelines – Release 2. The work on adaptation of the agri data-sharing governance models and policies to enable their use and

of the mechanisms enabling monitoring of the impact of these models is ongoing and will deliver its final outputs in Y3.

3.6 Objective 6

3.6.1 Description

Establish a specific **multi-actor approach** (MAA) to engage farmers and domain experts in the agriculture sector to enable co-created research design, deployment, and validation.

3.6.2 Status

Efforts have been put into the development of a framework that reports the main activities implemented to achieve a successful MAA. MAA framework requires the involvement of farmers and representative bodies such us: Farm/business advisory services, ICT and other technology providers, Manufacturers (hardware/software of sensors, IoT, devices, machinery), Agri data (space) providers (including data brokers and mediators), Policy makers / regulators / standardisation bodies / government / ministries. In this respect, requirements and motivations of users and related communities have been identified, facilitating technical and specialist knowledge exchange in the network delivering the initial version of the MAA roadmap. Finally, to support the DIVINE MAA, a survey was carried out by WFO with participants from 23 WFO National Farmers' Organisations worldwide, representing about 20 million farmers from 21 countries. Its purpose was twofold: (i) getting the farmers' perspective on the role of digital innovation in agriculture and their experience with digital innovation; and (ii) identifying which are the main challenges and opportunities for farmers in big data collection and sharing. The results of the survey guided both the DIVINE ADSE design and the pilot specifications.

3.7 Objective 7

3.7.1 Description

Analyse and adapt data-driven **business models** for increasing and extending agricultural data exploitation, as well as promotion of the project to various audiences results via suitable Dissemination and Communication channels.

3.7.2 Status

Significant progress has been made towards this objective, primarily through the efforts of WP7. The comprehensive market analysis executed, the stakeholder engagement and the development of an initial business plan have laid a solid foundation for the adaptation of data-driven business models within the ADSE. Surveys and feedback from consortium members and stakeholders have been

collected providing valuable stakeholder insights into the ADSE, guiding the development of data-driven business models. Moreover, the first version of a business plan has been delivered, positioning the project for post-project sustainability while addressing risks in the agri-tech market. Current efforts are focused on refining these strategies, incorporating insights from ongoing market trends and stakeholder needs to ensure successful post-project exploitation and sustainable agricultural data use models.

Moreover, DIVINE's objectives, key messages, and preliminary results have been effectively promoted to the diverse target audiences identified since the first months of the project. A wide range of dissemination and communication channels, tools, and activities have been employed to reach these groups. The project's website has been continuously updated, while three editions of the newsletter have been published. Our strong social media presence, marked by hundreds of engaging posts, has attracted thousands of followers. Additionally, two articles have been published in farmers' magazines, alongside six publications in scientific journals and conference proceedings. Furthermore, DIVINE has actively participated in 37 national, European, and international events, including workshops, conferences, fairs, and other high-profile gatherings.

3.8 Objective 8

3.8.1 Description

Demonstrate and assess the impact, efficiency, and performance of the ecosystem and the developed solutions via complementary pilots to be carried out engaging the wide range of related stakeholders and pilot-specific technologies and tools.

3.8.2 Status

In Y2, all four pilots have successfully completed the execution of their first round, while videos have been created for all pilots to capture the outputs of pilot round 1. To facilitate this, the pilot matrix has been revised, while a regular and structured technical forum connecting pilot actions and relevant technical work from across the three technical WPs has been established, aiming to ensure dynamic and responsive pilot support. Deployment of the pilot testbed was carried out, including the deployment of selected ADSE facilities on pilot sites. The first round of data collection was successfully completed for initial pilot impact assessment, while pilot round 1 data have been translated into AIM+. Moreover, specifications and initial integration of pilot solutions with the DIVINE ADSE and its data sharing mechanisms has been delivered. Other related activities focused on the impact assessment methodology using life cycle sustainability assessment (LCSA) and progress in technology readiness level. LCSA combines three individual assessment viewpoints (i.e., LCA, LCC, and SLCA) into a holistic assessment view covering environmental, economic, and social impacts. In line with that, first round of pilot data collection leading to assessment has been delivered. Moreover, activities ensuring cross-pilot coordination for the four pilots have carried on. Finally, he feedback obtained by pilot round 1 has been processed and considered towards the finalisation of the pilot requirements, designs, and planning for round 2.

4 Planned versus Completed Work on WP Level

4.1 WP1 – Project Coordination (ICCS)

WP1 is responsible for the overall coordination and management of the DIVINE project. Key WP1 activities include:

- undertaking the efficient day-to-day financial and administrative coordination of the project, ensuring the most appropriate distribution of resources;
- carrying out the efficient day-to-day scientific, technical and agricultural coordination of the project;
- setting up mechanisms to effectively identify, assess and manage the project administrative, scientific, technical, implementation and impact-related risks;
- ensuring the quality of the results and deliverables produced in each WP;
- putting into place effective innovation management mechanisms;
- handling the project's data and ethical management, planning and assessment.

During the second year of DIVINE, the project coordinator has been continuously monitoring the project's day-to-day operations. Periodic conference calls served as an accessible communications channel for all project members and have been supplemented by periodic meetings at Work Package (WP) level. The structure and the rigorous frequency of the above-mentioned calls has proven instrumental in maintaining the project focus while periodic face-to-face meetings have taken place as well. The coordinator has also collected and revised information from internal Quarterly Financial Reports (QFRs). The reports are focused on PM resource utilisation, deviations from the initial plan and potential risks that should be addressed in time. Documentation, which encompasses meeting minutes, partner presentations, deliverables, risks is accessible via the project's private portal. This effort will continue throughout the project's lifetime, providing an overview and a progress update of the work in relation to the project objectives pursued.

The technical manager of the project has led the project's technical coordination to ensure that the definition of technology and development strategy fulfil the project objectives and targeted outcomes and has driven the technical integration of the DIVINE technology outputs ensuring that all technical milestones are delivered to a high standard. Furthermore, continuous monitoring of risks is taking place, while a risk register is maintained.

All these activities have been performed in accordance with the DIVINE Project Handbook, which has been delivered since the first months of the project. Moreover, the data management plan has been revised and the updated version is integrated into the current report. Finally, the project's website is being continuously updated since its creation in the first months of the project. Overall, during the second year of the project, the respective WP1 tasks proceeded as planned and the WP1 partners carried out their duties as decided upon and no deviations have occurred so far. In M24, the current deliverable, D1.3 "Project Report Year 2", reporting for the overall project for Year 2 from administrative, technical, integration, innovation, legal and ethics perspectives is planned to be submitted on time.

4.1.1 Task 1.1

Task	Title (Leader, Duration)
1.1	Administrative Coordination (ICCS, M01-M36)
Contributors	ICCS

Summary of Progress during Year 2

During the second year of DIVINE, Task 1.1 guaranteed all administrative coordination processes and tools for the project, as agreed and documented in the Project Handbook delivered in Year 1. More specifically, it ensured the agreed communication procedures, as well as suitable time and human resource management and allocation, especially with regards to the project's deliverables and internal documents. Moreover, it handled any communication with the European Commission and respectively reported on the project's progress. It handled the organisation of two plenary meetings (one remote and one physical in Rome, Italy). It was also responsible for the project's finance administration payment management and budget distribution. Finally, it ensured the maintenance and update of the DIVINE website. All items above have been sufficiently addressed and have led to tangible outputs described below.

Significant Results during the Year 2

It coordinated the collection of QFRs from all partners aiming to closely monitor the financial resource consumption across the various WPs/Tasks and early detect any deviations (i.e., cases of partners or Tasks over- or under-spending their allocated resources).

Moreover, under Task 1.1, the **DIVINE website** (https://divine-project.eu/) is being maintained and updated, especially its "News" page that features the latest news of the DIVINE project in reverse chronological order, after its launch since the first months of the project.

Finally, the current deliverable, D1.3 "Project Report Year 2", reporting for the overall project for Year 2 from administrative, technical, integration, innovation, legal and ethics perspectives has been prepared.

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

No significant risks have been identified during this period or deviations from the DoA.

Next Steps in Next Period

Task 1.1 aims to carry on its administrative coordination activities in the next period, integrating comments and results from the first review conducted in Year 2 into the project planning. Moreover, as soon as all QFRs of partners for year 2 are delivered to the coordinator, there will be a crosscheck against the planned resource consumption and the actual resource consumption for the period M13-M24, aiming to identify considerable under and overspending cases or cases where the cost claims are not aligned with the outputs delivered. In case any amendment is required in this respect or for any other management or technical reason, this task will be

responsible for preparing the respective DIVINE contract amendment. Finally, this task will carry on maintaining the project's website and keeping it up to date with any new developments.

4.1.2 Task 1.2

Task	Title (Leader, Duration)
1.2	Technical Management (SETU, M01-M36)
Contributors	SETU

Summary of Progress during Year 2

T1.2, which runs for the duration of the project, continued its work through duration of the 2nd year of the project. Year 1 was primarily focused on gathering requirements, and developing baselines for the pilots, year 2 has been about progressing those solutions, gathering requirements for their integration into a common platform, and the commencement of that integration effort.

Technical management has focused on an overview of all technical activities across the project – primarily Work Packages 2 to 5, but also touching upon relevant activities in WP6. As outlined in the Year 1 report (Deliverable 1.2), this has taken an agile style approach to the activities whereby iterative development cycles known as **sprints** take place. The sprint activities can be summarised by following steps (refer to D1.2, section 4.1.2 for fuller explanation): i) gather requirements; ii) plan; iii) develop; iv) deploy; and v) evaluate.

Weekly **stand-up** meetings were, and continue to be, held. These alternate between having a technical focus and being pilot focused. This gives all stakeholders an appropriate platform to discuss their work – both completed, and upcoming. The technical meetings allow partners working on solutions to discuss progress, highlight any technical issues they may be having, and discuss with the other partners. The pilot meetings are more end-user focused with pilots being able to discuss what data they are gathering, identify the most appropriate technical partner to help them exploit it, and what results they are achieving.

The idea for both types of stand-up is that they are high-level in nature, and should be short in nature, with typically a 30-minute duration. A minor change in the running of technical stand-ups took place after the completion of reporting period 1. Initially these were task focused, with progress on T2.1, T2.2... etc., being solicited. The issue with this was that several tasks have already completed, others are dormant at a particular point in time, or in some cases partners may not have been able to attend. This has changed to a focus on the individuals present and what they are doing. These status updates allow for work to be scheduled and tracked in Gitlab which in the longer term will be more productive in terms of an overview of effort. While wherever possible substantive issues are avoided in the stand-ups themselves, they frequently highlight the need for a separate meeting between relevant partners to discuss issues, and

provide a platform for these to be scheduled.

Roll out of the DIVINE platform (tasks 2.5/5.2) commenced during the period. This was preceded by a requirement gathering process among the technical partners to precisely identify the infrastructure requirements to deploy their services.

Significant Results during the Year 2

Several milestones were achieved in year 2 of DIVINE. MS3 for the commencement of pilot round 1 and achieved by the delivery of D5.1; MS4 for the delivery Reference Architecture Specification, Stakeholder Ecosystem Creation and initial Impact Roadmap & Assessment completion (D2.2 plus D7.2, D7.3, and D7.4); MS5 for the completion of completion of pilot round 1 execution & evaluation (D5.2, D6.3); and MS6 for the delivery of the DIVINE Enablers, Services, Integrated Ecosystem and Agri Data Sharing policy framework Release 2 (D2.3, D3.2, D4.2, D6.4, and D6.5).

Significant results were achieved in deployment of the DIVINE infrastructure and making it available to the technology providers and pilot partners were achieved which will be covered in more detail in the sections on T2.5 (section 4.2.5) and T5.2 (section 4.5.2).

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

While no major risks or deviations in any way detrimental to the delivery of DIVINE occurred in the period, a couple of deviations from the grant agreement were made in order to facilitate that delivery.

Firstly, for operational reasons, full deployment and integration of the platform did not take place during pilot round 1 in the lead-up to the end of reporting period 1. This was to avoid deployment considerations becoming an impediment to the execution of the functionality for round 1. Furthermore, this delay has allowed identification of the required platform resources. Work began immediately in RP2 for the deployment and provisioning of the platform, and integration of the services, so this will have no ultimate impact on the final delivered solution.

Secondly, as work progressed, a significant overlap between tasks 2.3 and 4.4 - led by VICOM and SETU respectively – became apparent, both dealing with aspects of dashboarding and user experience. For the sake of producing a cohesive user experience, rather than strictly delineating the work, both tasks have worked closely together. Similar synergies exist between aspects of tasks 2.5 (integration and deployment) and 5.2 (pilot testbed, applications, and deployment) and both tasks have seen a fair degree of overlap. As both are these tasks are led by SETU, coordination of effort is not an issue, and will have no detrimental impact on the final result.

Next Steps in Next Period

The primary task in year 3 will be overseeing the completion and evaluation of pilot round 2, ensuring the appropriate technical resources are available to achieve this, and coordinating the integration efforts for the DIVINE platform.

4.1.3 Task 1.3

Task	Title (Leader, Duration)
1.3	Agricultural Coordination (CREA, M01-M36)
Contributors	CREA

Summary of Progress during Year 2.

This task supports WP1 Working with the project coordinator to monitor and direct all aspects related to the coordination of multi-actor approach (MAA) of the DIVINE (D1.1) and WP7 eensure a coherent set of practices and activities across the project, including proper implementation of the MAA (D7.4).

Significant Results during the Year 2

The main results are implementation of MAA in DIVINE is build on different blocks. A first in cooperation with task T7.4, CREA supported the develop of framework that report the main activities that will be implemented to achieve a successful MAA. MAA framework develop the original map DIVINE project following the involvement of the farmers and representative bodies such us:

- Farm/business advisory services
- ICT and other technology providers
- Manufacturers (hardware/software of sensors, IoT, devices, machinery)
- Agri data (space) providers (including data brokers, mediators, ...)
- Policy makers / regulators / standardisation bodies / government / ministries

In this context CREA has monitor partner FE will identify and map various motivations of users and establish segments of the community, facilitating technical and specialist knowledge exchange in the network in Initial version of MAA roadmap to be released at ID (M03). In addition CREA contributed to writing and internal review of D7.4. end-user is facing. As DIVINE IS building innovative solutions that address specific needs or problems, while involving the end-user in the process, the resulting product is highly adopted CREA supported the consortium's points of view regarding DIVINE's business model structure through the survey (Task 7.1 that gives rise to D7.2). This includes the identification of challenges, requirements and stakeholder mapping. In addition, we have proposed a structure for pilot round 1 evaluation in support to WP5, a summary reports on the main outcomes of pilot actions and the lessons learnt within, with an outlook to prospective follow-up actions and potential transfer of the results, through performance KPIs as a more objective, number-based assessment and end-user acceptance as a more subjective assessment that considers those people by questionnaires administered to pilot users. Tools used to evaluate pilot activities:

- performance KPIs as a more objective, number-based assessment
- end-user acceptance as a more subjective assessment that considers those people by questionnaires administered to pilot users

CREA elaborates a proposal of structure for the third edition of the Divine newsletter and ToC of

white paper. The structure of the newsletter and white paper has been mainly focused on the work of the pilots. ToC defines the content of the white paper with the content diversified on the specific results achieved by the pilot with focus on round 1 pilot results. In addition, CREA contributed to writing D6.4, D6.5, D7.2, D7.3.
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
No risk detected.
Next Steps in Next Period
Based on the pilot round 1 feedback, any updates to monitor the MAA activities that will be developed for individual pilots. Pilot MAA activity report to satisfy the stakeholder engagement goal in the pilot, in coordination with WP7. In coordination of WP5, will develop template and survey to capture the exact numbers of farmers that the pilot engages in any way and a survey to all pilot participants to gain a better understanding of activities that are being carried out withing pilots, planned in January 2025.

4.1.4 Task 1.4

Task	**Title (Leader, Duration)**
1.4	Risk management, Quality Assurance & Innovation Management (ICCS, M01-M36)
Contributors	ICCS, ENG
Summary of Progress during Year 2	
This task has been responsible for the design and implementation of suitable quality assurance processes across the project. Additionally, this task also established the project risk management and issue tracking system using a tabular format suitable for the size and complexity of the project. It carried out continuous risk monitoring & management during the first reporting period, including the maintenance of the risk register. Finally, it establishes links with the Technical Manager and Task 1.2 (Technical Management), as well as the Exploitation Manager and Task 7.1 (Exploitation strategies, market analysis and business modelling) to ensure that the implementation and integration activities are adopting contemporary best practice and market developments and the innovations targeted by the project are still valid and will eventually find their way to the market via adequate exploitation and business plans.	
Significant Results during the Year 2	
During the second year of the project, the work on this task focused on the specification of a sufficient quality assurance process focusing on the timely preparation of high-quality deliverables that meet the project's objectives and fully address the DoA. In this respect, the collaboration of the various partners is required and a deliverable review process is set that foresees two rounds	

of internal reviews before the delivery of the project's outcomes to the EC. In addition to the deliverable review process established, a list of appropriate, available reviewers for each document was set in place. All deliverables submitted to the EC during the second year of the project's lifetime have been through this quality assurance review process prior to submission/delivery. Regarding the innovation management process, this activity is strongly related with Task 7.1 of WP7; the innovation process has identified the relevant players, both inside and outside the consortium and has also observed the market evolution to adapt the project if necessary. The risk management process has been specified focusing on risk identification, update, maintenance and tracking. The consortium is committed to adopt best practice and market developments, and to closely align partners' efforts with the project's objectives. A risk description template has been designed and agreed upon and the identified risks have been described based on this template.
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
No significant deviations from the project workplan. The risk register needs to be updated and a well described process of regularly updating is missing. There is therefore the chance of a late identification of a new risk and the late identification of the respective mitigation/contingency plans. In relation to the Innovation management, further assessment and monitoring should be conducted to ensure IPR is cleared or that the commercialisation plans have no conflict with the rights held.
Next Steps in Next Period
Continue with quality reviews and refine innovation management practices. Revise the risk monitoring process to ensure that the risk register is regularly updated by the right people to ensure early identification of new risks and contingency/mitigation plans.

4.1.5 Task 1.5

Task	**Title (Leader, Duration)**
1.5	Data and ethical management, planning and assessment (DIGI, M01-M36)
Contributors	DIGI
Summary of Progress during Year 2	
During the Y2, progress is made on semantic description of (pilot) data collected, its translation using AIM+. In addition to that, the partners are continuing discussions on research data handling	

after DIVINE conclusion and release with an open access license.
Significant Results during the Year 2
The results during this year include the semantic description of data including translation using AIM+. There is no separate deliverable planned from T1.5 and the progress is described in Deliverable D1.3.
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
No risk or deviations from the DoA.
Next Steps in Next Period
During the next period, T1.5 will finalise the data management plan of DIVINE. The final version will describe data collected, processed, and generated during project lifecycle, information on handling research data after DIVINE conclusion, data released with open access license, and curation/preservation steps taken. The outcomes will be captured in the final report of DIVINE.

4.2 WP2 - Ecosystem Architecture and Technical Integration (SETU)

WP2 provides the technical foundation for DIVINE. It is supporting the development of the ecosystem and data extraction/analysis in WP3 and WP4, and it will ensure the pilots' requirements are included in the final suite of tools for validation in WP5.

WP2 delivered 2 deliverables during year 2; D2.2 - *DIVINE Reference Architecture* – captured the comprehensive DIVINE RA, building on the outputs of projects such as Demeter, and D2.3 - "*DIVINE technology integration tools - Release 2*" - reporting the work undertaken by tasks 2.2/2.3/2.4/2.5 in the first reporting period WP2. Furthermore these deliverables contributed to two milestones in the period; D2.2 to MS4 - "*Reference Architecture Specification; Stakeholder Ecosystem Creation and initial Impact Roadmap & Assessment completion*", and D2.3 to MS6 – "*DIVINE Enablers, Services, Integrated Ecosystem and Agri Data Sharing policy framework Release 2*".

The work has seen the deployment of the Stakeholder Open Collaboration Space (SOCS) in T2.4; a prototype dashboard for data visualisation in T2.3; and deployment of the DIVINE platform infrastructure which will facilitate the work of these other tasks, and that of WP3, WP4, and WP5.

4.2.1 Task 2.1

Task	**Title (Leader, Duration)**
2.1	DIVINE Reference Architecture (ICCS, M01-M18)
Contributors	ICCS, SETU, ENG, DIGI, CREA, IDSA

Summary of Progress during Year 2

During this second year a wide range of activities have been undertaken by T2.1 focusing on finalization the definition of the DIVINE Reference Architecture (RA). One of the project's key objectives is to establish an ecosystem to aggregate private and public agri-data that interconnects existing agri-data spaces, thereby enabling the sharing of data among stakeholders. The DIVINE RA that has been developed is suitable to address these challenges in the agrifood domain.

The DIVINE RA has been based on the development of several enablers, some of which are basic/mandatory (e.g., data model, interoperability, communication, security), while others are optional and developed as needed (e.g., visualisation tools, analytics and decision support enablers for specific applications) and are put down as enhanced enabling services. These enabling services are provided and consumed, first, via the DIVINE Agri Stakeholders Open Collaboration Space, accessible by end-users through the DIVINE Dashboard and Open APIs, and second, via the DIVINE Agora that provides all resources needed for the development of DIVINE-enhanced applications, as well as the integration and deployment of the developed tools and enabling technologies.

Subsequently, the actual RA has been designed via the specification of the following viewpoints:

- high-level view of the entire architecture
- functional viewpoint of the RA elaborating on the main functional blocks and components and on the interdependencies among these
- process view describing the system processes and how the components interact
- data viewpoint, highlighting the data flows and the components needed to manage the main data processes
- deployment viewpoint dealing with the topology and connections of software components on the physical layer when applications are deployed

Specific RA instantiations (and the respective enabling services) have also been defined, tailored to the needs of each DIVINE pilot to be implemented for pilot round 1, while some guidelines for GDPR concerns to protect the data and privacy of the various DIVINE stakeholders have been provided. After the delivery of the DIVINE RA, Task 2.1 has continued steering the RA implementation and collaborates with all the other WP2 tasks supporting (as needed) the development of the actual RA components, as well as with WP3, WP4 and WP5 to ensure that the RA fully addressed their needs and objectives.

Significant Results during the Year 2

The main outcome of the Task 2.1 during the second year of DIVINE include the preparation and release of Deliverable 2.2 ("Final reference architecture"). More detailed results achieved in the process of producing the DIVINE RA are highlighted below:

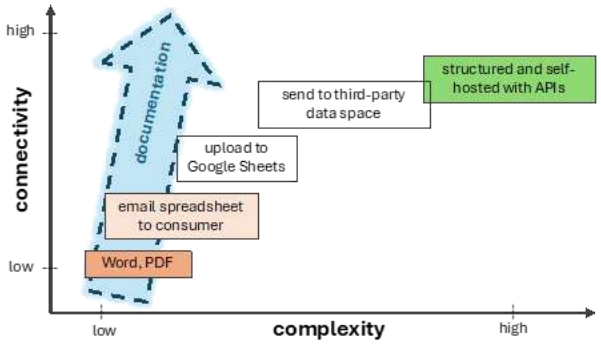
- the design of the final reference architecture, the definition of its key components and its thorough documentation via the definition of several architectural viewpoints (i.e., high-level, functional, process, data and deployment views)
- on-going support for the development of the architecture components and enabling

services for the pilots
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
While we have released the DIVINE RA that aim to sufficiently address all the needs and requirements, Task 2.1 has and will be constantly monitoring the implementation of this RA, related both to the development of the various architecture components developed by the tasks of WP2 and their usage upon pilot execution. This way it becomes possible to early identify any potential problems or omissions in the RA design. The RA has been originally planned and released on M18, described in Deliverable D2.2. This has not allowed Task 2.1 to consider the pilot round 1 evaluation findings and the revised stakeholder requirements of WP5. In case the feedback of the pilots incurs significant updates to the RA, these can be included in final WP2 deliverable to be delivered upon its completion.
Next Steps in Next Period
Task 2.1 has concluded its core activities with the delivery of D2.2, but the task still needs to monitor the implementation of the RA in the respective components of WP2 and the usage upon pilot execution.

4.2.2 Task 2.2

Task	**Title (Leader, Duration)**
2.2	Technical Interoperability, Connectivity and Service Provisioning (SETU, M03-M22)
Contributors	SETU, ENG, IDSA, ADSC
Summary of Progress during Year 2	
This task culminated with its contribution to D2.3, submitted on 31-July, 2024 (M22). Following on from its interoperability work in Year-1—which was captured in D2.1, submitted on 30-Sept, 2023 (M12)—this task primarily focused on data connectivity in Year-2.	
Significant Results during the Year 2	
The main results from T2.2 in Year 2 were (i) its contribution to D2.3, and (ii) a conference paper written and presented at the IEEE-COINS event in July, 2024. The chapter on T2.2 in D2.3 focused on data connectivity and compliments the interoperability work covered in D2.1. Connectivity could be considered the next step for agri-data owners after interoperability, but it moves more from the layman's description of interoperability into terms and concepts more readily found in software engineering (e.g. API, JSON, endpoint, etc.). The T2.2 chapter therefore begins with a short guide to terminology and concepts, before revisiting the existing data spaces listed in D2.1 and providing additional information on their connectivity options. Next it describes a worked	

example of building connectivity into a data source, and it concludes with a summary of the different stages of increasing connectivity for data owners. The infographic below is based on this work.



Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

Similar to the risk for Year-1, the main risk for T2.2 in Year-2 was that the technical work would be developed in isolation and would not involve the end-users (both internally via DIVINE partners and externally via other agri-data owners). SETU worked with the pilots during Year-1 to ensure this did not happen, and therefore the same approach was adopted in Year-2, with regular updates provided to the pilots on the progress of the work and subsequent discussions on same.

Next Steps in Next Period

T2.2 formally finished at M22, as per the GA. However, the task remains open to support the pilots as they continue their work. Equally, T2.2 will work with T2.5 (both led by SETU) to ensure appropriate hand-over of work and follow-up of any outstanding issues for the remainder of the project.

4.2.3 Task 2.3

Task	**Title (Leader, Duration)**
2.3	User Interfaces and Adaptive Dashboard Visualisations (VICOM, M05-M22)
Contributors	VICOM, DIGI, ENG

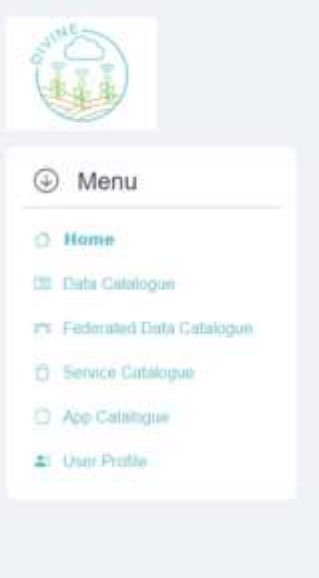
Summary of Progress during Year 2

The version of Knowage used during the first year presented important limitations in the generation of interfaces for data exploration. The dashboards created were static, and queries made to external services were frozen, preventing data updates. In addition, it did not have a virtual environment that allowed the integration of Python code to adjust or adapt the data before exploration and visualization on the platform. The new version of Knowage tackles and eliminates these limitations.

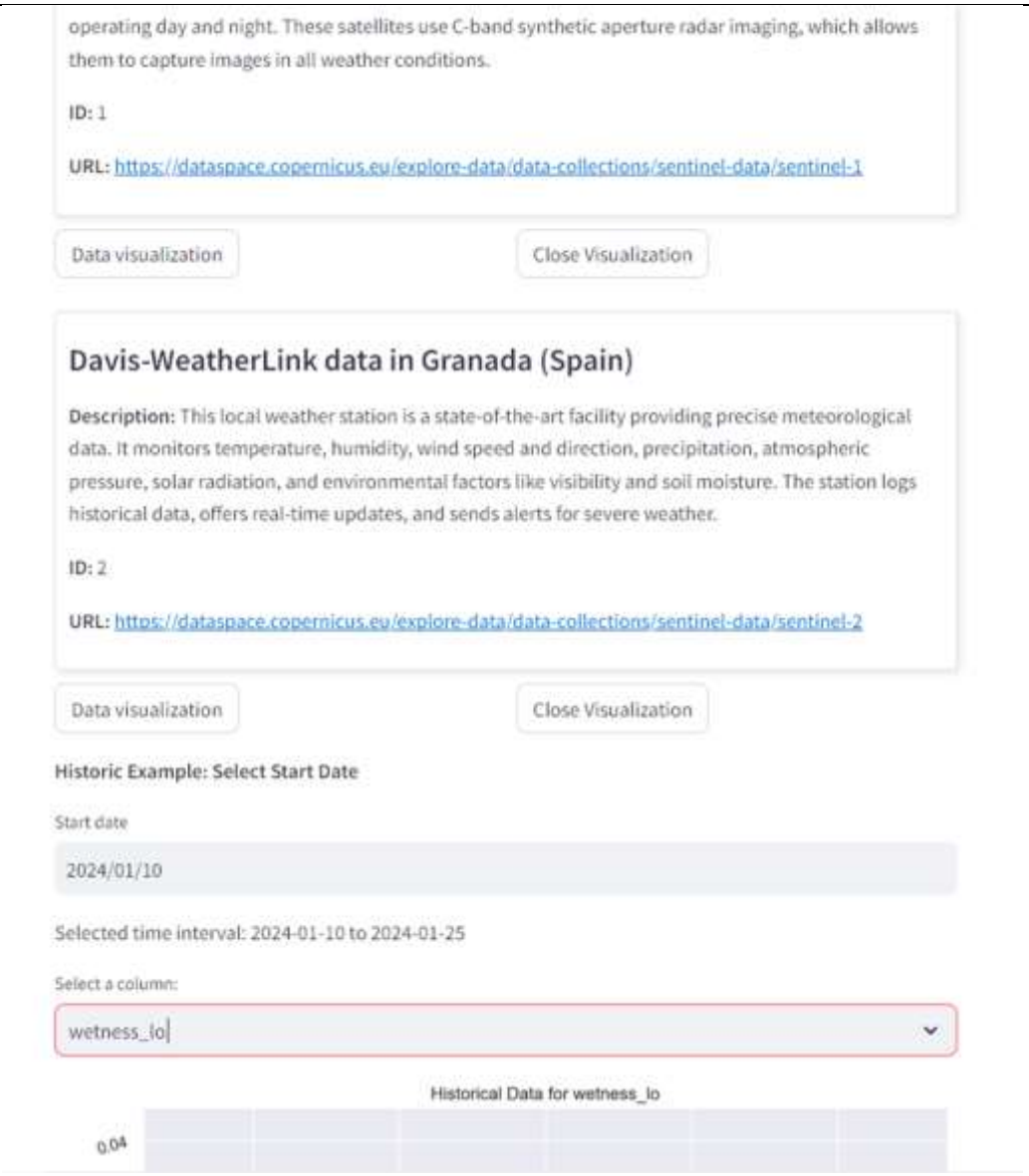
There was also a visualization objective not clearly defined in the project: the creation of a dashboard that would provide access and visibility to the various services of the DIVINE data ecosystem, such as service catalogs and data registered in Keyrock. Therefore, during the second year, it was agreed between ENG, VICOM and WIT that the T2.3 task would focus on the development of a prototype interface that would connect to the various services in the DIVINE data space.

Significant Results during the Year 2

The most significant result of the second year is the web service prototype developed with Streamlit, which provides access to the various services of the DIVINE Agriculture Ecosystem. On one hand, access to the catalogue of services registered in Keyrock has been enabled. Additionally, optional services have been implemented, such as data visualization and the display of information on the different available roles, along with their associated permissions. Furthermore, the option to connect the data catalogs of two fictitious users hosted in MinIO has also been enabled. In MinIO, buckets serve as fundamental storage units where objects (files or data) are stored.



This is the home page of the DIVINE DATA SPACE ECOSYSTEM.



Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

The main challenge of this prototype, and of this task, lies in the difficulty of aligning its design with the requirements of the typical users of data spaces in the agricultural sector. In order to create a design adapted to the needs of the users, individual meetings were held with the representatives of the different pilots, mockups were made to visualize the different functionalities detected, and a survey was conducted to evaluate the usefulness or prioritization of these functionalities according to the user profiles. Although these surveys are not statistically significant, given that only 12 professionals participated, they allowed us to evaluate the difficulties of the process. These difficulties have been collected in a white paper for future similar situations.

Next Steps in Next Period

The next step will be to evaluate, not the mockups, but the prototype itself developed with

Streamlit to access the different services. Individual meetings will be organized with the representatives of the different pilots, and surveys will be conducted during the next General Assembly to evaluate the prototype through a demo. Subsequently, the necessary adjustments will be made to improve its design.

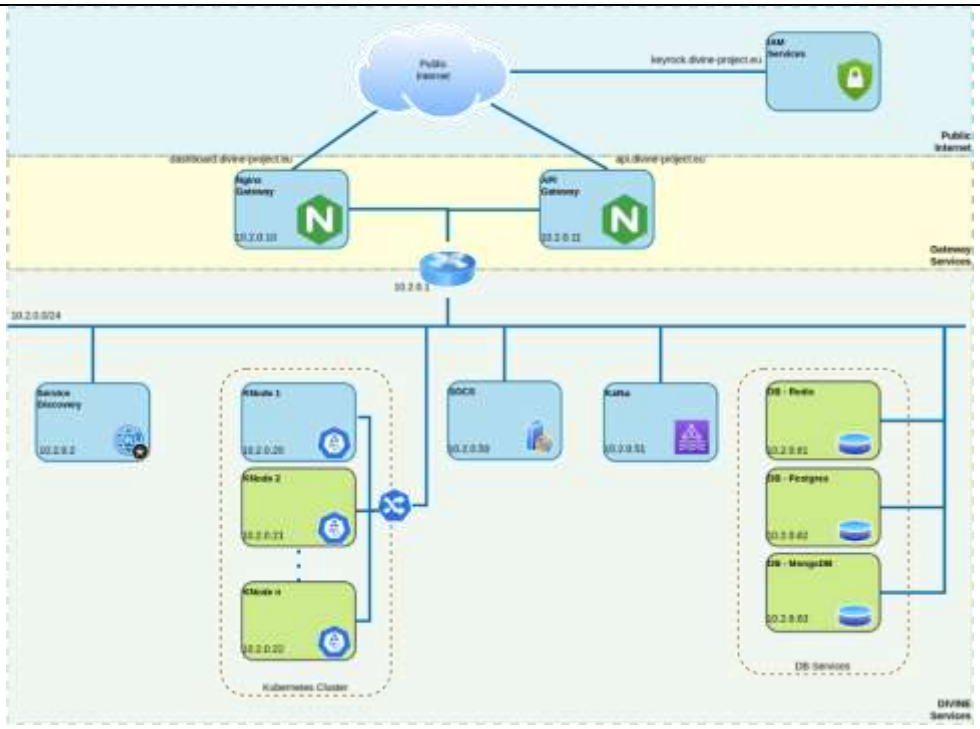
4.2.4 Task 2.4

Task	**Title (Leader, Duration)**
2.4	Stakeholder Open Collaboration Space (ENG, M03-M22)
Contributors	ENG, VICOM, DIGI
Summary of Progress during Year 2	
During the second year, significant strides were made in developing the **Stakeholder Open Collaboration Space (SOCS)**. The platform's architecture, built using Liferay and DYMER systems, was established to foster stakeholder engagement and collaboration. A key development was the **integration of KeyRock**, the project's Identity Management (IDM) system, ensuring secure access through OpenID Connect (OIDC). Users were able to join the platform and interact through personalized profiles, notifications, and chat functionalities. Additionally, new templates were created to allow stakeholders to search and collaborate with other organizations by country, skillset, and technology. These enhancements contributed to improving the usability of the SOCS and the efficiency of resource allocation within the ecosystem.	
Significant Results during the Year 2	
During the second year of the project, significant progress was made with the integration of KeyRock into the Stakeholder Open Collaboration Space (SOCS), enabling secure access through OpenID Connect (OIDC). This improved the platform's security and user management. The SOCS platform also became fully operational, allowing users to create profiles, receive notifications, and engage in collaborative chats. Customization features were introduced, making it easier for users to search and connect with others based on specific attributes such as country and skillset. Additionally, the SOCS architecture was further developed using Liferay and DYMER.	
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested	
During Year 2, one of the primary risks involved communication challenges between technical developers and end users, which complicated the process of defining platform functionalities. A deviation from the original plan occurred when the focus shifted from developing standalone data visualization tools to creating a more integrated platform for accessing the DIVINE ecosystem. To mitigate this, corrective actions were taken by organizing individual meetings with pilot users to align the platform’s functionalities with user needs, ensuring a better fit for data visualization and	

collaboration.
Next Steps in Next Period
Given that the task has been completed in M22, the next steps will focus on maximizing the efficiency of the existing resources. This will involve optimizing the current platform functionalities without adding substantial new features. The team will concentrate on fine-tuning the integration of services, ensuring that the platform is stable and user-friendly, and addressing any outstanding technical issues. Additionally, efforts will be directed toward finalizing any incomplete components, improving documentation, and supporting users to ensure smooth operation across pilots. While new developments may be limited due to resource constraints, the emphasis will be on consolidating progress made thus far and ensuring the platform meets its intended objectives.

4.2.5 Task 2.5

Task	**Title (Leader, Duration)**
2.5	System Integration, Deployment Tools and technical support of pilots (SETU, M07-M33)
Contributors	SETU, ENG, ICCS, DIGI, VICOM, IDSA, ADSC
Summary of Progress during Year 2	
The primary task of T2.5 in the period has been to work with the other task leads in WP2, as well as the Work Package leads for WPs 3-5 to provide a platform for the deployment of the DIVINE software artifacts. In the interests of progressing pilot round 1, the technical partners working with the pilot partners have produced individual solutions and demonstrators. This has allowed their attention be concentrated on the actual work to provide the solutions without platform considerations acting as a distraction. In parallel, through oversight of the technical work, requirements for the deployment platform specifications were gathered. This was complimented by a survey of infrastructure requirements carried out towards the end. With these results it was possible to specify and deploy the infrastructure – described in the significant results section below. This has required working closely with the other partners – T2.3 for integration of SOCS; T3.2 for high availability message brokers; T3.3 for data sovereignty; T3.4 to specify connecters for data spaces; tasks 2.3 and 4.4 for dashboarding; tasks 4.1 and 4.3 for service provision.	
Significant Results during the Year 2	



The figure above shows a schematic for the DIVINE deployment platform. The platform is provisioned on SETU's OpenStack cloud platform and is based on a secure private platform accessed via a public proxy using Nginx.

Kubernetes serves as a deployment platform for the software artifacts, and management of that deployment is via Helm[1]. Complementary to this are the Continuous Integration (CI) services provided by Gitlab. When a feature is pushed to Gitlab, the associated CI script is run. Several example services have been provided to illustrate this with the following CI pipeline steps: i) **build** – build a Docker image for the artifact; ii) **test –** run the test suite and code coverage for the artifact; and iii) **deploy –** if both previous steps are successful, tag the built version and push it to the container registry provided by Gitlab from whence it can be deployed.

Identity and Access Management is provided by Keyrock and at the time of writing is being integrated as a demonstrator with the test services.

Activities for T2.5 have been reported in D2.3 (NB., this does not cover the entire period of Y2).

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

It had originally been intended to add Continuous Deployment alongside CI. To date this has not been done, as it requires comprehensive test suites for the services to be confident of success. Deployment without being properly tested bears the risk of a service being automatically deployed to the production service. As it's difficult to enforce a software testing methodology across multiple development teams across several organisations, for now the deployment process

[1] Helm – The package manager for Kubernetes; https://helm.sh/

will have manual oversight. Since the number of software artifacts will not be unmanageable even considering the second pilot round, this will have no significant impact on project delivery. For demonstration purposes, should time allow, some services may be enabled for continuous deployment, but this will not be at the expense of more important project objectives.
Next Steps in Next Period
Completion the integration of the Identity and Access management system and associated reference documentation is the immediate goal. Attention will then turn to integration and deployment of the existing services and newly developed solutions, and the provision of connectors to external dataspaces. Close cooperation with the WP5 partners will be ongoing to validate and evaluate the platform.

4.3 WP3 - Agriculture Data Space Ecosystem (ENG)

WP3 handles data extraction, modelling, and sharing for the agrifood sector. It defines technical requirements, ensuring interoperability, security, and integration. This data is integrated into the DIVINE Agriculture Data Spaces Ecosystem (ADSE), enabling seamless, secure data sharing across diverse systems. WP3 also supports WP5 pilots in deploying its models and modules.

The main output in M12-M24 is D3.2 - Agricultural Data Space Ecosystem, which builds on the initial WP3 prototype. This version features enhanced data models, improved enablers, and additional modules. It integrates feedback from the first round of pilots and the work from Tasks 3.1 to 3.4. Although it's not the final version, this iteration is prepared for broader pilot testing, paving the way for further refinements.

4.3.1 Task 3.1

Task	**Title (Leader, Duration)**
3.1	Common Agricultural Data Models and semantic interoperability (ICCS, M01-M19)
Contributors	ICCS, ENG NP, IDSA
Summary of Progress during Year 2	
Various activities took place during this second year of the DIVINE project under Task 3.1 concerning the establishment of the DIVINE Agriculture Information Model+ (AIM+). The model is crucial for the whole project, since the whole data pipeline and the project-enabled applications need to be encoded accordingly. The end goal is to facilitate the interoperability between well-	

known and/or dominant existing solutions and DIVINE and deploy the relevant mechanisms.

Driven by the results following the analysis of the State of the Art and the subsequent definition of the technical requirements related to the Information Model, we have been able to identify the necessary updates, and we developed the respective ontologies that extend the Model. The new additions are relevant to the pilots' activities and needs and concern the description of data from field operations or deployed algorithms, like the "Plant Count Tool" and the "Yield Prediction Model".

Next, the possibility of extending the interoperability between DIVINE and other agri data spaces is still being examined and this research keeps going as new initiatives emerge. The translation mechanisms from and to AIM+ have been revised and the model is extended with the appropriate semantic mappings, as well.

Finally, Task 3.1 collaborates with the other tasks and mostly those related to the pilots' roll-out and the development of the enablers that comprise the DIVINE ecosystem, especially as regards the data sharing and compatibility with AIM+.

Significant Results during the Year 2

Preparation of the section for AIM+ in D3.2, contributing to MS2. The significant results can be summarised as follows:

- development of the necessary ontologies to facilitate pilot data representation to AIM+
- research and identification of the policies and regulations to be reflected on the Model
- significant work on the infrastructure towards the interoperability with other agri data spaces

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

The main danger for the task is the fact that data in the agriculture domain come from various, heterogeneous sources and consequently, the pilots happen to use data that are not standardised or are modelled for specific cases. Such data are not essentially compliant with our Information Model. This threat is tackled by working in close collaboration with WP5 and the pilots to implement wrappers and similar translating mechanisms to match the AIM+ format. After the initial pilot roll-out and by analysing the respective data, we were able to identify and work on the required updates to the Model.

Another tricky point is the extension of AIM+. Doing this in a sub-optimal way can really hinder the proper representation of concepts, integration of pilots and data interoperability. The way to tackle this is reusing terms from dominant and well-known ontologies as much as possible and only defining new concepts when necessary.

Next Steps in Next Period

First, the maintenance of the AIM+ remains one of the most crucial parts of Task 3.1 and we are ensuring that all semantic mappings and alignments remain valid, since some data models are also

updating and editing is needed for the semantic interoperability to keep happening.

Second, there is still ongoing work to update AIM+ to include necessary terms, concepts and definitions to be in line with the appropriate regulations and policies suggested by the EU, agricultural sectors, etc. This work will be crucial for the establishment of interoperability with other data spaces.

Third, we are constantly looking to extend and enhance the model with additional concepts that are missing and are necessary for our pilots or are important to achieve interoperability with some other model. Emphasis is given on new initiatives that produce outputs in the representation of agrifood data, while some updates are still ongoing to cover the pilots' needs.

Finally, we are always collaborating and supporting the remaining tasks that develop enablers that need to be compatible with the Information Model or are just involved in the data pipeline.

4.3.2 Task 3.2

Task	**Title (Leader, Duration)**
3.2	Data Management and Integration (DIGI, M03-M21)
Contributors	DIGI, ENG, VICOM
Summary of Progress during Year 2	
This task supports WP2 with integration of the AIM+ interoperability mechanism to pilot data sources and discovery through service registry. In addition to that, it has implemented a data pipeline using open-source Kafka for Big Data integration into the DIVINE ecosystem.	
Significant Results during the Year 2	
The main results are implementation of three DIVINE building blocks – (a) data pipeline for data integration using Apache Kafka, (b) AIM+ integration with pilot data sources for management and integration, and (c) service registry for other services to publish their API description. These results are reported in Deliverable D3.2.	
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested	
No risk/deviation detected.	
Next Steps in Next Period	
While preliminary testing of the above building blocks are done in the pilots, during the next period, they will be scale up as necessary and supported technically.	

4.3.3 Task 3.3

Task	Title (Leader, Duration)
3.3	Data Transparency, Protection, Trust, Sovereignty, Traceability & Usage Monitoring (VICOM, M03-M21)
Contributors	VICOM, DIGI, ENG, IDSA

Summary of Progress during Year 2

The core of the Identity Management system was developed mainly in year 1. During year 2 the following results have been achieved

- Traceability Module with blockchain technology
- Personal Wallet improvement
- Solving minor issues raised this year
- Writing a paper for a conference
- DIVINE user support and preparation of user manuals

Significant Results during the Year 2

During the year 2, the improvement of the identity management system has continued through a Self Sovereign Identities (SSI) approach. For example, a traceability module has been developed that collects the events produced in the IdM by leveraging the Ethereum blockchain deployed to support the SSI system. The traceability module is mainly based on a Smart Contract that allows interaction with a table that stores event data (date, type of event, user responsible for the event, other data).

In addition, we have supported DIVINE users so that they can integrate their services into the IdM. For example, ENG's SOCS application has been successfully integrated into our system. Finally, taking advantage of the novelty of our IdM system, progress has been made in the writing of some scientific articles. For example, the one published in 2024, which was drafted in year 2: CredSSI: Enhancing Security and Privacy with Self-Sovereign Identities Approach (https://ieeexplore.ieee.org/document/10503044).

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

No risks or deviations have been identified this year. It is also noteworthy that the risks detected in year 1 regarding the possible difficulty of integrating external services with the IdM and the future acceptance of new users have been resolved.

A couple of applications have been correctly integrated and users are registering in the system, interacting through their Personal Wallet with the applications and services offered.

Next Steps in Next Period

In the next period we want to make some further scientific contributions in the form of articles.

We are working on the preparation of an article for a high-impact journal. In addition, as the technical development is almost complete, we will focus on providing support so that DIVINE users will have no problems when interacting with it. If possible, we will try to add some additional improvements to the system, especially in the area of managing verifiable credentials through the personal wallet.

4.3.4 Task 3.4

Task	**Title (Leader, Duration)**
3.4	Agricultural Data Space Ecosystem development & Data Stakeholder Interaction (ENG, M03-M33)
Contributors	ENG, ICCS, VICOM, NP, ITC, IDSA
Summary of Progress during Year 2	
During Year 2, the **Agricultural DataSpace Ecosystem (ADSE)** saw substantial progress in its development and stakeholder engagement. The platform's architecture was refined to support efficient data exchange among agricultural stakeholders. A significant advancement was made in integrating technical modules, particularly those aimed at ensuring interoperability, security, and compliance with regulatory standards such as GDPR and eIDAS. This year laid the foundation for further real-world deployments and pilot applications	
Significant Results during the Year 2	
During Year 2, significant results were achieved in the development of the **Agricultural DataSpace Ecosystem (ADSE)**. Key outcomes include the successful integration of technical modules to ensure secure and seamless data exchange among agricultural stakeholders. The platform's architecture was strengthened to enhance interoperability and compliance with regulations such as GDPR and eIDAS, promoting data protection and trust. Additionally, advancements in stakeholder engagement tools facilitated improved collaboration and data sharing. These results have positioned the project to move forward with real-world deployments and pilot implementations in the next phases.	
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested	
No main risks or deviations.	
Next Steps in Next Period	
In the next period, the focus will be on stabilizing the platform and refining its functionalities based on pilot feedback. Efforts will also be made to ensure the platform is ready for real-world deployment, with emphasis on enhancing user experience and ensuring compliance with data-sharing regulations.	

4.4 WP4 - Knowledge Extraction, Decision Support and Benchmarking (CREA)

4.4.1 Task 4.1

Task	Title (Leader, Duration)
4.1	Targeted agri data analytics, fusion and knowledge extraction (ICCS, M03-M33)
Contributors	ICCS, ENG, VICOM, NP, ITC, IDSA

Summary of Progress during Year 2

Firstly, there have been made updates and optimizations in the UCD's application, originally developed during Year 1. The problem was that the application couldn't distinguish in some plants the color of the plant from the background soil, because the colors were mixed, thus providing reduced accuracy. To overcome that problem there was an effort of training different CNN Machine Learning models and configuration of the various parameters of the model. As a result, the problem was fixed to a high degree, and better accuracy was achieved by the ML model. Secondly, there has been extensive debugging in the NP's application code, where some minor issues were outputting some not accurate results. To overcome that issue, a debugging and correction of the python source code took place. All the issues were fixed, and the NP's code provides 100% correct results regarding the agroclimatic indicators and the forecasting values. Regarding ITC's application code, there have been made some changes in the python source code in cooperation to the ITC's needs. For instance, the ranges for each input were changed according to the empirical ranges that ITC's farm experts provided to ICCS. There have also been made updates in the python source code to meet the needs concerning the randomness of the results via the use of specific commands. As far as the ADSC pilot, an application was built concerning the calculation of parameters such as trend analysis, weather variables forecasting, variable correlation, graph of the wind, causality analysis and evapotranspiration forecasting based on limited values of parameters.

Significant Results during the Year 2

The realization of a better CNN ML model for UCD application mitigates the mistakes when trying to recognize plants from the background soil, something that in order to implement it needed a lot of training. The realization of ADSC application is something very crucial for the almond and olive farmers since it provides them with useful information regarding their farms In all 4 pilots Machine Learning rationale is used outputting results and information that help T4.3 in the decision-making approach.

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

All the applications should be integrated into real case environments to see their output and their

response as well as the feedback in order to improve them. UCD application was very demanding since the basic problem was how to separate plants from the background soil, where there are cases in which the colors are mixed. Making it extremely difficult even in State-of-the-Art models to output a reliable result. As far as the ITC application, due to the innovative approach, since at the time of writing the current paragraph, there is no similar algorithm in the literature, it would be very interesting to see what the results would be of putting the application into real situations.
Next Steps in Next Period
There is an effort to combine the four applications (one from each pilot) into one that the user could feed it with data and choose that function would like to accomplish There is research on using high end Machine Learning models that will make the total application even better.

4.4.2 Task 4.2

Task	**Title (Leader, Duration)**
4.2	Agricultural domain benchmarking & KPI monitoring support (CREA, M03-M33)
Contributors	CREA, FE, NP, UCD
Summary of Progress during Year 2	
During Year 2 of the DIVINE project, our working group continued to work on the analysis of the existing literature on of KPIs and benchmarking techniques and we started to work on a prototype of benchmarking tool. We organized several meetings with the partners and also with other tasks of WP4 and other WPs, in order to align ourselves better with the activities carried out by the other groups and also recover useful suggestions for continuing our work. We were therefore able to define a clearer picture of the different indicators to consider, the different possible types of benchmarking to use and the data necessary to implement them.	
Significant Results during the Year 2	
During Year 2 we reached significant results in terms of collaboration with other partners of the task and other tasks. We exchanged our ideas and experiences and planned the work to do to reach the expected outcomes of the project. We were able to produce our contribution to the draft of the second deliverable (4.2) and we will continue in this way, increasing our collaborations with other WPs and tasks. Thank also to their collaboration it was possible to define a series of KPIs, distinguishing them into the 4 categories envisaged by the project (economic, social, environmental and agronomic). Furthermore, we analysed the different types of benchmarking available and identified the different steps to follow to continue with the work envisaged by the task. We have also started working on the prototype of a tool useful for carrying out benchmarking and proposed several examples of possible results. We planned to continue the work on the implementation of benchmarking toll and start to test it first on the data produced by	

the pilot related to cereals (UCD) and then on the result of other pilots.
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
Compared to the first year, in this second year we tried to make up for the delay that for various reasons had accumulated on some of the activities envisaged by the task. Greater collaboration with partners and other participants has increased and communications have also improved. Participation in the meeting organized in Rome was also very useful because in this way we were able to have a clearer picture of what the other WPs were doing and thus also better understand what our possible contribution to the entire project was. We were thus able to produce all the results we had expected for this period. A possible difficulty that we have identified is linked to the fact that sometimes the deadlines of the deliverables of the different WPs are very close to each other and this sometimes creates some problems for us to respect the deliveries because we are few people, and we have to follow various activities. In any case, we will make even more efforts in the third year to try to produce what the project envisages and to respect all deadlines.
Next Steps in Next Period
In Year 3 we will continue to make our efforts in order to realize the required actions and respect the deadlines. We will continue to identify sources of data and analyse them to calculate different indicators that are necessary to realize the activities of benchmarking and provide a useful tool. We also will use the results of the different pilots to implement the benchmarking tool and verify if it works as expected or other activities are needed. Then we will continue to have collaboration and interactions with tasks and WPs involved in the frame of multi actor approach to achieve the expected results of the entire project.

4.4.3 Task 4.3

Task	**Title (Leader, Duration)**
4.3	Transparent Decision Making Support for agri stakeholders (ENG, M05-M33)
Contributors	ENG, ICCS, VICOM, NP
Summary of Progress during Year 2	
In Year 2, the main focus was on improving knowledge extraction, data fusion methods, and benchmarking frameworks. Agroclimatic indicators were developed to assist farmers in decision-making, while predictive models were introduced to enhance crop yield forecasts and optimize farm management. The integration of these tools into DIVINE Ecosystem set the groundwork for more advanced decision-support functionalities in future phases.	
Significant Results during the Year 2	

A significant result during Year 2 was the integration of pilots' requirements within the decision-support systems. This included the development of agroclimatic indicators and predictive models, which improved decision-making for farmers and enhanced crop yield predictions. The tools provided a deeper understanding of farming data, enabling better management practices. This progress was essential in moving towards more sophisticated decision-support features for future implementation.
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
No main risks or deviations.
Next Steps in Next Period
In the next period, the focus will be on finalizing and deploying the decision-support tools. This includes integrating real-time data, refining predictive models, and ensuring compliance with data regulations. Pilot testing will continue, and efforts will be made to expand the user base.

4.4.4 Task 4.4

Task	**Title (Leader, Duration)**
4.4	Stakeholder decision criteria specification and feedback collection dashboard (SETU, M07-M33)
Contributors	SETU, ENG, VICOM, CREA, UCD
Summary of Progress during Year 2	
Technology discovery concluded. Continued collaboration with T2.3 [User Interface and Adaptive Dashboard Visualisation] to ensure task and project coherence. Developed a simplified workflow that could accommodate pilot complexity elaborated in UX workshopping from phase 1. The focus of the first pilot round was the identification and elaboration of pilot solutions with overall integration as a secondary concern. With the 1st round drawing to a close, a clearer understanding of the types of user interfaces required for the services, and how these might be integrated allowed work on this to be progressed. As well as the T2.3 activities, this has also been closely aligned with the integration work of T2.5. Completion the integration of the Identity and Access management system and associated reference documentation is the immediate goal. Attention will then turn to integration and deployment of the existing services and newly developed solutions, and the provision of connectors to external dataspaces. Close cooperation with the WP5 partners will be ongoing to validate and evaluate the platform.	
Significant Results during the Year 2	
A simplified, common dashboard flow was developed for the initial prototype. Three types of	

dashboard services provided to expose the outputs of T4.1, T4.2 and T4.3 and reflecting the logical user journeys derived from the UX development process. The services are (i) analytics, (ii) KPIs and benchmarking and (iii) decision support tools.
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
Potential risks identified in Phase 1 are still being managed through (i) a common-sense approach that looks for a common needs/best fit solution that will work across diverse pilots; and (ii) close collaboration with related tasks and relevant stakeholders. The previously identified risks are: • Pilot variety can add complexity. Future views elaborated including through user mapping. Work is focussed on a simplified, common flow that can be adapted and improved. • End users are using a variety of dashboards for various purposes. Need to deliver a useful prototype without reinventing the wheel. • There are different visualisation and dashboarding tasks within the project. T4.4 is working very closely with T2.3 to ensure coherence without overlap and that the visualisation need at platform and pilot level are met.
Next Steps in Next Period
In the final period, the dashboard prototype will complete integration for all pilots incorporating additional pilot outputs from the second round of pilot actions. In addition, the dashboard will provision hosting for the services which will allow dynamic interrogation of the decision support tools. Additionally, user flow management will be enabled through integration with identity access and management implementation delivered through T3.3 [Data Transparency, protection, trust, Sovereignty].

4.5 WP5 - Pilots, Applications and Evaluation (DIGI)

WP5 concerns piloting the reference architecture of DIVINE, its software building blocks, and pilot specific applications. In this respect, the objectives of WP5 are twofold - (a) establishing and managing the four pilot sites across Europe to deploy, test, validate, and evaluate the technical solutions involving different local, regional, national stakeholders, within different pathways and (b) performing impact assessment of each pilots using a standardized methodology, KPIs.

4.5.1 Task 5.1

Task	**Title (Leader, Duration)**
5.1	Stakeholder requirements, pilot design, specification and planning (DIGI, M01-M21)
Contributors	DIGI, SETU, CREA, NP, ITC, WFO, UCD, KGZS, ADSC

Summary of Progress during Year 2
Based on pilot round 1 feedback, pilot requirements, designs, and planning for round 2 have been finalised. More specifically, WFO and pilot partners performed a survey with their internal and external stakeholders which led to the requirements covering pilot specifications, technical & operational features. These requirements were translated into a detailed pilot design. Together with the T5.3, the planning of pilot round 1 and round 2 considered system lock-in effects, general goal, target demonstration scenario, specific objectives, stage of the agri-food value chain involved, preliminary target impacts, foreseen innovations, end service, TRL of the solutions to be developed, data sources, and sustainability plan. While pilot round 1 has been completed, based on pilot round 1 feedback, pilot requirements, designs, and planning for round 2 have been finalised.
Significant Results during the Year 2
The finalised pilot design and planning are captured in Deliverable D5.3.
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
Due to non-aligned summer breaks in partner countries and reaching partner agreements for the Deliverable D5.3, the deliverable submission was delayed.
Next Steps in Next Period
This task has ended in Y2.

4.5.2 Task 5.2

Task	**Title (Leader, Duration)**
5.2	Pilot testbed management, pilot applications, system extensions and deployment at pilot sites (SETU, M03-M32)
Contributors	SETU, DIGI, NP, ITC, UCD, ADSC
Summary of Progress during Year 2	
In phase 1 a pilot testbed matrix document was developed to help identify any technological and non-technological challenges that might hinder pilot actions. Based on a review of the needs of all pilots, the matrix clusters common pilot goals into four categories, with various dimensions identified in each category: • Stakeholder needs analysis • Technical processes • Managing pilot participation	

• Pilot optimisation In close collaboration with T2.5 and through continuous monitoring of the technical and non-technical work across various work packages facilitated by the technical management of T1.2, any blockers were identified and addressed. This matrix has been updated in Phase 2 and is used to trigger additional supports as needed. Other progress in year 2 includes an intensification of pilot interaction through bi-monthly pilot technical stand-up meetings and ad hoc technical supports such as the triggering of workshops within WP5 calls related to T3.3 and supporting pilot partners with the roles and permissions functionality.
Significant Results during the Year 2
Key results include updated pilot matrix, the establishment of a regular and structured technical forum connecting pilot actions and relevant technical work from across the three technical work packages [WP3-5), dynamic and responsive pilot support as needed (e.g. video script templates, technical resources guide, ad hoc technical training). Deployment of the pilot testbed commenced in close collaboration with tasks 2.5 (deployment of the infrastructure), and 3.3 (data sovereignty).
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
No significant risks were identified in the period.
Next Steps in Next Period
This task will continue to work closely with T5.1, T2.5 and other relevant tasks to support pilot applications, and in particular focussing on the evolution of the pilots in round 2.

4.5.3 Task 5.3

Task	**Title (Leader, Duration)**
5.3	Pilot roll-out and execution management (NP, M11-M32)
Contributors	NP, ITC, UCD, KGZS, ADSC
Summary of Progress during Year 2	
The Pilot Round 1 was initiated at M13 and successfully completed by M18 in all four pilot sites in Slovenia, Ireland, Greece, and Spain, respectively. During this phase, pilot parcels were identified along with the relevant data collection technologies and data-sharing mechanisms within the pilot ecosystem. The data-sharing needs of the pilots were analysed and identified, and a classification for intra-pilot, inter-pilot, and cross-pilot data sharing was established. To ensure smooth execution, continuous monitoring of pilot activities was implemented, while initial assessment of	

pilots has been completed. Moreover, technical support and guidance were provided for the translation of pilot data into AIM specifications, to ensure semantic data interoperability across the project. In this context, a relevant methodology has been developed to translate atmospheric measurements and calendar data (e.g., data associated with irrigation, harvesting, sprays, fertilization, and phenological stages) to AIM and has already been followed in selected use cases. Task 5.3 progress has been monitored and reported in weekly stand-up meetings, focused on technical and pilot aspects, and weekly WP5 and plenary meetings. Finally, a video has been produced for each pilot, acting as essential visualization tool and communication medium for illustrating pilot services and specifications.
Significant Results during the Year 2
Among the key results obtained so far, pilot parcels were identified, data-sharing needs were analysed and classification for intra-pilot, inter-pilot and cross-pilot data-sharing was established. The first round of data collection was successfully completed for initial pilot impact assessment. Continuous monitoring ensured effective execution, and technical support through a thorough methodology was provided for translating data into AIM specifications. Videos were also created for each pilot to visualize and communicate the provided services, along with the benefits expected by integration with the DIVINE platform.
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
No significant risk is noted yet in Task 5.3.
Next Steps in Next Period
The next steps involve completing the data translation by integration with AIM specifications for all pilots, ensuring adaptability in case of evolving data sources and establishing cross-pilot interoperability checks. The results of Pilot Round 1 will directly contribute to finalizing the requirements and specifications for Pilot Round 2, which will take place within the following period (M23-M32). The second Pilot Round will be initiated, monitored, and brought to completion, with a focus on generating tangible results from pilot activities to support impact assessment. The monitoring analysis will be reported on at monthly meetings between relevant task/WP leaders and/or stakeholders. Additionally, the integration of new tools from WP3 and WP4 will be spearheaded across all pilots to enhance the overall functionality and efficiency of the DIVINE platform.

4.5.4 Task 5.4

Task	Title (Leader, Duration)

5.4	Pilot assessment, evaluation and stakeholder validation (DIGI, M15-M33)
Contributors	DIGI, SETU, CREA, NP, ITC, WFO, UCD, KGZS, ADSC
Summary of Progress during Year 2	
T5.4 initially focused on internal discussions on impact assessment methodology using life cycle sustainability assessment (LCSA) and progress in technology readiness level. LCSA combines three individual assessment view points of LCA, LCC, and SLCA into a holistic assessment view covering environmental, economic, and social impacts. In line with that, first round of pilot data collection leading to assessment has been concluded.	
Significant Results during the Year 2	
The initial impact assessment results for pilot 1 for LCA and LCC have been computed and reported in deliverable D5.2. Note that D5.2 submission comes in reporting period 2.	
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested	
Two minor risks have been identified which are described below. No significant deviation from the DoA or task timing has taken place due to the risks. Due to different harvest times, data collection for impact assessment and evaluation has been delayed. This has resulted in 2 months delay in sustainability assessment and interpretation of results for the pilot round 1. However, T5.4 runs until M33 and all assessments of pilot round 1 has been completed in Y2. Therefore, it is a minor risk without affecting or posing any further delay in T5.4 or its upcoming deliverables. Another foreseen risk concerns data collection for all pilots for sustainability impact assessment. The first round of data collection has revealed that all pilots do not have all required historical data needed for LCA and LCC. If the same situation persists for the pilot round 2, either secondary dataset will be adopted in consultation with the pilots or the scope of LCA will be adjusted to work with only the available data.	
Next Steps in Next Period	
Upon completion of the pilot round 2, it will perform the final impact assessment, TRL progress evaluation, and validation of assessments with internal and external stakeholders.	

4.5.5 Task 5.5

Task	**Title (Leader, Duration)**
5.5	Cross-Pilot Coordination, Fertilization and Optimization (CREA, M01-M33)
Contributors	CREA, NP, ITC, UCD, KGZS, ADSC

Summary of Progress during Year 2
Task 5.5 is currently finalising cross-pilot coordination for the four pilots, especially managing the shared resources and interfacing with the DIVINE technology developers for any upgrades and technical optimisation(s) that the pilots may require during the project.
Significant Results during the Year 2
A cross-pilot coordination methodology has been developed in this task during year 1. During the Year 2 a cross-pilot coordination created the exchange between pilot and technical leaders, was pursued through a bi-directional exchange of information: • from pilots to technical WPs: data collected from the pilots as requirements, envisioned Scenarios, represent inputs that technical WPs (WP2, WP3 and WP4) took into account in the definition of their specific technical requirements. • from technical WPs to pilots: DIVINE offers a set of core enablers needed for creating any DIVINE applications and so mandatory for any interested stakeholder who wishes to expose or share his/her own resources. This knowledge was collected in deliverables D3.2, D4.2, D5.2. Contribution to the writing of D5.2 and participation in weekly meeting to update the activities.
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
No specific risk foreseen.
Next Steps in Next Period
The main next step is to the implement the cross-pilot fertilisation. The main objectives of the cross-pilot fertilisation framework are: • to foster collaboration among pilots highlighting synergies, to highlight directions taken by pilots: this was addressed by WP5 bi-weekly meetings to promote the knowledge exchange on adopted practices and challenges. • to identify pilot's needs and concerns, to define validation KPIs: this was addressed by surveys sent to DIVINE farmers and KPI organised by WP7.

4.6 WP6 - Agri Data Sharing Governance Models and Policy making (FE)

WP6 is in charge of producing 6 Deliverables during the whole project. D6.1 and 6.2 were delivered respecting the GA on M12 (thus, during Y1), while D6.3, 6.4 and 6.5 were delivered on M19 and M22. Three different reports were thus prepared during Y2, each related to a different WP Task (D6.5 for Task 1, D6.4 for Task 2, D6.3 for Task 3). While the first two deliverables represented a second and updated version of the Policy analysis and Stakeholders' guidelines – whose analysis

already started on M1 and whose first version was released in M12. On the other hand, D6.3 was aimed at reviewing the impact of D6.1 and 6.2 and provide suggestions to ameliorate the Project's data governance.

4.6.1 Task 6.1

Task	**Title (Leader, Duration)**
6.1	Analysis of agri regulatory requirements and development of agri data-sharing governance models, policies, regulations (FE, M01-M22)
Contributors	FE, VICOM, CREA, KGZS

Summary of Progress during Year 2

- During Y2, the consortium worked with the aim of ameliorating and improve the Report delivered on M12. For this reason, on M22, the D6.5 was released.
- The partners' work was organized as it follows:
- Brainstorming sessions were initially organised to see how better structure the Deliverable. At the same time results and outcomes from D6.3 were analysed and used as basis for D6.
- F first ToC was established, and partners expressed their agreement with the work's subdivision.
- Each partner's work was collected, put together and checked internally.
- In terms of content, the Deliverable was constructed as it follows:
- Introduction on the scope of the Deliverable,
- Brief explanation of D6.3 outcomes (focus on what emerged during pilot's exchanges/from pilots' surveys), explaining in which areas the data governance should have been implemented.
- Core analysis: chapter 4 and 5 reviewing current regulatory changes and updates, and recommendations for further data governance amelioration.

Significant Results during the Year 2

- D6.5 was successfully completed;
- Regulatory needs of farmers and pilots were assessed and analysed;
- Practical solutions were given in order to facilitate and promote data exchange in the agri-sector.

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

D6.5 was initially under Task 6.2, while D6.4 as under Task 6.1. However, in light of the nature of the deliverables and partners, the consortium believed "interchanging" the two pilots between Task leaders would have been a better solution.

Next Steps in Next Period

In terms of focus, T6.1 aimed at deliver D6.1 and 6.5, which was successfully completed. However, an eye continues and will continue to be kept on pilots and on their relationship with data governance. Moreover, the partners involved in the WP being involved in all the tasks, continuous reporting and updates are taking place.

4.6.2 Task 6.2

Task	**Title (Leader, Duration)**
6.2	Data sharing policy integration in ADSE and agri data policy adoption framework & guidelines specification (ENG, M01-M22)
Contributors	ENG, VICOM, FE, KGZS
Summary of Progress during Year 2	
In Year 2, significant progress was made in integrating data sharing policies into the ADSE, focusing on the development of governance models, policy creation and the use of the NextCloud platform for secure policy management. Compliance with EU regulations was prioritised to ensure transparent data sharing practices.	
Significant Results during the Year 2	
The project is implementing a comprehensive data governance framework, in line with GDPR and the EU Data Governance Act. The NextCloud platform facilitated secure and scalable data sharing, empowering stakeholders and ensuring efficient collaboration.	
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested	
D6.5 was initially under Task 6.2, while D6.4 as under Task 6.1. However, in light of the nature of the deliverables and partners, the consortium believed “interchanging” the two pilots between Task leaders would have been a better solution.	
Next Steps in Next Period	
The focus for the next period will be on expanding stakeholder engagement, refining the policy framework based on feedback, and enhancing the functionality of the platform for greater scalability. Additional testing and validation will also ensure continued compliance with evolving regulations.	

4.6.3 Task 6.3

Task	**Title (Leader, Duration)**
6.3	Impact Monitoring and Assessment for the developed agri data-sharing

	governance models, policies, regulations (FE, M12-M33)
Contributors	FE, ENG, CREA, KGZS

Summary of Progress during Year 2

During Y2, the D6.3 was successfully submitted on M19. The deliverable was drafted since M12 with the aim of analysing the data governance model provided in the previous WP deliverables, evaluate it and propose eventual changes or ameliorations.

Calls among partners were held and inputs compiled.

Pilots were interviewed on their data collection methods, as well as on eventual KPIs that were tracked – feedback were requested.

Moreover, a survey was circulated among WP5 to evaluate the farmer's willingness to share data within the projects.

Significant Results during the Year 2

Among the main findings:

- Farmers seem still reluctant to share their data, even when it is made clear to that that data will be treated with respect of their privacy, accounting for EU regulation and strict data management.
- At the moment of the deliverable's publication, most of the Pilots declared that they did not have KPIs in place yet to monitor DIVINE's impact on sustainability, competitivity and social aspect. However, most of pilot leaders declared they believed the project overall effect would be positive on the three aspects due to multiple factors described in the Deliverable.
- Farmer's trust remains a fundamental issue that needs to be solved jointly with WP7 – dissemination and information.

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

While no specific risk foreseen, (as the last version of the deliverable due on M33. Need for proper organisation in order to not have the deliverable delayed.) it is possible that farmers may still not be willing to share their data. In order to avoid that, a close collaboration with WP7 and a proper communication strategy is needed.

Next Steps in Next Period

Since D6.6 is due on M33 (July 2025), the WP and Task will need to organise and share the work for the upcoming months, schedule calls and establish the proper ToC.

4.7 WP7 – Business Modelling & Exploitation, Dissemination, Standardisation and Stakeholder Mobilisation (ICCS)

WP7 is responsible for all project aspects related to exploitation, dissemination, user engagement and IPR, such as the following:

- Specifying exploitation strategies and delivering market analysis and business modelling
- Achieving global outreach, dissemination and communication
- Collaborating with related projects
- Governing multi-actor approach activities & mobilising stakeholders
- Managing and protecting intellectual property rights (IPR)

WP7 aims to deliver the following results: (i) develop a commercialisation strategy for DIVINE; (ii) manage IP generated and engage in standardisation; (iii) engage with relevant stakeholder groups to increase awareness of the project.

During the second year of the project, WP7 has delivered the following:

- Specifying exploitation strategies and delivering market analysis and business modelling
- Achieving global outreach, dissemination and communication
- Collaborating with related projects
- Governing multi-actor approach activities & mobilising stakeholders
- Managing and protecting intellectual property rights (IPR)

Three deliverables have also been submitted during Year 2: i) D7.2 “Market Analysis, Business Plan and Exploitation activities”; ii) D7.3 “Global Outreach, dissemination, standardisation and external collaboration” and iii) D7.4 “MAA activity planning, roadmap and initial results”.

Finally, MS4: Reference Architecture Specification; Stakeholder Ecosystem Creation and initial Impact Roadmap & Assessment completion has been jointly achieved by WP7 and WP2.

4.7.1 Task 7.1

Task	**Title (Leader, Duration)**
7.1	Exploitation strategies, market analysis and business modelling (ENG, M01-M36)
Contributors	ENG, DIGI, VICOM, CREA, FE, NP, ITC, IDSA, KGZS, ADSC
Summary of Progress during Year 2	
In Year 2, the project studied key exploitation strategies for the Agricultural Data Space Ecosystem (ADSE), focusing on market analysis and business modelling. Progress included identifying market gaps and opportunities, and defining potential revenue models, such as subscription-based and hybrid approaches. This work has laid a strong foundation for the future commercialisation and	

sustainability of DIVINE's outputs.
Significant Results during the Year 2
In Year 2, the project focused on developing a comprehensive exploitation strategy that addresses the market needs within the Agricultural Data Space Ecosystem (ADSE). The results included a detailed market analysis, identifying trends, gaps, and opportunities in the smart agriculture sector. The task activity also established key business models details, including the idea of different business models application to understand how to ensure the next definition of project's commercially sensitive/strategic innovation long-term sustainability of the ADSE
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
During the development of the business strategy, there were challenges related to the integration of various business models to meet the needs of diverse stakeholders in the agricultural sector. The complexity of data monetization models and the need for standardization posed significant risks. Corrective actions included proposing a flexible hybrid business model and emphasizing the importance of tailoring the strategy to address both data providers and consumers.
Next Steps in Next Period
The next phase will focus on refining the exploitation strategy by incorporating further market feedback and adapting the business models based on the pilot results. Efforts will also be directed towards scaling the ADSE, improving user engagement and exploring additional revenue streams such as consultancy services and premium data access. The project will continue to adapt its exploitation plan to the evolving agricultural data landscape and ensure that business models remain adaptable and sustainable.

4.7.2 Task 7.2

Task	**Title (Leader, Duration)**
7.2	Global outreach, dissemination and standardisation (ICCS, M01-M36)
Contributors	ICCS, WFO, SETU, ENG, ITC, IDSA, UCD, KGZS, ADSC
Summary of Progress during Year 2	

In the second year of the project, the global outreach, dissemination and standardisation efforts advanced into a more targeted and focused approach (second phase of the respective plans).

Key players in the market and targeted stakeholders were successfully identified and approached, building on the initial community established in Year 1. Significant progress has been made in expanding this network through publications in mass media, scientific journals and conferences, participation in high-profile events and workshops as well as a strong presence on social media along with a continuous update of the project's website and periodic newsletter publications.

Additionally, important steps have been made towards standardising two modules adopted and refined within DIVINE, the Dataspace Protocol (DSP) and the Agricultural Information Model (AIM), moving closer to formal recognition by relevant standard bodies.

D7.3 "Global outreach, dissemination, standardisation and external collaboration plan and activities" report was submitted in M18, documenting all T7.2 activities until mid-Year 2. Moreover, all global outreach and dissemination activities were continuously tracked and documented in a dedicated shared live spreadsheet.

Significant Results during the Year 2

Several key milestones were achieved in Year 2.

DIVINE expanded its online reach with 378 new followers on Twitter, 434 on LinkedIn, and 69 on Facebook, while uploading 170 new social media posts and one new YouTube video. The project's website featured 11 new announcements, and 3 newsletter editions were published. Two mass media publications in farmers' magazines along with 6 scientific publications contributed to the increase of the project's exposure. DIVINE also participated in 18 new conferences, workshops and other national, European and international events, efficiently promoting its key messages, activities, preliminary results and innovations to all the diverse targeted audience groups identified in Year 1.

Regarding standardisation, the official registration of ISO/IEC AWI 20151: "Cloud computing and distributed platforms, Dataspace concepts and characteristics" as well as progress within the Eclipse Dataspaces Working Group highlighted advances towards ISO standardisation of the DSP. Meanwhile, DIVINE extended the AIM with additional terms, concepts and modules, as it undergoes technical preparations for adoption as a standard by the Open Geospatial Consortium.

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

During Year 2, there were no deviations from the Description of Action and no corrective actions were required.

A continuous risk in global outreach and dissemination activities is the challenge of engaging diverse groups of stakeholders with different needs, interests and backgrounds. However, the wide range of global outreach and dissemination activities conducted in Year 2 ensured that key messages were effectively tailored and delivered to the appropriate audiences through various

channels and tools. In terms of standardisation, several challenges are foreseen, including technical heterogeneity, potential resistance from stakeholders in adopting new standards, and possible changes in data privacy regulations that could raise compliance issues. Despite these challenges, the promotion of protocols and models as standards progressed smoothly in Year 2, with no significant risks encountered, and the process remains on track.
Next Steps in Next Period
During the last year of the project, there will be a shift to the third phase of global outreach, dissemination and standardisation plans, focusing on fostering exploitation of DIVINE's results and ensuring their lasting impact. Planned global outreach and dissemination activities include: maintaining an active social media presence, producing videos featuring key consortium partners delving into DIVINE pilots and Agricultural Data Space Ecosystem (ADSE), updating the website with project news, results and public deliverables, as well as publishing 2 more editions of the newsletter. Additionally, more mass media and scientific publications are planned along with participation in targeted events identified. Last but not least, DIVINE will organise its own events, in collaboration with key stakeholders and affiliated initiatives, including 2 European workshops for analysis purposes and 3 training seminars. Regarding standardisation, IDSA and ICCS will continue working with standardisation bodies to facilitate the publication of DSP and AIM, respectively, as standards. DIVINE pilots will provide feedback to refine the DSP, while AIM+ will integrate necessary policies and regulations, and new modules developed for DIVINE pilots will align with OGC standards. All these future activities will be documented firstly, in an internal document due in M27 and secondly, in the final deliverable D7.6 "Overarching report on global outreach, dissemination, standardization, external collaboration, MAA and IPR protection activities", which is due in the end of the project (M36).

4.7.3 Task 7.3

Task	**Title (Leader, Duration)**
7.3	Collaboration with related projects (ICCS, M01-M36)
Contributors	ICCS, SETU, ENG, DIGI, FE, NP, WFO
Summary of Progress during Year 2	
During Year 2, DIVINE's collaborative efforts became more targeted and strategic, successfully implementing the second phase of the external collaboration plan designed in Year 1.	

The initial list of related projects identified during the first year was significantly expanded and existing relationships were further strengthened. This was supported by the active participation in several events that fostered networking with key partners across related initiatives as well as by the continuous strong presence on social media.

Throughout the second year of the project, several bi-lateral meetings were held with sister projects to align activities, complement actions, and explore opportunities for joint outputs to maximize impact. In this respect, specific tools and methodologies developed by other projects were adopted and extended by DIVINE while modules developed within DIVINE were promoted for uptake by other projects.

All the respective collaborative initiatives and joint actions were documented in a dedicated shared live spreadsheet, ensuring continuous tracking and reporting. Finally, D7.3 “Global outreach, dissemination, standardisation and external collaboration plan and activities” report was submitted in M18, documenting all T7.3 activities until mid-Year 2.

Significant Results during the Year 2

In Year 2, several new related projects were identified, including 3 Horizon Europe initiatives that launched during the last year: Farmtopia, SoilWise and DS2.

Participation in key events, like SmartAgriHubs Synergy Days 2023 and EU Agri-Food Days 2023, fostered networking with these and other related initiatives, enabling the creation of new collaborations and strengthening already existing relationships.

Moreover, DIVINE co-organized the "Innovation and Digitalization in Agriculture" session at the WFO Annual Meeting 2024 in collaboration with the TRUSTyFOOD project and WFO.

Finally, main technical collaborative activities during the second year of the project included: extending DEMETER’s AIM and knowledge extraction modules, validating AgriDataSpace’s framework in DIVINE’s real-world pilots, and aligning identity providers for data spaces with the FAME project. Additionally, ILVO explored the connectivity of DIVINE's ADSE, while the AgriDataValue and WATSON projects examined the potential reuse of DIVINE's AIM+.

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested

Collaboration with related projects is inherently challenging, as it requires cooperation and alignment of actions between initiatives that may have different priorities, lifecycle stages, and consortium backgrounds. These differences may lead to a lack of motivation or ineffective communication. Moreover, competitive dynamics with respect to additional funding or market share and the risk of lacking technical, semantic, organisational, or legal interoperability may further hinder collaborative efforts.

Despite these potential challenges, no significant risks were encountered during the second year of the project. External collaboration progressed smoothly thanks to robust communication channels in place, unwavering partners’ commitment, and a shared environment of mutual

support and trust cultivated since Year 1. As a result, there were no deviations from the Description of Action and there was no need for corrective actions during Year 2.
Next Steps in Next Period
In the final year of the project, the third phase of the external collaboration plan will be implemented, focusing on promising partnerships to maximize the project's impact. Key planned activities include co-organising joint events, such as workshops and training seminars to reach broader targeted audiences. Additionally, efforts will be intensified to support the exploitation of DIVINE's solutions by other ongoing projects, laying the foundation for future collaborations beyond the project's lifecycle. In this respect, more meetings and discussions are planned to strengthen relationships and align activities. All these future T7.3 activities will be documented firstly, in an internal document due in M27 and secondly, in the final deliverable D7.6 "Overarching report on global outreach, dissemination, standardization, external collaboration, MAA and IPR protection activities", which is due in the end of the project (M36).

4.7.4 Task 7.4

Task	**Title (Leader, Duration)**
7.4	Governance of Multi-Actor Approach activities & stakeholder mobilisation (FE, M01-M36)
Contributors	FE, ENG, CREA, IDSA, WFO
Summary of Progress during Year 2	
During Y2 the deliverable D7.4 was prepared and shared with the consortium and commission. Overall, the deliverable included an MAA analysis, an excel shared table including the names and contacts of potential stakeholders, categorized by group of interests and working field. Moreover, the delivery included a recommendation as well as a dissemination plan to properly initiate and maintain contact with DIVINE's stakeholders.	
Significant Results during the Year 2	
• MAA Analysis performed. • Stakeholders List including email address and contacts was established. • A roadmap for proper dissemination was implemented.	
Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested	
No major risk is foreseen in the future, in order to provide a proper stakeholder engagement guidelines need to be followed.	

Next Steps in Next Period
There is no Deliverable directly prepared under Task 7.4, but a continuous monitoring is currently in place and will feed into D7.6 due on M36.

4.7.5 Task 7.5

Task	**Title (Leader, Duration)**
7.5	Management and Protection of IPR (INLE, M01-M36)
Contributors	INLE, DIGI, VICOM

Summary of Progress during Year 2

This task centred on the process and methodology for identifying assets, either existing and/or being developed in the project, that are required for the project's execution and that may have restrictions in relation to IP rights. This task also focuses on the identification of commercially sensitive innovations arising from the project and guiding partners towards filing at least one related patent application.

Work has continued following the submission of D7.1 in the first year of the project to cover an IP training session, which was open to all members of the consortium to attend. This was a concrete action taken that supported the planned activities to progress this task. The timing of the training session was selected such that partners had the information needed to help identify potentially patentable ideas as technical implementation activities in the project were maturing.

To support the process, a simplified invention disclosure form was sent to partners showing the required information for initiating discussions on potentially protecting their ideas. A supporting document showing an example of how to fill out the form was also provided. These forms were discussed as part of the training session. In addition, outcomes from the technical work packages have been monitored to ensure the technical developments in the project are understood and areas of potential patents could be highlighted and discussed with relevant partners.

Significant Results during the Year 2

Work has continued to follow the IPR protection strategy outlined in the initial deliverable of this task presented in year 1 (i.e., D7.1: "IPR Protection Planning and Strategy" – submitted M09).

A detailed IPR training session has been completed that outlined: the value of patents to partner organisations and individuals involved in the project, details on patentability requirements, idea development approaches, potential areas of interest arising from DIVINE WP outcomes, and the process to be followed to gather ideas.

Simplified invention disclosure forms have been distributed to partners to initiate discussions and begin to gather project-related ideas that can potentially be protected.

Risks, Deviations from the Description of Action and Corrective Actions Taken/Suggested
No major deviations to report. The main risk associated with the task is to identify potentially patentable ideas relating to the project work. To mitigate this, INLE are following a process of training and direct engagement with partners to help support partners both in identifying potentially patentable IP and in guiding partners through the patent filing process.
Next Steps in Next Period
As the project has matured, it is expected that ideas for potential patent protection will be identified as part of the immediate next steps of this task. Details of these ideas and the resulting patent(s) to be filed will be developed in the early part of year 3 through one-to-one meetings with partners where. Details of these activities will be presented in D7.6, which is due in month 36. INLE will work with project partners to capture these ideas and support partners in developing their ideas, so they are in a strong position to secure a granted patent. In addition, the IPR directory will be updated in the next period to reflect the progress of assets being developed in the project and to ensure the information is up-to-date.

4.8 Deliverables in this period

Deliv. num	Deliverable name	WP num.	Lead partici-pant	Type	Dissemi-nation level	Delivery date (Annex I)	Receipt Date	Status
D2.2	DIVINE reference architecture	2	ICCS	R	CO	31/03/24	29/05/24	Submitted
D7.2	Market Analysis, Business Plan and Exploitation activities – Release 1	7	ENG	R	CO	31/03/24	31/03/24	Submitted
D7.3	Global outreach, dissemination, standardisation and external collaboration plan and activities	7	WFO	R	PU	31/03/24	15/04/24	Submitted
D7.4	MAA activity planning, roadmap and initial results	7	FE	R	PU	31/03/24	08/04/24	Submitted
D5.2	DIVINE pilot impact assessment, evaluation,	5	DIGI	R	CO	30/04/24	17/05/24	Submitted

	and best practices – Release 1							
D6.3	Validated agri data sharing policy recommendations – Release 1	6	FE	R	PU	30/04/24	08/05/24	Submitted
D3.2	Agriculture Data Spaces Ecosystem – Release 2	3	ENG	R, DEM	CO	30/06/24	01/03/24	Submitted
D4.2	Knowledge extraction, decision support & benchmarking – Release 2	4	CREA	R, DEM	CO	30/06/24	30/07/24	Submitted
D2.3	DIVINE technology integration tools – Release 2	2	WIT	R, DEM	CO	31/07/24	30/07/24	Submitted
D5.3	DIVINE pilot design, management, and deployment – Release 2	5	DIGI	R, DEM	CO	31/07/24	15/10/24[2]	Pending
D6.4	Development & integration of agri data sharing governance models, policies and regulations – Release 2	6	FE	R, DEM	PU	31/07/24	30/07/24	Submitted
D6.5	Agri data sharing policy framework adoption manual and guidelines – Release 2	6	ENG	R	PU	31/07/24	30/07/24	Submitted
D1.3	Project Report Year 2	1	ICCS	R	PU	30/09/24	05/10/24	Submitted

4.9 Milestones in this period

Milestone number	Milestone name	Related WP(s)	Due date (Annex I)	Means of verification	Status
MS3	Pilots Round 1 roll-out start	WP5	13	D5.1 delivered	Achieved
MS4	Reference Architecture Specification; Stakeholder Ecosystem	WP2, WP7	18	D2.2, D7.2, D7.3, D7.4 delivered	Achieved

[2] Foreseen delivery date.

	Creation and initial Impact Roadmap & Assessment completion				
MS5	Completion of Pilots Round 1 execution & evaluation	WP5, WP6	19	D5.2, D6.3 delivered	Achieved
MS6	DIVINE Enablers, Services, Integrated Ecosystem and Agri Data Sharing policy framework Release 2	WP2, WP3, WP4, WP6	22	D2.3, D3.2, D4.2, D6.4, D6.5 delivered	Achieved
MS7	Pilots Round 2 roll-out start	WP5	23	D5.3 delivered	Achieved

5 Summary and Conclusions

Deliverable D1.3 presents a summary of the work carried out by the entire DIVINE Consortium during the second year of the project's lifetime (M13-M24). The aim of this deliverable is twofold: first to elaborate on the status of the activities towards the accomplishment of the 8 project objectives and second to discuss the progress of the work across all Work-Packages and tasks. Thus, the present document discusses all aspects of the project, technical, agricultural and managerial of all considered domains such as research, scientific, policy-related, exploitation, dissemination, innovation, etc.