



Sustainable Weed Management in Agriculture with Laser-Based Autonomous Tools

D6.7 – Data Management Plan



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the European Union

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The views and opinions expressed in this document are solely those of the project, not those of the European Commission.

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* Report; Prototype; Demonstrator; Other.

**Public; Restricted to other programme participants (including the Commission Services); Restricted to a group specified by the consortium (including the Commission Services); Confidential, only for members of the consortium (including the Commission Services).

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HISTORY OF CHANGES

Revisions mainly refer to a refinement of language and rearranging some paragraphs to increase document readability and detail technical aspects. Some changes have been applied to team components (accessing Research Data) together with the tables of Research Data Sets (Table 6), their descriptions (Annex III), and related publications (Annex IV).

Changes are only reported about the affected sections and paragraphs.

The changes are detailed in the document “D6.7-Data management plan (III)_CHANGES.pdf”.

EXECUTIVE SUMMARY

In this deliverable, we describe the Data Management Plan (DMP) with reference to the different kinds of Research Data handled and produced by WeLASER.

WeLASER Consortium has adhered to the H2020 ORDP (Open Research Data Pilot) convention with the EC, which explicitly caters for the delivery of a DMP, together with timely and rapid distribution of project results, making them widely available and openly accessible according to FAIR¹ principles.

This deliverable describes the data management plan, establishing the policy regulating the collection, management, sharing, archiving, and preservation of research data in the WeLASER project. Data regulated by the plan are all Research Data (RD) - both confidential and public - that are either managed or produced by WeLASER researchers (i.e., data, charts, pictures, and documents), and the part of data to be disseminated through repository as Data Sets (DS).

SCHEDULED UPDATES

Issue	Expected by project month (M)
D6.5 - Initial DMP	M6
D6.6 - Intermediate DMP	M18
D6.7 - Final DMP	M39

¹ FAIR: findable, accessible, interoperable and reusable

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PARTNER ACRONYMS

CSIC	AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS (ES)
FUT	FUTONICS LASER GMBH (DE)
LZH	LASERZENTRUM HANNOVER e.V. (DE)
UCPH	KOBENHAVNS UNIVERSITET (DK)
AGC	AGREENCULTURE (FR)
COAG	COORDINADORA DE ORGANIZACIONES DE AGRICULTORES Y GANADEROS INICIATIVARURAL DEL ESTADO ESPANOL (ES)
UNIBO	ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA (IT)
IETU	INSTYTUT EKOLOGII TERENOW UPRZEMYSLOWION YCH (PL)
UGENT	UNIVERSITEIT GENT (BE)
VDBP	VAN DEN BORNE PROJECTEN BV (NL)

LIST OF ACRONYMS AND ABBREVIATIONS

AI:	Artificial Intelligence
CA:	Consortium Agreement
CATI:	Computer-Assisted Telephone Interviewing
CBA:	Cost Benefit Analysis
CC:	Creative Commons
D:	Deliverable
DPO:	Data Protection Officer
DS:	Data Set
ERDA:	Electrical Research and Development Archive
FAIR:	Findable, accessible, interoperable, and reusable
FGI:	Focus group interviews
GA:	Grant Agreement
GDPR:	General Data Protection Regulation
ICP:	Informed Consent Process
IPR:	Intellectual Property Rights
LCA:	Life Cycle Analysis
NO-SQL:	Databases non-constrained to SQL standard
OAI-PMH:	Open Archives Initiative Protocol for Metadata Harvesting
RD:	Research Data
SLCA:	Social-Life Cycle Analysis
SQL:	Structured Query Language
WP:	Work Package: WPn = work package number

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1 DATA SUMMARY

A growing global population demands increasing food production, which requires increasing use of pesticides and fertilizers. About 130 million tons of herbicides per year are used in Europe alone that persist in the environment, destroy non-target plants and beneficial insects for the soil and produce health effects in animals and humans – cancer, birth defects and endocrine disruption. Moreover, existing herbicides become more and more ineffective due to the evolution and spread of herbicide-resistant weeds. Substitution of herbicides by mechanical automatic systems is under study, but mechanical solutions contribute to deteriorate the soil properties, harm beneficial soil organisms and provide poor results for in-row weeding.

WeLASER aimed at developing a clean weed control system based on integration of autonomous field vehicles, vision-based weed identification and laser technologies. Aboard of the autonomous vehicle, AI-vision system discriminates crops from weeds and detects the position of the weed meristem to point and activate the laser on them using a laser scanner. The autonomous vehicle is driven by a smart controller embedded into an IoT ecosystem to monitor working area and environment, collect and elaborate validation data about test and efficiency of the tool.

WeLASER required intensive collaboration for co-design and development of subsystems, system integration and testing. Most of the tasks required to fill out design reports, laboratory and field experiment setup aimed at tool tuning and validation leading to wide data collections.

Because of the industrial exploitation meaning of the project, most of material produced during design is confidential and related to industrial exploitation of results (by specific tasks, see Section 8 - Annex V).

1.1 Data for the Working of the Project

Research Data has been generated by Tasks carried out within Work Packages 1-5, generating two different types of sources of RD, as described below:

- 1 RD from WP1 is related to the monitoring of the equipment development, observed failures or shortcomings to be used to find corrections, and develop assessment of procedures and usage protocols (communication, dissemination, exploitation, and risks). This RD, that includes survey generated by focus group interviews (FGI) integrated with planned discussion and interviews, literature study, and a quantitative survey (Computer-Assisted Telephone Interviewing, CATI), are used to refine the objective of the project and tune relevant design aspects, development of the invention, introduction to the market and impacts. Information collected also include data to be used to perform Economical and Social LCA analysis. Data for LCA are integrated with already existing data of Ecoinvent Ver 3 database² and literature data. LCA methodology is based on the ISO 14040:2009 standard. The raw data will be kept confidential. In publication

² [Ecoinvent database](#)

and dissemination only aggregated or anonymized data were used. As most of LCA data are based on commercial data-bases they cannot be disseminated in open Data Sets.

2 RD from WP2 - WP5 are related to the technology design, development and integration of the laser-based weeding system (WP2), weed-meristem perception system (WP3), autonomous vehicle (WP4) and the industrial integration and evaluation (WP5).

- RD from Tasks 2.1, 3.1, 4.1 and 5.1 consist of survey results and feed-backs from partners and stakeholders. These tasks relate to WP1 activities (interviews and focus groups).
- RD from Tasks 2.2-2.4, Tasks 3.2-3.5, Tasks 4.2-4.5, and Tasks 5.2-5.3 contain design features, data and calibration sheets, characteristics of case studies, and pictures. About the latter, a distinction must be made between pure image data and labelled image data. Labelled image data sets (partly originated or merged from those of previous or concurrent projects) cannot be disseminated in open Data Sets before completing the plan of exploitation of project results.

As most of contents of RD cannot be disseminated before completing the strategy of exploitation of results, they are only synthesized in confidential deliverable, i.e., D2.1 (by FUT), D3.1 (by LZH), D4.1 (by UNIBO), D5.1 (by CSIC), and D5.2 (by AGC). This research data have been stored in partner's data infrastructures for the whole duration of the project and will be conserved the successive years as specified in GA, under the supervision of researchers who are responsible of the data.

Relevant research outcomes (e.g., features and usage of weeding implement based on plant experiments) are presented in scientific publications and, when not critical for future exploitation of the project, the underlying Data Sets are made openly available.

- RD from Task 2.5 and Task 5.4 consist of tables of (numerical and categorical) data, images and footage resulting from of dose-response experiments with weeds and crops, dose-response experiments with non-target small organisms, risk assessment of large organisms, and field test on selected crops to investigate the impact on crop productivity, soil quality and climate-change mitigation effects. Those RD are synthesised in the public deliverables D2.3 and D5.3; they are also presented in scientific publications and deposited in the repository as publicly available Data Sets. Such material of major importance to the objectives of the project is therefore useful for spreading WeLASER results for any future research.

A more detailed description of WPs and related Tasks is given in Section 8 - Annex V.

1.2 Research Data generation and processing

Research Data are represented both by qualitative data and quantitative data coming from several sources: meeting records & notes, questionnaires, experimental design, test & calibration trials, field robot trials, environmental and vehicle metering, together with pictures and footage.

RDs have been collected by observation techniques related to specific lab and field experiments, in

this case oriented to assess the efficacy of devices and weeder toolset (laser, pointer, scanner) developed by WeLASER (see Section 8 - Annex V).

As observation techniques underwent a continuous refinement, RD structure and contents have been dynamically adjusted during the project.

RD have been formerly collected / ingested / digitized, and successively validated, checked, cleaned-out and sorted to be selected for analysis (see below).

Data recorded from IoT framework have been recorded in NO-SQL storage systems (data lakes) hosted by already available infrastructures at UNIBO.

The quality of the data has been carefully assured using different approaches for the different data types - each single data (included open and check questionnaire, images and pictures) is time-space referenced.

Researchers and data responsible {are listed in Table 4, and Table 5}.

Research Data have been regularly cleaned and validated to make them consistent. During this process any personal data - including images and footage with accidental inclusion of people - is 'wiped out' before the deposit in repository and the dissemination.

Research Information and Data are communicated and shared by partners through cloud & storage systems with up-to-date privacy & security system management technologies chosen among public and commercial services (in respect of EU rules on data storage location).

Data containing personal information have not been shared among partners, just temporarily stored and backed up on the local storage systems sited in the EU of the researchers that are responsible for them, according to what is indicated in the informed consent procedures and authorised through an informed consent form (see section "2.7 Ethical aspects").

2 FAIR DATA

This DMP follows the EU guidelines³ and describes the data management procedures according to the FAIR principles⁴. The acronym FAIR identifies the main features that the project research data must have in order to be findable, accessible, interoperable and re-useable, allowing thus for maximum knowledge circulation and return on investment.

In WeLASER, a large amount of data has been produced, including environmental data at different spatial and time resolutions, pictures, images and footage for monitoring crop growth, together with robot and tool activities. Such raw data are applied to successive filtering processes depending on the objectives of the technology development process, including (but not only) debugging, tuning,

³ [Guidelines on FAIR Data Management in Horizon 2020](#) (Version 3.0, 26 July 2016),

⁴ [The FAIR data principles](#) (Force11 discussion forum)

crop stage and mission-based protocols. Only data considered functional to an analytic procedure have been stored for further processing, under the responsibility of researchers involved and suitable to become openly available (see FAIR) and standardized Datasets (DSs) to be deployed in selected repositories (see table 1).

While Research Data could require a large amount of storage memory (data lakes), DSs has been limited to a maximum size of 4Gb.

A list and description of Data Sets produced by WeLASER is given in section 3.

2.1 Making data findable, including provisions for metadata

At the moment of publication of project results, each research teams identifies the underlying data sets to be deposited together with the proper institutional or public long-time storage data repositories that can attribute persistent unique identifiers (DOI or Handle).

The chosen data repositories support standard descriptive metadata to ensure data sets indexing and discoverability - Dublin Core and Data Cite Metadata Schema. Moreover, they comply with the OpenAIRE 3.0 requirements for data archives. Consequently, the project data sets are visible via the OpenAIRE portal, facilitating project reporting procedures.

Table 1 reports the repositories for data sets publication and preservation chosen by WeLASER partners and the key features of the chosen repositories

Table 1. Summary of repositories.

Partner	Repository name	Type (Institutional, Disciplinary, Multidisciplinary)	Type of Permanent ID (DOI / ULR / HANDLE, ...)	OpenAIRE level	Re3data
UGent IETU UCPH LZH	Zenodo	Multidisciplinary	DOI	OpenAIRE Basic (DRIVER OA)	https://www.re3data.org/repository/r3d100010468
UNIBO	AMS Acta	Institutional	DOI	OpenAIRE Data (funded, referenced datasets)	https://www.re3data.org/repository/r3d100012604
CSIC	Digital.CSIC	Institutional	HANDLE DOI	OpenAIRE 3.0 (OA, funding)	https://www.re3data.org/repository/r3d100011076
UCPH	Electronic Research Data Archive (ERDA)	Institutional	DOI	not indexed in OpenAIRE	not indexed in Re3Data
LZH	Forschungsdaten -Repositorium der LUH	Institutional	DOI	not indexed in OpenAIRE	https://www.re3data.org/repository/r3d100012825

As some repositories were not (yet) indexed in OpenAIRE (UPCH, LZH one's), supplementary copies of DSs have been deposited in Zenodo (see first row Table 1).

Specific keywords refer to thesauri and controlled vocabularies are associated to each data set to enhance semantic discoverability. Any specific ontology is mentioned in DS description file (README).

A nomenclature about DS is reported in Section 4 - Annex I

2.2 Making data openly accessible

WeLASER project does not have a data access committee, however as a guiding principle, WeLASER consortium sought, whenever possible, to make RD openly available (as DSs), in order to achieve project's main aim, to allow dissemination, validation and re-use of research results.

Restrictions to access have been adopted in the following cases:

- personal data of stakeholders involved in focus groups and meetings, interviews, and case studies,
- collaboration with companies (both partners and third parties) that implies sharing know-how and industrial solutions that make research data confidential (see Section 8 - Annex V).

Nevertheless, all possible and legitimate actions and strategies have been adopted to allow data sharing:

- during WeLASER focus groups and meeting with stakeholders only contact information have been collected, and an informed consent have been requested to stakeholders involved, while related data have been properly anonymized (described in D8.2 - see Section 8 - Annex V for details),
- copyright permissions have been obtained from third party data owners to be allowed to re-use, reproduce and distribute the collected data.

Research data that are structured and published as DS have been converted from proprietary formats to well-known and documented, open, formats to facilitate accessibility and reusability (Table 2).

Versions or parts of the DSs that cannot be freely shared have been indicated in Section 5 - Annex II, providing the specific motivations.

Table 2. Summary of data format.

Type of data	Formats used during data processing	Formats for sharing reuse and preservation
Textual data (e.g. Survey interviews)	TXT, XLSX	TXT, PDF, RTF
Bibliographic data	BIB, XLSX	BIB
Numerical data (e.g. tables & spreadsheets)	CSV, XLS, JSON	CSV, XLSX
Pictures	JPG, PNG	JPG, PNG
Videos	MPEG	MPEG

Datasets deposited in repositories are self-consistent and contain reusable data of interest to different potential users. For each deposited data set, all relevant documentation explaining data collection procedures and analysis (such as codebooks, methodologies, etc.) have been made available along with the data to guarantee intelligibility, reproducibility, and the validation of the project findings. Moreover, the deposited documentation specifies the tools and software recommended to reproduce and reuse the data, when necessary. (See Table 3 for examples of tools and software enabling reuse of the data-set).

2.3 Making data interoperable

All data sets are described using standard descriptive metadata, such as Dublin Core and DataCite Metadata Schema, as required by the OpenAIRE Guidelines, to ensure metadata interoperability for indexing and discoverability. All relevant documentation explaining codebooks, users' manuals, data collection procedures and analysis have been made available along with the data to guarantee intelligibility, reproducibility, and the validation of the project findings.

The chosen data repositories supported protocols for the interoperability of metadata such as Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH).

To allow data exchange and re-use among researchers, institutions, organizations, countries, etc., partners converted all shareable data from proprietary formats and make them available in well-known and documented, open, formats (see Table 1 for details), as much as possible compliant with available (open) software applications. In case particular software is used in data processing, full explanation and instructions are included in the deposited documentation (a summary of the tools and software necessary to reuse of data sets is described in Table 3).



Table 3. Summary of tools and software for enabling re-use of the data sets.

Data type	Format	Tools/software required
Textual data	TXT, RTF, PDF	Open ASCII editors (e.g., Notepad++) Open word processors (e.g., OpenOffice, LibreOffice) Open PDF readers (e.g., PDF eXchange)
Bibliographic data	BIB	Open reference management software (e.g. Zotero)
Numerical data	CSV, XLSX	Open ASCII editors (e.g., Notepad++) Open spreadsheets (e.g., OpenOffice, LibreOffice)
Pictures	JPG, PNG	Open image editing and visualization tools (e.g. GIMP)
Videos	MPEG	Open video streaming tools
Compressed folders	ZIP	Open compression tools

2.4 Increase data re-use (through clarifying licences)

WeLASER distributes the shareable data by adopting licenses that allow re-use of the data in their entirety by scholars, stakeholders, and other users. The data sets are made available, unless otherwise stated, under Creative Commons (CC) BY 4.0⁵ or CC0⁶ upon each DS final contents⁷.

In general, data are made openly available as underlying data necessary to validate the research results immediately at the time of publication of public reports and scientific papers. Data are given full citation from official project publications and web site, and they are made available through institutional or public data repositories compliant with OpenAIRE requirements⁸. (See Table 2).

The research data that cannot be shared because of confidentiality are those dealing with development of core technologies of the project, namely Laser, Laser pointing system, and field robot (dealing with most of deliverable of WP 2, 3, 4, 5). The strategies resulting from tasks T6.5 ("Management of Intellectual Property Rights") and T6.6 ("Plan for the exploitation of results") also detail how data are usable by third parties, after the end of the project. Confidentiality of produced DSs also reflects on deliverable, as described in Section 8 - Annex V.

2.5 Allocation of resources

Making data FAIR requires an investment of money and researchers' time. In WeLASER case, cost

⁵ Creative Commons Attribution 4.0 International (CC BY 4.0),

⁶ Creative Commons CC0 1.0 Universal (CC0 1.0) Public Domain Dedication,

⁷ <https://www.openaire.eu/how-do-i-license-my-research-data>

⁸ [OpenAIRE. For Data Providers](#)

of data preservation after the project end have been neglected because the chosen repositories do not apply fees for archiving and data curation.

During the project, a cloud service has been adopted to share IoT data among partners, under development at UNIBO. The cost to activate and maintain it for the duration of the project is covered by the project budget. The budget also covered the costs related to the project website setting up (from coordinator).

Costs related to data management and documentation, conversion of proprietary data files into open formats, and deposit procedures have been estimated about 3-5% of the number of Person-Months assigned to each Partner for the research activities.

A special case is represented by the time-consuming activities related to processing of interviews (i.e., transcription, translation, and anonymization). For each Partner involved, processing costs have been estimated to be about 0.1 Person-Months/hour of processed audio recording, and they are already considered in budgets (COAG, IETU). Personnel dedication to WP6 went from 1 PM (AGC, FUT), to 14 PM for UNIBO (including the activities related to the elaboration and update of the DMP).

2.6 Data security

The team leaders and their research collaborators (reported in Tables 4 and 5) were responsible for the management and storage of data.

Table 4. Summary and contacts of the research team leaders.

Team	RD responsible	ORCID ID (if available)
UNIBO	Vitali, Giuliano	0000-0002-7866-5534
CSIC	Gonzalez-de-Santos, Pablo	0000-0002-0219-3155
IETU	Krupanek, Janusz	0000-0002-6864-9733
COAG	M ^a García, Carmen	
UGENT	Xavier, Gellynck	0000-0002-8908-3310
UCPH	Andreasen, Christian	0000-0003-0844-141X
LZH	Wollweber, Merve	0000-0001-7024-2484
VDBP	van Zoggel, Paol	
FUT	Scholle, Karsten	
AGC	Aubé, Christophe	

Partners have identified all contributors (See Table 5) participating in data management activities, specifying their roles according to a given standard vocabulary (DataCite Metadata Schema).



Table 5. Summary of team members involved in the data sets collection and management.

Team	Member	ORCID ID (if available)	Role	Start date	End date
UNIBO	Francia, Matteo	0000-0002-0805-1051	Researcher	01/10/2020	28/2/2023
	Gallinucci, Enrico		Researcher	01/03/2023	31/12/2023
	Arru, Marco		Researcher	01/11/2021	31/08/2023
	Calvia, Massimiliano		Researcher	01/03/2023	31/12/2023
CSIC	Emmi, Luis	0000-0003-4030-1038	Researcher	01/10/2020	31/12/2023
	Fernández, Roemi	0000-0003-0552-5407	Project member	01/10/2020	31/12/2023
	Jesus Reviejo		Data Manager	01/10/2020	31/12/2023
	Pedro M. Martin		Researcher	16/03/2021	30/09/2023
	Ruth Cordova	0009-0003-2025-5676	Researcher	08/08/2022	30/09/2023
	Eloisa Cortinas		Researcher	12/06/2023	30/09/2023
IETU	Grzegorz Fronc		Data Manager	01/10/2020	31/12/2023
	Katarzyna Lubera		Data Manager	01/10/2020	31/12/2023
	Beata Michaliszyn-Gabrys		Project member	01/10/2020	31/12/2023
	Maria Buszman		Project member	01/10/2020	31/12/2023
	Marek Hryniewicz		Project member	01/10/2020	31/12/2023
	Joachim Bronder	0000-0002-0306-1330	Project member	01/01/2022	31/12/2023
	Wanda Jarosz		Project member	01/01/2022	31/12/2023
UGent	Duc Tran	0000-0003-4249-9076	Project member	01/10/2020	31/12/2023
	Margo Degieter	0000-0002-4050-7485	Project member	01/10/2020	31/12/2023
	Marcia Dutra de Barcellos	0000-0002-4311-2921	Project member	01/01/2022	30/09/2023
	Joachim Schouteten	0000-0002-2030-5608	Project member	01/10/2020	31/12/2023
AGC	Thomas de Saintignon		Project member	01/10/2020	31/12/2023
COAG	Roberto Saez		Project member	01/10/2020	31/12/2023
	Garau, Laura		Project member	01/10/2020	30/09/2021
	Linares, Manuel		Project member	01/01/2022	31/12/2023
	Garcia, M ^a Carmen García		Project member	01/10/2020	31/12/2023
	Villanueva, Rubén		Project member	01/10/2020	31/12/2023
UCPH	Mahin Saberi	0000-0003-1456-1119	Project member	01/10/2020	28/02/2022
	Eleni Vlassi	0009-0001-8453-9489	Researcher	01/10/2020	31/12/2023
	Nina Cedergren	0000-0003-4724-9447	Researcher	01/10/2020	31/12/2022

Team	Member	ORCID ID (if available)	Role	Start date	End date
	Signe Marie Jesen	0000-0002-7738-5231	Researcher	01/10/2020	31/12/2023
	Nadmeh Salehan	0000-0001-8252-5668	Researcher	01/10/2020	31/12/2023
	Kenneth S. Johannsen		Technician	01/10/2020	31/12/2023
	Mathias Mons Mørch Hansen		Technician	01/10/2020	31/12/2023
LZH	Hustedt, Michael	0000-0003-1991-8666	Project member	01/10/2020	31/12/2023
	Brodeßer, Alexander	0000-0003-1518-7501	Project member	01/10/2020	31/03/2021
	Sandmann, Hendrik	0000-0001-9984-4745	Project member	01/10/2020	31/12/2023
	Hohndorf, Ruben		Project member	01/10/2020	31/05/2021
	Ripken, Tammo	0000-0003-3512-9544	Project member	01/10/2021	31/12/2023
	Worzischek, Malte		Project member	01/10/2021	30/07/2023
	Lünsmann, Lorenz Alexander	0000-0002-4987-3860	Project member	01/12/2020	31/12/2021
LZH	Johannsmeier, Sonja	0000-0002-8618-9187	Project member	01/10/2023	31/10/2023
	Krieger, Jonas		Project member	01/08/2022	31/10/2022
	Meyer, Fenja		Project member	01/11/2022	31/12/2022
	Rahtz, Alina		Project member	01/03/2023	31/12/2023
	Spoida, Björn		Project member	01/06/2022	30/06/2022
	Bauche, Thomas		Technician	01/04/2022	31/08/2023
	Büttner, Hannes		Project member	01/11/2023	30/11/2023
	Kujawa, Klaus		Technician	01/05/2023	31/05/2023
FUT	Anja Ahrens		Project member	01/10/2020	31/03/2022
	Michael Schäfer		Researcher	01/04/2022	31/12/2023
	Malte Kaule		Project member	01/10/2020	31/12/2023
	Peter Fuhrberg		Project Member	01/10/2020	31/12/2023
	Tilo Naumann		Researcher	01/10/2020	31/12/2023
	Andreas Gieselmann		Researcher	01/12/2022	31/12/2023
VDBP	Jacob van der Borne		Project member	01/10/2020	31/12/2023
	Pjotr de Vries		Project member	01/10/2020	31/12/2023
	Jasper Janssen		Project member	01/10/2020	31/12/2023
	Luca Kisicek		Project member	01/10/2020	31/12/2023

Keys for "Role" column: Data Collector (such as survey conductors, interviewers, etc.), Producer (person responsible for the form of a media product), Project Member (a researcher indicated in the GA), Researcher (an assistant to one of the authors who helped with research, data collection, processing and analysis but is not part of team indicated in the GA), Research Group (the name of a research institution or group that contributed to the data set).

(See Section 5 - Annex II for details about data management responsibilities related to each project data set).

At each institution, research data have been stored in computers, laptops, intranets or hard-drives (including RAID system) accessible through institutional password periodically modified according to national law provisions for data security and protected by regularly updated firewalls and antiviruses.

All the data have been password protected. If mobile devices were used to store data files (e.g., backup files), they were kept in a safe place accessible only to the researchers involved.

All Partners are kept local updated copies of all their files: all the research materials stored in computers were subject to daily backup to safeguard them from accidental losses, that mostly also included regular backup on large data storage systems as SACO (CSIC cloud system for data-backup) and version management systems (GitLab) working in 'intranet' mode.

Long term preservation of public data has been ensured by depositing the data sets (DSs) in repositories that have specific preservation policies. UNIBO AMS Acta, for example, guarantees long term preservation to the archived materials also thanks to a deposit agreement with the National Central Library in Florence. Zenodo policy ensures that the items are retained for the lifetime of the repository and in case of closure, best efforts are made to integrate all content into suitable alternative institutional and/or subject based repositories. ERDA guarantee the availability of the archived data and the UCPH-minted DOIs for at least 10 years.

2.7 Ethical aspects

WP8 were devoted to the ethical aspects related to the protection of personal data, the protection of the environment and the safety of the staff involved in the WeLASER project. Deliverables D8.1 and D8.2, which have already been submitted, have a direct impact on the DMP and must therefore be taken into consideration.

In deliverable D8.1, the procedures to be implemented for the collection, storage, protection, and destruction of personal data have been defined, and a Data Protection Officer (DPO) has been appointed for each of the tasks identified as requiring protection of personal data. All the procedures defined in D8.1 comply with the EU legislation. The template for informed consent and informed consent procedures have also been presented in D8.1. In addition, deliverable D8.2 explains the responsibilities of the DPO and includes their appointments in its Appendix A.

The technical, organizational and security measures to protect the rights and freedom of the data subjects, the techniques used for anonymization or pseudonymization and the explicit confirmation that the data used in the project are publicly available, as requested by the EC, are also addressed in D8.2. Besides the protection of personal data, we have not identified additional ethical issues.

In D8.1, it is stated that the link between the person's identity and the collected data are deleted one month after the collection (to guarantee anonymity). The questionnaires dealing with personal data

include informed consent for data sharing, as well as information that the data collect could be used for further research beyond the end of the project.

3 DATA SET OVERVIEW

Table 6 lists the data sets produced from the project participants. Each DS is detailed as reported in Annex I, II and III (Sections 4, 5 and 6, respectively).

Table 6. Data sets list.

n°	TASK	CT	DATA SET TITLE (contents)	SOURCE	STATUS
1	5.2	UNIBO	WeLASER. IoT in Crop Management. Survey	C	A
2	5.2	CSIC	Images of a wheat field in early growth stage	C	A
3	5.2	CSIC	Images of a maize field in early growth stage	C	A
4	5.2	CSIC	Images of a maize field with 2-3 leaf collars	G	A
5	5.2	CSIC	Images of a sugar beet field with 2-3 leaves	G	A
6	5.2	CSIC	Images and annotations of maize crop in early growth stages (1 - 8 leaves)	G	A
7	5.2	CSIC	Images and annotations of sugar beet crop in early growth stages (1 - 8 leaves)	G	A
8	5.4	CSIC	Data on the WeLASER robot carrying out a mission in the experimental fields of the Center for Automation and Robotics (UPM-CSIC)	C	A
9	5.4	CSIC	WeLASER robot logs executing various missions between January and September 2023	G	A

* Table acronyms and abbreviations: TBD: to be defined, n°= data set progressive number, LB = WP lead beneficiary, PP = project phase (starting month-ending month), CT = creator team in charge of curating the data set, C=collected, G=generated, A=available, IP=in progress, NYA=not yet available.

During the project several causes determined changes in data set expected and available at the end of the project as:

- Several papers described the development of technology describing their performance without a precise protocol - data are of minor interest and not directly related to described results;
- Delayed assembly of tool, also due to the preparation of field days, crop seasonality not respected in field experiments - tillage and sowing was a function of robot trials;
- Confidentiality and value of data, as explained in section 1.1



4 ANNEX I: DATA SET NOMENCLATURE

WeLASER DSs are named following common rules to improve data visibility, discoverability, citation, and permanent online tracking.

The DS title structure is coded as:

WeLASER_Title specifying dataset content, coverage, and a version number

Example:

WeLASER_IoT-in-Crop-Management-Survey

The DMP also recommends the following rules for file naming:

- for data set file(s)

WeLASER_Keywords-specifying-coverage-and-nature-of-data. [ext] Example of spreadsheet .xlsx file:

WeLASER_IoT-in-crop-management-Survey.xlsx

- for README file (see Section 5 - Annex II)

WeLASER_ keywords-specifying-coverage-and-nature-of-data _README.ext Example:

WeLASER_IoT-in-crop-management-Survey_README.rtf

where [ext] is file extension. For README files suggested extensions are .txt (or any ascii-readable format, e.g., Markdown) and macro-free formats, e.g., Rich Text Format.

5 ANNEX II -“README” FILE TEMPLATE

A “README” file is a document that is deposited with each dataset, containing relevant information about data set authorship, terms of reuse and responsibilities, explaining data set content and structure, collection procedures and analysis (such as file specifics, methodologies, code-books of variables, data sources, and further necessary notes). The template of the README file that is used by WeLASER partners is shown here.

Introductory section

Data Set Title: “[insert title as defined in the DMP]”

Data Set Author/s: Name Surname (Affiliation), ORCID (if available);

Data Set Contributor/s: Name Surname (Affiliation), ORCID (if available);

Data Set Contact Person/s: Name Surname (Affiliation), ORCID (if available), email;

Data Set License: this data set is distributed under a (INSERT LICENSE)

Publication Year: (insert YEAR)

Project Info: [PROJECT ACRONYM] ([project full title], funded by European Union, Horizon 2020 Programme. Grant Agreement num. [grant agreement number]; [project website url]

Data set Contents

The data set consists of:

[Indicate the files that compose the dataset and their name and format.

In the following examples the data sets were composed by only one file. In case the dataset consists of more files you can name them as described and put them in a compressed folder. In this case readme file name should match the compressed folder name]

Data set Documentation

Abstract

[Insert a brief abstract describing the content of the dataset]

Content of the files:

file [Insert filename] contains ... [Provide a brief description of the content of the file/s. This is an example of how you could start]

File specifics

[Provide useful info regarding file conversion etc... (Optional)

Please indicate instruction/technical info to allow potential users to correctly visualize and reuse your data (e.g., specific software, ...).

In case of data converted in open formats it could be useful to provide some further information. For example, if you deposit for long term preservation a .csv file derived from an excel you can describe the conversion. Here is an example of description of conversion using libre office calc software:

To create the .csv files, "LibreOffice Calc" version: 5.1.4.2 (portable) was used, with the following specifics:

- Character set Europa occidental (Windows-1252/WinLatin1)
- Field delimiter « , » (comma)
- Text delimiter « " » (quotes)]

Notes [Related to the whole dataset or to single files of a multi-file dataset (Optional)]

Data sources [Optional]

Methodologies [If necessary to understand how to reuse data]



6 ANNEX III: DATA SETS TABLE DESCRIPTOR

Analytic descriptions of template and currently deposited data sets of WeLASER project are reported hereafter.

Template:

DSN.n	-not yet available - available -in progress	Dataset title
ID [ID type]		
Version		
Team in charge		
Creator/s		Family name, given name [TEAM]
Contributor/s		Family name, given name [TEAM]
Contact Person/s		Family name, given name [TEAM, MAIL]
Contents		
Data format		
Data volume		
Accessibility		Open, <i>restricted</i> , <i>closed</i> - license (e.g., CC BY) - (specify embargo)
Related publication/s		

#1	available	WeLASER. IoT in Crop Management. Survey
DOI		http://doi.org/10.6092/unibo/amsacta/6592
Version		v1
Team in charge		UNIBO
Creator/s		Vitali, Giuliano [UNIBO]; Francia, Matteo [UNIBO]; Golfarelli, Matteo [UNIBO]; Canavari, Maurizio [UNIBO]
Contact Person/s		Vitali, Giuliano [UNIBO, giuliano.vitali@unibo.it]
Contents		This dataset contains the underlying data of the following publication: "Vitali G, Francia M, Golfarelli M, Canavari M. Crop Management with the IoT: An Interdisciplinary Survey. <i>Agronomy</i> . 2021; 11(1):181. https://doi.org/10.3390/agronomy11010181 ". This data summarizes article citations aggregating them in categories and reporting the related keywords.
Data format		.xlsx, .bib
Data volume		49 kB
Accessibility		Data accessible under Creative Commons Attribution 4.0 International (CC BY 4.0) license.
Related publication/s		Vitali G, Francia M, Golfarelli M, Canavari M. Crop Management with the IoT: An Interdisciplinary Survey. <i>Agronomy</i> . 2021; 11(1):181. https://doi.org/10.3390/agronomy11010181

#2	available	WeLASER - Dataset
DOI		https://doi.org/10.20350/digitalCSIC/14567
Version		v1
Team in charge		CSIC
Creator/s		Herrera-Diaz, Jesus; Emmi, Luis Alfredo (CSIC); González-de-Santos, Pablo (CSIC)
Contact Person/s		Emmi, Luis (luis.emmi@car.upm-csic.es)
Contents		Images of a wheat field in early growth stage. The dataset is composed of several images named as: type of crop_date_number.png.
Data format		rar, txt
Data volume		545 MB
Accessibility		http://hdl.handle.net/10261/264622
Related publication/s		Emmi, Luis Alfredo; Herrera-Diaz, Jesus; González-de-Santos, Pablo. Toward autonomous mobile robot navigation in early-stage crop growth. Proceedings of the 19th International Conference on Informatics in Control, Automation and Robotics (ICINCO 2022). http://hdl.handle.net/10261/287296

#3	available	WeLASER - Dataset
DOI		https://doi.org/10.20350/digitalCSIC/14566
Version		v1
Team in charge		CSIC
Creator/s		Herrera-Diaz, Jesus; Emmi, Luis Alfredo (CSIC); González-de-Santos, Pablo (CSIC)
Contact Person/s		Emmi, Luis (luis.emmi@car.upm-csic.es)
Contents		Images of a maize field in an early growth stage. The dataset is composed of several images named as: type of crop_date_number.png.
Data format		rar, txt
Data volume		416 MB
Accessibility		http://hdl.handle.net/10261/264581
Related publication/s		Emmi, Luis Alfredo; Herrera-Diaz, Jesus; González-de-Santos, Pablo. Toward autonomous mobile robot navigation in early-stage crop growth. Proceedings of the 19th International Conference on Informatics in Control, Automation and Robotics (ICINCO 2022). http://hdl.handle.net/10261/287296

#4	available	WeLASER - Dataset
DOI		https://doi.org/10.20350/digitalCSIC/15104
Version		v1
Team in charge		CSIC
Creator/s		Emmi, Luis Alfredo (CSIC); Gonzalez-de-Santos, Pablo (CSIC)
Contact Person/s		Emmi, Luis (luis.emmi@car.upm-csic.es)
Contents		Images of a maize field with 2-3 leaf collars.
Data format		rar, zip, txt
Data volume		926 MB
Accessibility		http://hdl.handle.net/10261/287771
Related publication/s		

#5	available	WeLASER - Dataset
DOI		https://doi.org/10.20350/digitalCSIC/15105
Version		v1
Team in charge		CSIC
Creator/s		Emmi, Luis Alfredo (CSIC); Gonzalez-de-Santos, Pablo (CSIC)
Contact Person/s		Emmi, Luis (luis.emmi@car.upm-csic.es)
Contents		Images of a sugar beet field with 2-3 leaves
Data format		rar, zip, txt
Data volume		888 MB
Accessibility		http://hdl.handle.net/10261/287772
Related publication/s		

#6	available	WeLASER - Dataset
DOI		https://doi.org/10.20350/digitalCSIC/15646
Version		v1
Team in charge		CSIC
Creator/s		Emmi, Luis Alfredo (CSIC); Gonzalez-de-Santos, Pablo (CSIC), Cortiñas, Eloisa (CSIC)
Contact Person/s		Emmi, Luis (luis.emmi@car.upm-csic.es)
Contents		Images and annotations of maize crop in early growth stages (1 - 8 leaves)
Data format		rar, txt
Data volume		2.9 GB
Accessibility		http://hdl.handle.net/10261/337452
Related publication/s		

#7	available	WeLASER - Dataset
DOI		https://doi.org/10.20350/digitalCSIC/15647
Version		v1
Team in charge		CSIC
Creator/s		Emmi, Luis Alfredo (CSIC); Gonzalez-de-Santos, Pablo (CSIC), Cortiñas, Eloisa (CSIC)
Contact Person/s		Emmi, Luis (luis.emmi@car.upm-csic.es)
Contents		Images and annotations of sugar beet crop in early growth stages (1 - 8 leaves)
Data format		rar, txt
Data volume		2.03 GB
Accessibility		http://hdl.handle.net/10261/337459
Related publication/s		-

#8	available	WeLASER - Dataset
DOI		https://doi.org/10.20350/digitalCSIC/15665
Version		v1
Team in charge		CSIC
Creator/s		Emmi, Luis Alfredo (CSIC); Gonzalez-de-Santos, Pablo (CSIC)
Contact Person/s		Emmi, Luis (luis.emmi@car.upm-csic.es)
Contents		Data on the WeLASER robot carrying out a mission in the experimental fields of the Center for Automation and Robotics (UPM-CSIC)
Data format		zip, txt
Data volume		101 KB
Accessibility		http://hdl.handle.net/10261/338246
Related publication/s		-

#9	available	WeLASER - Dataset
DOI		https://doi.org/10.20350/digitalCSIC/15710
Version		v1
Team in charge		CSIC
Creator/s		Emmi, Luis Alfredo (CSIC); Gonzalez-de-Santos, Pablo (CSIC)
Contact Person/s		Emmi, Luis (luis.emmi@car.upm-csic.es)
Contents		WeLASER robot logs executing various missions between January and September 2023
Data format		rar, txt
Data volume		9.34 MB
Accessibility		http://hdl.handle.net/10261/340534
Related publication/s		An efficient Guiding Manager for ground mobile robots in agriculture, Robotics, ISSN: 2218-6581, In 1st Revision.



7 ANNEX IV: OPEN ACCESS STATUS OF PROJECT PUBLICATIONS

In the following table (Table 7) it is reported the updated list describing the open access status of the project publications related to data sets reported in Section 6 - Annex III.

Table 7. Open access status of WeLASER publications with indicated the related data sets.

Publications	
Vitali G, Francia M, Golfarelli M, Canavari M. Crop Management with the IoT: An Interdisciplinary Survey. <i>Agronomy</i> . 2021; 11(1):181. https://doi.org/10.3390/agronomy11010181	
Open Access repository URL	http://hdl.handle.net/11585/789000
Status	Open Access, indexed in OpenAIRE
Related dataset	Vitali, Giuliano ; Francia, Matteo ; Golfarelli, Matteo ; Canavari, Maurizio (2021) <i>WeLASER. IoT in Crop Management. Survey</i> . University of Bologna. http://doi.org/10.6092/unibo/amsacta/6592
Luis Emmi, Jesus Herrera-Diaz and Pablo Gonzalez-de-Santos, Toward Autonomous Mobile Robot Navigation in Early-Stage Crop Growth, ICINCO 2022: 19th International Conference on Informatics in Control, Automation and Robotics, Lisbon, Portugal, 14-16 July 2022.	
Open Access repository URL	https://www.mdpi.com/2077-0472/13/5/1005 https://digital.csic.es/handle/10261/307954
Status	Open Access on DIGITAL.CSIC
Related dataset	10.20350/digitalCSIC/14566
Cordova-Cardenas, R.; Emmi, L.; Gonzalez-de-Santos, P. Enabling Autonomous Navigation on the Farm: A Mission Planner for Agricultural Tasks. <i>Agriculture</i> 2023, 13, 2181.	
Open Access repository URL	https://www.frontiersin.org/articles/10.3389/fagro.2023.1198840/full https://digital.csic.es/handle/10261/340215
Status	Open Access on DIGITAL.CSIC
Related dataset	https://doi.org/10.20350/digitalCSIC/15665
Cortinas, E.; Emmi, L.; Gonzalez-de-Santos, P. Crop Identification and Growth Stage Determination for Autonomous Navigation of Agricultural Robots. <i>Agronomy</i> 2023, 13, 2873.	
Open Access repository URL	https://doi.org/10.3390/agronomy13122873 https://digital.csic.es/handle/10261/340218
Status	Open Access on DIGITAL.CSIC
Related dataset	https://doi.org/10.20350/digitalCSIC/15647 https://doi.org/10.20350/digitalCSIC/15646
Luis Emmi, Ruth Cordova-Cardenas, and Pablo Gonzalez-de-Santos, A mission planner for autonomous tasks in farms. The Sixth Iberian Robotics Conference (ROBOT 2023). Coimbra, Portugal. 22-24 November 2023.	

Open Access repository URL	https://digital.csic.es/handle/10261/341090
Status	Open Access on DIGITAL.CSIC
Related dataset	https://doi.org/10.20350/digitalCSIC/15665
Luis Emmi, Roemi Fernández, and Pablo Gonzalez-de-Santos, An efficient Guiding Manager for ground mobile robots in agriculture Robotics 2023, 15, 5, December 2023	
Open Access repository URL	https://www.mdpi.com/2218-6581/13/1/6 https://doi.org/10.3390/robotics13010006
Status	Open Access on DIGITAL.CSIC
Related dataset	https://doi.org/10.20350/digitalCSIC/15710

8 ANNEX V: EXCERPT OF GA ABOUT WP'S TASKS

WP1 "Open-ended multi-actor networking and activities: from initial specifications to exploitation". This pool of activities will follow an interdisciplinary and multidimensional approach to deal with multiple effects in different domains, forecasting system behaviour and technology evolution, uncertainties, and risks. Related tasks are recalled hereafter.

TASK 1.1 (TL: COAG) "Identification, involvement, coordination and knowledge exchange with stakeholders and other entities" point to select stakeholders to be involved into focus groups and workshops to assess: i) technical, functional and economical aspects of the development and application of the new technology; ii) social and behavioural, legal and system conditions affecting farmers' adoption of the innovative technology; iii) environmental impact of the innovative technology and the requirements concerning labour, health safety and risk management in farms (see Task 1.5).

TASK 1.2 (TL: CSIC) "Scientific and technical continuous assessment – Value chain follow-up" is devoted to monitoring all the aspects included in the value chain, regarding both scientific-technical and evaluation issues, as much as monitoring marketing opportunities. These steps will also involve stakeholders and institutions for feedback.

TASK 1.3 (TL: UGENT) "Economic assessment and risk management in farms" focus on development of a model for the investment profitability assessment (on the level of individual farmer and entrepreneur) and development of cost benefit analysis (CBA).

TASK 1.4 (TL: IETU) "Health and environmental issues" regards health and environmental issues assessment of WeLASER technology through the Life Cycle Assessment (LCA) methodology based on the ISO 14040:2009 standard.

TASK 1.5 (TL: IETU) "Social aspects concerning the adoption of novel techniques" fill focus on Social Life Cycle Assessment (S-LCA) to assess the social and socio-economic aspects of innovative product and their potential positive and negative impacts along with its life cycle encompassing manufacturing; distribution; use; re-use; maintenance; recycling; and final disposal.

Research data collected during Task 1.1 (Subtask 1.1.1) will be used to refine the objective of the project and tune relevant design aspects, further development of the invention and its introduction to the market. RD from Subtask 1.2.1 will be used to monitor the equipment development to detect possible failures or shortcomings and suggest/collect corrections, while those from subtask 1.2.2 will be addressed to the assessment of procedures (communication, dissemination, exploitation, and risks). RD collected from partners during Task 1.3 (Subtask 1.3.1) will be used to perform an analysis including identification and evaluation of investment and operational costs (life cycle perspective) with evaluation of economic benefits to farmers, considering opportunities for innovative economic models like machine sharing/leasing/lending, and accounting for the geographic heterogeneity (biological, geological, structural, environmental) within the EU in the agriculture sector. RD from T1.4 (S1.4.1) collected from WeLASER partner/partners and integrated with Ecoinvent Ver. 3 and literature data to compare WeLASER solution to existing agricultural practices in weeding (chemical, mechanical).

The results obtained will be described in deliverables D1.1 to D1.3 (public) and oriented to identify the potential of improvement of the social sustainability of the products. They will be used for dissemination and internal and available for any further development. Results from Task 1.4 will also contribute to deliverable D8.3 (EPQ-Requirement No. 3) and used for dissemination and for internal and available for any external further development. RD from Task 1.5 (Subtask 1.5.1) include qualitative survey generated by focus group interviews (FGI) integrated to planned discussion and interviews, and literature study, and a quantitative survey (CATI) as an initial stage of research leading to a wider qualitative analysis.

WP2 - WP5 are dealing with technology design, development, and integration:

WP2 "Laser-based weeding system: Development and impact" is aimed at design, development, tests, and evaluation activities.

WP3 "Weed-meristem perception system"

WP4 "Autonomous vehicle for laser weeding"

WP5 "Industrial integration and evaluation"

Involved activities are regularly subject to survey and feedback from partners and stakeholders (multi-actor involvement procedure), in **Task 2.1 - Task 5.1** (TL: IETU) reported in annual deliverables (D1.1 – D1.3) and with Research Data already discussed above (Task 1.1).

Other involved tasks are briefly recalled, and related RD discussed hereafter.

TASK 2.2 (TL: FUT) "High-power laser source" is oriented to development of a new fibre laser source to supply the laser scanner.

TASK 2.3 (TL: LZH) "Laser-based weeding scanner" is aimed at development of the device for directing and positioning the laser beam to precisely hit the weed's sensitive area (meristem).

TASK 2.4 (TL: FUT) "Weeding system integration and technical evaluation - TRL" is aimed at Individual tests for the system components (subtask 2.4.1), weeding system integration (subtask 2.4.2) check of the integrated weeding system (subtask 2.4.3).

RD collected during lab and field test of tasks 2.2-2.4 contains data and calibration sheets, features of experiments and case study. Such RD are confidential and will be synthesised in D2.1 (by FUT, confidential).

TASK 2.5 (TL: UPCH) "Impact of laser doses on living organisms" is devoted to experimentally study the effect of different laser doses on target and non-target living organisms and involves Dose-response experiments with weeds and crops (subtask 2.5.1), dose-response experiments with non-target small organisms (subtask 2.5.2), risk assessment of large organisms (subtask 2.5.3) and field test on selected crops (subtask 2.5.4). This task will origin the majority pf public RD from WP2. These RD are of major importance to the objectives of the project. They will be synthesized in D2.3 (public), will be used to produce publication, and they will be useful for any future research aimed at enhancing WeLASER results, researchers, and developers. RD will consist of raw data and images data at the base of reports, statistics, tables, and other elaborated information data.

TASK 3.2 (TL: LZH) "Weed-meristem perception device" will be developed to identify target plants, target's meristem, and to provide a 3D localization of the meristem for the weeding scanner.

TASK 3.3 (TL: LZH) "Crop/Weed discrimination algorithms" focus on the design and development of the recognition software for precise detection and classification of crops and weeds in the intra-row space.

TASK 3.4 (TL: LZH) "Impact-point AI-vision system and weeding control system" is devoted to the design and development of the innovative AI-vision system to detect and precisely localize the sensitive growth centres of plants (meristems).

TASK 3.5 (TL: CSIC) "Perception system integration and TRL evaluation" entailing the Individual tests for the perception device (subtask 3.5.1), weeding system integration (subtask 3.5.2), TRL assessment (subtask 3.5.3).

RD of tasks 3.2-3.5 contains data and calibration sheets, features of experiments and case study. Such RD are confidential and will be synthesised in D3.1 (by CSIC, confidential).

TASK 4.2 (TL: AGC) "Adaptation of the mobile platform" focus on the adaptation of the autonomous vehicle by AGC to support the laser-based weeding tool.

TASK 4.3 (TL: CSIC) "Smart central controller" devoted to developing the smart central controllers, and in particular the development of control unit (subtask 4.3.1), Input/output module (subtask 4.3.2) and system integration (subtask 4.3.3).

TASK 4.4 (TL: UNIBO) – "IoT and cloud computing –integration and management" aimed at developing and test field IoT devices (subtask 4.4.1), on board IoT devices (subtask 4.4.2) and cloud system (subtask 4.4.3).



TASK 4.5 (TL: CSIC) "Autonomous vehicle integration and TRL evaluation" aimed at Individual tests for the system components (subtask 4.5.1), autonomous vehicle integration (subtask 4.5.2) and TRL assessment (subtask 4.5.3).

RD of tasks 4.2-4.5 contains data and calibration sheets, features of experiments and case study. Such RD are confidential and will be synthesised in D4.1 (by UNIBO, confidential).

TASK 5.2 (TL: CSIC) "Equipment integration and testing" is oriented at a series of activities: system breakdown, integration procedures, test scenarios and assessment criteria (subtask 5.2.1), mechanical and communication integration check (subtask 5.2.2), final integration (subtask 5.2.3).

TASK 5.3 (TL: CSIC) "Equipment evaluation and TRL assessments" devoted to conduct the final tests and experiments, evaluating the performances of the final equipment and determining that the TRL is achieved.

RD of tasks 5.2-5.3 contains data and calibration sheets, features of experiments and case study. Such RD are confidential and will be synthesised in D5.1 (by CSIC, confidential), and D5.2 (by AGC, confidential).

TASK 5.4 (TL: UCPH) "Impact of the weeding equipment on crops and soil" has the scope of study of the impact on crop productivity (subtask 5.4.1), the impact on soil quality and climate-change mitigation (subtask 5.4.2). RD produced in this task are of major importance to the objectives of the project. They will be synthesized in D5.3 (public), will be used to produce publication, and they will be useful for any future research aimed at enhancing WeLASER results, researchers, and developers. RD will consist of raw data and images data at the base of reports, statistics, tables, and other elaborated information data.

WP6 - "Knowledge spread and innovation management" includes task about regulation of "multi-actor involvement procedure" (Task 6.1, TL: IETU), communication activities (Task 6.2, TL: COAG) leading to "products about the Launch of the project website and social media channels and accounts" (D6.1, by CSIC), and practice Abstracts (24 of them will be issued each year, documented in deliverable, and reported on web-site). Data will be publicly accessible via the project web site at <https://welaser-project.eu>, and related data reside on a server managed by administrative personnel of coordinator (at CSIC). The server is backed up weekly. Data will be maintained at least five years after the life of the project. Task 6.3 (TL: UCPH) is about dissemination of results leading to deliverable "Communication, dissemination and exploitation activities and results" (D6.2, D6.3, D6.4 by COAG). Task 6.4 will be about production of DMP (D6.5, D6.6, D6.7, by UNIBO), Task 6.5 on "Management of Intellectual Property Rights" (TL: CSIC), Task 6.6 (TL: UGENT) on "Plan for the exploitation of results" leading to D6.8 (by CSIC). Finally, Task 6.7 (TL: VDBP) will focus on "Exhibitions, on-farm demonstrations and training activities" leading to D6.9 (by COAG).

WP7 is about coordination and will deliver regular reports on "risk management actions" each 6-

months.

WP8 focus on "ethics requirements" that the project must comply with and will be discussed below along with description of FAIR policy. WP6, WP7, WP8 are not producing any RD.

