



## D7.8 Standardisation Activities

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Topic: LC-GD-6-1-2020: Testing and demonstrating systemic innovations in support of the Farm-to-Fork Strategy

## List of Abbreviations & Definitions

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Abbreviation	Definition
AgData	Partnership of Agricultural Data
AGV	Automated Guided Vehicle
AOP	Agro-ecological and organic practices
BSI	British Standards Institution
CAP	Common Agricultural Policy
CD	Committee draft
CEN	European Committee for Standardisation
CLC	European Committee for Electrotechnical Standardisation
D	Deliverable
DIS	Draft International Standard
DLT	Distributed Ledger Technologies
DSS	Decision Support System
DST	Digital and space based technologies
EC	European Commission
EU	European Union
F2F	Farm to Fork
GDPR	General Data Protection Regulation
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IPM	Integrated Pest Management
ISMS	Information Security Management System
ISO	International Organization for Standardization
N	Nitrogen
P	Phosphorous
PWI	Preliminary Work Item
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SC	Sub-committee
T	Task
TC	Technical committee
TRL	Technical readiness level
WG	Working Group
WP	Work Package

## Executive Summary

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This deliverable provides an overview of the standardisation activities in which experts within the PestNu project were involved in the first 18 months. In addition, the deliverable gives an overview of the existing links to standardisation in which the technical partners were involved or practising prior to participating in PestNu to give a full picture of the use of standards in the field of agricultural technologies.

The first half of the project saw the most effort go towards identifying the standards and committees with work programmes most relevant to the technical partners and developments within the project. The new standards towards which PestNu experts are contributing are developed by ISO/IEC and CEN/CLC. All contributions are done through national standardisation bodies whether at the committee stage or the public enquiry stage. The nature of the PestNu contribution is different in each case as standards development on an international stage is very collaborative, with many experts from different fields working towards consensus. The aim of the standardisation task within PestNu is to bring expertise advanced alongside practical experience from the Horizon project to standard development and closer align “soft regulation” to practice and the gaps between regulation and implementation.

The standardisation activities have been divided by technology type, which aligns with the project's structure: 1) digital and space-based technologies, and 2) agroecological and organic practices. These include contributions to standards around artificial intelligence and distributed ledger technologies for the DST solutions and standards for wastewater treatment for fertilisation and plant biostimulants for the AOP solutions.

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# 1. Introduction

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## 1.1. Background

The PestNu project follows the Farm to Fork and Green Deal strategies with the aim to reduce dependence on pesticides and fertilisers by developing innovative **digital and space-based technologies** (DST) and **agro-ecological and organic practices** (AOP). At the start of the project, the tools are at TRL5 (technical readiness level) and by the end of the project, they will reach TRL7. The partners will test and demonstrate solutions in aquaponic and hydroponic greenhouses as well as open fields in Greece and Spain. As part of upscaling the technologies, the partners will explore avenues for improving the interoperability and sustainability of the products after the end of the project.

Work package 7 (WP7) “Cooperation with European Commission services and projects” includes the task T7.4 *Collaboration with standardisation bodies national, regional and worldwide*. The activities of this task include:

- monitoring existing and upcoming standardisation activities relevant to the PestNu project,
- identifying the standardisation needs of the project’s DST and AOP developers, potential end-users and regulatory requirements,
- communicate with international standardisation organisations ISO/IEC and CEN/CLC and contribute to the relevant work programmes with reference to PestNu’s end-user(s), any legal requirements and developer specifications.

The partners report in this deliverable the efforts that they have taken to achieve these goals. As per the Grant Agreement, this deliverable will present the standards with which the PestNu products should be aligned and will propose new contributions based on PestNu innovations to national, regional and worldwide standardisation bodies. This deliverable is a living document and will be updated at the end of the project.

## 1.2. Purpose and scope

The purpose of this deliverable is to present the results of standardisation activities in PestNu from the first 18 months. This includes analysing the standards landscape, identifying the areas where the contribution of PestNu’s technical experts would be most valuable and summarising those direct efforts. This task and deliverable contribute to achieving Objective 7 of the project on *Cooperation with European Commission services and projects*, where the aim is to ensure interoperability and sustainability of the project’s results and maximise uptake and reuse of the solutions developed even after the project has ended.

The deliverable covers all standardisation efforts as part of this project where an expert working with PestNu has contributed towards developing a draft standard either through direct drafting, providing feedback and comments or voting through a national body towards an international standard developed by ISO/IEC or CEN/CLC.

The deliverable also presents the efforts of the project's partners to adopt ISO/IEC or CEN/CLC standards into the design of PestNu technologies and how well or poorly the standards were suited for furthering the aims of the technologies and meeting regulatory requirements.

### 1.3. Document structure

This deliverable will start by explaining the methodology and overall approach to standardisation in PestNu alongside the limitations of this type of approach and the issues that, in turn, may arise. The methodology will identify how we selected the areas and topics for standards development, the status of which will be analysed in the section on the standards landscape. This section also includes a gap analysis for standards in the field of precision agriculture and proposes an approach for closing that gap. The following part of the deliverable will look at the active work programme items in the relevant subcommittees of international standardisation organisations, explain the relevance of these standards and highlight the contribution and involvement of PestNu's experts in developing these standards thus far. The final section of the deliverable plans out the strategy for the standardisation task in the second half of the project, identifying potential challenges to come and proposing mitigating strategies. We have summarised the efforts of the first half of the project at the end of the deliverable along with the proposed next steps for the second half of the project.

## 2. Objectives

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This deliverable proposes an approach that follows both the EC initiative to more closely align standardisation efforts and EU-funded projects<sup>1</sup> as well as the collection of reports published by the EC funded project BRIDGIT “How to link standardisation with EU research projects: Standards to support research and innovation”<sup>2</sup>. This deliverable is an example of how to incorporate standards activities into research projects in a beneficial way for both enhancing the products of the research and widening standardisation activities. The objectives can be summarised as follows:

- **Increasing efficiency during the execution of the project.** Using standards at the early stages of the project can enhance the quality of the technical solutions by providing a stable base from which to build. Additionally, following standards can ensure state-of-the-art practices are employed or improved upon.
- **Providing a sustainability plan for the project results after the end of the project.** Contributing to standard development (though there’s no guarantee it will be included in the final product) can cement the best practices in the project as guidelines upon which other projects or products can build.
- **Maturing the field.** Contributing to standard development in fields that are developing at fast speeds will help mature the field by enabling other stakeholders to build upon the best practices where international or regional consensus has been reached.
- **Increasing the value of the products on the market.** Meeting standards from reputable organisations such as ISO or CEN can enhance the value of the products created in these EU projects in the eyes of potential procurers, giving them a possible advantage on the market and facilitating additional uptake of the results.

PestNu is committed to linking standardisation to EU-funded research projects through these means. To achieve the conceptual objectives described above, we will:

- Identify best practice guidelines that may support the advancement of the technical products developed within the project.
- Identify results from the project with potential to support the development of best practice guidelines.
- Identify the most relevant areas of work for maximising the value of the effort used and following the best known approaches for the input and output exchange.

Section 3 describes how the partners have incorporated the objectives into the methodology for contributing to standardisation activities and how we have had to adapt the approach to suit the needs of the technical partners within this project. It also describes the limitations of this type of approach alongside the proposed mitigation measures to minimise any risks to achieve the desired results.

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<sup>1</sup> European Commission, An EU Strategy on Standardisation: Setting global standards in support of a resilient, green and digital EU single market, 2 February 2022,

<sup>2</sup> BRIDGIT, *How to link standardization with EU research projects*, CEN/CENELEC, 2015, available at <https://www.ideal-ist.eu/sites/default/files/toolbox/BRIDGIT-members-guide.pdf>

## 3. Methodology

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Standards (in this context) are best practice guidelines developed by a group of experts who have achieved consensus. The main standardisation organisations with which PestNu is involved are ISO/IEC and CEN/CLC, the largest international and European standardisation organisations respectively. Standards serve a variety of purposes but one of the most useful for manufacturers is for bridging gaps between regulation and implementation – they provide guidelines for achieving regulatory requirements. Standards are voluntary, so these guidelines are not the only permissible way in meeting regulatory requirements, instead they offer routes of best practice. When mapping the existing standardisation landscape that would be relevant for PestNu technologies, we applied the following principles:

1. Which regulations do PestNu technologies have to meet?
2. Which standards currently in development can help meet those regulatory requirements?
3. How can our experts contribute to the development of the selected standards?
4. Which standards can be applied to PestNu technologies to help them meet regulatory requirements?

Additionally, we looked at possibilities where PestNu expertise could be put towards developing standards in instances where they would not necessarily help meet regulation (at least for the technologies in the project) but could serve as best practice guidelines in general. To do this, partners were asked to identify any standards that they were already following within their organisation that were relevant to the project's activities or if they were existing members within any standards development organisation. Based on this information, we identified the committees responsible for developing these standards, reviewed their current work programme and made a note to track any active processes relevant to the project where PestNu experts could contribute.

Alongside contributing to standardisation, the published titles of the chosen committees were reviewed to see if there were any standards from which the technical partners could benefit by adapting the technologies and tools we are developing in the project to meet any ISO or CEN standard or certification in a certain standard.

Some of the technologies developed in PestNu are using innovative solutions such as artificial intelligence and blockchain where the field itself is constantly developing and has yet to stabilise. The best practices or “leading” approaches tend to change rapidly, and the practitioners’ community consensus is unstable. In many relevant areas, standardisation work is non-existent. The fast-paced nature of the field in combination with the strong presence of large corporate actors (Microsoft, Apple etc.) on the committees limits the ability of PestNu to realistically influence standardisation work and standardisation organisations in these particular areas. The current document focuses on the propositions that are realistically achievable for the project.

### 3.1. Input from developers of the technologies

To understand the needs of the technical partners and how they relate to the proposed methodology, we collected feedback through two main methods. First, after an initial scan of the landscape, we identified a selection of potentially relevant committees and work programmes and sent a list to the partners to provide their feedback on the relevance of the standards to the technologies and the alignment of technical expertise with the work programme. Based on this feedback, we thinned the selection and TRI attempted to join the most appropriate committees as a facilitator or a mediator for

the technical experts within the project. In some instances, where TRI was unable to join the committee due to a lack of expertise in the given area, we urged other partners to join the standards committees on their own behalf and contribute to standardisation directly (with support from TRI on understanding the process). The reason for TRI's mediation was pre-existing membership in some of the selected committees, previous expertise in participating in standardisation committees and available time and resources to commit to further participation and active monitoring that other partners did not have.

Second, we collected the input from partners through standards workshops internal to the project. This was to spread awareness on the usefulness of standards, understand usefulness or resistance towards implementing standards and discuss how to cater to both the technical needs with the requirements of the project. These workshops helped focus the standardisation activities further on partners that had more resources or availability of experts to contribute to standard development, as well as to find further opportunities that had become apparent during the implementation of the project, for the use of standards.

### 3.2. Barriers and proposed solutions

One of the limitations identified for standardisation in agriculture and agricultural technologies was a lack of general interest from some of the technology developers and piloting partners due to a perceived lack of necessity for standards. Meeting regulatory requirements was seen as the priority. Though in some instances, standards provide guidelines for meeting regulation, it is not always the case. For example, one of the piloting site partners for the project, Tilamur, was interested in standards that would help them meet requirements for organic practices, but no such standards exist to help aquaponic practices achieve organic status at the moment, since the Regulation (EU) 2018/848 restricts aquaponic produce from being certified organic as of January 2022. Though some research has been done around finding ways to make aquaponics meet organic certification, for example, by making the aquaponic plant units soil-based<sup>3</sup>, no best practice yet exists at the European level as more research is required.

In the second half of the project, we will be engaging with the EC project *HSBooster*, the aim of which is to support efforts of EU-funded projects in standardisation. HSBooster will connect the PestNu project with a standardisation expert who can help navigate through the standardisation landscape and assist with understanding the possibilities and processes necessary for introducing new standards, for example, to support aquaponic products gain certification. For such purpose this deliverable will also work as an important tool for setting the ground for future.

Another aspect relating to this limitation is the fact that the technologies developed in PestNu were already at a certain TRL level before entering the project, meaning there was at least some proof of concept and methods for achieving that concept, that either already were following some standardised practice for doing things or following other guidelines. The developers of the technologies with lower TRL or new solutions developed as part of the project were therefore focused on finding standards that could be applied to the product by design as these tools were at a more flexible stage of what could still realistically be changed.

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<sup>3</sup> Fruscella, Lorenzo; Kotzen, Benz; Milliken, Sarah, "Organic aquaponics in the European Union: towards sustainable farming practices in the framework of the new EU regulation", *Reviews in Aquaculture*, Vol. 13, 2021, pp. 1661–1682, doi: 10.1111/raq.12539

## 4. Existing standards landscape

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### 4.1. Pre-project standardisation links

As part of understanding the standards landscape, we asked all project partners to identify any standards that they were already following or where they already had a certification. This would help place the start of the task at hand and direct the task to ensure that efforts in standard development were not misplaced to work programmes that would not further the technological development or assist with meeting regulatory requirements. The following section gives an overview of the pre-existing links to standardisation that the technical partners had prior to joining the project, whether that be certification in adherence to a standard or participation in a standard development committee, and explain how that relates to the technologies that are being developed within PestNu.

#### 4.1.1. ISO 14034:2016 Environmental technology verification

The development of nutrient monitoring devices in water by project partner TelLab is directly impacted by national and European regulations, such as the Nitrates Directive and the Water Framework Directive. These directives define the acceptable range of concentrations of pollutants in water. The Nitrates Directive determines a safe upper limit of 50 mg/L nitrates in fresh- and groundwater and Directive (EU) 2020/2184 specifies that the requirements for quality of water intended for human consumption are less than 50 mg/L nitrate and 0.5 mg/L nitrite. For phosphate, the Water Framework Directive specifies that rivers in Ireland can be classified as High Environmental Quality when phosphates are less than 0.025 mg/L P. Monitoring technologies should be able to accurately detect those ranges in freshwater and drinking water to ensure they are meeting the market needs.

In addition to the measuring ranges, Directive (EU) 2020/2184 states that methods of analysis should comply with EN ISO/IEC 17025 or similar, which is why the sensors developed should aim for ISO accreditation. The nitrate/nitrite analyser developed by TelLab, which is the core technology upon which PestNu project is being developed, has recently received ISO 14034 (Environmental technology verification) accreditation, which provides a significant competitive advantage as one of the only nitrate/nitrite analysers with this accreditation.

#### 4.1.2. ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories

As briefly mentioned above as relevant to nutrient analysers, the ISO/IEC 17025:2017 standard provides the necessary requirements that test and calibration laboratories must meet, facilitating the harmonisation of quality criteria, also relevant to biopesticide developer Fertinagro. The main objective is to guarantee the technical competence and reliability of the analytical results. Fertinagro has its own quality laboratory and assay laboratory, so the application of this standard ensures the reliability of the results and that they meet all the requirements of the different regulations to produce fertilisers and other inputs for agriculture (as biopesticides and other chemicals). Fertinagro has a certification and the lab is accredited which helps the products to fulfil all the specifications that the different regulations demand.

It also allows for the analysis of all raw materials, products, formulations, and soils, vegetables and others according to the standards, and to have results that are comparable to other labs.

#### 4.1.3. NP 4457 Management of RDI activities

AgroInsider, the developer of the AgroRadar, follows the internal document of Policies and Procedures of good practices and the Portuguese Norm NP 4457 Research, Development and Innovation. This standard provides a systematic approach for organising RDI activities and allows to keep track of technology development and identify opportunities for improvement. The standard also allows for transparency in the administration of RDI activities increasing trust in the organisation.

AgroRadar is a powerful software infrastructure that uses earth observation data from satellites of the Copernicus Programme of the European Space Agency (ESA) using artificial intelligence algorithms that provide big data and deep learning abilities onto agro data. AgroRadar automatically: i) detects soil-water-plants anomalies; ii) divides plots or geographic units in management zones; iii) produces and develops smart sampling strategies; iv) forecasts yield; v) forecasts biomass/carbon; vi) calculates the spatial structure of a region and with this calculates different spectral bio-diversity indexes; vii) detects land use change; viii) registers field evidences, etc.

In addition, AgroRadar uses temperature data from the Meteosat 2<sup>nd</sup> Generation (Land Surface Temperature) to predict good climatic conditions for the occurrence of pests and diseases at regional scale (not at parcel scale). This model does not test directly on a specific type of pest or disease. It is guidance information for the farmer to know the probability of occurrence of pests and diseases in the PestNu target vegetables. Therefore, it does not need a licence. Knowing the typical pests and diseases of the PestNu target vegetables, AgroRadar gives indication/alerts of the optimal temperatures for their occurrence.

Collected data is stored (following the best practice guidelines) on a secure, private, cloud-based server that is maintained on a routine basis. Regular data backups are performed on suitable systems. Evidence recorded in the field (photographs, sound and videos) and laboratory reports referring to the analysis of soil samples are protected by blockchain technology to guarantee the transparency of the entire process in the value chain. All information is confidential, only known to workers during the employment relationship for an unlimited period - even after the employment relationship ends. Confidential information is only used by AgroInsider. All access to cloud-based server files is granted by invitation only.

#### 4.1.4. FSSC 22000 Scheme for Food Safety Management Systems

FSSC 22000 provides a certification model that can be used in the whole food supply chain to ensure food safety standards and processes. Specifically, FSSC 22000 is a standard that benefits the sectors of farming, animal feed production, food manufacturing/processing, food packaging manufacturing, transport, and storage, catering as well as retail.

FSSC 22000 is applicable in a variety of products including the ones that PestNu agro-ecological and organic practices (AOPs) and Digital and Space-based Technologies (DSTs) technologies are planned to be applied, namely perishable products of plant origin (i.e., fresh vegetables). This standard is

applicable to all organisations, regardless of size, complexity, public or private sector, providing competitive advantages such as improvement of stakeholder reassurance; increased credibility through third party certification; improvement of performance by reducing costs and improving efficiency through continual improvement.

Which partner is related to this certification? Earlier sections 4.1.1 to 4.1.4 mentioned who and I miss that here

#### **4.1.5. ISO/IEC TS 27008:2019 Information security management systems controls**

ISO/IEC TS 27008:2019 provides guidance to review and assess the implementation and operation of an Information Security Management System (ISMS) and check its compliance with the required standard. Thus, it enables organisations, public and private businesses and federal agencies, that perform reviews on information management and tests for operational compliance, to ensure that an ISMS controls their information/data as it is supposed to.

SiVi, which is the visual anomaly detection and cyber security system developed by Sidroco and used for the enhancement of the DSS (developed within the project), follows the guidance of ISO/IEC TS 27008:2019 related to “information security management systems” controls that are selected through a risk-based approach for security management. The result of that is the enhancement of the information risk management that the tool provides: strengthening the security domains, including information security, network security, Internet security and critical information infrastructure protection. SiVi can handle different kinds of data, such as cybersecurity events, to improve the state of cybersecurity and the services that it provides.

## **4.2. Identifying soft regulation opportunities**

To identify standards that will be most beneficial for the technologies developed in PestNu, it was important to identify the policies and regulations that they are expected to meet. One of the most useful purposes of standards is implementing them in scenarios where they would help meet regulatory requirements. This use case of standards is often referred to as “soft regulation”. Older regulations will have more existing standards supporting their implementation, while newer regulation will see more standards still in development. Therefore, the strategy for identifying draft standards where PestNu experts would be able to contribute involved identifying the new regulations that specifically identify standards as a method for meeting regulatory requirements. This gives quite a wide reach for potential standardisation activities as the technologies, being quite different from one another, will have to meet different regulations and directives. As the standards available to all partners are either at the EU level or international level, then the policies and other instruments that we analysed for soft regulation opportunities were also at EU level.



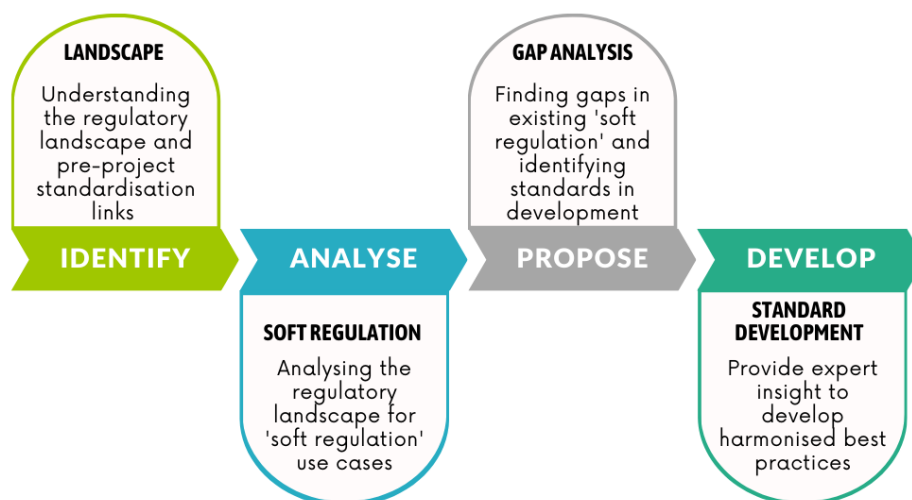


Figure 1: Methodology for identifying opportunities for standards development

The two key EU strategies towards which the PestNu project aims to contribute are the EU Green Deal and the Farm2Fork strategy. The directives and regulations for implementing these strategies, such as Common Agriculture Policy (CAP), [Fertilising Products Regulation](#) 2019/1009, etc., will be analysed below for reliance on soft regulation for implementation. As part of identifying the requirements of the technologies in T1.2, all partners were asked to list the regulations with which their products have to be compatible, which were then analysed also as part of this task to identify any existing standards in place to help meet the regulation as well as any planned standards to which PestNu experts would be able to contribute.

#### 4.2.1. Minimum requirements for water reuse Regulation 2020/741

PestNu partner STAM is developing an automated microalgae wastewater treatment system. It needs to meet the requirements of the Regulation 2020/741, the aim of which is to support the 2020 Circular Economy Action Plan and will apply from June 2023. [The guidelines](#) for meeting this regulation have been developed by DG ENVIRONMENT and lean on the ISO 16075 series on Guidelines for treated wastewaters use for irrigation projects. These standards have been developed by ISO TC 282/ SC1 'Treated wastewater use for irrigation' and most of them have been published. The ISO 16075-6 Part 6: Fertilization is currently under final stages of development and when published will be relevant to the automated circular economy system for agro-wastewater treatment developed by STAM, which reduces the quantity of nutrients N and P to comply with EU regulation. STAM will look to apply the published standard to the treatment system. The standard is expected to be published at the end of 2023 and therefore any application of it would take place in the second half of the project or beyond.

### 4.2.2. Fertilising Products Regulation 2019/1009

CEN/CLC will need to produce or update a total of 230 standards to assist with compliance verification alongside the introduction of the new Regulation<sup>4</sup>. Project partners Fertinagro, STAM and Neoalgae have all identified this is a regulation they must follow and mentioned already as part of the requirement analysis task T1.2 that there are no existing standards that would help meet this regulation<sup>5</sup>. CEN TC 455 Plant Biostimulants is in the process of developing new and/or updated standards to assist with meeting the new regulation. The standards will ensure harmonisation of testing and sampling methods for fertilising products across Europe, standardising terminology, specifications and ensuring environmental safety in use. These will come into an enquiry phase towards the end of 2023 at which point the AOP experts will be able to provide their insight. Any contributions made towards these standards as they relate to the Fertilising Products Regulation will be included in the updated version of this deliverable due at the end of the project in September 2024.

### 4.2.3. REACH Regulation 1907/2006

One of the regulations that biostimulant and fertiliser producer Neoalgae has to meet is '*Registration, Evaluation, Authorisation and Restriction of Chemicals*' (REACH) Regulation, which aims to improve human health and environment by boosting innovative, safer chemicals. European standards guiding the implementation of this regulation also aim to support the EU Circular Economy and the Green Deal by reducing the use of hazardous chemicals and boosting sustainable chemicals<sup>6</sup>. The CEN committees that produce these standards are numerous, among which we also find CEN/TC 223 'Soil improvers and growing media', CEN/TC 455 'Plant Biostimulants' and CEN/TC 260 'Fertilisers and liming materials'. As chemicals are at the base of different industries, fertilisers and pesticides are subjected to targeted regulations they are expected to meet; therefore, we find some overlap with previously mentioned regulations and the related standards committees. Similar to the Regulation 2019/1009, standards to which PestNu AOP experts aim to contribute will be around the harmonisation of testing and sampling methods for fertilising products. The EU is expected to revise the REACH Regulation in 2023/24 so we will monitor this development to see whether this also affects standardisation work programme put out by CEN to support the implementation of the regulation.

### 4.2.4. New Organic Regulation 2018/848

The new Organic Regulation that affects both biostimulant and pesticide producer Fertinagro relates to the same three committees identified as assisting in materialising the REACH regulation in the previous section. Likewise, the efforts from PestNu experts put towards developing the standards to support Regulation 2018/848 will take place in the second half of the project. This regulation changes the requirements for agricultural products achieving organic certification as the connection to soil in production is reinforced. This regulation, therefore, defines hydroponic and aquaponic farming practices as inorganic which affects project partners UTH and Tilamur. There are no existing standards nor

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<sup>4</sup> Fertilizers Europe, *Fertilizing Products Regulation*, 2019. <https://www.fertilizerseurope.com/agriculture-environment/fertilizing-products-regulation/>

<sup>5</sup> No existing standards as relevant to the PestNu project. There have been nearly 100 European standards already published following the 2020 standardisation request [M/564](#) from the EC to CEN in support of implementing the Regulation 2019/1009.

<sup>6</sup> CEN/ CENELEC, *Work programme*, 2022.

standards in development that would help hydroponic or aquaponic practices achieve organic status at this moment. As discussed in section 3.2 above though some proposals for making aquaculture organic exist, more research is required into advancing the production design before best practice guidelines can be developed.

#### **4.2.5. Common Agriculture Policy Regulation 1305/2013**

Though the Organic Regulation 2018/848 does not support aquaponic practices, this food production method does meet several goals of the Common Agriculture Policy: reducing emissions, closing the cycles of organic waste, water and nutrients, and minimising chemical dependency and the use of inorganic fertilisers. These are criteria that all products in PestNu aim to support in one way or another: the flow cytometer developed by RISE is one of the tools. It would also support aquaponic practices by providing real-time analysis of the growing algae and bacteria during cultivation and providing valuable insight towards fish-plant symbiosis. Again, we can name CEN/TC 455 Plant biostimulants as a relevant standards committee due to the expertise available at RISE, but it is less closely correlated with the CAP. Each Member State will need to develop their own strategic plan for implementing CAP nationally, so the standards that are able to support the strategy may vary and are more likely to be developed at a national level since no suitable options exist at the European or international level.

#### **4.2.6. Sustainable use of pesticides Regulation 2009/128**

The aim of this directive is to reduce the environmental impact of the EU food system by reducing the use of chemical pesticides. The CEN Work Programme 2022 identifies CEN/TC 144 'Agriculture machinery & motor-operated electric tools' as a relevant standards committee since they are working on adapting the ISO 16122 series on 'Inspection of sprayers in use' to a European context for it to support the regulation. These standards are relevant to the autonomous spot-spraying robot (AGV) that IKH is developing within the project and fits the model of the sprayers that the robot uses. We plan to review and contribute to this series when it comes under enquiry in March 2023.

This regulation is also relevant to the decision support system (DSS) developed by CERTH and Sidroco that will enable farmers to make informed decisions. One of the measures set out in this directive is the implementation of an Integrated Pest Management (IPM). This DSS allows the farmer to always be on top of the pest management strategies in place as it provides insight based on monitoring activities. As the DSS generates prescriptive recommendations for both open-field and aquaponic cultivation, it is important that they follow best practices and meet regulatory requirements.

#### **4.2.7. EU Partnership for Agricultural Data (AgData)**

The AgData aims to support sustainable agriculture alongside the F2F Strategy and the CAP. This partnership affects AgroInsider and the AgroRadar technology they are developing as it uses Copernicus datasets. The final proposal for the EU Partnership for Agricultural Data specifically states that no special attention to the development of standards in relation to the initiative but rather aim to

create synergies with aligning EU level initiatives<sup>7</sup>, e.g., the Sustainable Food Systems Initiative, which is planned for adoption in the third quarter of 2023.

#### 4.2.8. EU Cybersecurity Act 2019/881 and GDPR Regulation 2016/679

One of the purposes of the Cybersecurity Act is to level the cybersecurity certification schemes across Europe and create a digital single market for ICT products and services. To support the certification scheme, CEN/CLC JTC 13 'Cybersecurity and Data Protection' develops ICT security guidelines, organisational frameworks and management systems, among other things<sup>8</sup>. This committee has also adopted the ISO 27000 series standards as a European standard, which provides guidelines for information security management. As the innovation in this project is around agricultural products and solutions, the experts available to the project will be more knowledgeable in the subject matters mentioned above and will be less likely to be able to contribute to the development of standards in this field; therefore, the priority is to incorporate relevant existing standards into the DSS to enhance the security of the product. Meeting standards developed by the ISO and CEN committees on information security will assist with making the PestNu digital tools competitive on the single market.

#### 4.2.9. Upcoming Artificial Intelligence Act

The planned AI Act will seek to regulate AI products by risk level and determine systems that would require conformity assessments or similar to limit risk to users and subjects. CEN/CLC JTC 21 'Artificial Intelligence' will be developing standards in support of the regulation based on the EC standardisation request (which is currently available in [draft form](#)). One standard, for example, currently in development is adapting the IEEE 7000 Standard Model Process for Addressing Ethical Concerns during System Design to meet the requirements of the AI Act. The new standard will offer a systematic risk assessment method for considering the ethical risks and translates that to product requirements during the whole lifecycle of the AI system. Participating in this standard development committee will provide valuable insight also for the tools in PestNu that use AI, and will make sure that they are ahead of the legislature and will not need major adjustments when the regulation comes into force.

### 4.3. Recognised gaps

This section includes an overview of the gaps in existing soft regulation in the field of precision agriculture and highlights areas where best practice guidelines are needed. The gap analysis is summarised here based on the PestNu survey of Farm2Fork practitioners from the start of the project, the pre-project standardisation links, the analysis of soft regulation opportunities and developer requirements as discussed above.

In a survey of Farm2Fork practitioners<sup>9</sup> (farmers, farmers' agents, agricultural suppliers, agronomists) carried out at the start of the PestNu project, it was found that regulation in the field of precision

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<sup>7</sup> European Commission, European Partnership under Horizon Europe Agriculture of Data, 2022.

<sup>8</sup> European Commission, *Rolling Plan for ICT standardisation*, 2022. <https://joinup.ec.europa.eu/collection/rolling-plan-ict-standardisation/rolling-plan-2022>

<sup>9</sup> The full results of the survey are available in D1.1 *Farm to Fork practitioners needs and requirements*, published on <http://pestnu.eu>

agriculture was changing too often, leading to a lack of up-to-date standards to support implementation. Many existing guidelines were found to be impractical, instead giving more general advice. A lack of standards around measuring nutrient losses and nutrient impacts in agro-ecological systems was found. The aim of the upcoming [Soil Health Law](#) is to address some of these concerns around nutrient measurement and impacts as part of soil management and monitoring by establishing rules for sustainable soil use. The initiative is expected to be adopted in the second quarter of 2023. We will monitor this space to see if it has any impact on the CEN Work Programme 2023 - an annually updated document providing an overview of the active work programme of all technical committees.

When speaking to practitioners in workshops organised by the project on the subject of using AI-based decision support systems in farming, they emphasised a need for these systems to have some degree of explainability and always leaving the final decision up to the farmer. This is for varied reasons, for example, wanting to retain autonomy of their farm or not trusting the system to make a better decision than they can. Another factor is due to not understanding how the DSS is coming to its conclusions, which could be improved by increased explainability and transparency of the AI involved. These gaps are not necessarily due to a lack of standards but rather a lack of practice or requirements for enabling this level of transparency of the system.

In addition to the gaps in soft regulation that we have identified, we would also attract attention to a gap between existing standards and awareness of standards. Across the various workshops and presentations both internal and external to the project that we have done through the first 18 months, there is limited awareness of standards in practice, certification in standards and a lack of necessity to use standards as an advantage over a competitor in the market in the field of precision agriculture. Some part of it can be put down to marketing of standards. There is a large resource of harmonised standards that have been published but remain quite inaccessible to the first time user due to the difficulty of navigating the library. The barriers come from a lack of available information about what the standards contain, without purchasing the standard first. To someone unfamiliar with the content, this can be deterring especially when the perceived benefits are limited.

The coded language, largely unfamiliar to general public, used when talking about a standard and its status carries over when participating in standard development for the first time. Standards committees could also do more for inclusivity with gender representation being wildly skewed to the male demographic in the ICT sector committees. Recruitment of younger standards experts has also been identified as an issue by CEN<sup>10</sup>, which is something that is now actively being addressed through various workshops as part of a dedicated campaign.

Alternatively, standards in this field are marketed well, but the lack of interest from our partners towards adhering to them from a business strategy perspective could be reflective of the fact that the existing standards are not useful for SMEs producing technologies in the field. Though the standards supporting legislation relevant to AOP products seem to be on track to catch up with the expertise, the DST technologies used in agriculture are too domain specific and unique enough on their own to benefit from AI or ICT standards as an advantage on the market. Due to the nature of standardisation a lack of interest in them could also be attributed to the generalisation that is needed to some degree to create a standard applicable across a wide range of practices that ends up making them quite impractical in some cases.

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<sup>10</sup> CEN/CENELEC, (2022), *Young professionals in standardization: CEN and CENELEC are launching a campaign*. Available from: <https://www.cencenelec.eu/news-and-events/news/2022/brief-news/2022-03-17-young-professionals-in-standardization/>

## 5. Contributions to standard development

In the previous section, we identified the committees that are producing standards relevant to the regulations and directives PestNu technologies will be expected to meet. This section provides an overview and description of contribution to standard development that has already taken place in the first 18 months of the project or to which we plan to contribute. As many standards identified as relevant to the project will become available for outside contribution in the second half of the project, this section will be updated on a rolling basis with a comprehensive list of all contributions being provided in the second version of this deliverable at the end of the project.

After analysing the a) developer input, b) pre-project standardisation links, c) soft regulation opportunities, and other relevant sources<sup>11, 12</sup> we identified the committees where the active work programme was most closely aligned with the work done in PestNu. The purposes for using standards were found to be in the following order of popularity:

1. to meet regulatory requirements,
2. to have comparable qualities to other products on the market,
3. to have a competitive edge on the market

Based on this knowledge, the developers of the DST and AOP solutions were presented with the proposed approach for contributing to standard development and incorporating standards into their technologies by design. They were then asked to provide feedback to these proposed solutions to better direct the efforts in this task and ensure it was spent in a valuable way. As the standards relevant to the two types of solutions developed and tested in PestNu will be quite different from each other, the developer's input into directing the work programme has been grouped accordingly.

### 5.1. DST and DSS route

As it is unrealistic to follow all activities due to the sheer volume of work being done, we made a selection based on the most popular choices/ where it was more likely that PestNu experts would be able to contribute also to the drafting of the standards. A full overview of all committees reviewed is presented in Annex 1 of this deliverable. After presenting the developing partners a pre-selection of possibly relevant committees, identified based on their feedback, the ISO/IEC and CEN/CLC committees found most relevant to the work of DST are as follows:

Table 1: Overview of DST standardisation committees identified as relevant to the project

Committee number	Committee name
ISO TC 307	Blockchain, Distributed Ledger Technologies
CEN/CLC JTC 19	Blockchain, Distributed Ledger Technologies
ISO/IEC JTC 1/ SC 42	Artificial Intelligence
CEN/CLC JTC 21	Artificial Intelligence

<sup>11</sup> CEN/CENELEC, *Standards in support of the European Green Deal Commitments*, 2020.

<https://www.cencenelec.eu/media/CEN-CENELEC/Areas%20of%20Work/CENELEC%20sectors/Accumulators,%20Primary%20cells%20and%20Primary%20Batteries/Documents/standardsinsupporteuropeangreendealcommitments.pdf>

<sup>12</sup> European Commission, *Standardisation Policy*, 12 May 2022. [https://single-market-economy.ec.europa.eu/single-market/european-standards/standardisation-policy\\_en](https://single-market-economy.ec.europa.eu/single-market/european-standards/standardisation-policy_en)

ISO/IEC JTC 1/ SC 27	Information Security, cybersecurity and privacy protection
CEN/CLC JTC 13	Cybersecurity and data protection
CEN TC 144	Agriculture machinery & motor-operated electric tools
ISO TC 23	Tractors and machinery for agriculture and forestry

As these are closely aligned with the competencies of the task lead for T7.4, TRI was able to join many of these committees through the UK national standardisation body BSI, and act as a facilitator to enable the experts in PestNu to provide their feedback to any standards at a drafting/ enquiry stage.

The most relevant items in the work programme to which PestNu experts could contribute are listed in the table below. Standards that have been previously incorporated into the design of the tools or that have been followed pre-project are not included in this overview – that information is available in section 4.1.

Table 2: Overview of DST work programme

Committee	Standard number	Standard title
CEN TC 144	prEN ISO 16122 1-4	Inspection of sprayers in use
CEN/CLC JTC 21	PWI	AI Trustworthiness characterisation
CEN/ CLC JTC 21	PWI	AI systems risk catalogue
ISO/IEC JTC 1/SC 27	ISO/IEC 27071	Security recommendations for establishing trusted connections between devices and services
ISO TC 307	ISO/DTR 3242	Use Cases Summary Report

### 5.1.1. prEN ISO 16122 1-4 ‘Inspection of sprayers in use’

This four-part standards series is being adapted from the ISO 16122 range to meet the requirements of the Sustainable use of pesticides 2009/128 directive. The scope of this series is to provide general requirements to be fulfilled for the inspection of all types of sprayers for plant protection products used in agriculture. It provides guidelines for test methods used in inspection relating mainly to the condition of the sprayer with respect to potential risks for the environment and its performance. The 3D spot sprayer on the robot (AGV) developed by IKH will operate on a similar module and therefore will be relevant to the project.

### 5.1.2. AI trustworthiness/ robustness

The upcoming AI Act attaches great importance to trustworthiness and robustness of AI systems throughout their lifecycle. Standards such as the IEEE 7000 Standard Model Process for Addressing Ethical Concerns during System Design and ISO/IEC TR 24368 Overview of ethical and societal concerns provide guidelines for considering the ethical risks of an AI system with the IEEE standard providing a more product requirement orientated approach, operationalising some of the risk management aspects outlined in the AI Act. Though these standards offer valuable methods for addressing the ethical concerns, to meet the full AI Act requirements, they need to include all stages of the AI lifecycle. CEN/CLC JTC 21 is currently in the process of adapting these standards to the EU market in the draft standard AI systems risk catalogue.

Another standard under similar due process is on AI trustworthiness characterisation, being adapted from ISO 25059 Quality model for AI systems, ISO TS 5471 Quality evaluation guidelines for AI systems, and IEEE P7001 Draft Standard for Transparency of Autonomous Systems. Both adaptations are at an early stage of development and will require more narrowing of the scope before being accepted as new working items. As TRI is a member of the CEN/CLC committee for Artificial Intelligence, we will directly be able to contribute to the drafting of this standard alongside facilitating the insight from the technical experts at CERTH and Sidroco.

The IEEE standards mentioned above have recently been announced as being available free of charge to the general public as part of the IEEE GET Program “to encourage adoption and use of standards that contribute to advancing technology for humanity in key areas”<sup>13</sup>.

### 5.1.3. Cybersecurity and blockchain

ISO/IEC 27071 Information technology – Security techniques – Security recommendations for establishing trusted connections between devices and services, currently at a drafting stage, provides a summary of different frameworks for trusted connections between device and service. As the DSS being developed in PestNu makes recommendations to the user based on input from the AI robotic trap, the Agroradar, the UVC analysers and the AGV, it is important to have a secure connection between the reports from the different services. The DSS will use the SiVi platform developed by Sidroco, which is capable of detecting vulnerabilities and anomalies and displaying that information in a user-friendly way. The cybersecurity platform will be interconnected using a blockchain-based system. We hope to apply this expertise to the standard and provide a perspective from an agricultural use case where digital infrastructure is not always as up to date as in other fields. This expertise and use case uniqueness can also be put towards the ISO/DTR 3242 Blockchain and distributed ledger technologies – Use cases summary report, which aims to showcase many different ways for implementing DLT.

## 5.2. AOP route

The standardisation committees identified to be most relevant for partners involved in AOP product development were as follows:

Table 3: Overview of AOP standardisation committees identified as relevant to the project

Committee number	Committee name
ISO TC 282/ SC 1	Treated wastewater reuse for irrigation
CEN TC 455	Plant Biostimulants
ISO/TC 134/WG 6	Beneficial substances (including biostimulants)
CEN TC 223	Soil Improvers and Growing Media
CEN TC 260	Fertilisers and liming materials

<sup>13</sup> IEEE, (2023), IEEE GET Program, Available from: <https://ieeexplore.ieee.org/browse/standards/get-program/page/series?id=93>



The AOP products are a lot more similar in nature to each other than the DST products and therefore there was a lot more overlap in the committees that were deemed to be most relevant for the project, hence a shorter list. These committees are expected to deliver first drafts of relevant standards in the second half of 2023 so the AOP contributions to standard development will be discussed in more detail in the second edition of this deliverable.

As the activities of these committees lay somewhat outside the competencies of task lead TRI, the options for contributing to the work programme of these committees was either through the public commenting function at the appropriate time or for one of the technical partners to join the committee themselves in order to contribute directly through drafting and voting.

The most relevant items in the work programmes to which PestNu experts could contribute are listed in the table below. Standards that have been previously incorporated into the design of the tools or that have been followed pre-project are not included in this overview - that information is available in section 4.1.

Table 4: Overview of AOP work programme

Committee	Standard number	Standard title
CEN TC 455	prEN 17702 1-2	Sampling and sample preparation
CEN TC 455	prEN 17708	Preparation of sample for microbial analysis
ISO/TC 134/WG 6	ISO/CD 6675	Detection of Escherichia coli
ISO/ TC 282/ SC 1	ISO/DIS 16075-6	Guidelines for treated wastewater use for irrigation projects — Part 6: Fertilization
CEN TC 223	prEN 12579	Soil improvers and growing media - sampling
CEN TC 260	prEN 1482 rev 1-4	Sampling and sample preparation

### 5.2.1. CEN TC 455 Plant Biostimulants

This committee is producing standards that specify methods for the reduction and preparation of both microbial and non-microbial biostimulant samples and sets out the requirements for the sample preparation reports. Additionally, the committee is preparing standards for determining the prevalence of specific chemical compounds, fungi and bacteria that would be present in the biostimulant. The biostimulant formulas developed by Fertinagro and Nealgae will benefit from the publication of these standards as they will provide guidelines for meeting the requirements set out in the EU Fertilising Products regulation. The ISO equivalent of this committee ISO/TC 134/WG 6 also has standards on the detection of some of these bacteria on their open work programme. In the interest of establishing the European standard as best practice worldwide, contributing to the development of both is beneficial for the experts of PestNu.

### 5.2.2. CEN TC 233 and CEN TC 260

Similar to CEN TC 455, these committees are updating the guidelines for sampling to support the Fertilising Products regulation 2019/1009. CEN TC 233 is updating standards for sampling soil improvers (prEN 12579), intended for the use of buyers and product enforcement agencies to verify claims on the product, and not as a guideline for controlling manufacturing. The committee is also

updating other standards that define methods for sampling and testing of specific chemical and organic compounds found in the products such as the moisture content, pH level, determining the aerobic biological activity, temperature and time profile as they relate to composting and digestion. CEN TC 260 is updating sampling provisions for large quantities of non-organic fertilisers and liming materials and standards for the determination of various chemical substances present in the fertilisers, such as cyanamide nitrogen and extracted phosphorus P205. These standards are loosely related to the products developed in PestNu, but are highly relevant to some of the EU regulations that affect the PestNu technologies and where our expertise allows we aim to provide insight to developing the harmonised best practice.

### **5.2.3. ISO/DIS 16075-6 Guidelines for treated wastewater use for irrigation projects — Part 6: Fertilisation**

This standard is one in a six-part series on understanding the contributing factors to reducing or eliminating the negative effects of excess nutrients in soils and crops. Currently under development by ISO/ TC 282/ SC1 Treated wastewater reuse for irrigation, this standard aims to create a guideline for optimal wastewater reuse in combination with fertilising products to limit the use of excessive quantities, pollution and health risks. Part 6 will provide guidelines for evaluating the nutrient quantities in treated wastewater, the availability and monitoring of nutrients to crops irrigated with treated wastewater and matching the water quality and fertiliser properties. When published, this standard can inform the automated circular economy system for agro-wastewater treatment developed by STAM to reduce the quantity of nutrients N and P to comply with EU regulation. This water can then be used for irrigation. This type of standard is missing on the European market and will be helpful for identifying the harmonised approach for evaluation of nutrient availability to the crops.

## 6. Plan for M18-M36

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This deliverable will be updated at the end of the project in M36 (September 2024). This section includes a summary of the strategy to achieve the task objectives and provides an overview of all the contributions towards standards development that will take place in the second half of the project.

2023 will see the Commission's response to the public consultation phase on updating marketing standards for agricultural products<sup>14</sup>. The aim of the initiative is to update outdated marketing requirements that may hinder efforts to make the food system more efficient and sustainable. This initiative will be relevant to the objectives of project partner Masoutis involved in promoting food health and safety as a retailer and we will follow any developments on this delayed adoption to see opportunities for contributing.

In summer 2022, PestNu applied to the EC project Horizon Standardisation Booster, which aims to bring EU projects funded under Horizon programmes and standardisation efforts closer together. The HS Booster project matches the Horizon project with a standardisation expert and enables greater contribution towards standards development from those experts that have no prior experience or understanding of how to contribute towards standardisation. HS Booster promises to engage the experts of PestNu in the first half of 2023. Any contributions towards standard development done in collaboration with the HS Booster project will be summarised in the second version of this deliverable at the end of the project.

### 6.1. Plan for future engagement of DST experts

As DST technologies and applicable regulations are closely linked with the DSS being developed in the project, the standards relevant for both will be included in this section. DST experts will be able to contribute to the following committees:

1. CEN/TC 144 Agriculture machinery & motor-operated electric tools
2. CEN/CLC JTC 21 Artificial Intelligence
3. ISO/IEC JTC 1/ SC 27 Information security, cyber security and privacy protection
4. ISO TC 307 Blockchain, Distributed Ledger Technologies

The nature of the engagement is described above in section 5.1.

### 6.2. Plan for future engagement of AOP experts

The AOP experts involved in fertiliser production will be able to contribute to some of the 250 harmonised standards needed for the new EU Fertilising Products Regulation that has come into force from summer 2022<sup>15</sup>. The regulation changes the way CE marking is done and the drafted or updated standards will

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<sup>14</sup> European Commission, Agricultural products – revision of EU marketing standards, Dec 2021. [ec.europa.eu/info/law/better-regulation](https://ec.europa.eu/info/law/better-regulation).

<sup>15</sup> Fertilizers Europe, Fertilizing Products Regulation, 2019. <https://www.fertilizerseurope.com/agriculture-environment/fertilizing-products-regulation/>

support implementing the regulation by providing guidelines for meeting the regulatory demands. The standards are expected to be in place by summer 2024, meaning any contributions for PestNu experts that have been included in the final standards will be clear by the time the updated version of this deliverable is due.

The CEN committees that are drafting new European standards in support of the various regulations relating to the AOP solutions analysed above in chapter 4, and where PestNu experts are planning to contribute are:

1. CEN/TC 455 Plant Biostimulants
2. CEN/TC 260 Fertilisers and liming materials
3. CEN/TC 223 Soil improvers and growing media

In addition to that, PestNu experts will be interested in the developments within ISO/ TC 282/ SC 1 Treated wastewater use for irrigation as partner STAM consider applying ISO/DIS 16075-6 Guidelines for treated wastewater use for irrigation projects — Part 6: Fertilisation once published.

### 6.3. Challenges for the second half of the project

The main aim for the second half of the project is to follow through on existing standardisation development plans and to ensure that the efforts made support the sustainability of the project's final results. We are on the right track to achieve that as we have identified the subcommittees with the work programmes most closely related to our project's goals and that align with the interests of our experts. The biggest challenge for validating the project's standardisation efforts is the take-up of the standards towards which we have contributed. Greater use of the standard demonstrates the quality and, more importantly, the usefulness of the standard. This is more likely to happen with standards where production has been mandated by an EC standardisation request to support upcoming or newly established EU regulation.

As we are not able to join every committee identified and contribute directly due to availability of resources, then for some of the contributions we are expecting to provide insight at the public enquiry stage of the standard development. One of the risks associated with this is missing the narrow window of opportunity to contribute to some of the standards. This means that we will have to monitor the national standardisation bodies' websites for updates, and though usually they provide indicative dates for when to expect the next stage in development, these are not always accurate, can come sooner or later than expected and result in the feedback window being minimised and contribution being rushed or fully missed. To mitigate the risk of missing the opportunity to contribute to some of these working items, we will actively monitor updates to the status of the work programme to minimise the chance of the enquiry window being closed before the opportunity is noticed.

## 7. Conclusion

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This deliverable presents an analysis of the standardisation opportunities related to the technologies and solutions developed within the PestNu project. The analysis is not limited to the technical aspects: it also includes methodologies and processes related to the PestNu products. The analysis is based on the responses of the PestNu partners to the T2.1 project survey on the current state of regulations, protocols, standards and guidelines they follow as they relate to the technologies being developed in the PestNu project.

The analysis showed several interesting insights:

- The reasons for using standards in this field are varied:
  - **meeting regulatory requirements,**
  - **allowing for norm-based comparison to competitors,**
  - **using certification as a recognisable stamp of quality** and having an edge on the market
- Though using standards as a marketing tool was mentioned, for most partners, meeting **regulatory demands takes priority** when it comes to standards use, as there isn't enough motivation to apply it for a competitive edge. Whether that be due to lack of procurers who value ISO/ CEN compatible products in the field or due to a lack of competition on the market that would warrant meeting additional standards is unclear.
- Many of the new regulations and directives in the agricultural domain that PestNu technologies have to meet are actively **using standardisation as a supporting measure** that practitioners would be able to use for meeting the regulatory demands.

Based on this understanding of why standards are used in the field, we also analysed the regulatory landscape to identify any opportunities in new or upcoming EU level regulation that could benefit from the contribution of PestNu experts and that could be applied to PestNu products once published. The field where PestNu experts would be able to make the most impact by way of contributing is in plant biostimulants and fertilisers, as well as AI and blockchain as this is the field where we are innovating the fundamentals of the concept or applying them in a unique way for a constantly developing field.

Many of the standards identified as relevant will be open to contribution in the second half of the project and the updated version of this deliverable will provide a more detailed description of the standards to which PestNu experts have contributed and/or to which they will apply to PestNu products.

## ANNEX 1 Overview of committees

Relevant Committee: Digital and Space-Based Technologies (DST)	Standards Body	Scope
<b>Provide Task Description for relevant proposals and contribute to sections on the state of the art</b>		
ISO/IEC JTC 1/SC 41/ Internet of Things & Digital Twins	ISO/IEC	Standardisation in the area of Internet of Things and related technologies. Serve as the focus and proponent for JTC 1's standardisation programme on the Internet of Things and Digital Twin, including their related technologies. Provide guidance to JTC 1, IEC, ISO and other entities developing Internet of Things and Digital Twin related applications.
ISO/IEC JTC 1/SC 35/ User interfaces	ISO/IEC	Standardisation in the field of user-system interfaces in information and communication technology (ICT) environments and support for these interfaces to serve all users, including people having accessibility or other specific needs, with a priority of meeting the JTC 1 requirements for cultural and linguistic adaptability.  This includes: <ul style="list-style-type: none"> <li>• user interface accessibility (requirements, needs, methods, techniques and enablers);</li> <li>• cultural and linguistic adaptability and accessibility (such as evaluation of cultural and linguistic adaptability of ICT products, harmonized human language equivalents, localization parameters, voice messaging menus);</li> <li>• user interface objects, actions and attributes;</li> <li>• methods and technologies for controlling and navigating within systems, devices and applications in visual, auditory, tactile and other sensorial modalities (such as by voice, vision, movement, gestures);</li> <li>• symbols, functionality and interactions of user interfaces (such as graphical, tactile and auditory icons, graphical symbols and other user interface elements);</li> <li>• visual, auditory, tactile and other sensorial input and output devices and methods in ICT environments (for devices such as keyboards, displays, mice);</li> <li>• user interfaces for mobile devices, hand-held devices and remote interactions.</li> </ul>

ISO/IEC/JTC 1/SC42/ Artificial Intelligence	ISO/IEC	<p>Standardisation in the area of Artificial Intelligence</p> <p>Serve as the focus and proponent for JTC 1's standardisation program on Artificial Intelligence Provide guidance to JTC 1, IEC, and ISO committees developing Artificial Intelligence applications</p>
ISO/IEC/JTC 1/SC27/ Information Security, Cybersecurity & Privacy Protection	ISO/IEC	<p>The development of standards for the protection of information and ICT. This includes generic methods, techniques and guidelines to address both security and privacy aspects, such as:</p> <p>Security requirements capture methodology; Management of information and ICT security; in particular information security management systems, security processes, and security controls and services; Cryptographic and other security mechanisms, including but not limited to mechanisms for protecting the accountability, availability, integrity and confidentiality of information; Security management support documentation including terminology, guidelines as well as procedures for the registration of security components; Security aspects of identity management, biometrics and privacy; Conformance assessment, accreditation and auditing requirements in the area of information security management systems; Security evaluation criteria and methodology.</p> <p>SC 27 engages in active liaison and collaboration with appropriate bodies to ensure the proper development and application of SC 27 standards and technical reports in relevant areas</p>
ISO/IEC JTC 1/SC 7 - Software and systems engineering	ISO/IEC	<p>Standardisation of processes, supporting tools and supporting technologies for the engineering of software products and systems. Note: The processes, tools and technologies are within the scope of JTC1 terms of references and exclude specific tools and technologies that have been assigned by JTC1 to other of its SC's.</p>
ISO/TC 307/Blockchain & Distributed Ledger Systems	ISO	<p>Standardisation of blockchain technologies and distributed ledger technologies.</p>
ISO/TC 299/ Robotics	ISO	<p>Standardisation in the field of robotics, excluding toys and military applications</p>
ISO/TC 159/SC 4: Ergonomics of human-system interaction	ISO	<p>Ergonomics standardisation of the interaction between systems (often computer based) and the people who use and operate them as well as those who develop, manufacture, evaluate, install and maintain them. Areas of standardisation include hardware ergonomics (including input, display and interactive devices and associated workplaces and environments), software ergonomics (including dialogue and interaction design) and human centred design processes and methods (including usability engineering and participative design methods) as well as accessibility.</p>
ISO/TC 110/SC 2: Safety of powered industrial trucks	ISO	<p>Standardisation of the safety of powered industrial trucks</p>

CEN/CLC/WS EFPFInterOp: European Connected Factory Platform for Agile Manufacturing Interoperability	CEN/CLC	Standardisation of agile manufacturing interoperability for European connected factory platform
CLC/TC 65X: Industrial-process measurement, control and automation	CLC	Its scope is to contribute, support and coordinate the preparation of international standards for systems and elements used for industrial process measurement, control and automation at CENELEC level. To coordinate standardisation activities which affect integration of components and functions into such systems including safety and security aspects. This CENELEC work of standardisation is to be carried out for equipment and systems and closely coordinated with IEC TC65 and its subcommittees with the objective of avoiding any duplication of work while honouring standing agreements between CENELEC and IEC.
CLC/SR 119: Printed electronics	CLC	Standardisation of terminology, materials, processes, equipments, products, and health/safety/environment which are related to the printing methods for electronics.
CEN/CLC/JTC 5: Space	CEN/CLC	This TC covers all standardisation activities in CEN and CENELEC related to space, including dual use aspects, systems of systems, as well as upstream and downstream applications, inasmuch as these topics are not covered by any other existing technical body in CEN or CENELEC or by the European Cooperation for Space Standardisation (ECSS) or ETSI, therefore it is important and necessary that it coordinates its work with relevant technical bodies in ETSI. It develops European Standards that are needed to support the implementation of EU-level space projects.
CEN/CLC/ JTC 21 - Artificial Intelligence	CEN/CLC	The JTC shall produce standardisation deliverables in the field of Artificial Intelligence (AI) and related use of data, as well as provide guidance to other technical committees concerned with Artificial Intelligence. The JTC shall also consider the adoption of relevant international standards and standards from other relevant organisations, like ISO/IEC JTC 1 and its subcommittees, such as SC 42 Artificial intelligence. The JTC shall produce standardisation deliverables to address European market and societal needs and to underpin primarily EU legislation, policies, principles, and values.



CEN-CLC/JTC 19 Blockchain and Distributed Ledger Technologies	CEN/CLC	To prepare, develop and/or adopt standards for Blockchain and Distributed Ledger technologies covering the following aspects: - Organizational frameworks and methodologies, including IT management systems; - Processes and products evaluation schemes; - Blockchain and distributed ledger guidelines. The JTC will focus on European requirements, especially in the legislative and policy context, and will proceed with the identification and possible adoption of standards or other relevant documentation already available or under development in other SDOs or regulatory bodies, which could support the EU Digital Single Market and/or EC Directives/Regulations. Special attention will be paid to ISO/TC 307 standards. If required these standards will be augmented by CEN TRs and TSs.
IEC 113- Nano technology for electrotechnical products and systems	IEC	Standardisation of the technologies relevant to electrotechnical products and systems in the field of nanotechnology in close cooperation with other committees of IEC and ISO
IEC 119 - Printed Electronics	IEC	Standardisation of terminology, materials, processes, equipment, products and health / safety / sustainability in the field of printed electronics
IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems	IEEE SA	The IEEE Global Initiative's mission is, "To ensure every stakeholder involved in the design and development of autonomous and intelligent systems is educated, trained, and empowered to prioritize ethical considerations so that these technologies are advanced for the benefit of humanity."
ISO/TC 20 - Aircraft and Space Vehicles	ISO	Standardisation of materials, components and equipment for construction and operation of aircraft and space vehicles as well as equipment used in the servicing and maintenance of these vehicles.

<b>Relevant Committee: Agro-ecological and Organic Practices</b>		
<b>Provide Task Description for relevant proposals and contribute to sections on the state of the art</b>		
ISO/TC 190 Soil quality	ISO	<p>Standardisation in the field of soil quality</p> <p>Soils in situ;</p> <p>Soil materials intended for reuse in or on soils, including dredged sub-aquatic soil materials (= excavated sediments).</p> <p>Excluded:</p> <p>Threshold or limit values for the assessment of soil quality; Civil engineering aspects (are dealt with by ISO/ TC 182 "Geotechnics"); In situ sediments (are dealt with by ISO/TC 147 "Water quality").</p>
ISO/TC 23/SC 6 Equipment for crop protection	ISO	Standardisation of equipment of crop protection
ISO/TC 23/SC 19 Agricultural electronics	ISO	Standardisation of agricultural electronics
ISO/TC 323 Circular economy	ISO	<p>Standardisation in the field of Circular Economy to develop frameworks, guidance, supporting tools and requirements for the implementation of activities of all involved organizations, to maximize the contribution to Sustainable Development.</p> <p>Excluded:</p> <p>Aspects of Circular Economy already covered by existing committees.</p> <p>Note: In parallel, the ISO TC 323 works in cooperation with existing committees on subjects that may support Circular Economy.</p>
ISO/TC 268 Sustainable cities and communities	ISO	<p>Standardisation in the field of Sustainable Cities and Communities will include the development of requirements, frameworks, guidance and supporting techniques and tools related to the achievement of sustainable development considering smartness and resilience, to help all Cities and Communities and their interested parties in both rural and urban areas become more sustainable. Note: TC 268 will contribute to the UN Sustainable Development Goals through its standardisation work. The proposed series of International Standards will encourage the development and implementation of holistic and integrated approaches to sustainable development and sustainability.</p>

ISO/TC 176 Quality management and quality assurance	ISO	<p>Standardisation in the field of quality management (generic quality management systems and supporting technologies), as well as quality management standardisation in specific sectors at the request of the affected sector and the ISO Technical Management Board.</p> <p>Note: ISO/TC 176 is also entrusted with an advisory function to all ISO and IEC technical committees to ensure the integrity of the generic quality system standards and the effective implementation of the ISO/IEC sector policy on quality management systems deliverables.</p>
CLC/TC 111X Environment	CLC	<p>To deal with environmental aspects for electrical and electronic products and systems. To promote activities in CENELEC relevant to reducing detrimental impacts of electrotechnical activities/products/systems on the natural environment (In this context "reducing" means a process of continual environment improvement aimed towards an optimum balance with social, economic, safety and performance requirements). To enhance CENELEC's environmental links with the European legal framework, particularly in the context of standardisation aspects of EU environmental regulations and directives. To prepare the necessary standards framework and in co-operation with other CENELEC Technical Bodies co-ordinate the development of, or when necessary produce, the needed standardisation deliverables. Product TCs remain autonomous in dealing with environmental aspects relevant to the products included in their scope.</p>
ISO/TC 213 - Dimensional and geometrical product specifications and verifications	ISO	<p>Standardisation in the field of geometrical product specifications (GPS), i.e. macro- and microgeometry specifications covering dimensional and geometrical tolerancing, surface properties and the related verification principles, measuring equipment and calibration requirements including the uncertainty of dimensional and geometrical measurement. The standardisation includes the basic layout and explanation of drawing indications (symbols).</p> <p>Excluded: the definition of the specific proportions and dimensions of drawing indications (symbols) and their execution.</p>



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