



PROPOSAL FOR A NEW FIELD OF TECHNICAL ACTIVITY

PROPOSER:

DIN and ANSI

DATE OF CIRCULATION:

2023-05-31

CLOSING DATE FOR VOTING:

2023-08-23

A proposal for a new field of technical activity shall be submitted to the Office of the CEO, which will process the proposal in accordance with [ISO/IEC Directives, Part 1, Clause 1.5](#).

Furthermore, a proposal will be considered as complete if every information field is complete and follows the guidelines for proposing and justifying a new field of activity given in the [ISO/IEC Directives, Part 1, Annex C](#).

TITLE

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.2](#))

Data-Driven Agrifood Systems

SCOPE

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.3](#))

Standardization in the field of big-picture, data-driven, principled-decision-making, multi-objective optimization of agricultural and food systems. This includes interoperability challenges such as:

- Agrisemantics¹;
- Sustainability models, metrics and data in agrifood systems;
- Livestock activities data management
- Greenhouse, controlled environment, and urban farming

Excluded: standardization covered by ISO/TC 34 “Food Products” and ISO/TC 23 SC 19 “Agricultural Electronics”. A strategic objective of the proposed Data-Driven Agrifood Systems committee is to concentrate expertise on data management to serve as a resource for other relevant committees and where appropriate, work in liaison and in joint projects with existing committees

PURPOSE AND JUSTIFICATION (Please use the field immediately below or attach an annex.)

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.13](#))

¹ Agrisemantics is a branch of semantic web technologies that seeks to develop and promote the implementation/use of standardized vocabularies, ontologies and other semantic resources to represent agricultural data and information. Thus, agrisemantics aims to create a “common language” for describing and sharing agricultural data across different platforms and systems, making it easier to find, access, interoperate with, and reuse.

Agriculture is a vitally important human activity. As the human population of the world grows in the context of over-used arable land and fresh water, increasing crop productivity is imperative for well-being and food security. Moreover, this productivity increase must be balanced with sustainability and regulatory compliance, and take place despite climate change, market volatility, and political instability, while pursuing increasingly tighter integration into the end-to-end, input-manufacturer-to-dinner-plate agrifood system.

Modern information technologies (e.g., artificial intelligence and the Internet of Things) have been presented as components of a solution to the challenge of increasing agricultural productivity at scale in an economically, ecologically and socially sustainable way. This potential, however, has been severely limited by data interoperability concerns. The guiding principle inspiring this proposal (represented in literature such as GODAN's "*A Global Data Ecosystem for Agriculture and Food*", [available online here](#)) is that, by standardizing the data being exchanged across agrifood system value chains, interoperability will increase and the benefits of sustainable agriculture will be available to agrifood producers worldwide. This will be especially true if the standardization effort follows an inclusive approach that considers smallholders and their technology providers as communities that must be served by the new standards, in addition to the more traditional equipment and crop input manufacturers, large corporate farms, etc.

While ISO has multiple Technical Committees and Subcommittees whose work intersects the agrifood systems domain, the organization's generally bottom-up approach does not to date provide a comprehensive planning and management perspective that supports data-driven principled decision-making in the multi-objective context of agrifood systems. Moreover, much of the existing standardization work, while excellent from a domain (e.g., analytical, or process description) point of view, does not directly address the matter of standardizing *data* in agrifood systems (e.g., the observations and measurements used as decision-making inputs throughout the system), particularly the digital representation and communication of these data.

The proposed technical committee is meant to address data interoperability in agrifood systems at scale, both by providing a holistic, systems-oriented view and reference architecture for the domain, and by developing (and coordinating) standards to fill standardization gaps. The proposed technical activities will complement and strengthen existing ISO activities and are in line with ISO STRATEGY 2030, ISO's commitment to achieve the climate agenda by 2050 (London declaration) and the UN SDGs.

Additional sources of motivation for the existence of this TC include:

1. In the absence of an agrifood-data-specific TC, there would not be a domain-centric source for ongoing direction for the Smart Farming Coordination Committee proposed by the ISO Strategic Advisory Group on Smart Farming (SAG-SF) in Recommendation 3.1.4 of its final report.
2. The standards landscape in smart farming across the world is fragmented, incomplete, and susceptible to poorly coordinated efforts. The SAG-SF recommended the creation of a multi-organization landscaping and coordination group (See Recommendation 3.1.5 in its final report), but ISO will need technical domain input in order to fully participate in that effort; the proposed TC would be able to provide much of that, i.e., the aspects related to agrifood systems data.
3. There will be an increasing number of data-related standards in the future; fitting them into the current ISO structure would be inadequate, as it will tend to place the standards in TCs / SCs that lack a high concentration of agricultural data expertise.

PROPOSED INITIAL PROGRAMME OF WORK (Please use the field immediately below or attach an annex)

Please see the [ISO/IEC Directives, Part 1, Annex C.4.4 and C-4.5](#)

For each item, the initial work programme shall define the deliverable type and target dates. The initial work programme shall also assign priorities to the different items.

a.) ISO Standard to enable conformance assessment of FAIR Data Principles

- ISO standard(s) for assessing the conformance of data, data exchange, and data exchange processes to the principles of findability, accessibility, interoperability, and reusability (FAIR). Collaboration can be envisaged with ISO/TC 184 and SC4 in support of developing high-quality data.
- The SAG-SF roadmap places the start of this work in 2024.

b.) ISO Standard for Reference Architecture for Smart Farming

- A standard for a reference architecture to describe generic smart farming data system characteristics, a conceptual model, a reference model and a number of architectural views aligned with the architectural approach defined in ISO/IEC/IEEE 42010
- This work would be done in consultation with JTC 1/SC 41 and patterned after ISO/IEC 30141:2018 (Internet of Things (IoT) — Reference Architecture) developed by that subcommittee.
- The SAG-SF roadmap places the start of this work in 2024, associated with an international workshop on the reference architecture, to be begun in 2023.

c.) ISO Standard on Data Type Registry (Semantic Infrastructure)

- Develop and share a standard that defines and enables the sharing of agricultural data type definitions through appropriate data type registries, manifested as APIs, SPARQL endpoints, and other similar technologies. The definitions themselves can follow the model laid out in CD 7673-2 and the registries can follow patterns laid out in ISO 19135 for administration and governance.
- The SAG-SF roadmap places the start of this work in 2024.

d.) ISO Model and Controlled Vocabulary of Crops

- Develop a standard to define a data model for the concept of “crop”, representing an extended, albeit analogous version to the machine-oriented idea presented in ISO 11783-10. This standard would recognize (at least) the following aspects of a crop:
 - Botanical component (e.g., one or more botanical taxa)
 - Refinement component: non-taxonomic physical and physiological features of the organism, as well as other attributes that may contextualize it in the food system (e.g. bearing a specific trait/gene, or not suitable for human consumption)
 - Intended use component (e.g., fresh / processing)
 - Geopolitical context
- Enable a controlled vocabulary of these crop objects to be stored inside a registry. Make this available to the public in the form of machine-actionable data, through an electronic registry (e.g. a RESTful API). This implies creating a relationship with an organization that can host this registry and establish an architecture and governance system as per ISO 19135.
- Help put in place the community to govern the vocabulary
- A similar effort was established and put forward by VDMA (Verband Deutscher Maschinen- und Anlagenbau) - a German mechanical and plant engineering association - to deliver a human-readable data dictionary for the ISO 11783 standard (see www.isobus.net). However, in order to enable smart farming at scale, we propose that the data are made machine-readable and machine-actionable.
- It is important to recognize that there will be geopolitical context – dependent variations. This semantic infrastructure is meant to be a reference to which other systems can map. The registry should include mechanisms for actors to assert/manage relationships among different entries.
- This standard should be considered a candidate for the IEC-ISO Standards Machine Applicable Readable and Transferable (SMART) program.
- The SAG-SF roadmap places the start of this work in 2024.

RELATION OF THE PROPOSAL TO EXISTING INTERNATIONAL STANDARDS AND ON-GOING STANDARDIZATION WORK

- The proposer has checked whether the proposed scope of the new committee overlaps with the scope of any existing ISO or IEC committee or JTC1 sub-committee
- If an overlap or the potential for overlap is identified, the affected committee has been informed and an agreement has been reached between proposer and committee on
 - i. modification/restriction of the scope of the proposal to avoid overlapping,
 - ii. potential modification/restriction of the scope of the existing committee to avoid overlapping.

- If agreement with the existing committee has not been reached, please explain why the proposal should be approved.

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- Have proposals on this subject been submitted into an existing committee and rejected? If so, what were the reasons for rejection?

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LISTING OF RELEVANT DOCUMENTS (SUCH AS STANDARDS AND REGULATIONS) AT INTERNATIONAL, REGIONAL AND NATIONAL LEVEL

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.6](#))

Final Report of the ISO Strategic Advisory Group on Smart Farming, February 2023

ISO 11783-10

ISO 19156, ISO 19157, ISO 19115, ISO 19135

ISO/IEC/IEEE 42010

ISO 8000 Data quality series and specifically on:

- data governance, data quality management and maturity assessment; ISO 8000-61 specifies a process reference model for data quality management.
- creating and applying requirements for data and information; ISO 8000-110 specifies how to exchange characteristic data that are master data.
- monitoring and measuring information and data quality; ISO 8000-8 specifies approaches to measuring information and data quality.
- improving data and, consequently, information quality; ISO/TS 8000-81 specifies an approach to data profiling, which identifies opportunities to improve data quality.
- issues that are specific to the type of content in a data set; ISO/TS 8000-311 specifies how to address quality considerations for product shape data.

FAIR Guiding Principles for scientific data management and stewardship

LISTING OF RELEVANT COUNTRIES WHERE THE SUBJECT OF THE PROPOSAL IS IMPORTANT TO THEIR NATIONAL COMMERCIAL INTERESTS

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.8](#))

The topic is relevant for agricultural countries in general. A sizable sample of 20 countries demonstrated this by providing experts that participated in the ISO Strategic Advisory Group for Smart Farming: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Iran, Italy, Israel, Netherlands, New Zealand, Russian Federation, Saudi Arabia, Singapore, South Korea, Spain, United Kingdom, United States of America. These countries represent nearly half of the world's arable land.

Arguably the topic is even more important to developing countries where the population is growing, arable land is shrinking, and crop/livestock productivity per unit area is relatively low (e.g., much of Sub-Saharan Africa).

LISTING OF RELEVANT EXTERNAL INTERNATIONAL ORGANIZATIONS OR INTERNAL PARTIES (OTHER THAN ISO AND/OR IEC COMMITTEES) TO BE ENGAGED AS LIASONS IN THIS WORK

(Please see the [ISO/IEC Directives, Part 1, Clause C.4.9](#))

AgGateway, Bill and Melinda Gates Foundation, CGIAR, FAO, VDMA, DEVCO, ITU Focus Group "Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture" (FG-AI4A), IEEE, CIGR, UNECE

Regarding ISO and/or IEC committees, the following stand out as valuable liaisons for the proposed technical committee:

- ISO/TC 23 SC 6 (Equipment for crop protection)

- ISO/TC 23 SC 7 (Equipment for harvesting and conservation)
- ISO/TC 23 SC 18 (Irrigation and drainage equipment and systems)
- ISO/TC 23 SC 19 (Agricultural electronics)
- ISO/TC 34 Food Products
- ISO/TC 34 SC 17 Management Systems for Food Safety (and others)
- ISO/TC 134 (Fertilizers, soil conditioners and beneficial substances)
- ISO/TC 154 (Processes, data elements and documents in commerce, industry, and administration)
- ISO/TC 184 (Automation systems and integration)
- ISO/TC 184 SC 4 (Industrial data)
- ISO/TC 190 (Soil quality)
- ISO/TC 207 Environmental Management
- ISO/TC 211 Geographical Information Systems
- ISO/TC 234 (Fisheries and aquaculture)
- ISO/TC 268 (Sustainable cities and communities)
- ISO/TC 299 (Robotics)
- ISO/TC 331 WG 2 Biodiversity: Measurement, data, monitoring and assessment
- JTC 1 SC 41 (IoT and Digital Twin)
- ISO/CASCO
- ISO/DEVCO

IDENTIFICATION AND DESCRIPTION OF RELEVANT AFFECTED STAKEHOLDER CATEGORIES

(Please see [ISO Connect](#))

	Benefits/Impacts/Examples
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<p>Industry and commerce – large industry</p>	<p>Large companies that participate in the agrifood sector at scale (input manufacturers, equipment companies, etc.) will likely benefit from standardization that would help them better improve interoperability in different countries.</p> <p>Food and beverage companies, under consumer pressure to show evidence of sustainably grown produce, create incentives for data sharing. Doing this at scale requires farm-to-fork interoperability. This means the information from the first production process needs to be accessible and efficiently transferred to all parties requiring it.</p> <p>It would be beneficial to have representation in the TC from food companies, large input (seed, crop protection, fertilizer, feed, pharma) manufacturers and distributors, and equipment (tractors, irrigation systems, harvesters, sprayers, etc.) companies. Representatives would optimally be well-versed in processes in the agrifood systems, the data that is created, stored, exchanged, and used to drive decisions, and on approaches to representing those data.</p>
<p>Industry and commerce – SMEs</p>	<p>Small and medium enterprises in particular benefit from data standardization, as they may not have the financial resources or market share to compete with large market actors with proprietary data formats and solutions.</p> <p>Three particular categories of stakeholders in this sector stand out as especially desirable for representation in the TC:</p> <ul style="list-style-type: none"> • Agricultural producers, large and small. Larger producers employ IT professionals that could participate in the TC; additionally, commodity groups and grower associations should be approached for representation. It is also of key importance to represent the interests of the smallest growers, i.e., smallholders; please see the “Other” category below for more detail on this group. • Agricultural and food technology providers such as software companies creating decision- and discussion-support tools for producers and other actors. • Agronomists and other advisors that producers trust and exchange data with (e.g., retailers, crop insurance agents).

<p>Government</p>	<p>Pursuing interoperability is a political option for action, but it is also a state duty to guarantee user rights. Competition law and initiatives such as the EU’s Digital Markets Act presuppose freedom of choice for users, which is meaningless if they cannot move data among competing systems.</p> <p>For the rights to freedom of choice and data portability to be effectively implemented, states must expand their design mandate and, loosely based on the guiding principle that “code is law”, increasingly integrate interoperability standards and technical protocols into their legislation.</p> <p>Government extension personnel who seek to provide services to producers at scale would be valuable representatives in the TC. It would also be valuable to receive government input regarding direct-reporting initiatives that impact equipment, farm management information systems, and so forth.</p>
<p>Consumers</p>	<p>A major benefit of data-driven farming and food systems for consumers is a more transparent and traceable method of food production allowing consumers to decide whether food meets their ethical and environmental requirements.</p> <p>The SAG-SF’s Recommendation 3.1.9 emphasizes the importance of stakeholder engagement for assessing and addressing the interoperability of ISO agrifood system standards. Engaging consumer groups that participate in supply chain transparency initiatives could provide valuable input for the TC effort.</p>
<p>Labour</p>	<p>Repetitive and physically demanding work can be reduced through automation using data.</p> <p>The SAG-SF’s Recommendation 3.1.9 emphasizes the importance of stakeholder engagement for assessing and addressing the interoperability of ISO agrifood system standards. Engaging labor groups that participate in occupational safety and health transparency initiatives could provide valuable input for the TC effort.</p>
<p>Academic and research bodies</p>	<p>Universities and their funders often expend considerable resources to fund very promising research that is ultimately not impactful because the resulting tools (e.g., decision-support aids) cannot scale or interoperate with existing industry platforms. Moreover, the companies responsible for said platforms do not have clear incentives to invest in integrating with market-unproven tools. Using standardization to make the tools interoperable and easy to integrate with could dramatically lower barriers to adoption.</p>

<p>Standards application businesses</p>	<p>Enabling data interoperability through standards is a key to making processes more observable and controllable, thus creating more opportunity for standards application businesses in the agrifood sector.</p> <p>The SAG-SF's Recommendation 3.1.9 emphasizes the importance of stakeholder engagement for assessing and addressing the interoperability of ISO agrifood system standards.</p> <p>Recommendation 3.1.10 encourages enabling smaller actors to implement standards by leveraging user communities.</p> <p>In light of the previous points, engaging standardization consultants and third-party conformance assessment groups, as well as user communities of agrifood system standards would provide valuable input for the TC effort.</p>
<p>Non-governmental organizations</p>	<p>Having standardized mechanisms for technology providers, advisors, non-governmental organizations (NGOs), extension services, etc. to integrate their tools and data collection mechanisms with a learning framework as proposed in Clause 3.4.30 of the ISO SAG-SF final report would be very advantageous to help make data more usable.</p> <p>The SAG-SF's Recommendation 3.1.9 emphasizes the importance of stakeholder engagement for assessing and addressing the interoperability of ISO agrifood system standards. Engaging NGOs that work with producers (e.g., technology-oriented farmer groups) and other segments of the industry (e.g., sustainability consortia, pollinator advocacy groups, etc.) could provide valuable input for the TC effort.</p>

<p>Other (please specify)</p>	<p>Smallholders in developing countries have a lot to gain from involvement in the field of data-driven agrifood systems; the business capabilities enabled by this approach to food production can mitigate the impact of climate change on their food security and income.</p> <p>Data-driven agrifood systems are very likely to reduce the barriers of interoperability and make agronomic and market advice more accessible and affordable to the smallholder, which in turn can lead to higher productivity, food security and income for the smallholder, as well as reducing the food insecurity for the surrounding population.</p> <p>Data-driven services afford multiple opportunities to smallholders:</p> <ul style="list-style-type: none"> • Access to financial services, such as banking, money transfer, credit, and micro-loans • Access to risk management instruments such as crop insurance • Access to market data, such as product requirements, pricing/selling, buyer location • Land and crop allocation optimization in planning, field operations and going-to-market • Weather forecasts and alerts • Asking questions and receiving expert advice <p>Engaging individual smallholders in the TC's activities is impractical and unlikely to yield any direct short-term benefit to the smallholders themselves. There are, however, organizations that work with, and provide services to smallholders that should be engaged in the TC's activities (technology adoption organizations, microlenders, etc.)</p>
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EXPRESSION OF LEADERSHIP COMMITMENT FROM THE PROPOSER

(Please see the [ISO/IEC Directives, Part 1, Annex C, Clause C.4.12](#))

DIN has committed to managing the secretariat of the proposed TC on Data-Driven Agrifood Systems; ANSI has committed to staffing the position of the TC chair.

The proposer confirms that this proposal has been drafted in compliance with iso/iec directives, part 1, annex c

SIGNATURE OF THE PROPOSER

**DIN
ANSI**

COMMENTS OF THE ISO CENTRAL OFFICE (IF ANY)

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