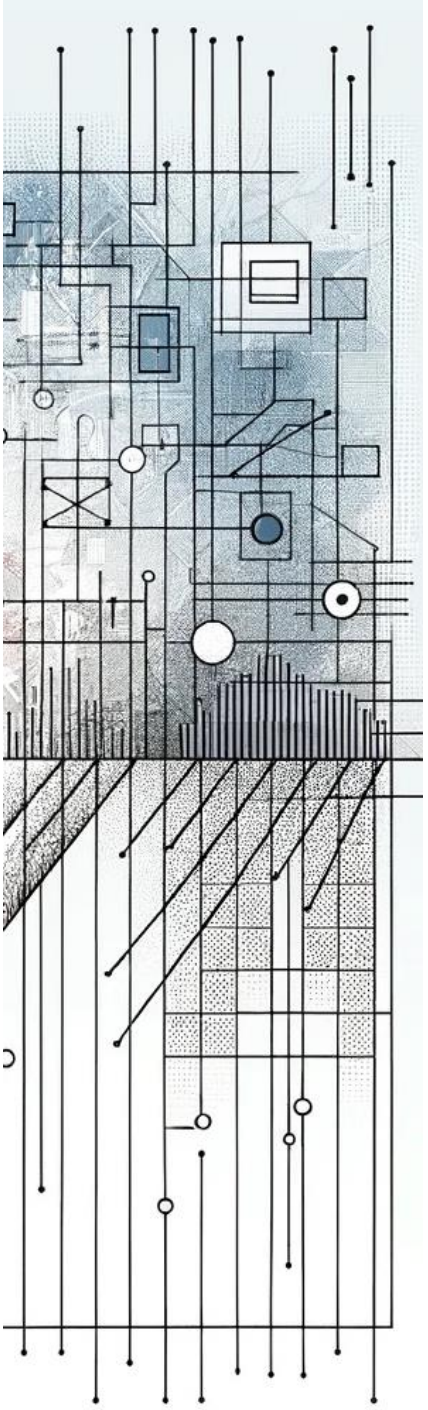
ISO Committee

Advancing PA: opportunities for impact through the ISO-ISPA relationship

R. Andres Ferreyra, Ph.D. (Chair, ISO/TC 347)

April 7, 2025

SUSTAINABLE DEVELOPMENT GOALS

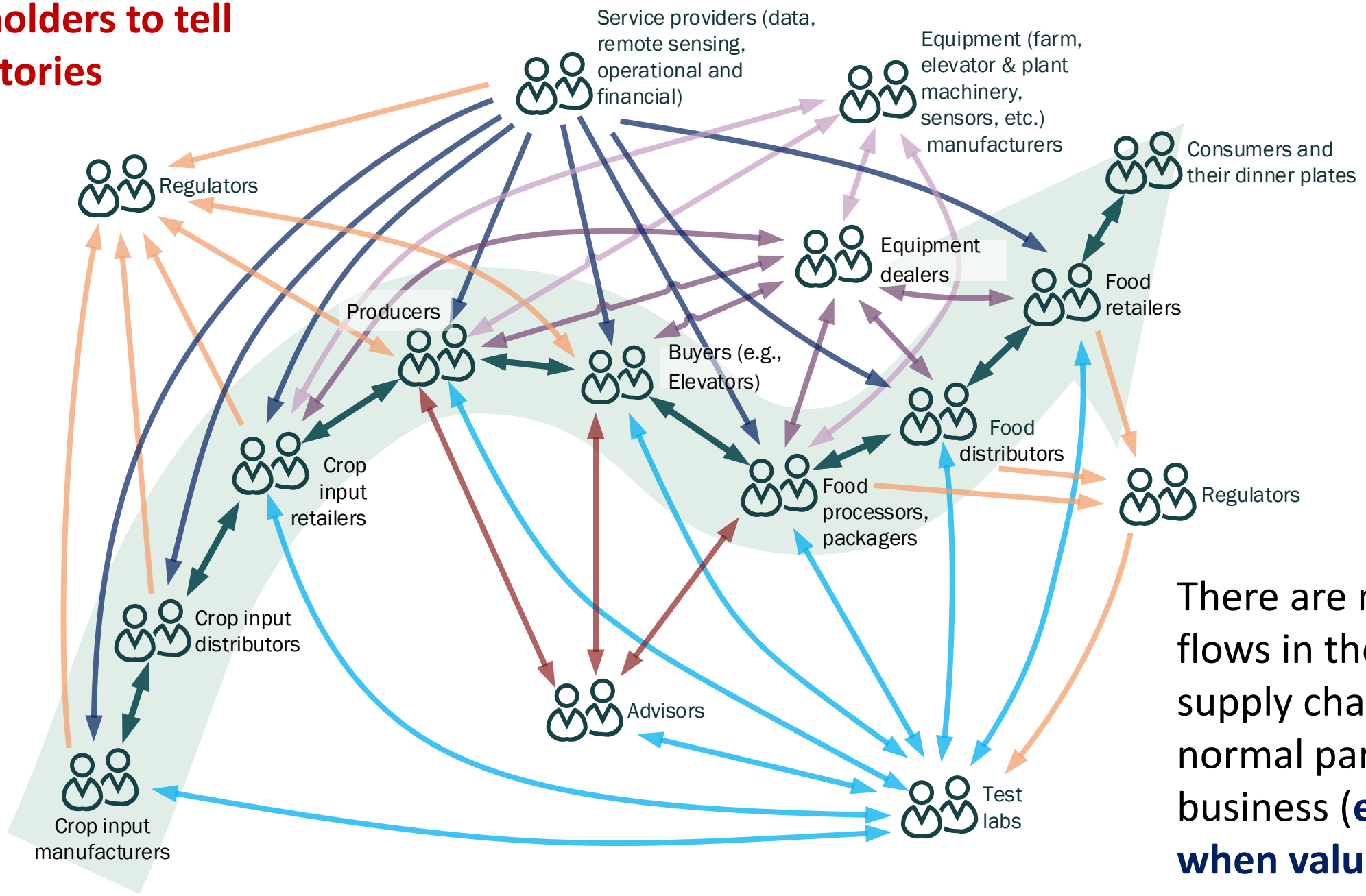


Farming, food production are getting harder

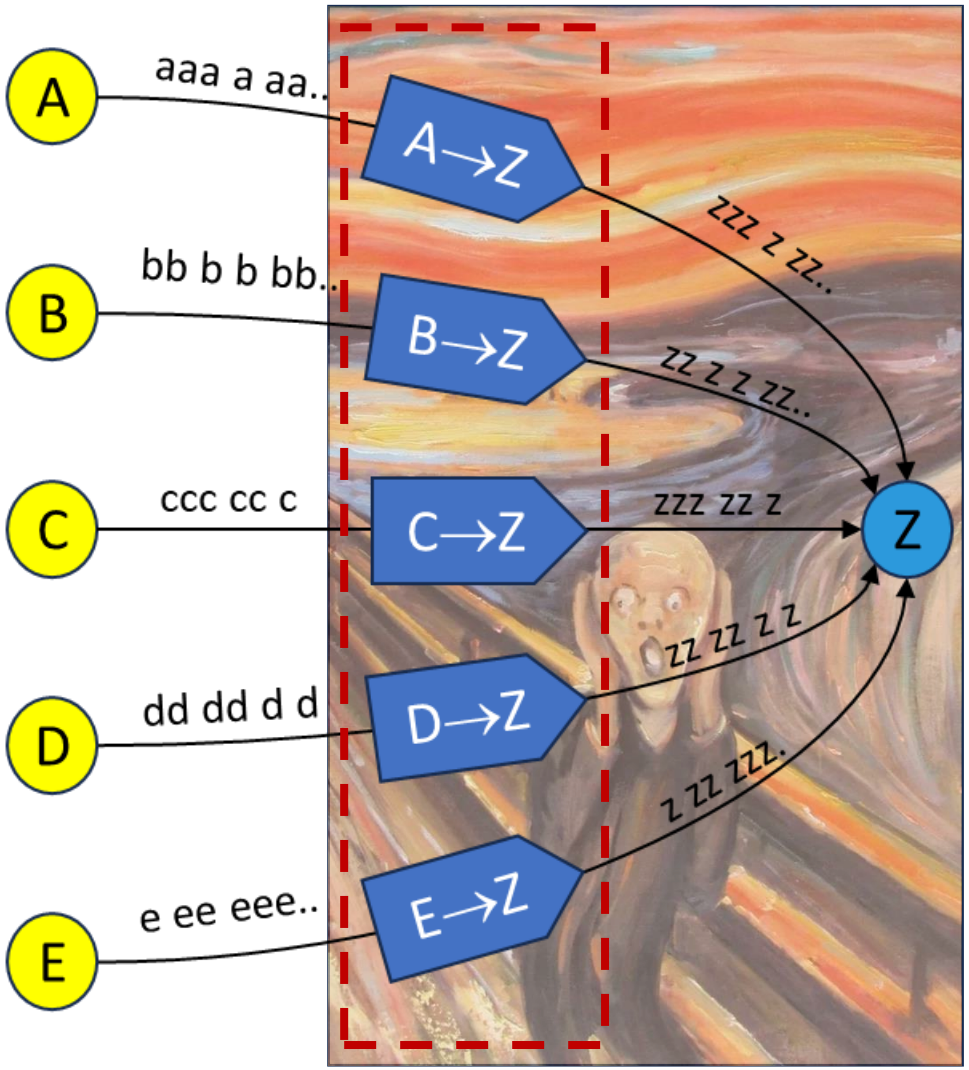
- Agriculture & food production is a set of complex, adaptive processes involving hundreds of **decisions** per crop season.
  - Complex regardless of farm size
  - Smallholders*
    - more vulnerable
    - less access to inputs, advice, finance, risk management, etc.
- In the past these decisions were often driven by traditional local customs. In this **rapidly changing world** (Climate change! Supply chain disruptions! Political unrest!), they must increasingly be made based on **data**.

* Definition varies geographically; often using farm area (e.g., < 2 ha) as a metric

Data flows enable stakeholders to tell their stories

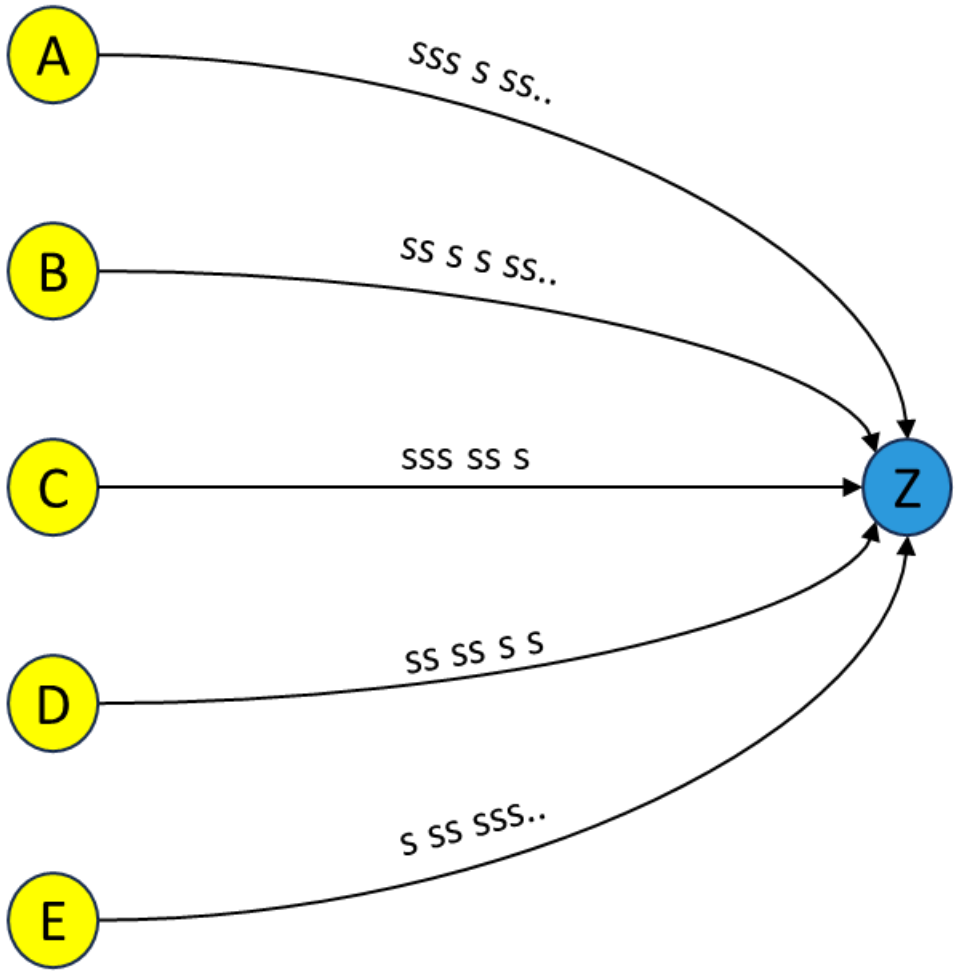


There are many data flows in the agrifood supply chain as a normal part of doing business (**especially when value-adding**).



Not Using Standards:

Many translations to maintain →
large burden on data consumer's system



Using Standards:

No translations needed → creating
data-driven tools is much easier

When you find yourself in a hole, stop digging

(Wordsworth Dictionary of Proverbs (2006) p 283

- The industry is in a bind: our standards aren't enough to support data-driven, decision-making needed to solve modern problems / the SDGs.
- This emerges from the bottom-up growth of both the industry and its standardization efforts.
- The **International Organization for Standardization (ISO)** realized this, chartered a Strategic Advisory Group for Smart Farming
  - 180 experts from 21 national standards bodies (NSBs)
  - Mission: develop a strategy to guide hybrid top-down, bottom-up action.
- Key part of the proposed strategy: create a permanent home for standards specific to data-driven agrifood systems. This is now ISO Technical Committee 347 (ISO/TC 347).

Picture: https://upload.wikimedia.org/wikipedia/commons/a/a7/Stop_Digging_%5E_-_geograph.org.uk_-_195319.jpg

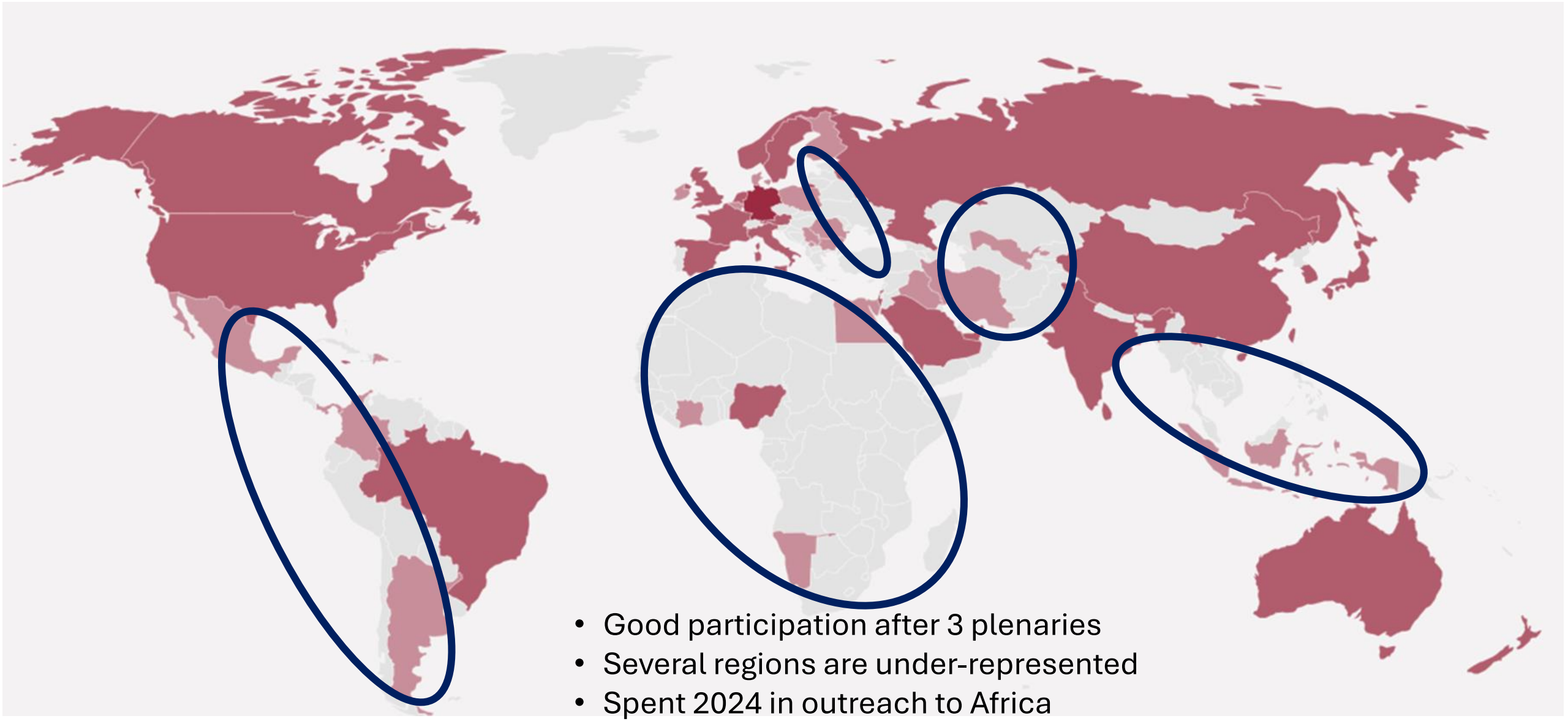
Basic facts about ISO/TC 347

- Secretariat: DIN (Germany)
  - Committee Manager: Mrs Dr Sophie Oberländer-Hayn
- Chair: ANSI (USA)
  - Chairperson (until end 2029): R. Andres Ferreyra, PhD (ANSI)
- ISO Technical Programme Manager [TPM]: Mr David Hassan

ISO-Webpage:
https://www.iso.org/committee/9983782.html

LinkedIn page:
https://www.linkedin.com/company/iso-tc-347

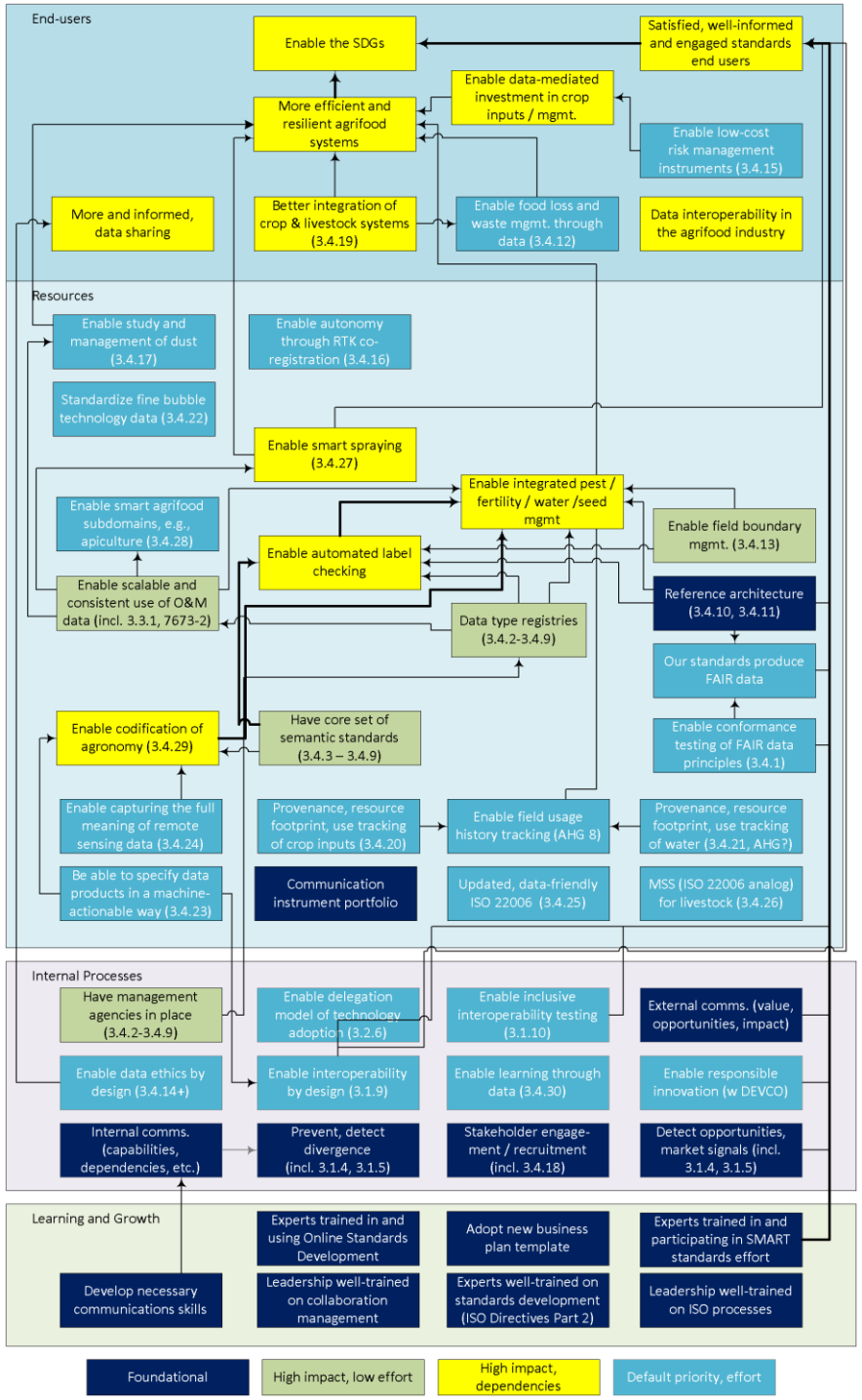
Participation in ISO/TC 347 (Members)



- Good participation after 3 plenaries
- Several regions are under-represented
- Spent 2024 in outreach to Africa
- Kicked off emphasis on SE Asia in Nov. 2024

TC 347 strategy

- Set of strategic objectives
  - Seek to help attain the SDGs by enabling more efficient and resilient agrifood systems.
- We work backward from there.
- The strategy has four layers that build on one another:
  - Learning and growth
  - Internal processes
  - Resources
  - End users



Members of ISO/TC 347

20 observing members

Country/Territory	Acronym
Argentina	IRAM
Belgium	NBN
Bulgaria	BDS
Colombia	ICONTEC
Côte d'Ivoire	CODINORM
Denmark	DS
Dominican Republic	INDOCAL
Egypt	EOS
Finland	SFS
Indonesia	BSN
Islamic Republic of Iran	INSO
Iraq	COSQC
Ireland	NSAI
Mexico	DGN
Namibia	NSI
Panama	DGNTI
Poland	PKN
Romania	ASRO
Serbia	ISS
Uzbekistan	O'ZTTSA

26 participating members

Country/Territory	Acronym
Australia	SA
Austria	ASI
Brazil	ABNT
Canada	SCC
China	SAC
France	AFNOR
Germany	DIN
India	BIS
Israel	SII
Italy	UNI
Jamaica	BSJ
Japan	JISC
Republic of Korea	KATS
Netherlands	NEN
New Zealand	NZSO
Nigeria	SON
Norway	SN
Russian Federation	GOST R
Saudi Arabia	SASO
Singapore	SSC
Spain	UNE
Sri Lanka	SLSI
Sweden	SIS
United Arab Emirates	MoIAT-STR
United Kingdom	BSI
United States	ANSI

Internal liaisons from ISO/TC 347

Liaison committees that ISO/TC 347 is looking into

Reference	Title	ISO/IEC
ISO/TC 23/SC 19	Agricultural electronics	ISO
ISO/TC 34/ SC 19	Bee Products	ISO
ISO/TC 34/SC 20	Food loss and waste	ISO
ISO/TC 93	Starch (including derivatives and by-products)	ISO
ISO/TC 211	Geographic information/Geomatics	ISO
ISO/TC 268	Sustainable cities and communities	ISO
ISO/TC 279	Innovation Management	ISO
ISO/TC 323	Circular Economy	ISO
ISO/TC 324	Sharing Economy	ISO
ISO/TC 207	Environmental Management	ISO

Internal liaisons to ISO/TC 347

Liaison committees that are looking into ISO/TC 347

Reference	Title	ISO/IEC
ISO/IEC JTC 1/SC 31	Automatic identification and data capture techniques	ISO/IEC
ISO/TC 23/SC 19	Agricultural electronics	ISO
ISO/TC 34/ SC 19	Bee Products	ISO
ISO/TC 34/SC 20	Food loss and waste	ISO
ISO/TC 154	Processes, data elements and documents in commerce, industry and administration	ISO
ISO/TC 211	Geographic information/Geomatics	ISO
ISO/TC 276	Biotechnology	ISO

External (Category A) liaisons to ISO/TC 347

Acronym	Topic	Status
AEF	Agricultural electronics. Machine & implement control	Complete
AgGateway	Data interoperability in supply chain & field operations	Complete
CiA	Communications over controller-area networks	Complete
GS1	Barcoding and reference data in supply chain	Complete
ICAR	Animal (esp. Dairy cow) identification, tracking	Complete
IFPS	Barcodes for produce standards	Complete
ISPA	**International Society for Precision Agriculture**	**Complete**
OGC	Open Geospatial Consortium: Spatial data	Complete
YPARD	Young professionals in agricultural development	Complete

Current TC 347 work

What we accomplished in year 1

Working to have the right people around the table

- National standards bodies (NSBs)
- Internal liaisons
- External liaisons
- Communications advisory group (AG 1)
- Stakeholder engagement advisory group (AG 2)

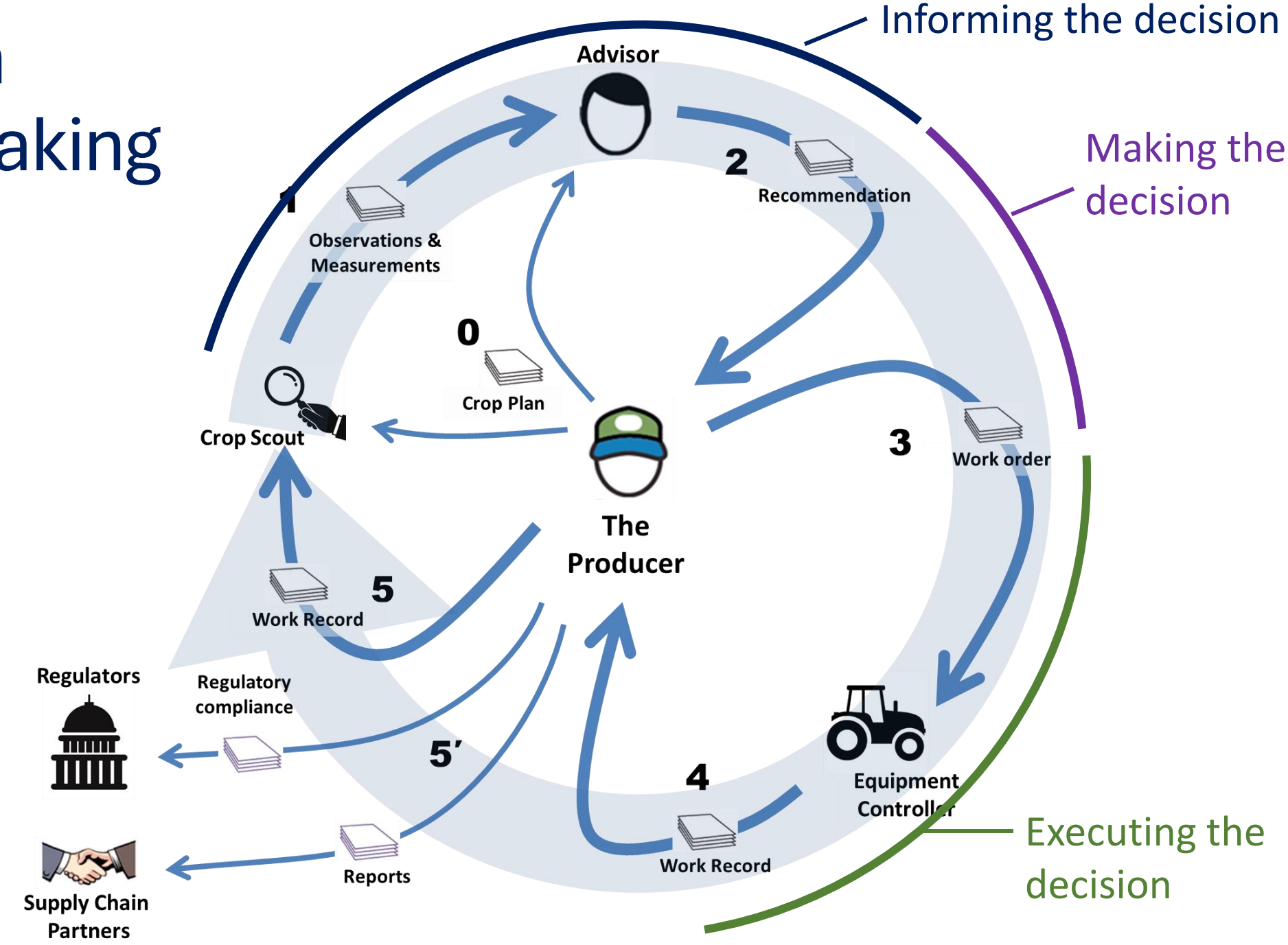
Putting the right institutional pieces in place

- Strategic business plan ad hoc group (AHG 1)
- Responsible innovation advisory group (AG 3)

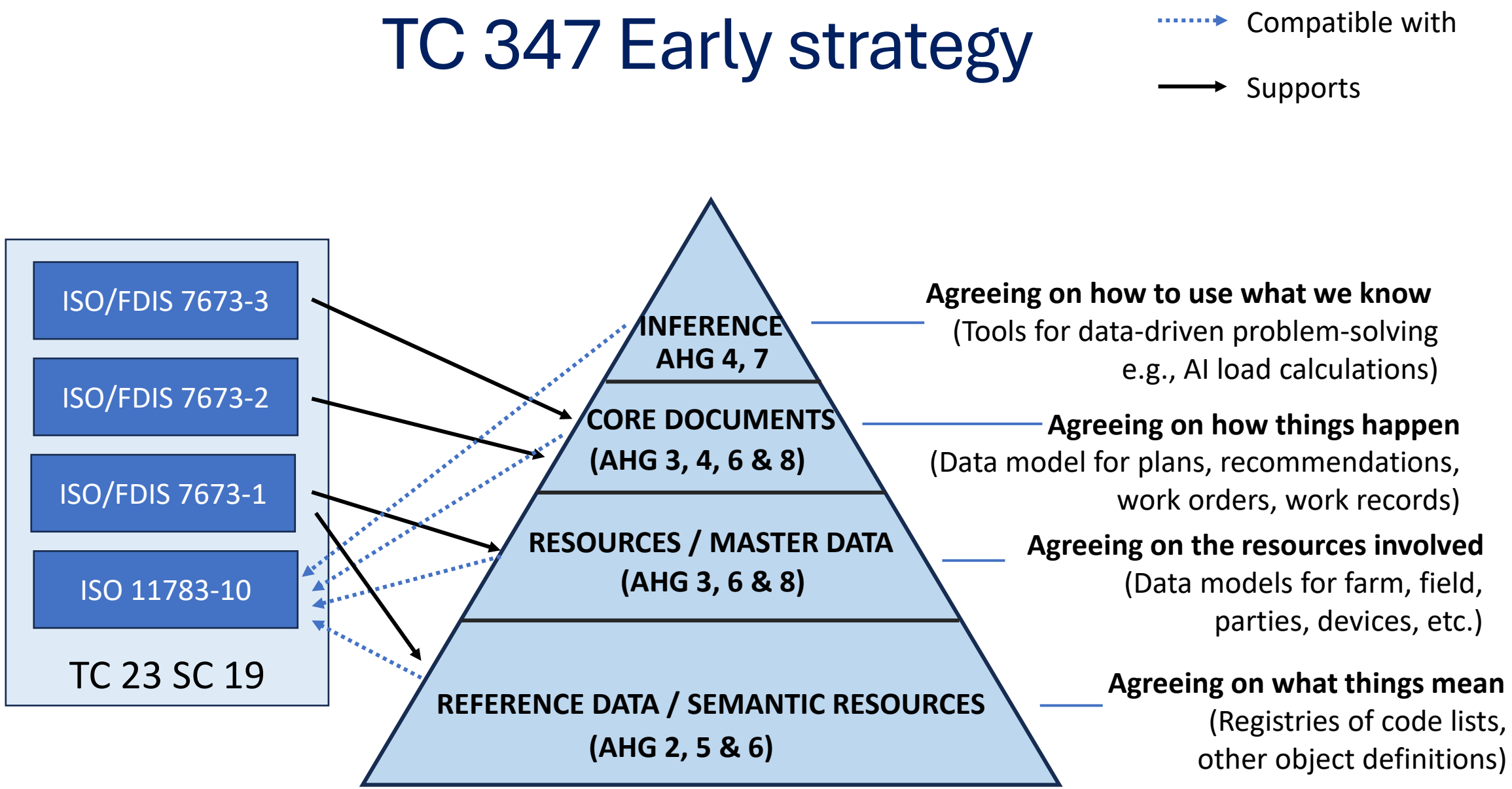
Taking first steps toward interoperability

- IWA 47
  - Deliverables: Use cases, business capability model, terms & definitions
- Advancing on NWIPs with AHG 2-AHG 7, with AHG 8 on the way

Data-driven decision-making



TC 347 Early strategy



How we work: advisory and ad hoc groups

- **Advisory groups (AGs)**
  - AGs are convened to deal with ongoing concerns.
- **Ad hoc groups (AHGs)**
  - AHGs are convened to meet specific goals in limited time intervals.
  - We are using these to house emergent work.
  - Initiating our work in AHGs groups enables preliminary discussions about what interoperability looks like in each domain while we are still developing our reference architecture and while the 36- or 48-month standards development clock is not ticking yet.
  - This also lets us feed things back into the reference architecture (use cases, capability model, terms and definitions) that we are working on in IWA 47 and vice-versa.

Current AGs/AHGs ISO/TC 347

Reference	Title	Status
ISO/TC 347/AG 1	Communications	Existing
ISO/TC 347/AG 2	Stakeholder Engagement	Existing
ISO/TC 347/AG 3	Responsible Innovation	Existing
ISO/TC 347/AHG 1	Strategic Business Plan	Existing
ISO/TC 347/AHG 2	Model and controlled vocabulary of crops	Existing
ISO/TC 347/AHG 3	Greenhouse and controlled environment automation	Existing
ISO/TC 347/AHG 4	Integrated Pest Management (IPM)	Existing
ISO/TC 347/AHG 5	Annotating agrifood data for AI	Existing
ISO/TC 347/AHG 6	Livestock activities tracking	Existing
ISO/TC 347/AHG 7	Enabling actionable insights from field operations data	Existing
ISO/TC 347/AHG 8	Digital land usage histories/ field passports	Balloted

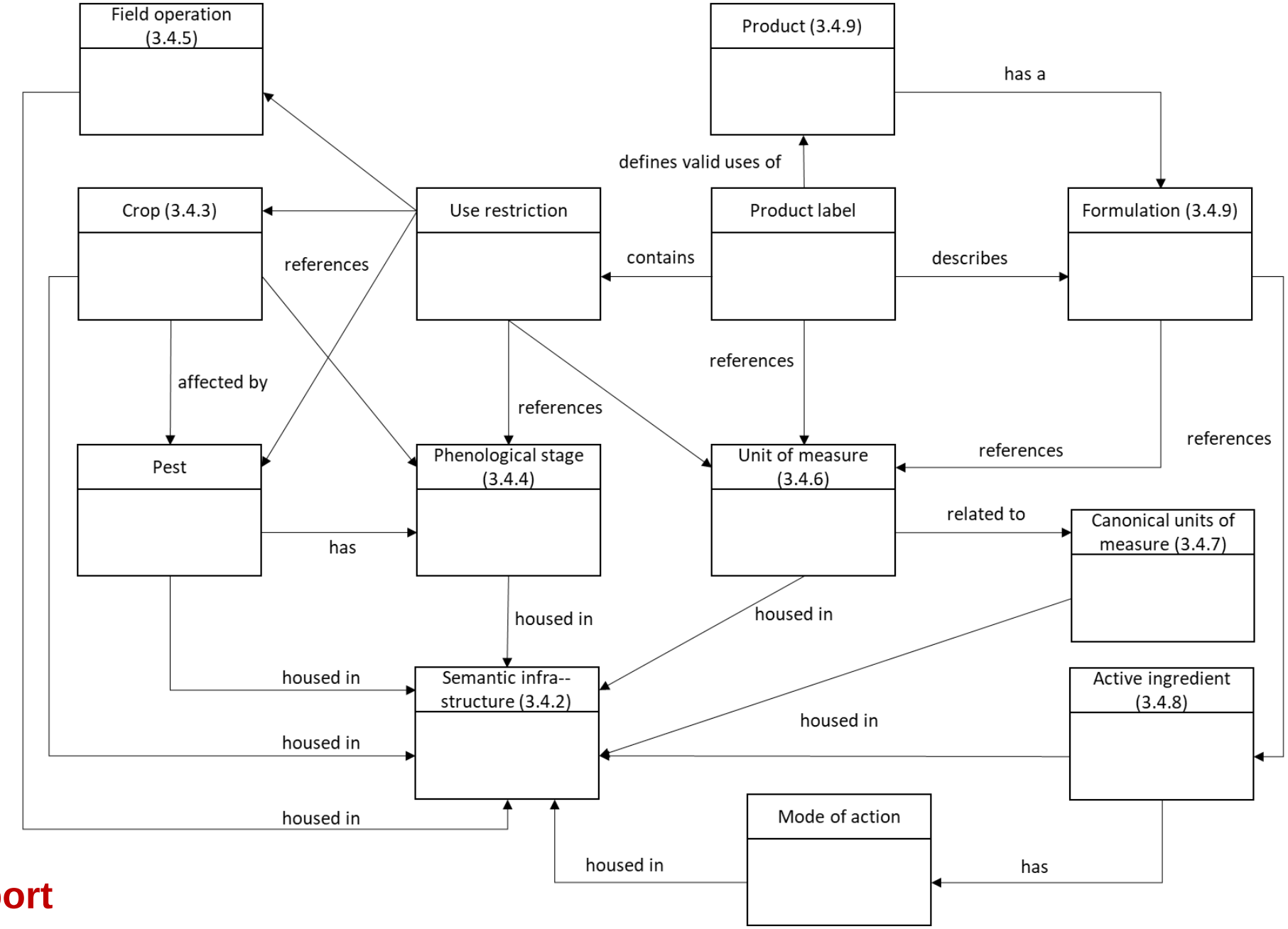
Advisory groups of ISO/TC 347

Reference	Title and problems it targets
ISO/TC 347/AG 1	**Communications** • Building community • Communicating value of standards in data-driven agrifood systems • Young professionals program
ISO/TC 347/AG 2	**Stakeholder Engagement** • Bring more people to the table, and bring value to those people • Enabling a delegation model through standards
ISO/TC 347/AG 3	**Responsible Innovation** • Ensure we have mechanisms in place to reflect critically on what we are doing and do our due diligence in terms of data ethics and responsible innovation.

Ad hoc groups in ISO/TC 347 (1 of 2)

Reference	Title
ISO/TC 347/AHG 1	**Strategic Business Plan** • Establishing and documenting rationale, priorities for TC 347
ISO/TC 347/AHG 2 (USA)	**Model and controlled vocabulary of crops** • “Tip of our agrisemantics iceberg”. Motivating the first (CropDefinition) in a series of standards aimed at enabling data-driven, principled decision-making (e.g., automated label checking) in agrifood systems. • Also, standard for delivering agrisemantics resources via API.
ISO/TC 347/AHG 3 (Rep. Korea)	**Greenhouse and controlled environment automation** • Modeling greenhouse & controlled environment systems in terms of processes and data. Create standards for communication & control of those systems.
ISO/TC 347/AHG 4 (China)	**Integrated pest management (IPM)** • Model integrated pest management problems in data-driven way • Model integrated pest management programs in data-driven way • Leverage observations & measurements • Quick progress on fall armyworm standard

High-priority SAG-SF recommendations



From ISO SAG-SF Report

Ad hoc groups in ISO/TC 347 (2 of 2)

Reference	Title
ISO/TC 347/AHG 5 (Germany)	**Annotating agrifood data for AI** • What metadata scheme can help us annotate agrifood data sets for use with AI (e.g., to lower likelihood of “hallucinations”)?
ISO/TC 347/AHG 6 (Norway)	**Livestock activities management** • Model animal individuals & groups (cows, pigs, sheep, birds, fish, bees) • Represent **activities** and traceability
ISO/TC 347/AHG 7 (USA)	**Maximizing usability of field operations data** • Machine data is notoriously difficult to use, but users have growing expectations of using it to solve problems. • This AHG will lead to standard(s) for workflows that enable using machine data to solve real problems at scale.
ISO/TC 347/AHG 8 (Proposed Spain and Netherlands)	**Field usage history AHG (Balloting)** • Series of standards modeling fields, field boundaries, field **activities** / operations, and a package encapsulating a sequence of field operations and the properties of the field. • Analogous to AHG 6 for cropping systems

ISO Committee

Possible new work

Possible new work (1 of 5)

Type, leadership	Title
AG (TBD)	**Strategic data assets** • Manage use cases, a capability model, and a set of terms and definitions, all assets emerging from IWA 47
AG	**Learning and growth (L&G)** • Develop and manage the strategy for learning and growth in strategic business plan ; i.e., foundational needs for skills development in our technical committee
TBD	**Guidance for checking SDG boxes** • TCs are asked to describe how their standards contribute to the SDGs. • We need guidance on how to do this consistently, because ISO does not provide any. • Proposal: Joint AG 1 / L&G (and maybe AHG 1) project to produce an SOP document.
CCCC / TG 5	I**SO Guide 84, Guidelines for addressing climate change in standards** • This work, published in 2020, is undergoing a revision. • An iteration of revision was recen tly balloted and not approved. • There is an opportunity to work on a new revision.

Possible new work (2 of 5)

Type, leadership	Title
AHG (JM/US?)	**Manual harvest (and other field operations)** • **Context**: Many crops worldwide are harvested (or planted) manually or with minimal equipment. This is done by smallholders and very large companies. • **Need**: There are is no standard for data payloads for manual harvest (or other manual operations). Having one could allow greater efficiencies for large growers to capture data into FMIS, and allow for smaller growers, armed with simple phone apps to have more marketing opportunities. • **Proposal**: Model data payloads for non-mechanical harvest (and possibly, other field operations such as planting). Make them small-device-compatible.

Possible new work (3 of 5)

Type, leaders	Title
AHG (TBD)	**Federated diffusion of innovation platform** • **Context:** There are many innovations of great value to agrifood systems that do not lend themselves to standardization. • **Need**: A way to make these innovations visible and accessible (via different business models) worldwide, linking contributors (e.g., inventors, software developers), implementors (e.g., a village blacksmith / entrepreneur) and users (e.g., farmers) world-wide. • **Proposal**: An AHG to explore a standard for a federated platform for diffusion of innovations. This could be analogous to a Github with reputation management layers for contributors, implementors and users. Instances of the platform could be implemented by innovation hubs, universities, etc. The federated aspect would allow users to search across instances. This work would be tied strongly to AGs 1-3..

Possible new work (4 of 5)

Type, leadership	Title
AHG (CN/US)	**Irrigation optimization** • There is potential for improvement in irrigation water use efficiency, but it is predicated on better (data-driven) decision-making • We have a set of proposals for standards related to irrigation optimization, but several may have already been taken care of by other standards (e.g., ISO 7673). • We will triage soon with the proposer and the project leader of ISO/FDIS 7673.
AHG or WG 1 (TBD)	**Next agrisemantics standard: field operations / activities?** • Following CropDefinition with ActivityDefinition is convergent with, and enabling of, work being done in AHG 6, and work being discussed in the context of one of our liaison organizations (AgGateway)..
AHG (TBD)	**Trait nomenclature** • There is interest among our members for standardizing nomenclature for phenotyping traits. (Both functional and administratively relevant) • This appears to be easily built on 7673-2 • We should tackle it collaboratively with other organizations (e.g., CGIAR).

Possible new work (5 of 5)

Type, leadership	Title

AHG (TBD)	**Data-driven management system standards**
	• There was interest expressed among a group of IWA 47 participants to develop a management system standard (MSS) on data-driven livestock management systems.
	  • This is consistent with ISO-SAG Recommendation 3.4.26
	• The same group expressed interest in building on ISO 22006, toward an MSS on data-driven cropping systems.
	  • This is consistent with ISO-SAG Recommendation 3.4.25
	• A next step will be to discuss ways to move this forward in collaboration with TC 34

AHG or WG 1 (CN?)	**Designing ontologies for semantic interoperability in agrifood systems** • Proposing a multi-step strategy involving multiple steps of socialization of the idea and value of ontologies, followed by a technical report (TR) and possible international standard (IS).

Standards to expect from ISO/TC 347

- Standards to agree on what things mean
  - Crop definitions, pest definitions, active ingredients, modes of action, etc.
  - Meant to be enablers for good unambiguous communications and higher functions like automated label checking
  - Registries for geopolitical-context-specific data (Farming is ultimately local!)
- Standards for resource definitions
  - Field boundaries (including data quality metrics and usability of boundaries based on their origin/quality)
  - Enhancements to farmer/producer, farm, field, cropzone, etc from 7673-1
- Standards for how things happen
  - Field operations: Build on models for plans, recommendations, work orders and work records from ISO 7673-1
  - Management system standards for data-driven crop and livestock production
- Standards and guidelines on how to use all of this to solve business problems
  - How to set up workflows to get (and use) high-quality machine data
  - How to set up workable integrated pest management programs

Existing standards to take a look at

- ISO/FDIS 7673-1
  - Agricultural field operations data Part 1: Core concepts
- ISO/FDIS 7673-2
  - Agricultural field operations data Part 2: Observations and measurements
- ISO/FDIS 7673-3
  - Agricultural Field Operations Data Part 3: Irrigation Operations
- ISO 14040:2006
  - Environmental management — Life cycle assessment — Principles and framework
- ISO 14091:2021
  - Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment
- ISO 22000
  - Food safety management
- ISO/TS 22002-1:2009
  - Prerequisite programmes on food safety Part 1: Food manufacturing
- ISO/IEC 42001:2023
  - Information technology — Artificial intelligence — Management system

How to participate in TC 347

- Most work happens online
- Two plenaries per year
  - **Virtual** (October, 2 x ½ day Zoom)
  - **In-person** with some hybrid participation (March, 4 days)
- 3 ways of contributing / connecting to TC 347:
  - **Through your national standards body**
    - Participate directly, help vote
  - **Through a liaison organization (e.g. ISPA)**
    - Participate directly, don't vote
  - **Through IWA 47**
    - Participate directly in IWA 47, indirectly in TC 347

IWA 47 registration package (Zip file)
https://bit.ly/3Jhk6lv

IWA 47 registration form (online)
https://bit.ly/3THCV7k

Aligning ISPA and TC 347

ISPA definition of PA (Rev. Jan 2024)

- Precision Agriculture is
- a **management strategy**
- that **gathers, processes and analyzes**
- temporal, spatial and individual **plant and animal data** and
- **combines it with other information** to
- **support management decisions**
- according to estimated variability for improved resource use efficiency, productivity, quality, profitability and sustainability of agricultural production.

ISO alignment

Aligned with ISO emphasis on management systems, SAG-SF recommendations, and upcoming TC 347 work.

Aligned with TC 347 / AHG 7

Aligned with TC 347 / AHG 2 and AHG 6

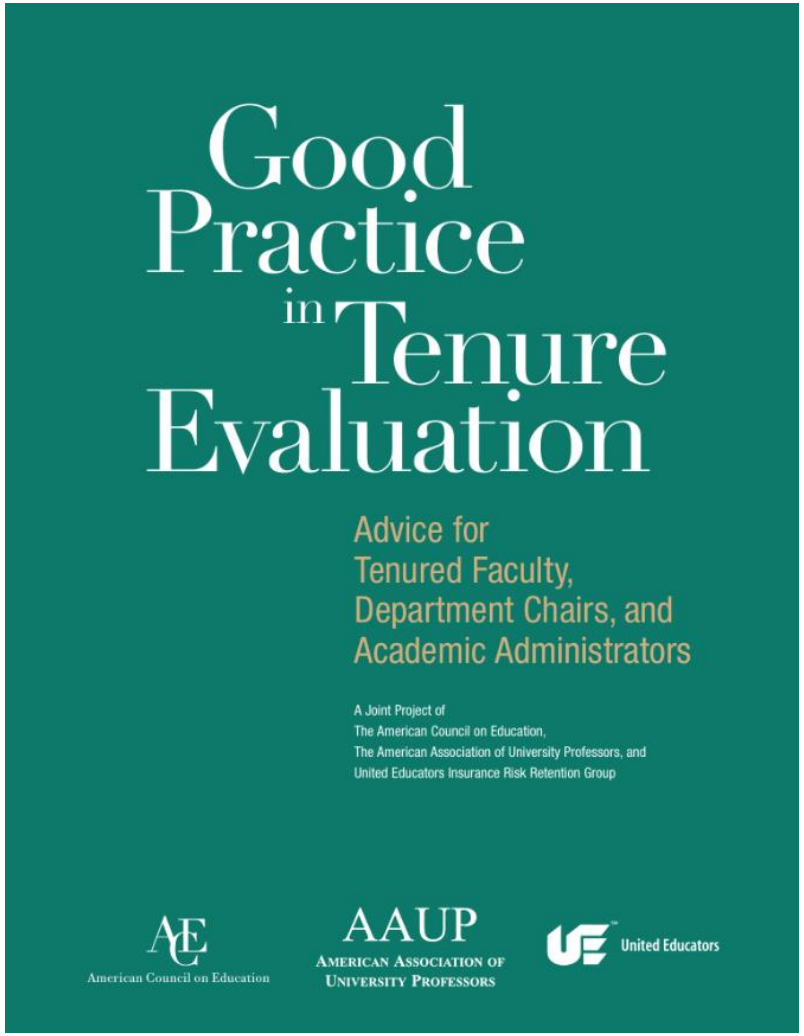
Aligned with TC 347 / AHG 5 and future work on FAIR (meta)data standards

Central goal in TC 347 scope statement.

Multi-objective nature of mgmt. decisions, recognized in TC 347 scope statement.

Why ISPA members should consider TC 347 and AG 3

- Academic and research institutions evaluations are changing.
- Peer reviewed articles have been the gold standard for decades, but doubts are growing about review processes and about impacts of those articles.
- Some institutions are looking for more direct evidence of research benefits to taxpayers.
- ISO standards are used worldwide. Being involved in ISO = impact.



Source: https://www.aaup.org/

Thank you.

Making lives ***easier***, ***safer*** and ***better***.

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