Digital Product Passports and Field Passports

R. Andres Ferreyra, Ph.D. (andres.ferreyra@syngenta.com)

AgGateway Europe Spring Meeting
Berlin, March 14, 2025

Context, part 1

- **Increasing push** worldwide for **greater sustainability** of agricultural and food production.
- Regulator and market emphasis on circularity and accounting of material and energy flows is driving a **demand for more detailed, machine-actionable record-keeping** (e.g., CSRD).
- The "**product passport**" concept
  - Refers to a digital record that contains detailed information about a product's lifecycle, including its materials, manufacturing processes, environmental impacts, and potential for reuse or recycling.
  - Often called a "Digital Product Passport" (DPP).
- It's impossible to do all of the above for an agrifood product without being able to track the history of crops in the field.
- An analogous concept is the "**field passport**", which **applies this concept to a parcel of land** (e.g., a field or paddock, some subdivision thereof, a greenhouse or some other kind of facility.
- This idea will be henceforth referred to by the more descriptive name of "**Digital land usage history**".

Context, part 2

- Keeping track of land usage history is a fundamental idea of **farm management information systems**.
- By **unambiguously recording** the application of crop inputs, harvest of agrifood products, and operations (e.g., spraying, tillage, etc.) performed on a parcel of land, producers can obtain important insights on business aspects such as (among many more):
  - Their **costs of production**, gross and net income on a per-parcel basis
  - Being able to **objectively answer questions** such as whether a rent increase on a parcel of land is affordable
  - Managing fertility to maximize profit and **minimize nutrient losses**
  - Managing active ingredient loads, restricted entry intervals and pre-harvest intervals associated with the application of chemicals, to **maintain compliance** with worker protection and food safety regulations
  - **Managing water** using scientific irrigation scheduling
  - Managing a crop to **optimize carbon intensity** or other sustainability metrics

CEN/CLC/JTC 24 - Digital Product Passport - Framework and System: Scope I

- Development of deliverables for the Digital Product Passport (DPP) framework and system, based on but not limited to standards on:
  - unique identifiers;
  - data carriers and links between physical product and digital representation;
  - access rights management, information, system security, and business confidentiality;
  - interoperability (technical, semantic, organisation);
  - data processing, data exchange protocols and data formats;
  - data storage, archiving, and data persistence;
  - data authentication, reliability, integrity;
  - Application Programming Interfaces (APIs) for the product passport lifecycle management and searchability;
  - and the data delivering system, data specification method while ensuring cross-sectoral and cross-system interoperability.

CEN/CLC/JTC 24 - Digital Product Passport - Framework and System: Scope II

- Excluded are:
  - **Sector specific standards**,
  - deliverables already covered by the scope of other CEN and CENELEC TCs,
  - **definition of the content of data belonging to different product types or segments**.

- The project page: CEN Technical Bodies - CEN/CLC/JTC 24

Proposed ISO/TC 347 / AHG 8 on Digital Land Usage Histories / Field Passports

Context, part 3

- In order to be usable, a digital land usage history must be accompanied by additional information:
  - **Reference data**: A standardized findable, accessible, interoperable and reusable (FAIR) set of nomenclature for the crops, pests, active ingredients, products, product formulations, etc. associated with the parcel of land over time
  - **Setup / master data**: Fit-for-purpose geographic boundaries that delimit the parcels of land, producer/farm/field trees, data about equipment involved in production, etc.
- A standard for recording digital field usage histories and their reference and setup data **does not exist yet** in the agrifood systems standardization space.
- **Most of the pieces are there** (e.g., in ADAPT framework), but not a way to encapsulate them or provide metadata.

TC 347 Use Cases, 1

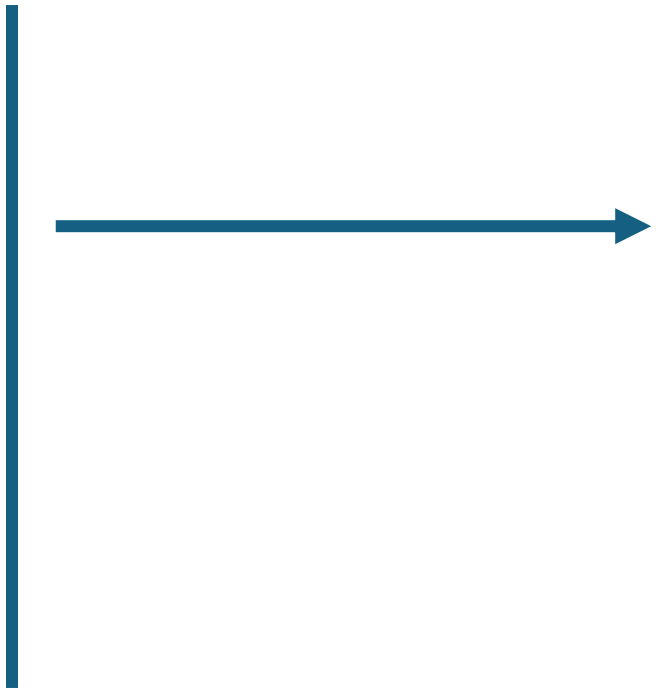
Use case name	Use case description
Land use and change – deforestation (EUDR)	Regulator or food processor desires to know a farmer/supplier is complying with anti-deforestation expectations. By beeing able to uniquely identify the field, communication of compliance to EU Deforestation Regulation throughout the supply chain is made easier.
Measuring different sustainability indicators such as the the carbon footprint or biodiversity	Measure the carbon footprint or biodiversity footprint of a certain crop produced on a field
Third-party users of a parcel	A field is rented to another colleague farmer. This farmer wants to know the complete history of the field in order to plant the right crop.
Property valuation and sale	Someone purchasing a parcel of agricultural land wants to understand the history of the field(s) on the parcel to know if the status of the soil health/fertility based on previous fertilization and yield (removal) operations
Action planning by field robots	Based on the field history, the farm management AI can plan the next action, add it to the history as “planned” and put a robot as executor. The robot is checking the field passport, finds the new action item and performs work.
Environmental reporting - water management	A regulator has interest in ensuring a farmer/producer is complying with runoff regulations. Nutrient runoff could be as-applied fertilizers, as well as manure from livestock
Land Transactions	When purchasing farmland, the new owner needs access to historical data about chemical inputs, fertilizers, pesticides, and soil treatments previously applied to the land. This information is critical for determining whether the land can be certified for organic farming and if any transition period is required. The challenge is ensuring accurate, verifiable, and standardized data exchange between previous owners, land registries, and agricultural certification bodies.

TC 347 Use Cases, 2

Use case name	Use case description
Comply to regulations	There are rules for land uses, so the farmer needs to prove that he complied to these rules.
Understand land parcel state and history	be able to query a registry to find out about a parcel of land, its current state, and the events that have affected it. Don't tell me about things that have happened nearby or which are peripheral to the state of the land. So don't tell me about a planning or operations analytics activity that happened in an FMS. Don't tell me about the use of diesel fuel by farm vehicles. Do tell me about movement of vehicles, especially heavy ones, across the parcel of land (=soil compression). Do tell me about CP product application events. Do tell me about soil tillage activities (or periods of no-till etc farm management). Do tell me about any application of soil improvement material, particularly where it relates to organic carbon, incorporated into the soil or not.
Specific recording of usage of crops and/or input products to the field	By identifying the field, farmers can more easily record actions that have been taken on/to that field
Physicial and chemical requirements of the products	including water content, ash content, total protein, PH, enzyme activity, anti oxident activity, etc.
Green house gas emission in paddy field	To collect data of the duration (number of days) when the land surface is covered wirh water, or the depth of water in paddy fields. Those data can be used for carbon credit generation. Farmers can obtain extra money depending on the carbon credit calculation.
Check the sustainability level of agri-food product by retailers	Retailers would like to check the the sustainability level of agri-food product that they buy. To evaluate the sustainability level, the data including that the product was when, where and how to grow is needed.
Supply Chain Transparency	standardizing the identification of a field makes it easier to share data about the field. Farm to fork

Important point

- Farmers, other agrifood actors despise unfunded mandates.
- There are plenty of business-related use cases for field passports.



- A business-friendly model of a field passport will reduce the friction of regulatory compliance.

What this group would likely do

- Gap-check the IWA 47 business capability model
- Harmonize with AHG 2 output (initiating relevant reference data objects).
- Propose how to fit this work within a **TC 347-wide stratified approach**, proposing a family of standards to enable digital land usage histories, i.e.,
  - **A base level of TC 347 standards not specific to, but enabling, digital land usage histories** (e.g., field operation codes, nutrient reference data, data type definitions)
  - **A mid level of fundamental standards that are common to digital land usage histories** in general, e.g. expanded models for the core documents introduced in ISO/FDIS 7673.
  - A **more specific level of parcel type or problem-specific standards** (e.g., extending the core documents to greenhouses or feed mills).
- Identify and harmonize **key terms and definitions** with the glossary being initiated by IWA 47
- Draft and present one or more **NWIP**s (Form 4), accompanied by an outline or **draft**.

What would a digital field usage history contain? I

- A sequence of **core documents** (with varying degree of coverage)
  - Observations and measurements
  - Recommendations
  - Work Orders
  - Work records
- A description of the **relationships** among them
  - Establishing the principled decision-making aspect!
  - “This work record resulted from this work order, that resulted from…”

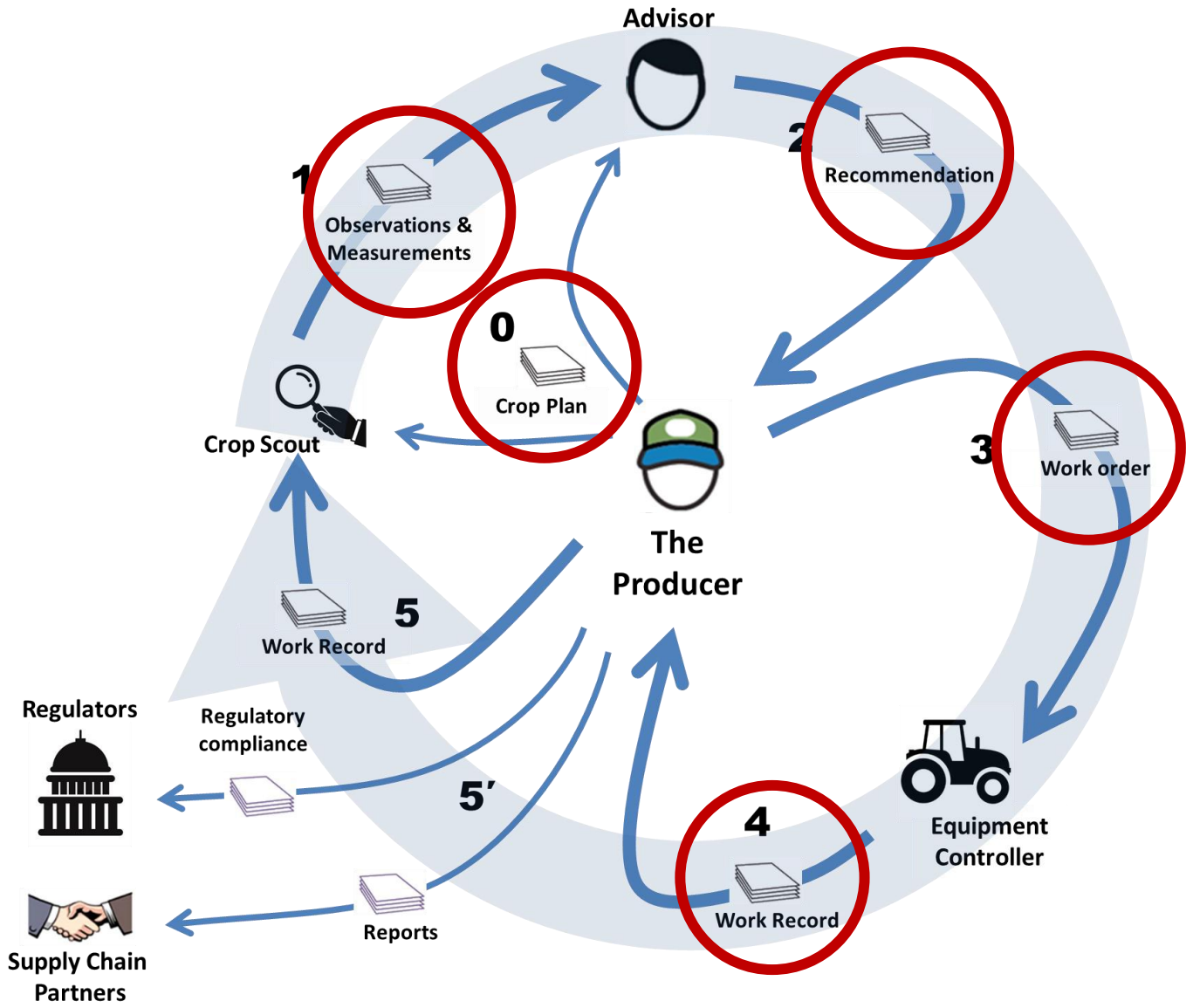
What would a digital field usage history contain? II

- The set of **resources (setup/master data)** referenced by the documents:
  - Producer / Farm / Field / Cropzone tree
  - Field boundary (including data quality measures!!)
    - Note co-registration of RTK networks recommendation 3.4.16)
  - Equipment (machines sensors, etc.), facilities
  - People (where appropriate)
  - Animal groups or individuals (as appropriate)
- The **reference data** used within the documents:
  - Crops, Pests, Products,
  - Data type definitions (e.g., observation codes, etc.)

In a nutshell

- What field passport use cases do we need to support?
- How should we encapsulate a set of core documents (and their corresponding reference and master data) into a land usage history?
- Are the Core Documents of ISO/FDIS 7673-1 enough? Do we need to add more documents or add to the documents?

- Intent to create ballot ASAP following the plenary.



Thanks!