

# rmAgro/drmAgro/drmCrop

*Standardisation of electronic data exchange and architecture*

*Live webinar on Wednesday 15 February*

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# Daan Goense

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- Retired from Wageningen University & Research (WUR)
- Hired by WUR for the Farm Digital Project of AgroConnect
- Member of the the Ad Hoc Arbeitsgruppe Bus Schitstelle, LBS, (1987- 1993)
- Member of ISO/TC23/SC19/WG1 & WG5 (1993 - .....)
- Research in Farm Machinery Management, Precision Agriculture and ICT in Agriculture.



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# What triggered rmAgro?

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- Changes in technologies over time. (ADIS, EDIFACT, XML, JSON, API)
  - → Domain reference model should be independent from implementations.
- Recent additional scope's.
  - Precision Agriculture, Tracking and tracing, Guidance, etc.
- → **One common basis that defines the whole Agricultural Production Domain.**
  - First focus on crop production

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# Why one model for whole Agriculture

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- Different branches of agriculture share objects.
  - Organisations, people, etc.
- There is a significant percentage of mixed farms.
  
- Branches in rmAgro
  - Crop production
  - Greenhouse production,
  - Animal husbandry
  - Aqua culture

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# rmAgro; a model suite

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- Business Process Model (**BPMN**), mainly for FISpace
- **Use case** model, mainly for ISO/TC23/SC19WG5
- Domain Reference Model (**drmAgro**)
- Dynamic view (**sequence diagrams** for FISpace)
- **DDL model** (*transformed from drmAgro*)
- External models (ISO19107, Fertilizer, Crop Protection)
- External XSD's (ISO11783, GML)
- Mapping (drmAgro/drmCrop to other models )
- **Java Model** ( interface model & *implementation model* transformed from drmAgro)
- **WSDL** (defines messages for FISpace)
- **XSD model** (transformed from drmAgro)

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# Modelling conventions for the domain model

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- It is a **platform independent** model !
- No id's or keys, except for a Global Unique Identifier (GUID) as an attribute.
- No foreign keys.
- Limited set of generic datatypes (*no language specific datatypes*)
- Many to many relations stay as they are, no association class (*except when it has attributes*)

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# Some starting points

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- Use existing standards when appropriate
  - **ISO191xx** and **GML** for geometry
  - **SensorML** for sensor data

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# Structure of the domain model (1)

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## ■ drmAgro

- DataTypes
- Enumerations
- Geometries ( → GML or → ISO19107)
- SWE types (DataArrayType)
- XSD types ( token, ncName, anyURI)



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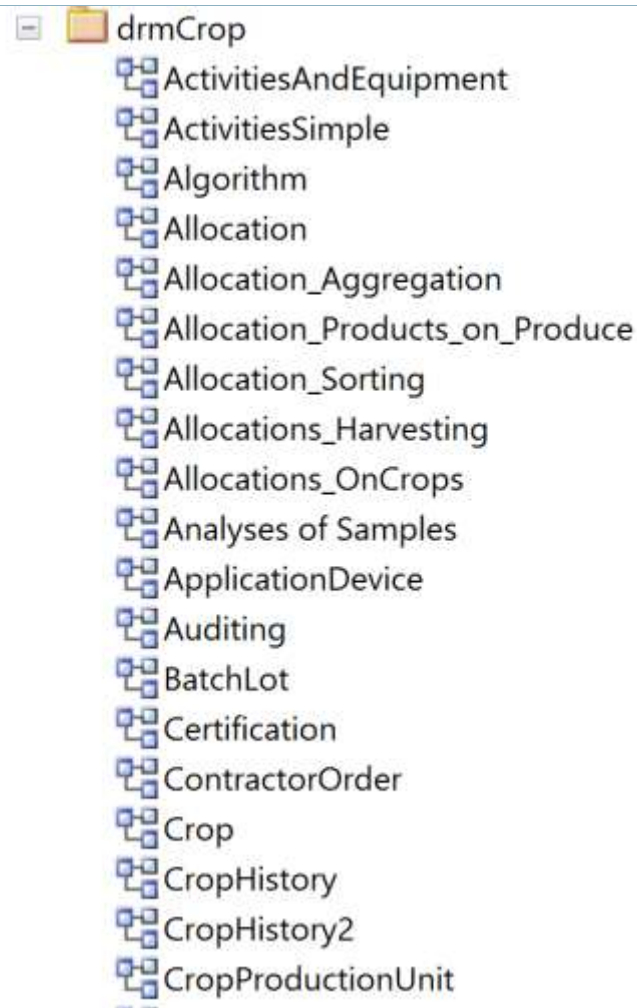
# Structure of the domain model (2)

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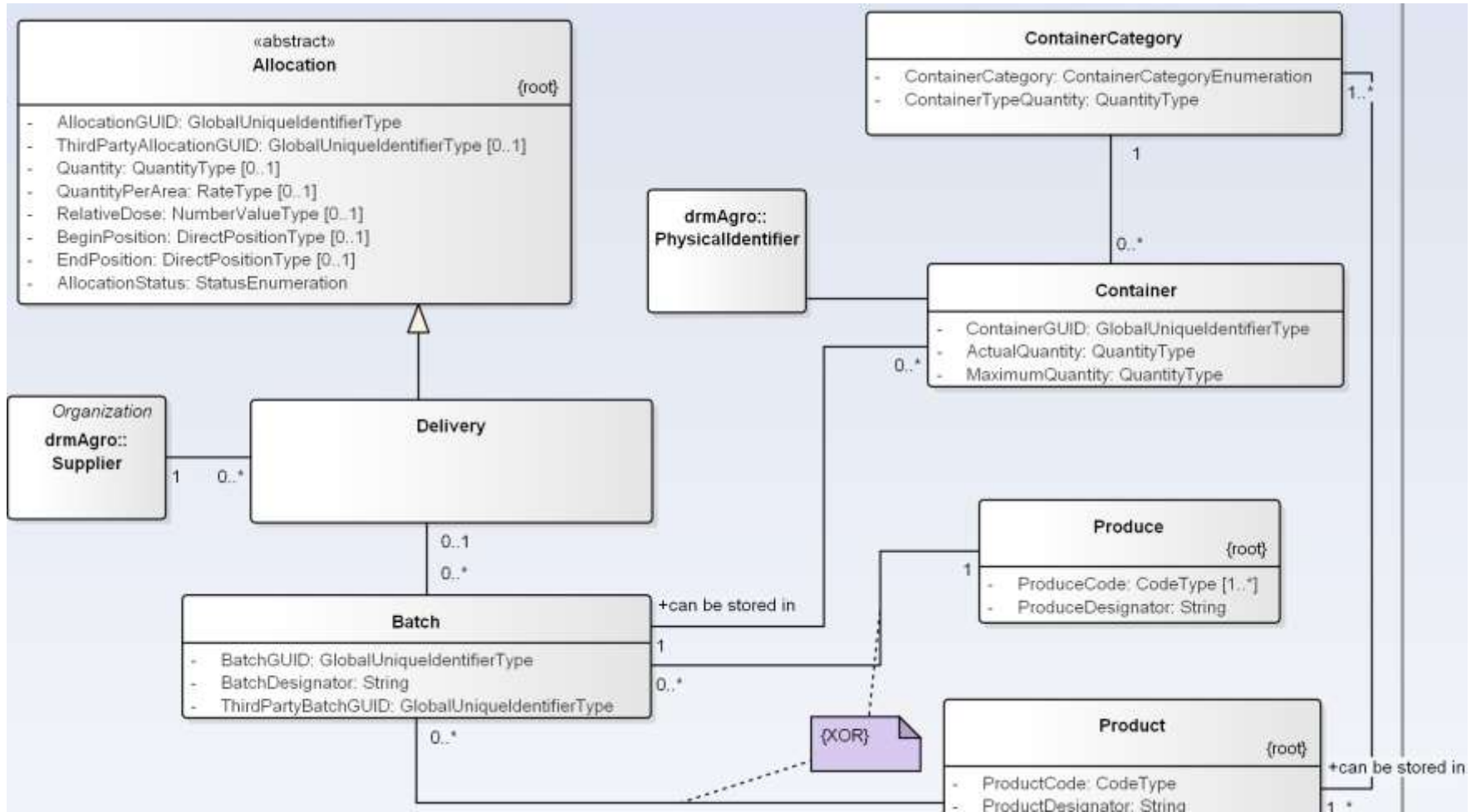
## ■ drmAgro

- *All common classes* (i.e. Party, Organization, .)
- .....
- .....
- drmCrop
- drmAnimal
- drmGreenHouse
- drmInfrastructure (yards, trees, roads, etc)
- drmPostharvest

# Diagrams for different scopes of the model



# Example for Batch



# All classes have definitions, evt. remarks and examples

The screenshot shows a software interface for editing a class named "CropField". On the left, a navigation pane lists "Properties" (General, Templates), "Rules" (Requirements, Constraints, Scenarios), and "Related" (Files, Links). The main area displays the class name "CropField" and a rich text editor with a toolbar. The text in the editor includes a **Definition.** section stating that **CropField** describes the continuous surface of land used during a period of time by a certain **CropProductionUnit**. It also includes a **Remark.** section stating that the surface of the **CropField** is always within the borders of a Field, and that as a **CropProductionUnit** applies to only one **CropType**, a **CropField** is grown by one **CropType**. A final paragraph explains that it is the farmer who decides when to split up into different **CropFields**, which can be for different **Variety**, purposes, or seed production classes, requiring separate tracking and tracing.

Class : CropField

Properties

- General
- Templates

Rules

- Requirements
- Constraints
- Scenarios

Related

- Files
- Links

CropField

**B** *I* U **A**  $\frac{1}{3}$   $\frac{2}{3}$   $x^2$   $x_2$

**Definition.**  
**CropField** describes the continuous surface of land which is used during a period of time by a certain **CropProductionUnit**.

**Remark.**  
The surface of the **CropField** is always within the borders of a Field.

As a **CropProductionUnit** applies to only one **CropType**, a **CropField** is grown by one **CropType**.

It is the farmer who decides when to split up to different **CropFields**. That can be a different **Variety**, a different purpose for which the crop is grown, a different class in seed production, the need to keep it separate for tracking and tracing purposes etc.

Stereotype:

Status:

Alias:

Keywords:

Author:

Complexity:

Language:

Version:

Phase:

Package:

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# Scopes covered by drmAgro

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- Parties
  - Party, Organization, Person, Department, Farm, etc.
- Fields
  - Plot, Field, CropField, GreenhouseFloor, ActivityField, KadastralField
- Activities on the farm
  - Job, Task, Operation
- Data processing
  - DataSet, DataAggregation, Algorithm, DataProcess

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# Scopes covered by drmAgro (2)

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- Handling of products and produce
  - ProductAllocation, Product, Batch, TreatmentZone
- Sampling and analyses
  - Sample, Analyses, PropertyValue, Laboratory, Container, VerticalLayer
- CropRecording
  - CropProductionUnit, CropField, Operation, AbsoluteTiming, CulturalPractise, OperationTechnique, ProductAllocation, TreatmentZone, Batch, etc.

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# Scopes covered by drmAgro (3)

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- Farm machinery
  - Equipment, Implement, Tractor, ManMachineSystem
- Ordering
  - Order, OrderItem, Delivery, Invoice, Customer, Supplier
- Product composition
  - Product, ProductAllocation, Batch, ProductElement

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# Relevant Packages

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- drmAgro/drmCrop
  - Allocation\*\*\*
  - Auditing & Certification
  - Crop & CropRecording
  - Operation\*\*\*
  - ProductApplicationOnCrops
  - PropertyValue
  - Site
  - Zone
  
- drmAgro/drmGreenhouse
  - Greenhouse



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# Availability of the model

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- rmAgro snapshot:  
**[ftp://pragmaas.com/rmCrop/rmAgro\\_SNAPSHOT](ftp://pragmaas.com/rmCrop/rmAgro_SNAPSHOT)**
- Enterprise Architect model: **rmAgro.eap**
- Description of background: **rmAgroGuideline.docx**