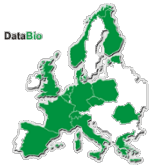


FOODIE
FARM-ORIENTED OPEN DATA IN EUROPE

FOODIE - Data Models for Crops from seed to store

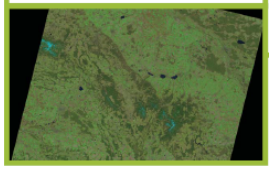
Karel CHARVÁT, Tomáš ŘEZNÍK, Karel CHARVÁT jr., Šárka HORÁKOVÁ
Vojtech LUKAS, Michal KEPKA

OGC AGRICULTURE Summit Web
Delft 21.03.2017

From FOODIE towards DataBio

FARM-ORIENTED OPEN DATA IN EUROPE

Satellite data



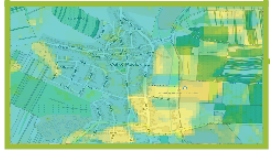
Open Land Use

OpenTransportMap

Sensor measurements

...

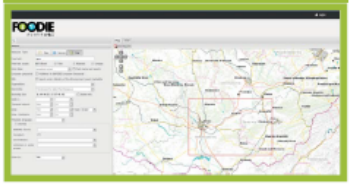
Vegetation indices



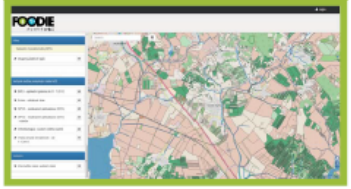
FOODIE Platform

Marketplace

Catalogue



Mapping



FOODIE

FARM-ORIENTED OPEN DATA IN EUROPE

APIs

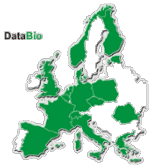
- OGC WMS
- OGC WFS
- REST API
- OGC CSW
- OGC SOS
- Complex Event Processing
- ...
- WS Notification

Software A

Software B

Software C

Software D



From FOODIE towards DataBio

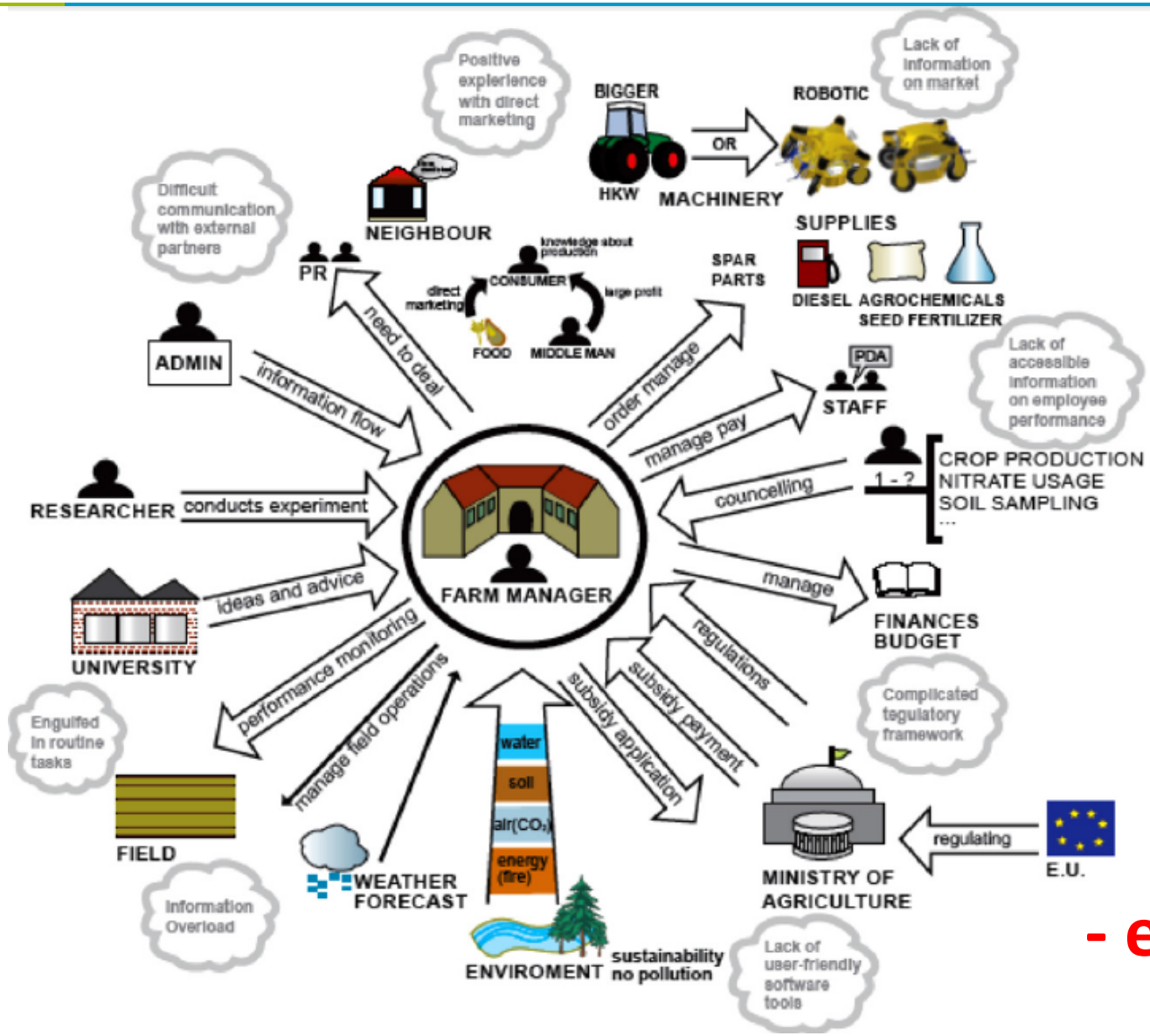
FOODIE
FARM-ORIENTED OPEN DATA IN EUROPE

- **Variety** (managing integration of all the heterogeneous data from the past - using Linked (Open) Data and semantics/ontologies etc. - and data access, queries, reporting etc. for data preparation). Descriptive analytics and classical query/reporting (performance data, transactional data, attitudinal data, descriptive data, behavioral data, location-related data, interactional data, from many different sources)

- **Velocity** (managing real time/sensor data from the present - complex event processing, Apache Kafka/Storm etc.) Monitoring and real-time analytics - pilot services (in need of Velocity processing - and handling of real-time data from the present) - trigging alarms, actuators etc.

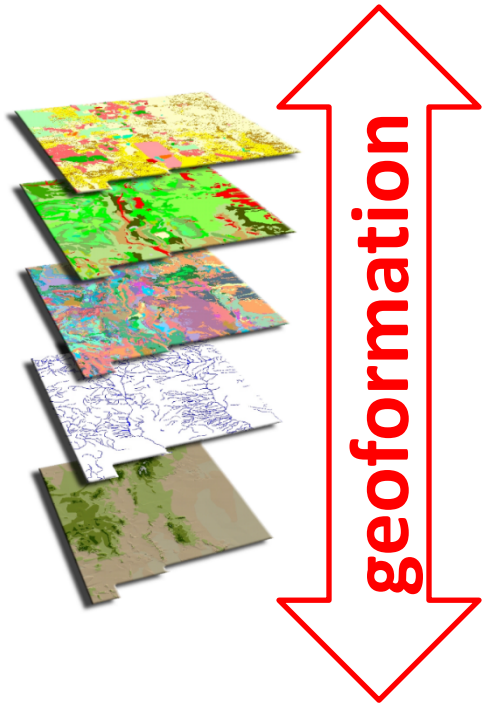
- **Volume** (mining all the data with respect to prediction and forecasting for the future - using various types of machine learning and inductive statistical methods). Forecasting, Prediction and Recommendation analytics - pilot services (in need of Volume processing - and processing of large amounts of data combining knowledge from the past and present, and from models, to provide insight for the future).

Motivation



Dimension:

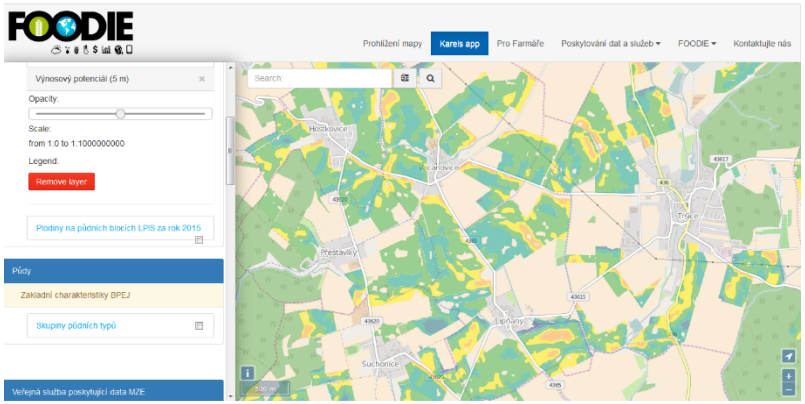
- economic



- environmental

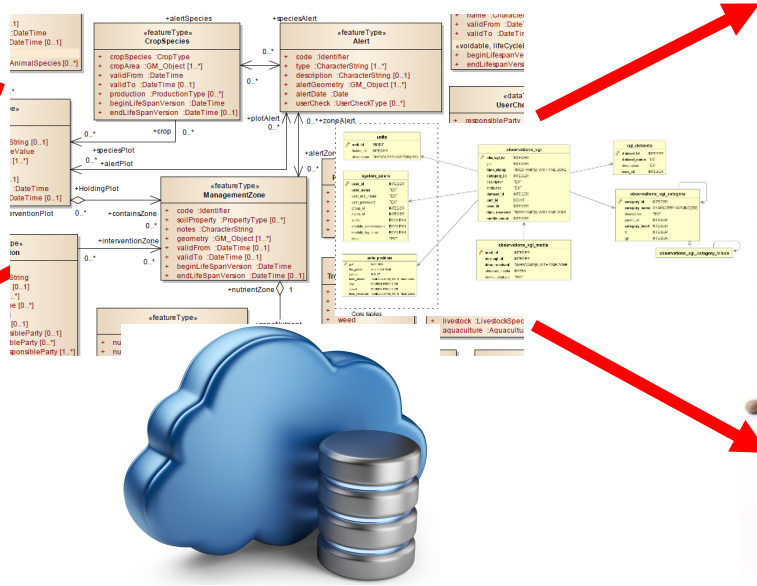
Fromz: http://ifro.ku.dk/english/staff/?pure=files%2F21514055%2Fconceptual_model.pdf, http://www.dbstephens.com

FOODIE Data Models



Machinery fleet monitoring

Management zones

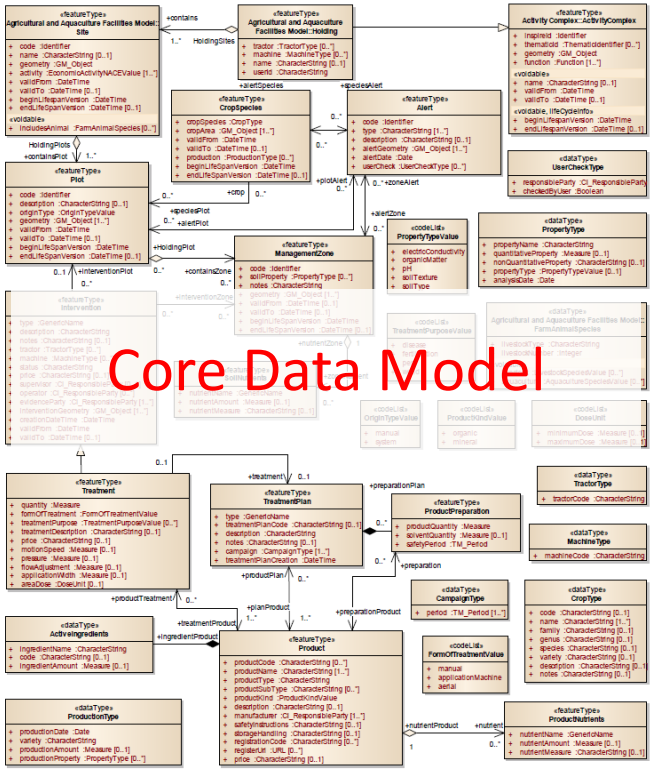


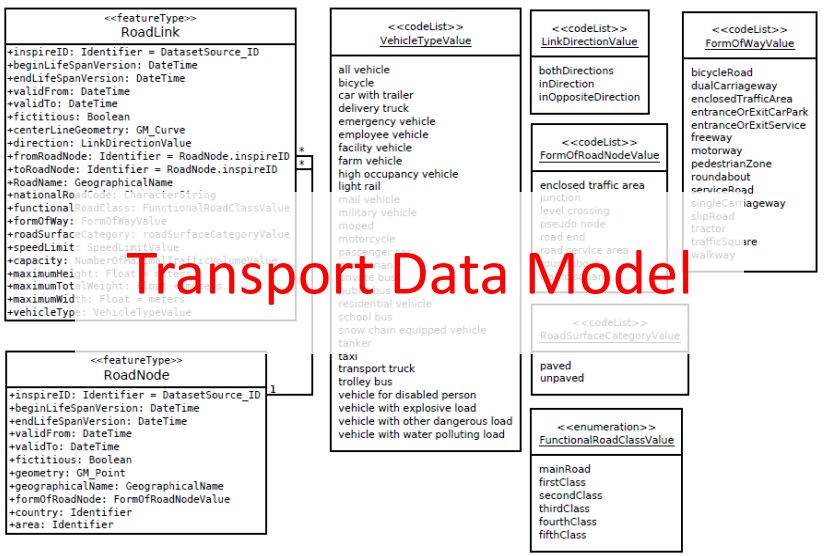
Sensor measurements

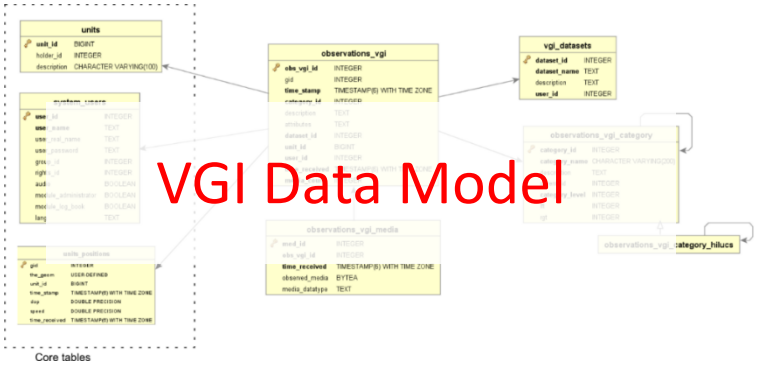
Fertilizers/pesticides information

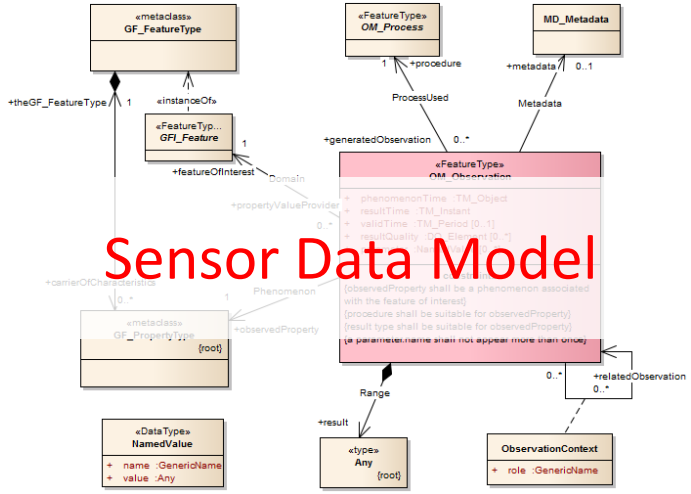
Obrázky převzaty z: http://gillinstruments.com, http://wisegeek.com, http://www.dbta.com/

FOODIE Data Models



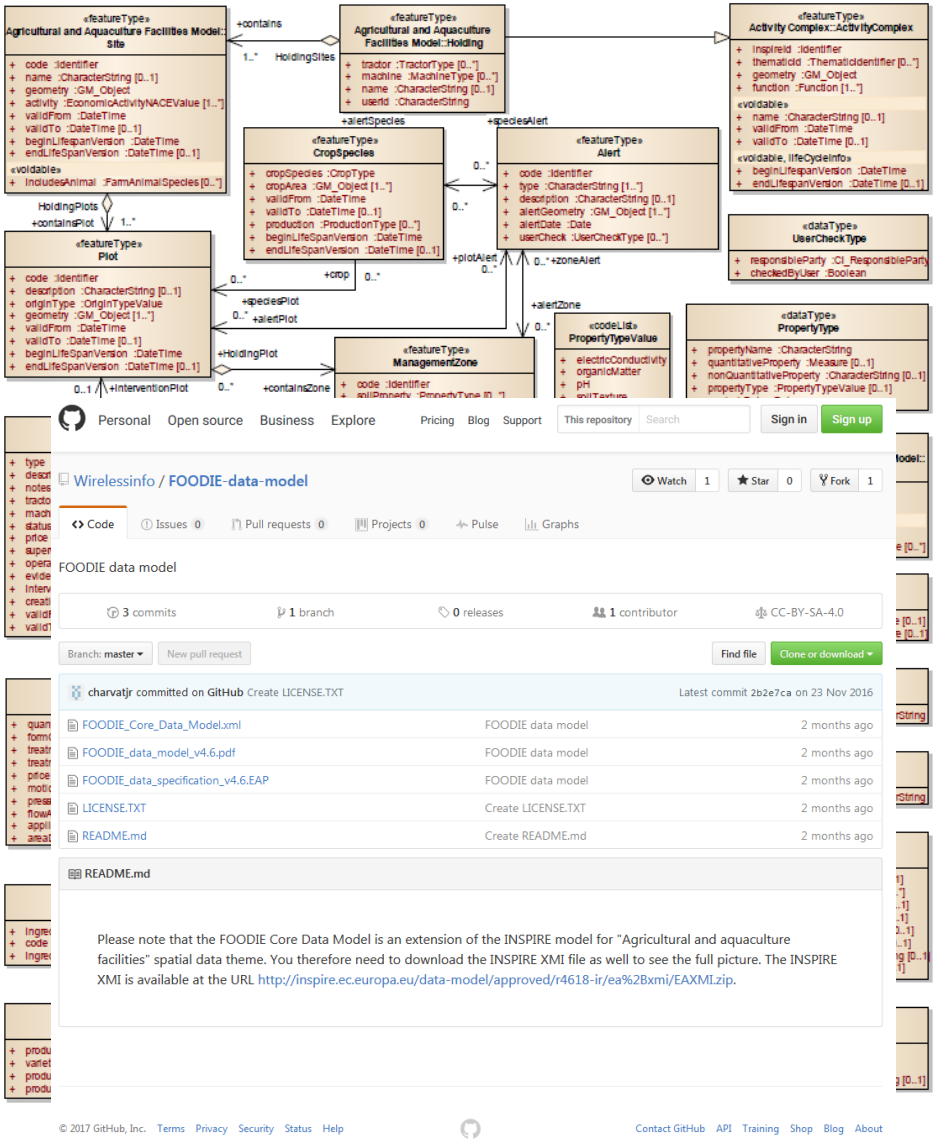




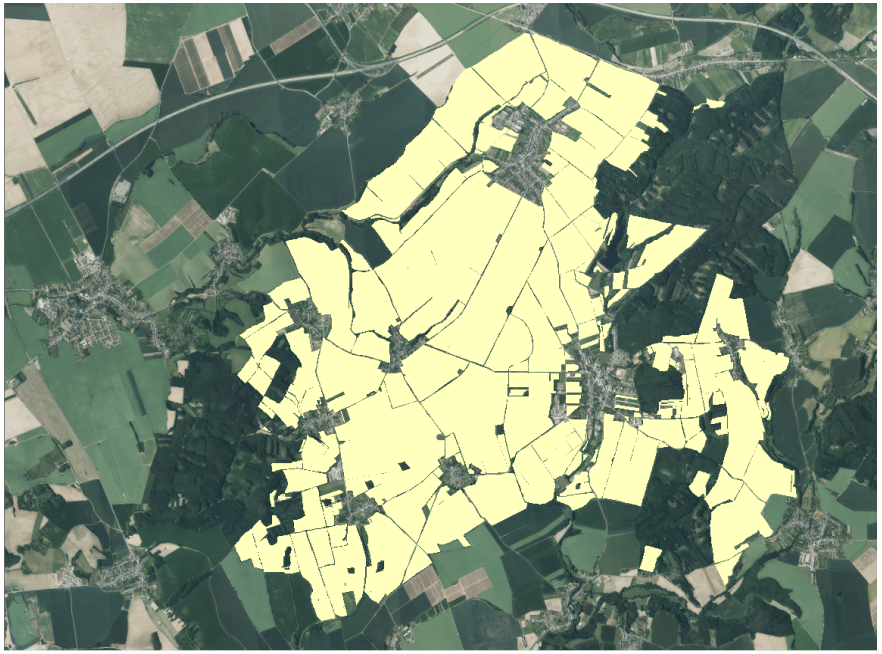


Core Data Model

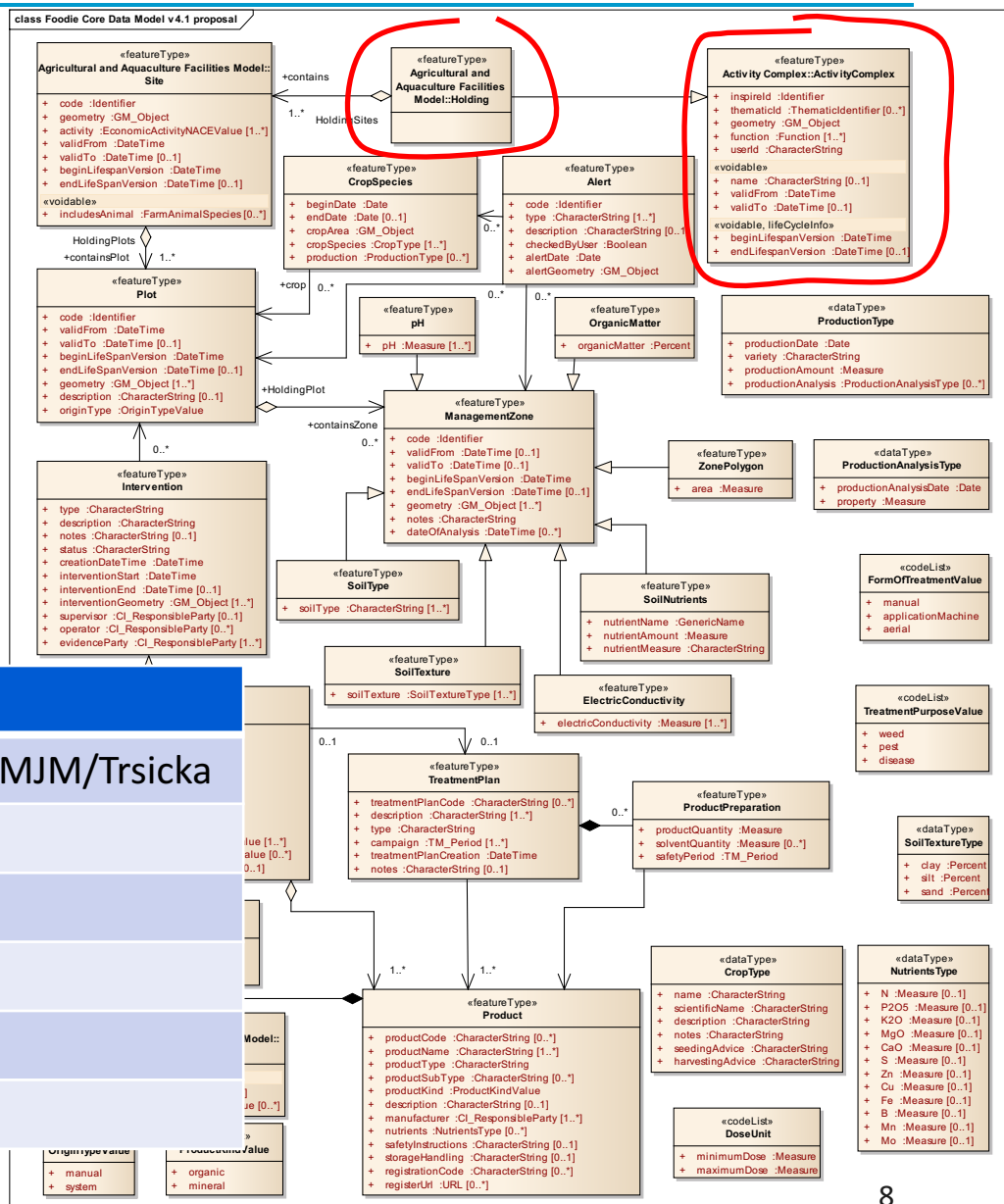
- Platform independent
- Based on more than 15 years of research as well as commercial activities
  - economic and environmental data
- Compliant to
  - ISO 19100 series standards
  - CAP IACS (Common Agricultural Policy Integrated Administration and Control System)
  - INSPIRE legislation (2007/2/ES)
  - GEOSS AIP-8
- UML (EA, XMI,…) and SQL (PostgreSQL)



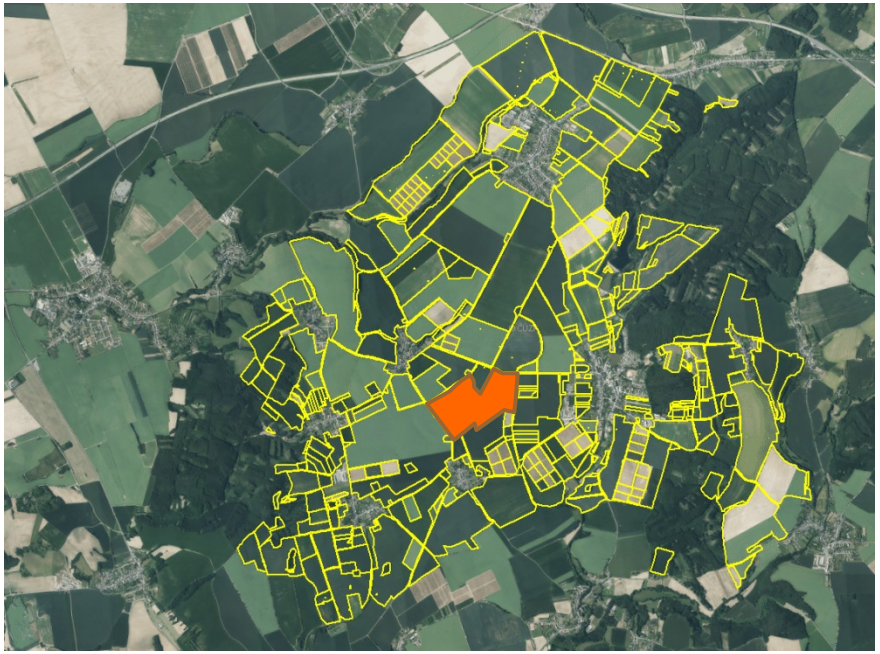
Core Data Model



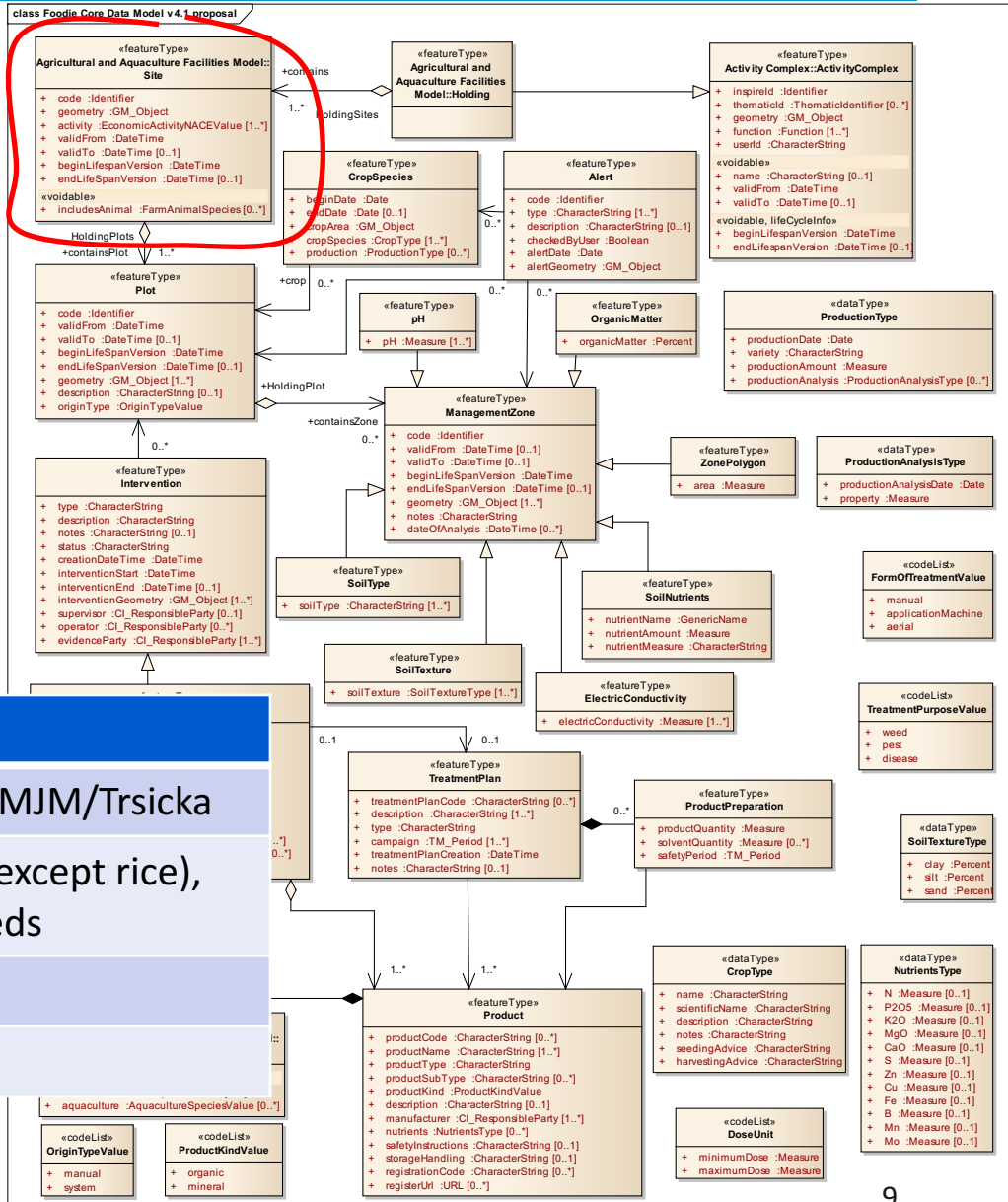
Holding attribute	Value
Identifier	http://foodie-project.eu/CZ/MJM/Trsicka
Function	agriculture
User identifier	47674814
Name	Tršická zemědělská, a.s.
Valid From	1993-12-13
Begin Lifespan	2015-03-11



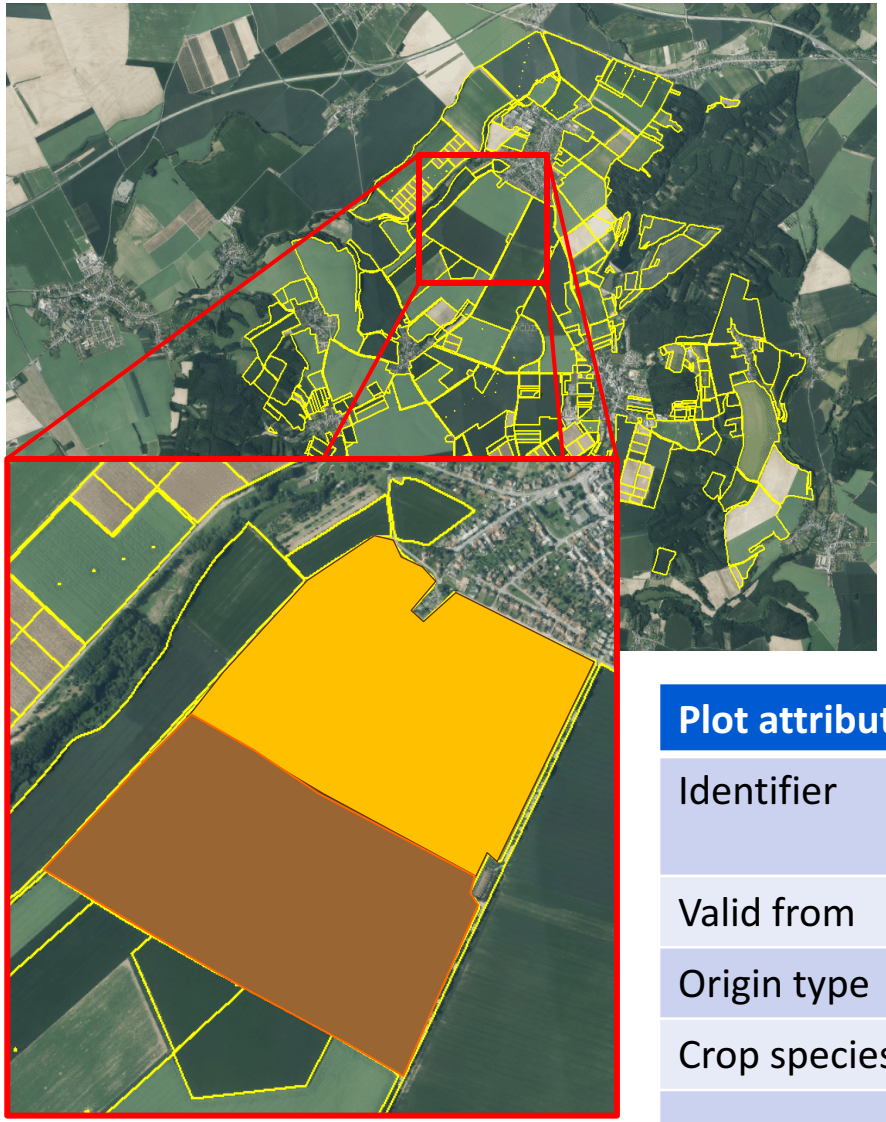
Core Data Model

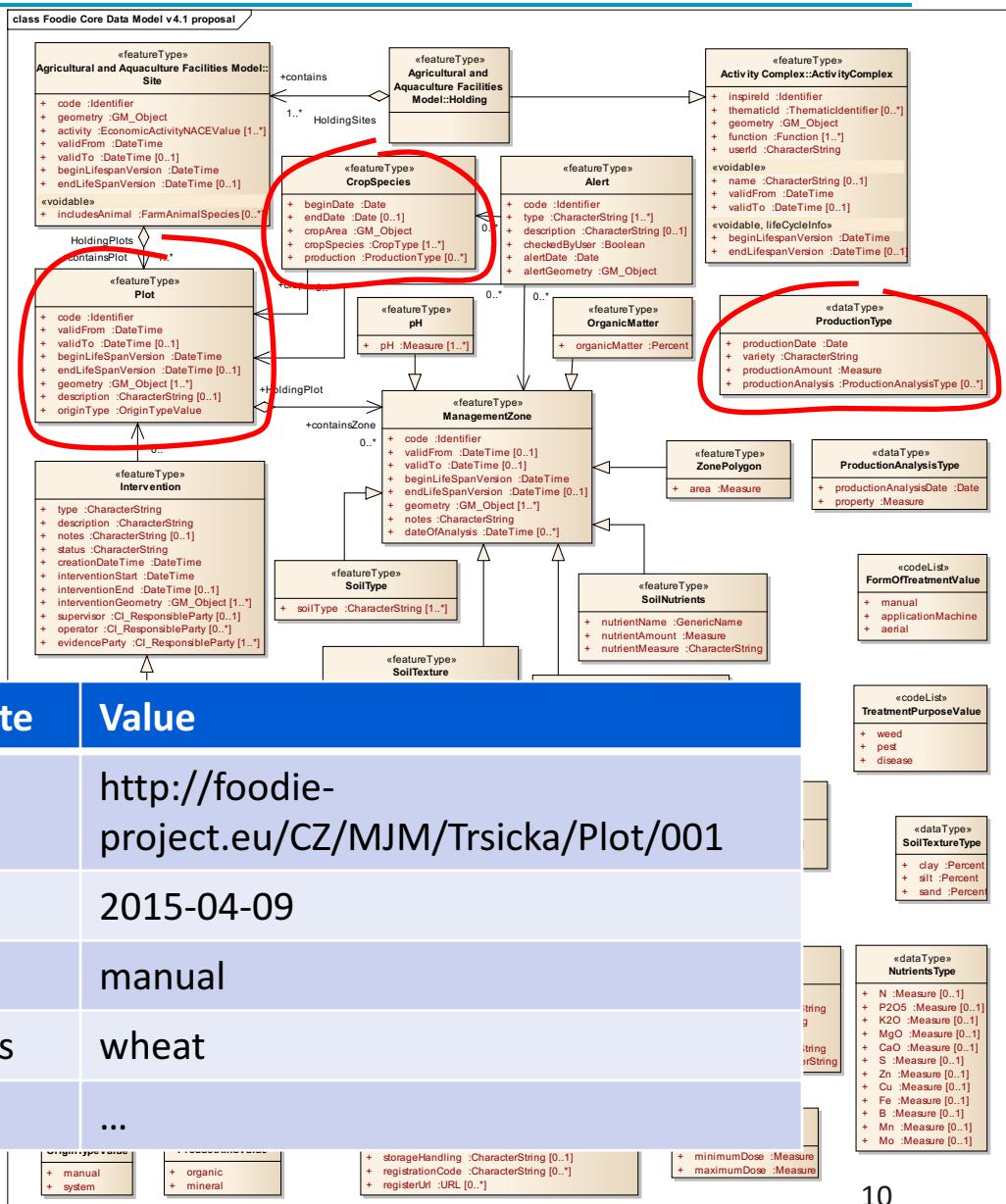


Site attribute	Value
Identifier	http://foodie-project.eu/CZ/MJM/Trsicka
Activity (NACE code)	A1.1.1 - Growing of cereals (except rice), leguminous crops and oil seeds
Valid From	2014-03-15
Begin Lifespan	2015-04-07



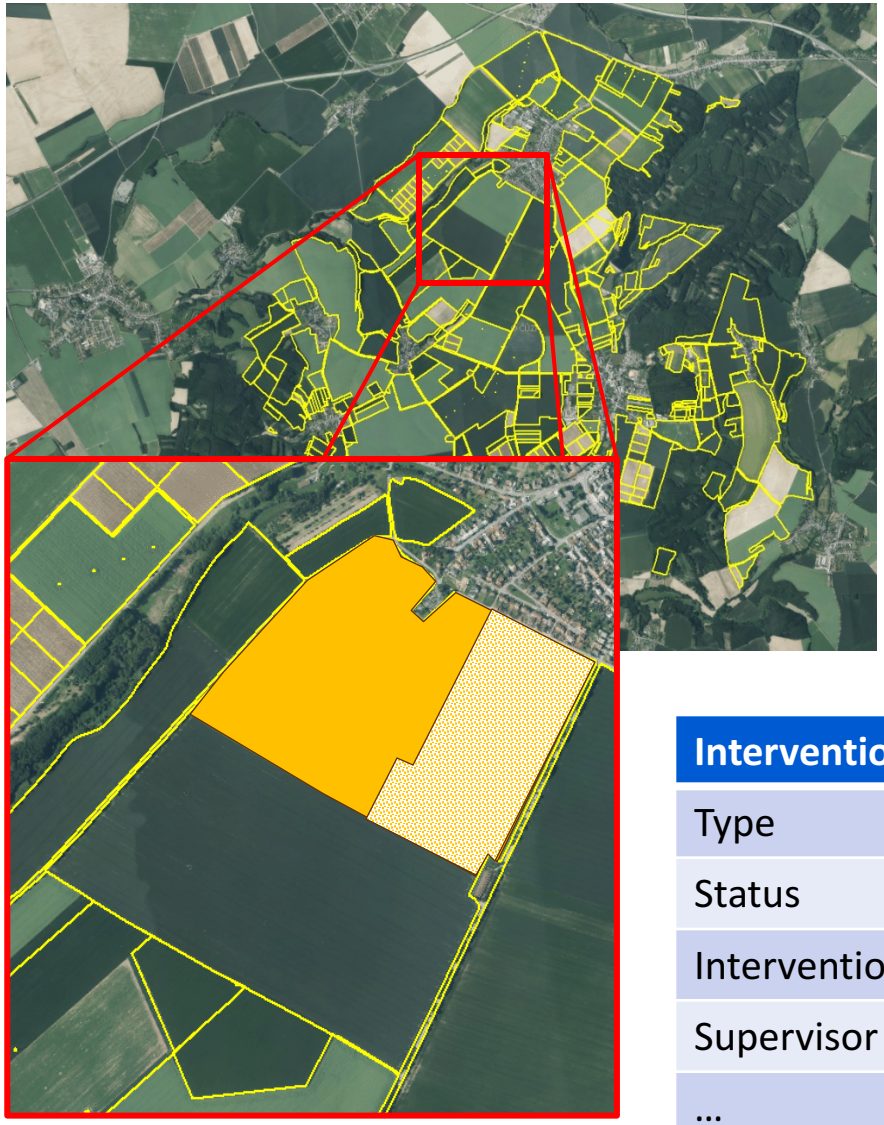
Core Data Model





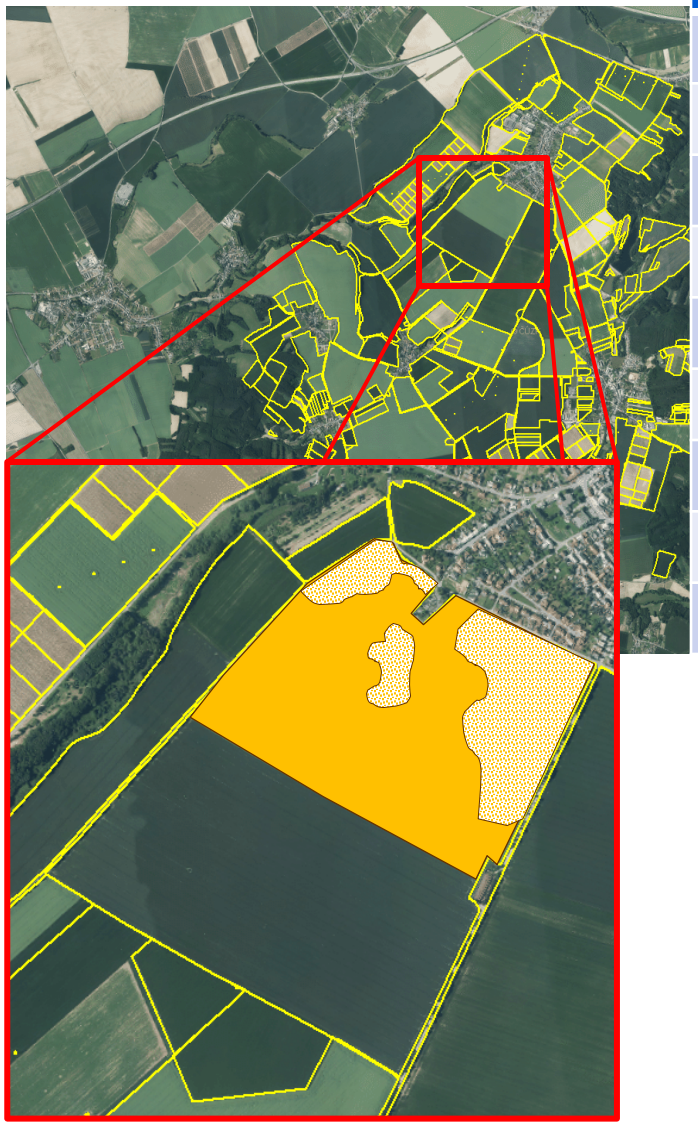
Plot attribute	Value
Identifier	http://foodie-project.eu/CZ/MJM/Trsicka/Plot/001
Valid from	2015-04-09
Origin type	manual
Crop species	wheat
…	…

Core Data Model

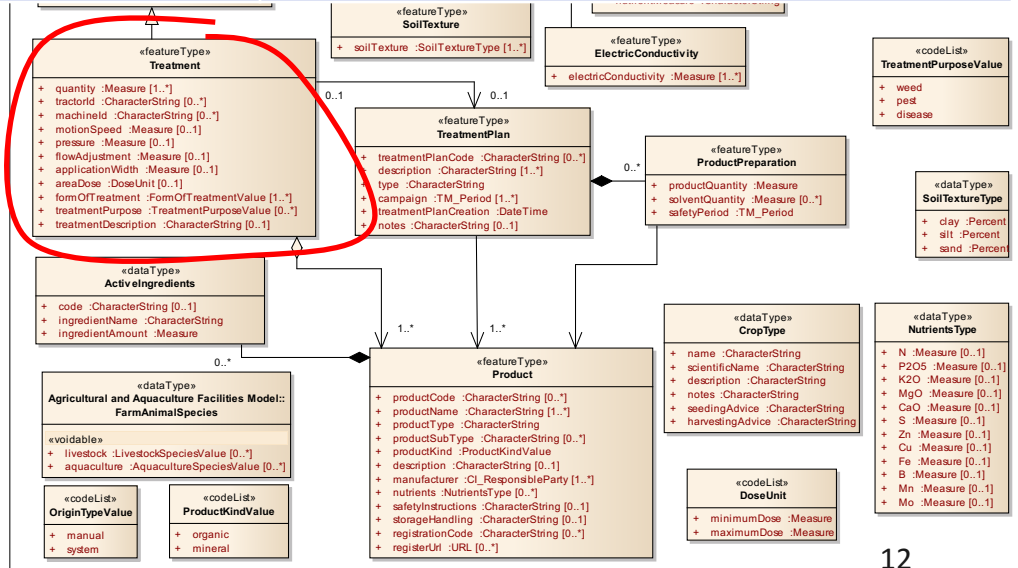


Intervention attribute	Value
Type	tillage
Status	ongoing
Intervention start	2015-04-22
Supervisor	John First, senior manager, phone 7435
…	…

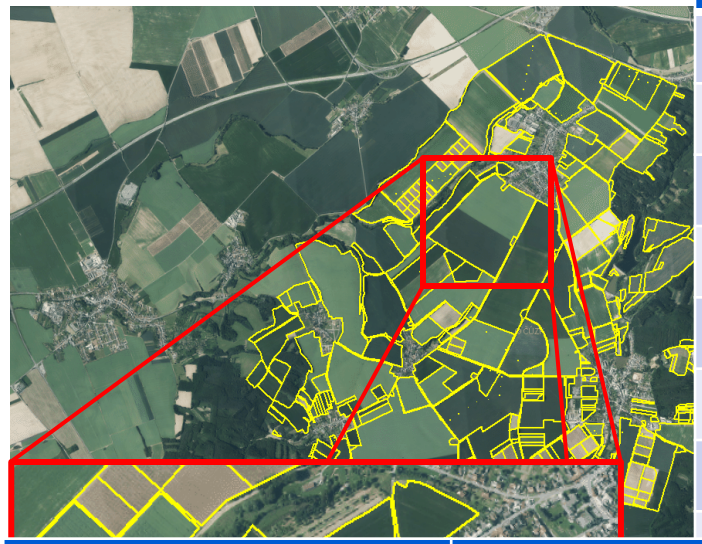
Core Data Model



Treatment attribute	Value
Intervention type	herbicide application
Status	ongoing
Intervention start	2015-04-22
Supervisor	John First, senior manager, phone 7435
Dosing	240 litres
Application width	25 meters
Form of treatment	Application machine
Product	Roundup®
…	…

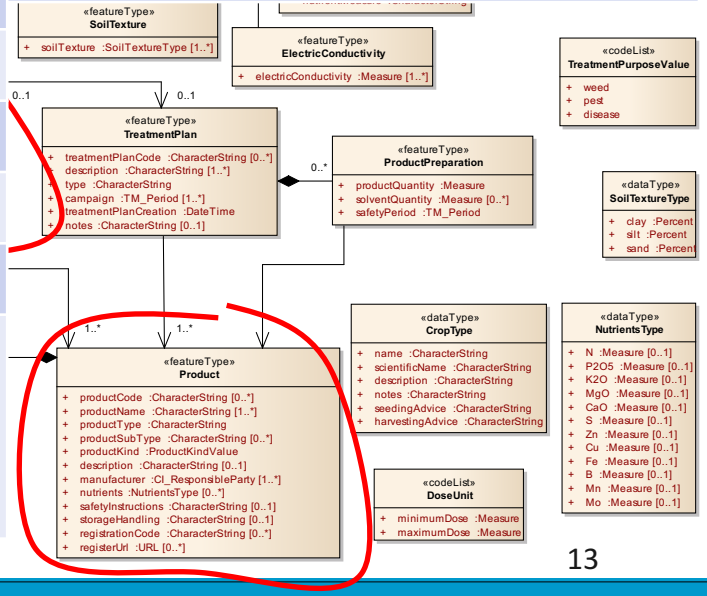


Core Data Model



Treatment attribute	Value
Intervention type	herbicide application
Status	ongoing
Intervention start	2015-04-22
Supervisor	John First, senior manager, phone 7435
Dosing	240 litres
Application width	25 meters
Form of treatment	Application machine
[illegible]	undup®

Product attribute	Value
Product code	01475200
Product name	Roundup®
Product type	herbicide
Manufacturer	MONSANTO®
Register URL	http://agro-register.cz/?1475
Safety instructions	Eye contact: may cause may cause pain, redness and tearing based on toxicity studies. …



Core Data Model

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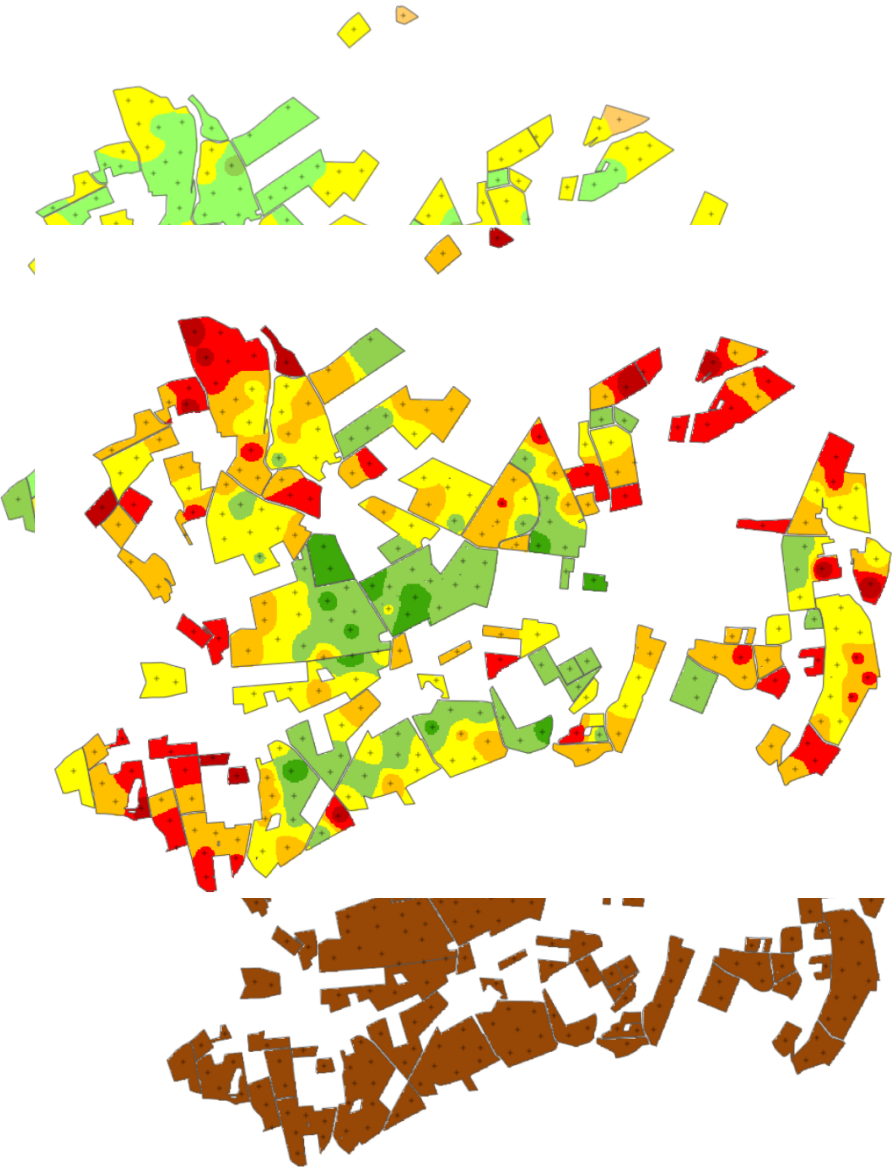
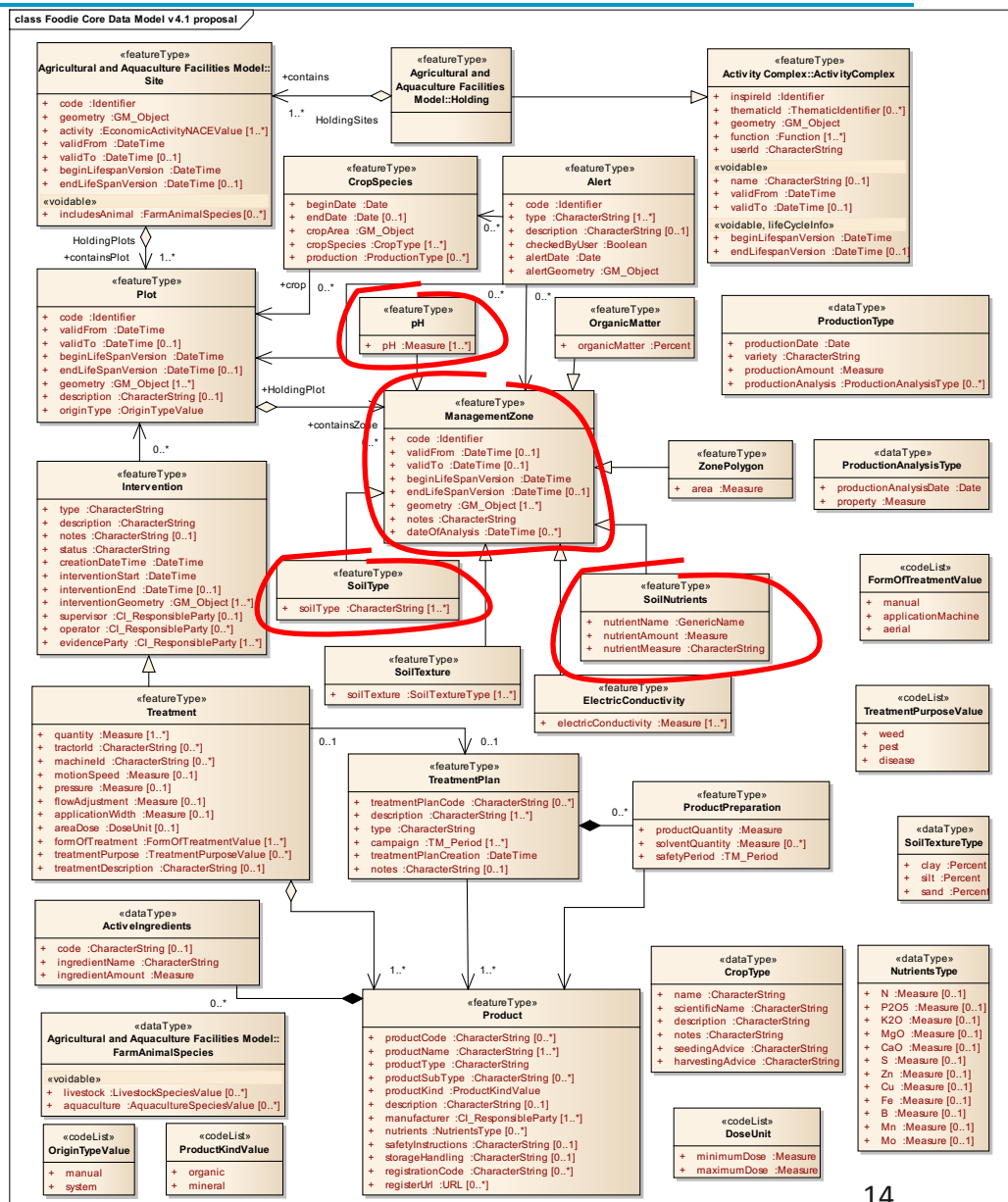
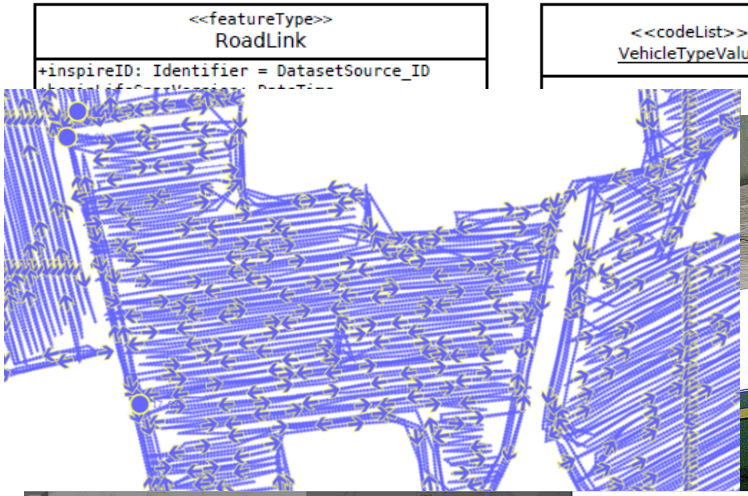
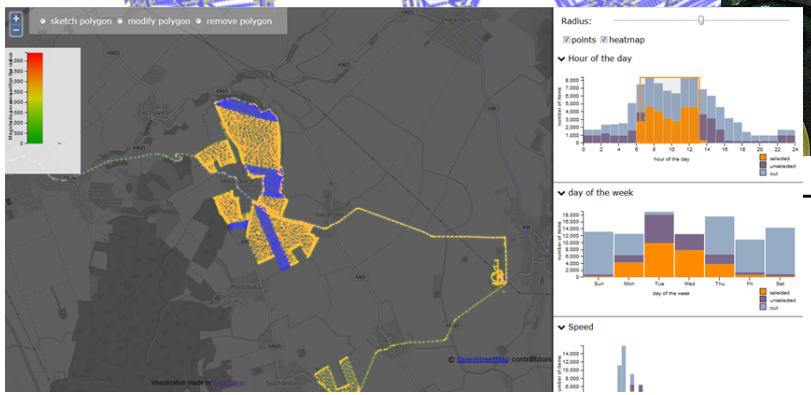




Transport Data Model

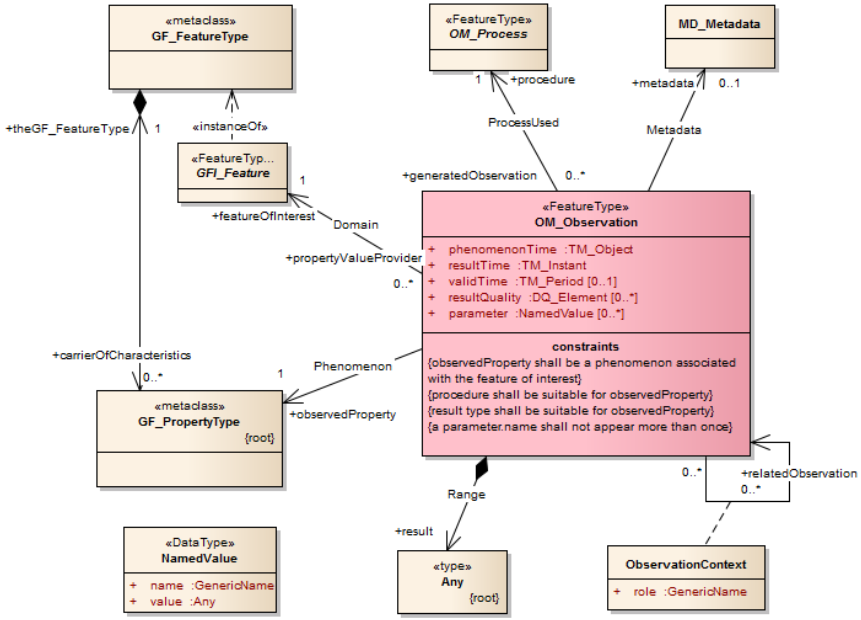
- Machinery fleet monitoring
- Extending the INSPIRE data model for Transport Networks
  - SDI4Apps, OpenTransportNet, Plan4All,…





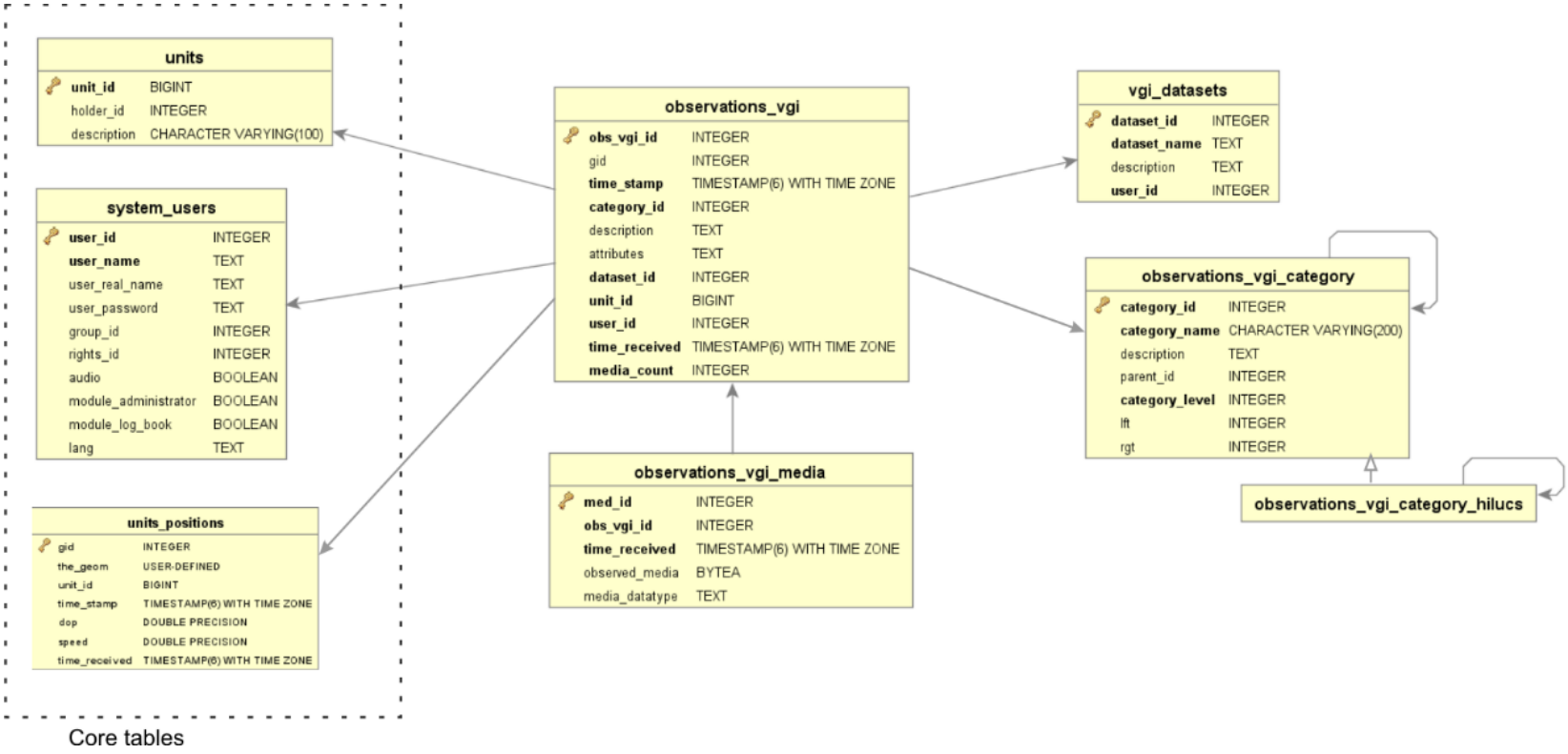
Sensor Data Model

- Adopted from OGC/ISO 19156 Observations and Measurements
- Meteorological and pedological characteristics



VGI Data Model

- Extension of OGC/ISO 19156 Observations and Measurements
  - multimedia support, classifications of measurements etc.



The DataBio project in a nutshell

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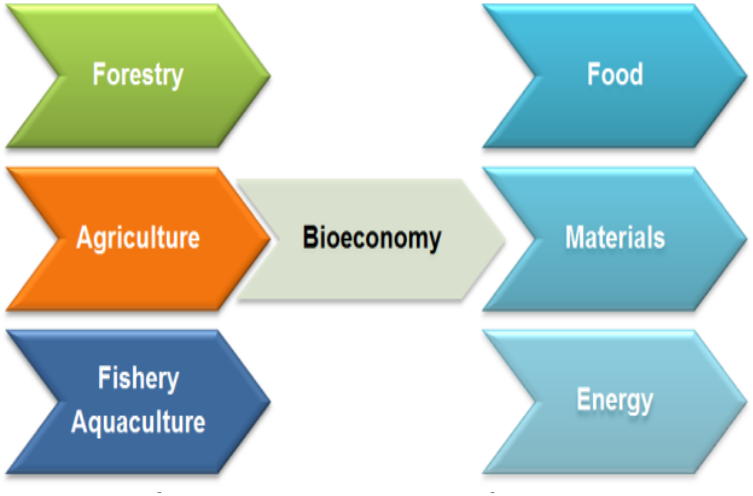
- **The industrial domain addressed**
  - Bioeconomy
    - Production of best possible raw materials for the Bioeconomy industry to produce f



- **The current landscape**
  - Few large ICT vendors so far
- **The opportunity**
  - Bioeconomy can get a boost from Big Dat
    - Farm machines, fishing vessels, forestry m sensors collect large quantities data.
    - Large scale data collection and collation enhances knowledge to increase performance and productivity in a sustainable way.
- **DataBio's vision for influencing the domain**
  - Showcase the benefits of Big Data technologies in the raw material production for the bioeconomy industry
  - Increase participation of European ICT industry

The DataBio Concept and methodology

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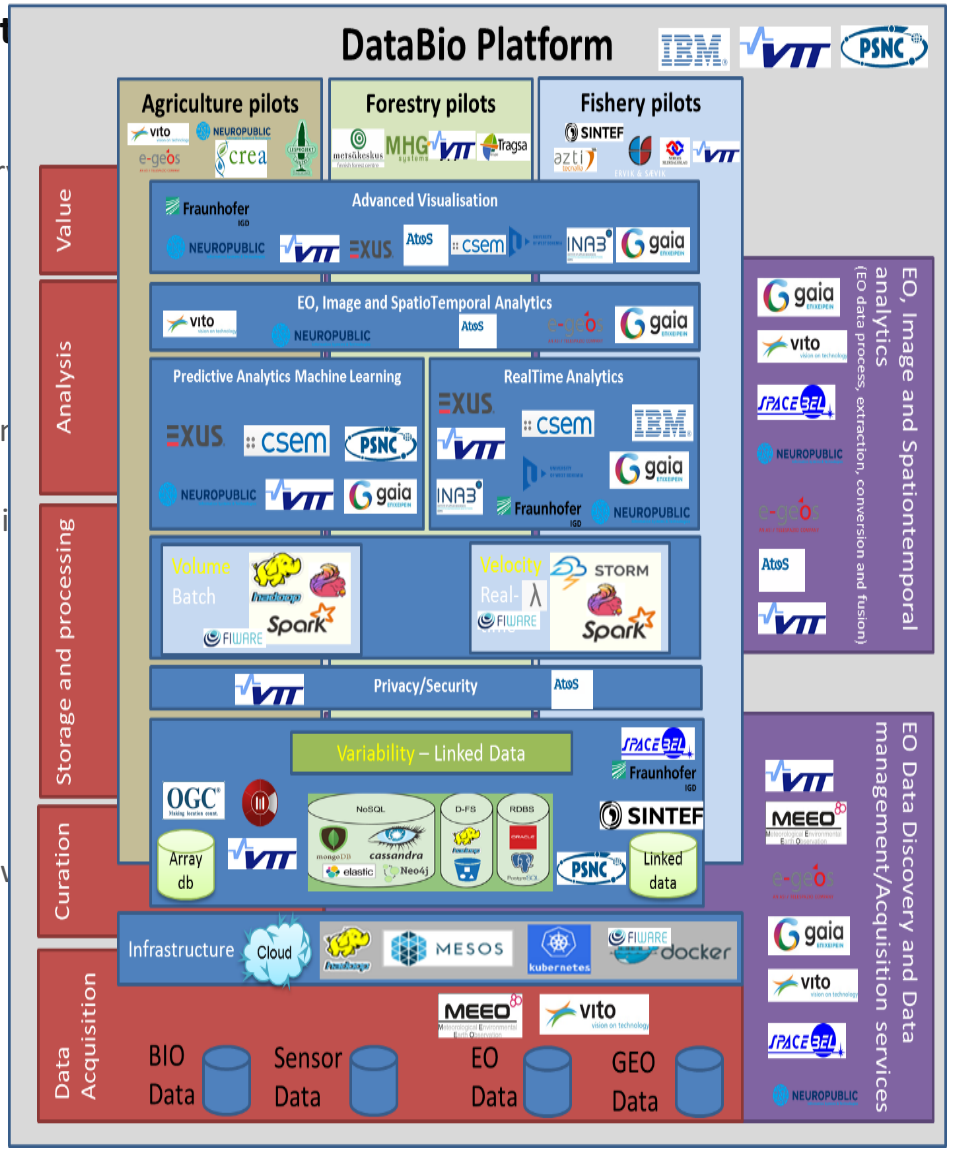
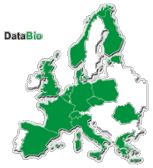
FARM-ORIENTED OPEN DATA IN EUROPE

DataBio will build a platform suitable for different industries and user profiles

- Capability to handle distributed, heterogeneous and ver large datasets
- Configure predictive analytics and machine learning components
- Mechanisms for real time analytics and stream processir
- Solutions for managing storage and queries of various bi data sources
- Integrated advanced visualization services
- Big data acquisition and curation with security/privacy support
- Easily replicated due to using standard systems and knov best practices





FOODIE
FARM-ORIENTED OPEN DATA IN EUROPE

- Thanks for attention
- https://github.com/Wirelessinfo/FOODIE-data-model
- charvat@Lesprojekt.cz