

## Background and rational

### LPIS Core Conceptual Model (LCM)

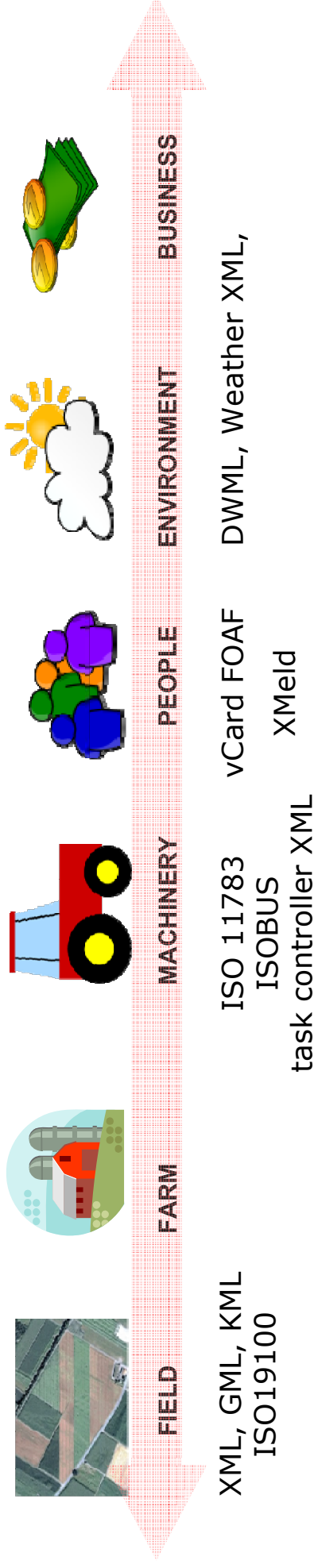
- **Model of requirements**
- **Key spatial and non-spatial concepts**
- **Class model**
  - Model Boundaries
  - LPIS Data Model
  - Reference parcel of LPIS
- **Conclusions**

## **LPIS Core conceptual Model (LCM)**

- announced at LPIS workshop in October 2007
- draft for comments to SDIC experts available in January, 2008 via wikiCAP
- first version published in discussion paper on GeoCAP web page in June, 2008
- paper presented in FIG conference in Stockholm, June 2008
- co-operation with Land Administration Domain Model for annex to ISO standard 19152

- CAP issues: geographic data for support of 1<sup>st</sup> and 2<sup>nd</sup> pillar, integration of environmental and rural development data, agricultural indicators
- European initiatives: INSPIRE, GMES, LUCAS
- Cross-sector issues of data flow at the farm

## level: FieldFact, AgriXchange



## Core Conceptual model for LPIS

### purpose:

- agreement on common definitions of **concept** and spatial features
- proposal for standardised **core** data model
- open and transparent **rules** for quality assessment and conformity test
- promote of tools and **international standards** for modelling within **spatial data infrastructure** (SDI)

### scope:

- **analyse** the European regulatory requirements for first-cut Core Conceptual Model
- **analyse** National LPIS implementations for 'As-is analysis
- Produce first-cut conceptual **model** for LPIS

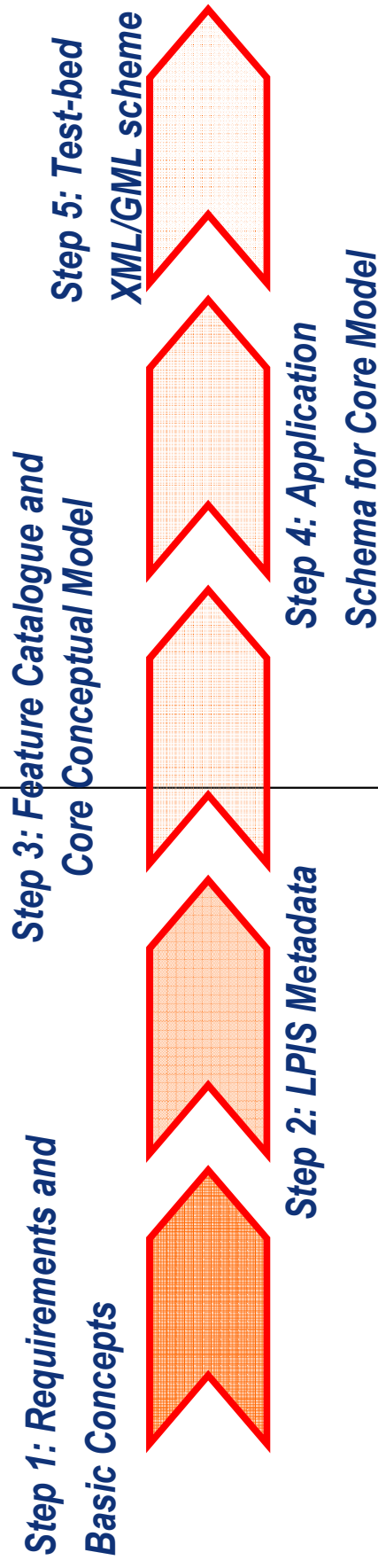
## The steps in process....



JRC IPSC-G03/P/MS/MSA D (2007) 0665  
The JRC IFMP Action Plan 0665.doc

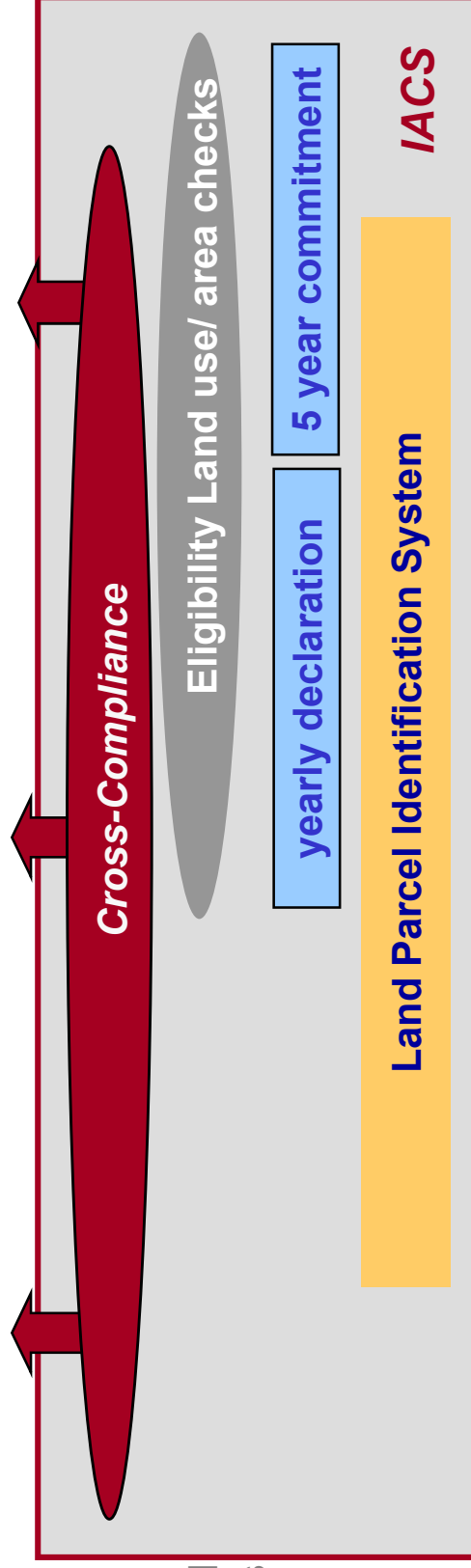
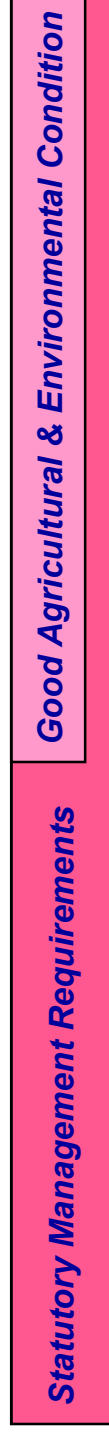
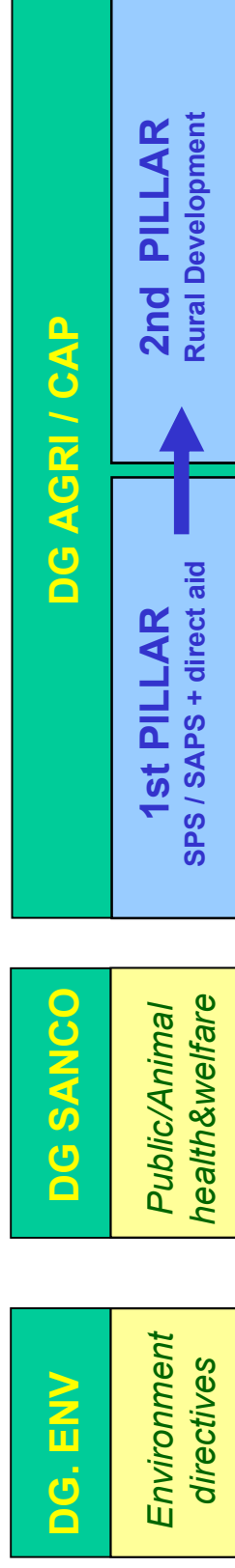
Mars-PAC  
Discussion paper

LPIS Core Conceptual Model:  
Methodology for Feature Catalogue and  
Application Schema



## Common Agricultural Policy: Direct payments to farmers

### The EC Regulations



Cross-checks and  
Field inspections

**MS**

**administrations**



**Farmers**



## Step 1. Analysis of the requirements: textual document

### EC-DG-JRC-PSC-AGRICULTURE Unit

V:1.0

LPIS conceptual model : application schema and feature catalogue

#### 3.2. The EU regulatory requirements for LPIS

3.2.1. The system for identification of agricultural parcels indicated in point (b) of Art. 18(1) the Council Reg (EC) No 1782/2003, also known as LPIS, is the main subject of the modelling efforts. It is part of IACS and it is closely related to other modules. It is often implemented as an independent state register. It has GI content and according to the Art. 20(1) Council Reg (EC) No 1782/2003

shall be established on the basis of maps or land registry documents or other cartographic references. Use shall be made of computerized geographical information system (GIS) techniques including preferably aerial or spatial orthomagey, with a homogeneous standard guaranteeing accuracy at least equivalent to cartography at a scale of 1:10000

Art 6 (1) of the Comm Reg (EC) No 796/2004

The GIS shall operate on the basis of a national geodetic system.

3.2.2. The Regulations specify the main purposes of LPIS, which are (I) identification and location of agricultural parcel (II) determination of area eligible for payment and (III) furnishing of the farmer's aid application with map information as referred in two following citations<sup>2</sup>:

Art 12(3) of the Comm Reg (EC) No 796/2004 establishes that:



## Different ways to document requirements: Database

EC-DG-JRC-IPSC-AGRICULTURE Unit

V:1.0

LPIS conceptual model : application schema and feature catalogue

### Annex III. Structure of Requirements' database

#### LPIS REQUIREMENTS DATABASE STRUCTURE

**Table 1. REQ\_requr**

**Table 2. REC\_requr**

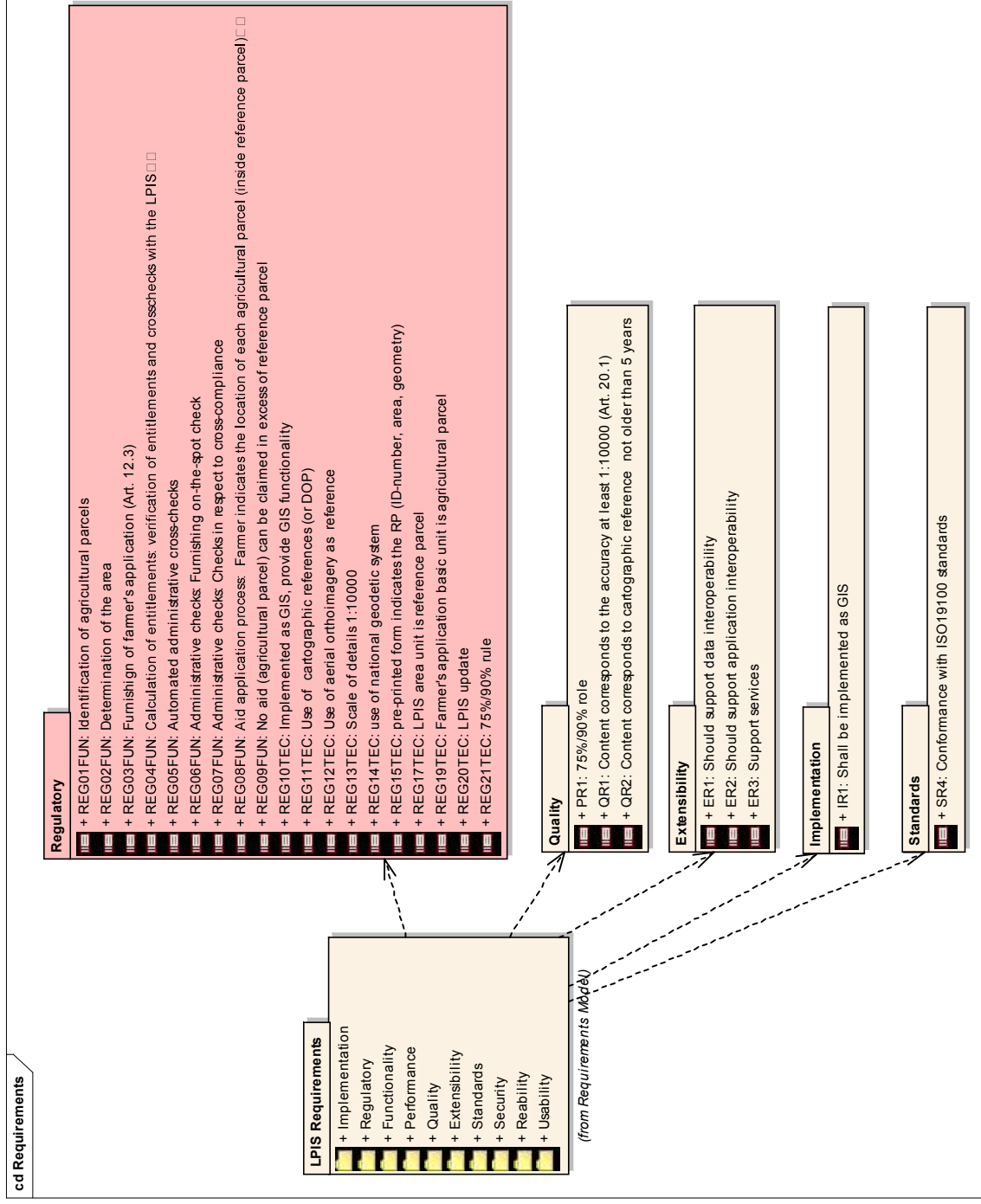
NAME	DESCRIPTION	CODE_LIST	TYPE
REQ_AREA	Requirement type	REG- regulatory requirement; REC- recommendation;	code_list
REQ_NR	sequential number for each type		Integer
REQ_TYPE	requirement area	FUN- functional requirement; REC-technical non-functional) requirement;	code_list
REQ_UID	Complex string -REQ_AREA + REQ_NR + (if applic) REQ_TYPE		text
DESCRIPTION	Requirement description		text
REQ_REF	Reference to regulatory/guidelines document		text
CIT_UID	Citation unique Identifier (applicable for regulatory requirements) in table Regulatory CIT		text



# Requirements Model

LPIS Workshop 2008, 17-18 September, 2008

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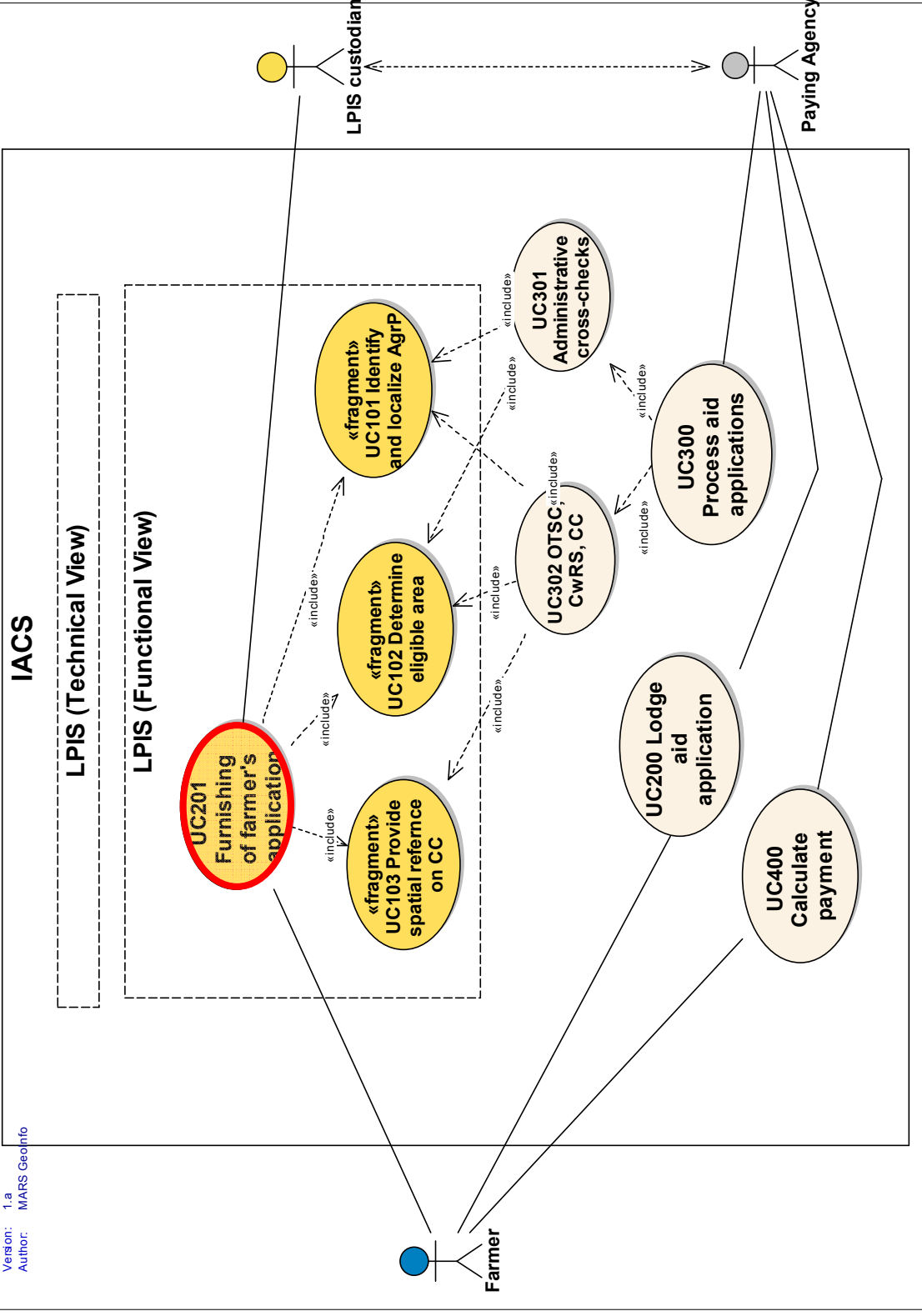
# Use Case model

LPIS Workshop 2008, 17-18 September, 2008

12

LPIS Use Cases 1

Name: LPIS Use Cases 1  
Package: Use Cases  
Version: 1.a  
Author: MARS Geoinfo



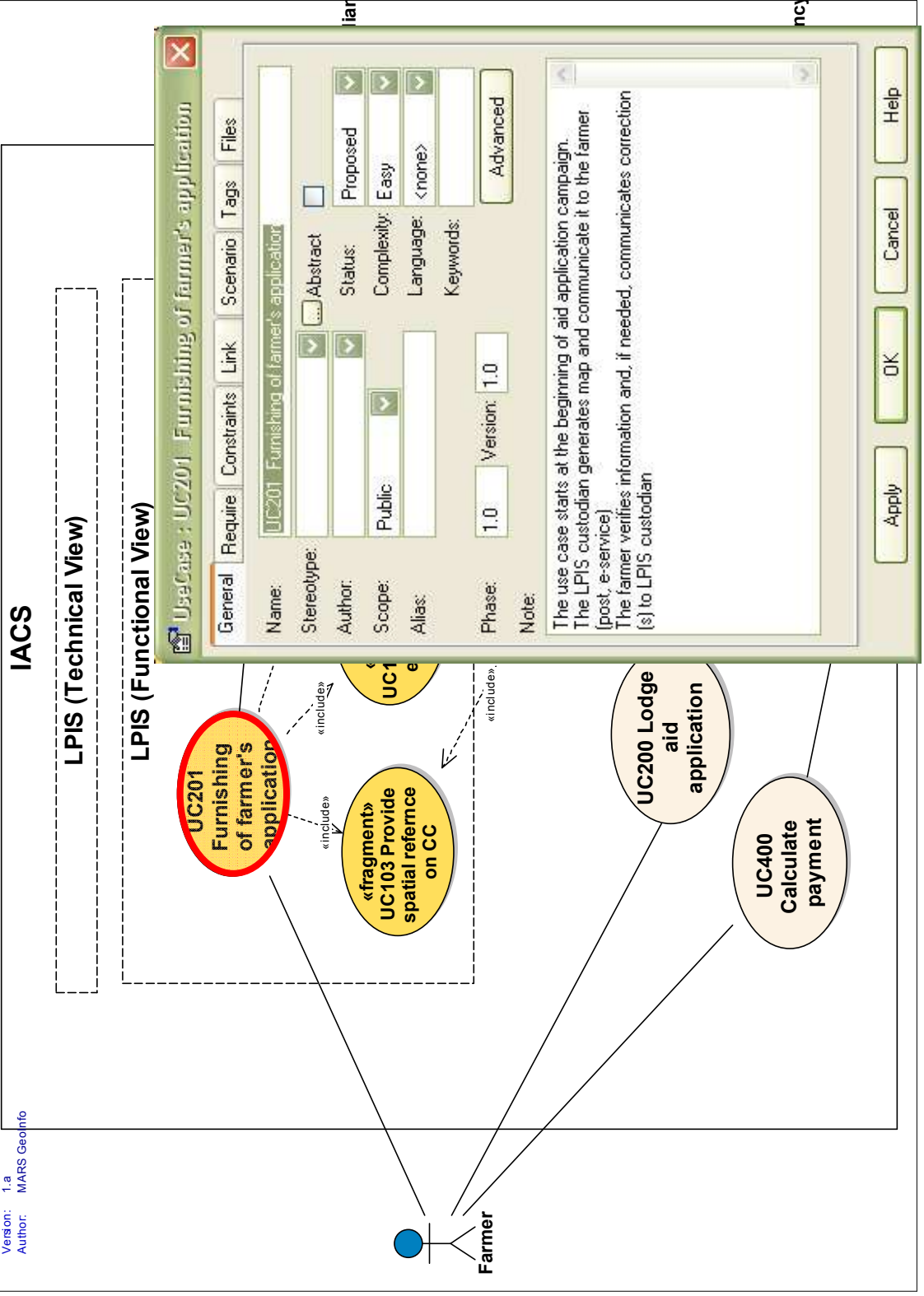
# Use Case model

LPIS Workshop 2008, 17-18 September, 2008

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Use Case 1

Name: LPIS Use Cases 1  
Package: Use Cases  
Version: 1.0  
Author: MARS GeoInfo



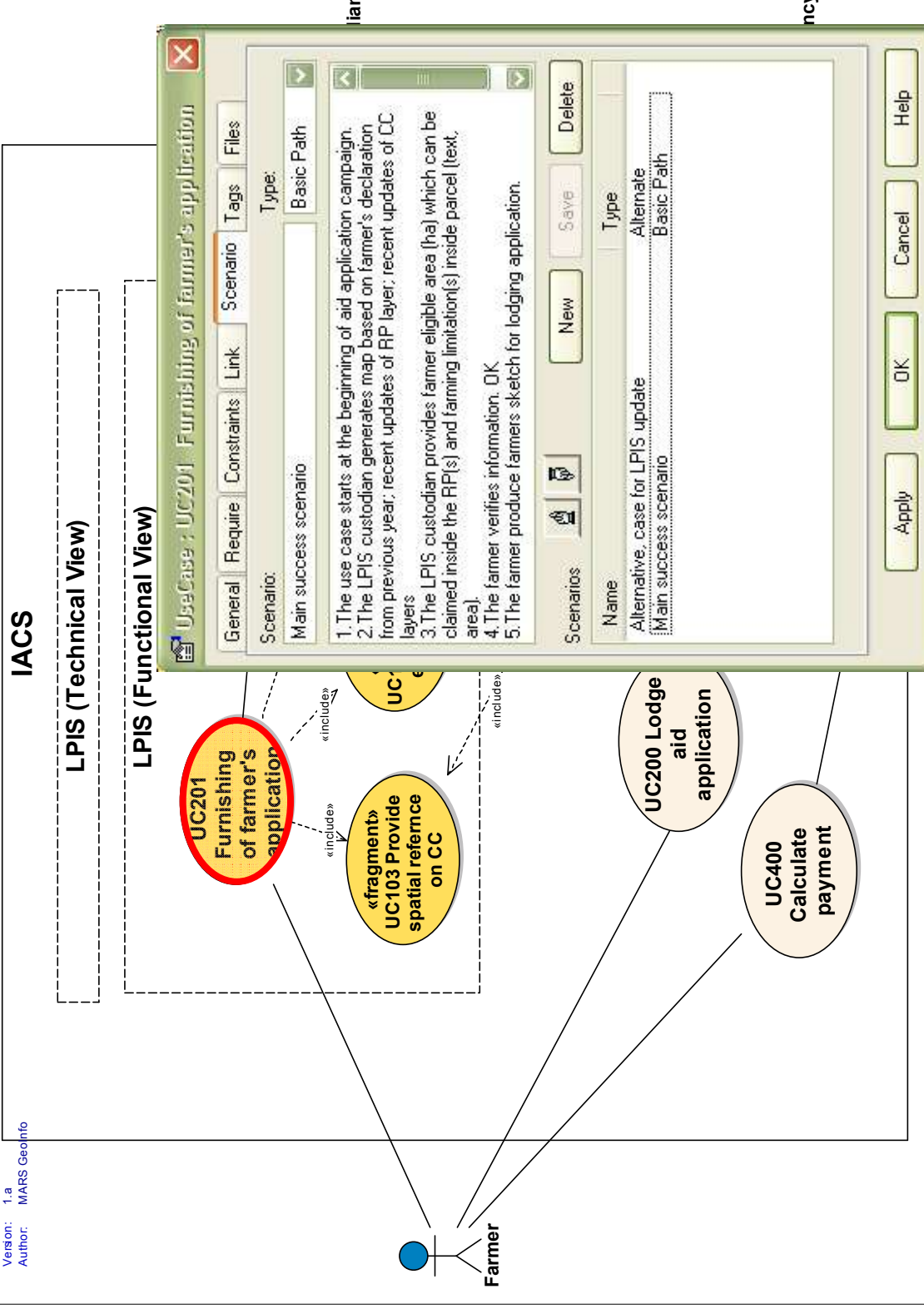
# Use Case model

LPIS Workshop 2008, 17-18 September, 2008

14

LPIS Use Cases 1

Name: LPIS Use Cases 1  
Package: Use Cases  
Version: 1.a  
Author: MARS Geoinfo



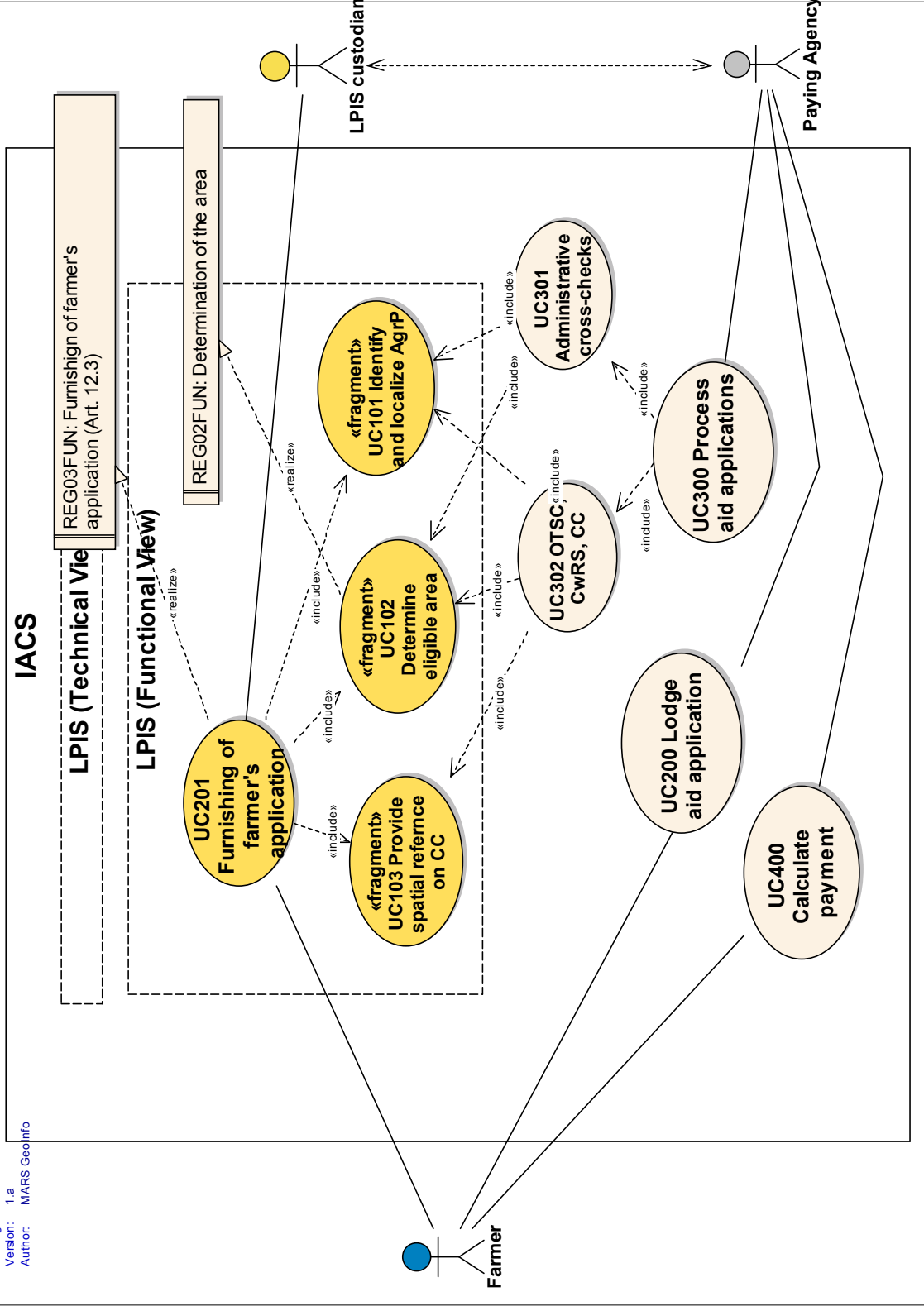
# Use Case model

LPIS Workshop 2008, 17-18 September, 2008

15

Use Case model

Name: LPIS Use Cases 1  
Package: Use Cases  
Version: 1.0  
Author: MARS GeoInfo





# Use Case model

LPIS Workshop 2008, 17-18 September, 2008

16

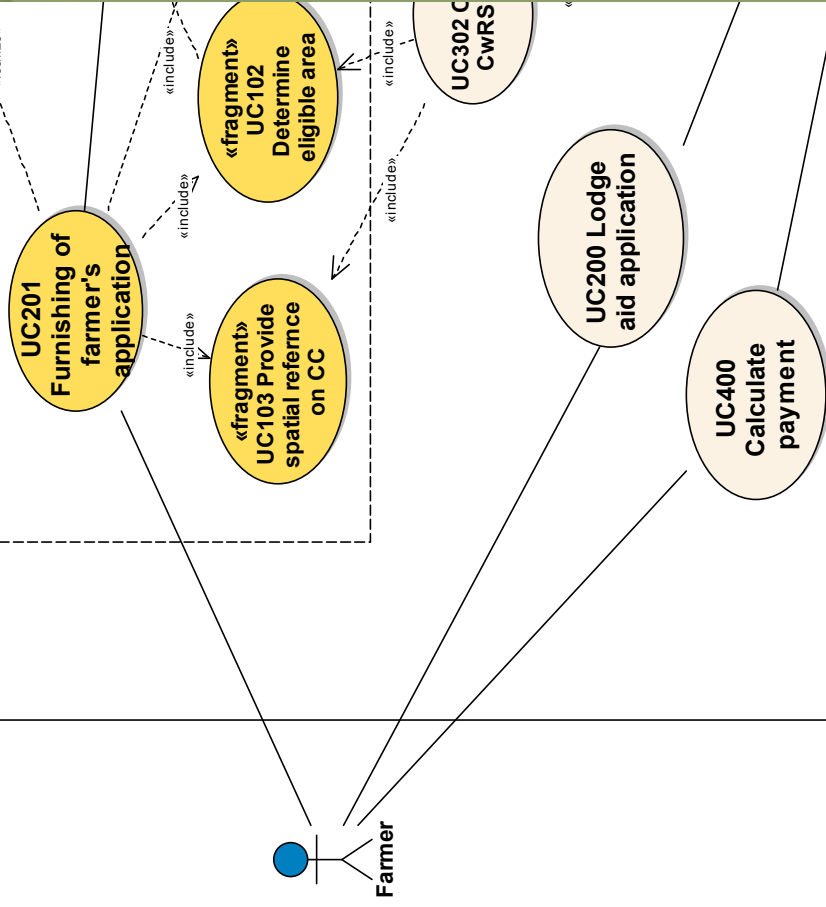
Use Case 1

Name: LPIS Use Cases 1  
Package: Use Cases  
Version: 1.0  
Author: MARS Geoinfo

## IACS

### LPIS (Technical View)

### LPIS (Functional View)



REG03FUN: Furnishign of farmer's application (Art. 12.3)

**Requirement**

Properties Files Tags

Short Description: REG03FUN: Furnishign of farmer's application (Art. 12.3)

Status: Proposed Type: Functional

Difficulty: Medium Phase: 1.0

Priority: Medium Last Update: 25/05/2008

Author: Created: 14/12/2007

Version: 1.0

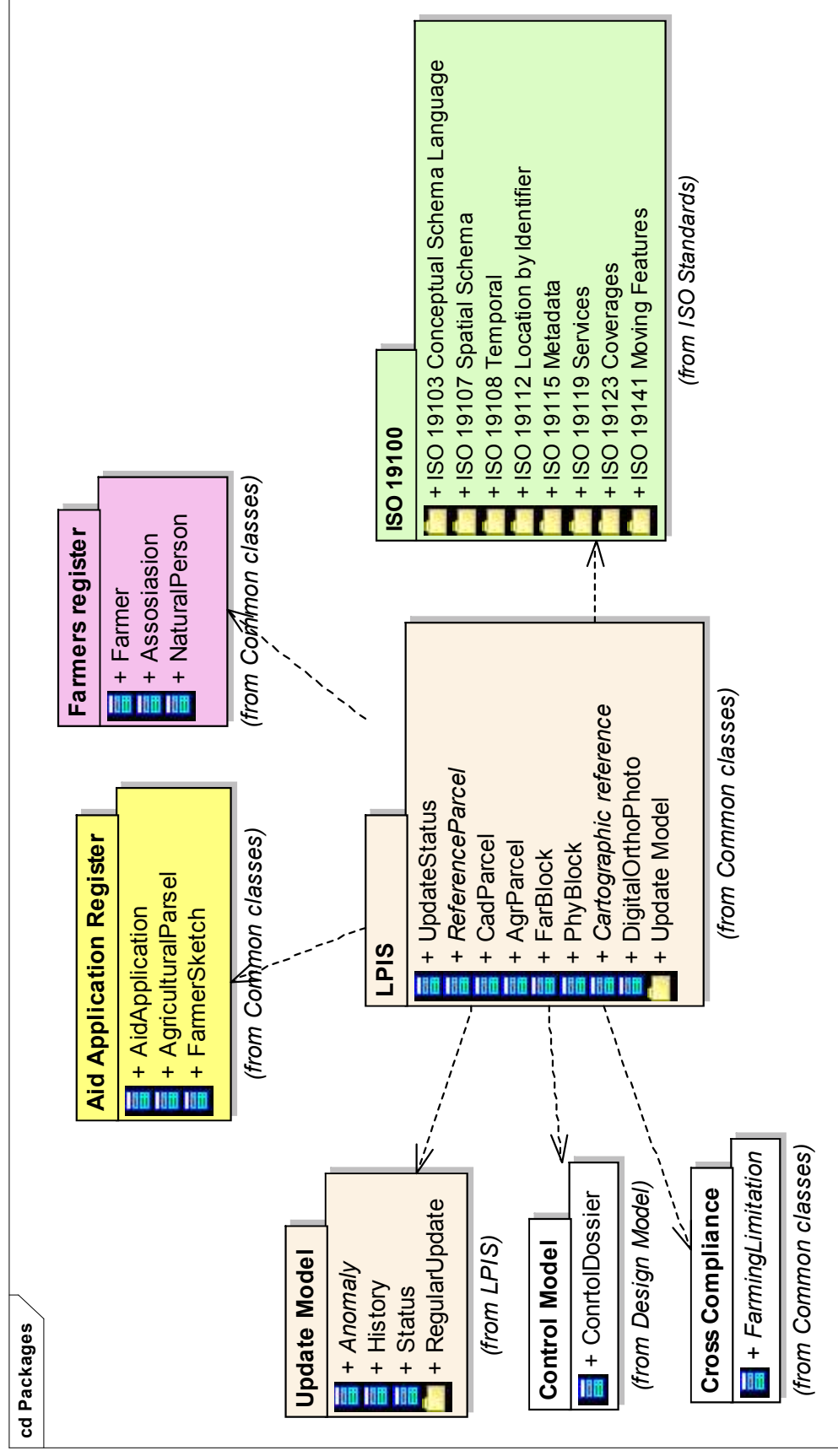
Details: CIT-15 796/04 art.12.3. For the purpose of the identification of all agricultural parcels on the holding referred to in paragraph 1(d), the pre-printed forms distributed to the farmer in accordance with Article 22(2) of Regulation (EC) No 1782/2003 shall mention the maximum eligible area per reference parcel for the purposes of the single payment scheme. Moreover, the graphical material supplied to the farmer in accordance with that provision shall indicate the boundaries of the reference parcels and their unique identification and the farmer shall indicate the location of each agricultural parcel

OK Cancel Help

# Data structure model: Packages

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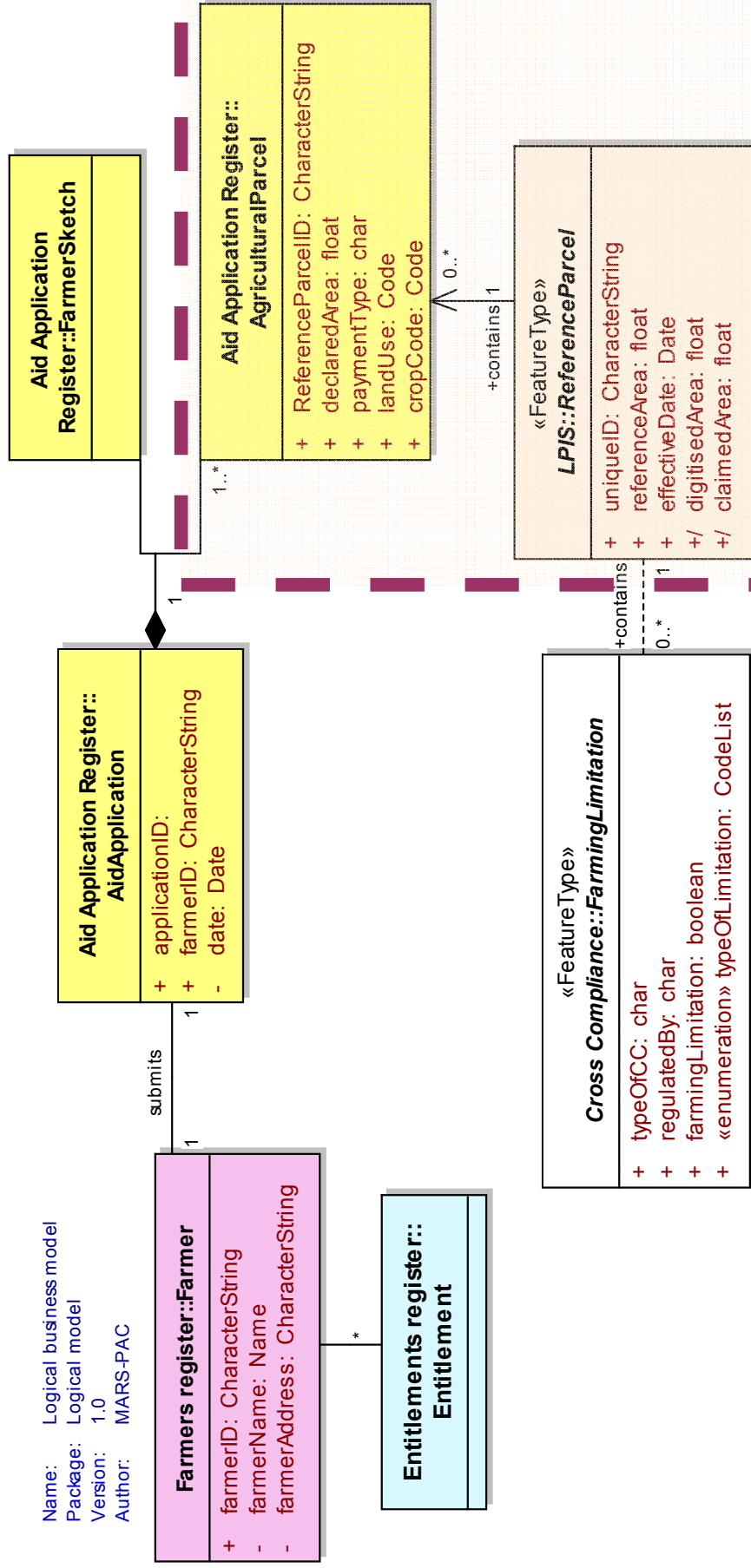
# Basic concepts: Logical business model

LPIS Workshop 2008, 17-18 September, 2008

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cd Logical business model

Name: Logical business model  
Package: Logical model  
Version: 1.0  
Author: MARS-PAC



## Commission Regulation (EC) No 796/2004 Art 2

### (1a) Agricultural parcel

shall mean a continuous area of land on which a single crop group is cultivated by a single farmer. However, where a separate declaration of the use of an area is required in the context of this Regulation that specific use shall further limit the agricultural parcel;



### (26) Reference parcel

shall mean a geographically delimited area retaining a unique identification as registered in the GIS in the Member State's identification system referred to in Article 18 of Regulation (EC) No 1782/2003;

Art 6(1) CR 796/2004

the identification system for agricultural parcels .... shall operate at **reference parcel** level such as cadastral parcel, or production block which shall ensure unique identification each of reference parcel



## Agricultural parcel (AP)

- Concept of IACS; subject of payment and control
- Represented in aid application register
- Related to farmers' register

## Reference parcel (RP)

- concept of LPIS for referencing and allocating of AP as well as determining of area;
- core data layer maintained and updated in LPIS

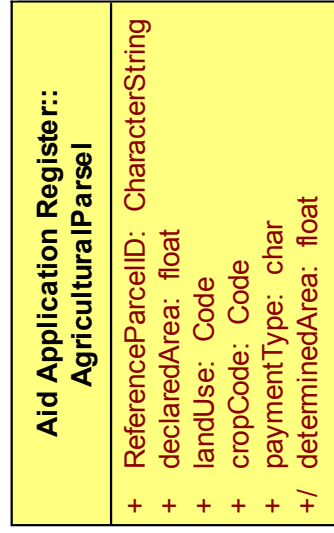
**1<sup>st</sup> step - Modeling Core content**

## Areas of farming limitation

- concepts of SMR's: Environment Directives and Directives on public and animal health
- concepts of good agricultural and environment conditions -GAECs (national measures)
- external data layers from different sources, **2<sup>nd</sup> modeling step**
- standardization and harmonization links to INSPIRE directive



cd LPIS logical data model



+contains 0..\*

+contains 1

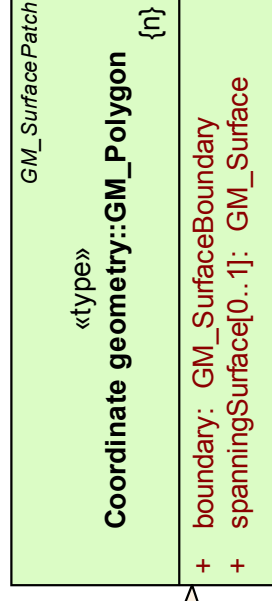


+contains 0..\*

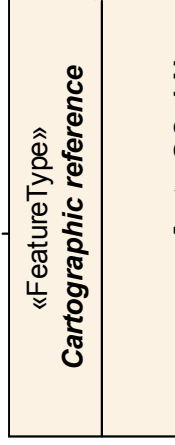
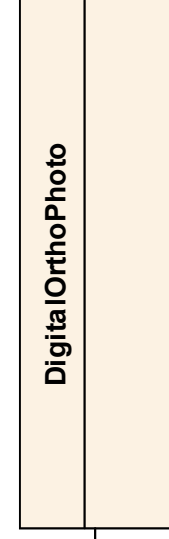
**«FeatureType»  
Cross Compliance::FarmingLimitation**

+ typeOfCC: char  
+ regulatedBy: char  
+ farmingLimitation: boolean  
+ «enumeration» typeOfLimitation: CodeList

**ISO 19107**



**ISO 19123**



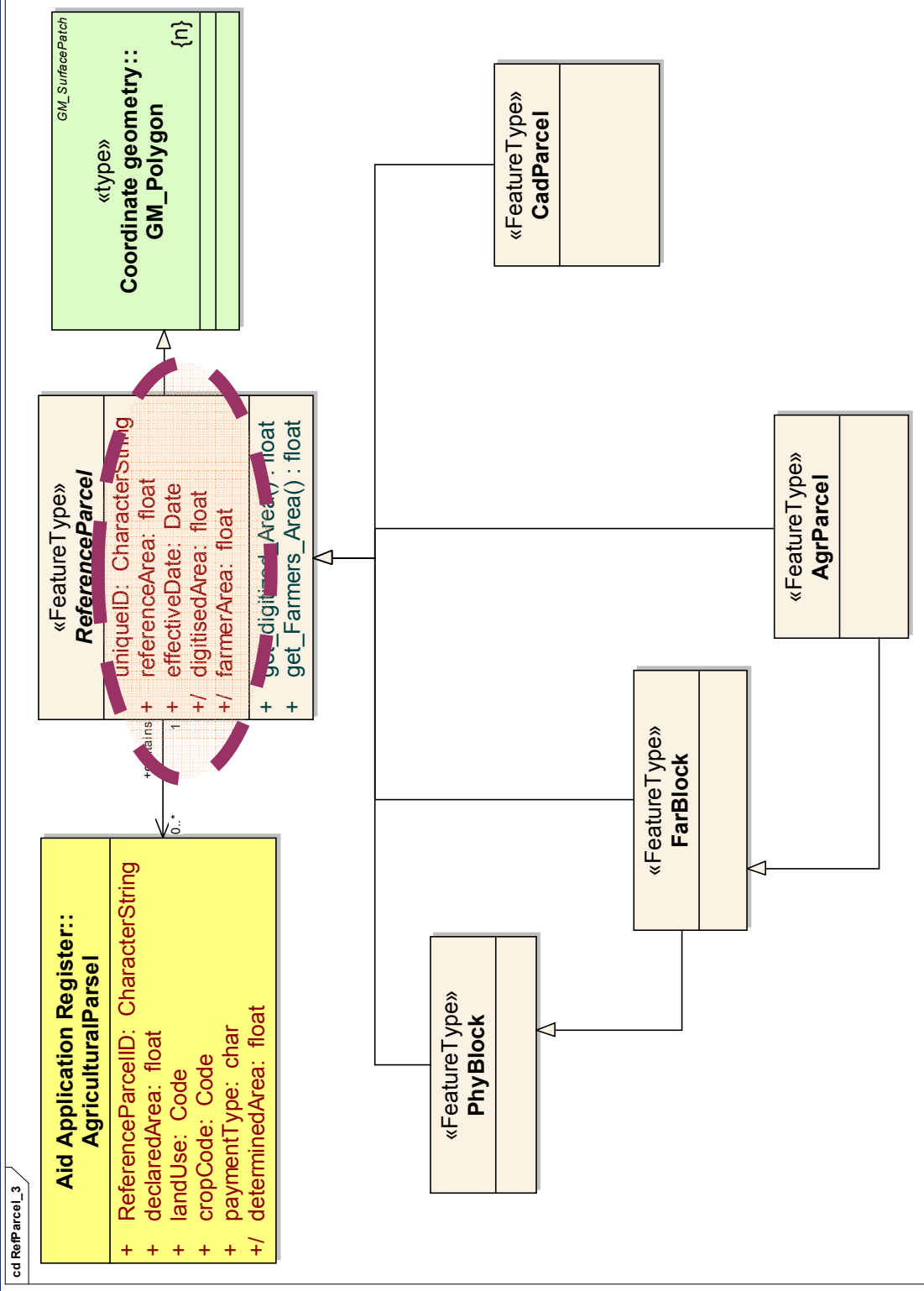
**Art. 20 (1)**

## How to deal with 27 implementations based on .....

### .....4 types of Reference Parcel?



	= Agricultural parcel (spatial)	< Farmer block/lot	< Physical block	Cadastral parcel
content / coverage	one single crop group	one or several crop groups	one or several crop groups	do not match agricultural pattern
applicants	single farmer	single farmer	one or several farmers	one or several farmers
temporal aspect	annual	multi-annual	semi-permanent	n/a



- **Unique identifier**

- ✓ unambiguous geographical identification of agricultural parcels for aid application.
- ✓ unique under the national system
- ✓ a key attribute for connection with other IACS and MS national registers

- **Reference area**

- ✓ calculation of the aid amount, also referred in the Regulations as ‘maximum eligible area’ and caps the area of all APs that can be claimed for the RP concerned.
- ✓ It is **an attribute** has official status (compare to legal area in cadastre system)
- ✓ calculated once, at the time when current version of the RP is approved.

- **Effective date of the parcel**

- ✓ date new version and new attribute values of the RP come in to force with respect to third parties (e.g. Paying Agency) and registers
  - ✓ crucial for all bodies working with LPIS register
- possible dates are (i) those of the proposal for RP modification made by farmer, LPIS operator or inspector; or (ii) those specified within the time period when it is certain that a change will occur in the future (e.g. changes in use rights, lease contract, activating/transferring of entitlement).

cd RefParcel\_1

	< Physical block
content / coverage	one or several crop groups
applicants	one or several farmers
temporal aspect	semi-permanent

«FeatureType» <b>PhyBlock</b>
<ul style="list-style-type: none"> <li>+ landUseCover: CharacterString</li> <li>+ isLFA: boolean</li> </ul>
<b>::ReferenceParcel</b> <ul style="list-style-type: none"> <li>+ uniqueID: CharacterString</li> <li>+ referenceArea: float</li> <li>+ effectiveDate: Date</li> <li>+/- digitisedArea: float</li> <li>+/- farmerArea: float</li> </ul>
<b>::GM_Polygon</b> <ul style="list-style-type: none"> <li>+ boundary: GM_SurfaceBoundary</li> <li>+ spanningSurface[0..1]: GM_Surface</li> </ul>
<b>::GM_SurfacePatch</b> <ul style="list-style-type: none"> <li>+ interpolation: GM_SurfaceInterpolation = "planar"</li> <li>+ numDerivativesOnBoundary[0..1]: Integer = 0</li> </ul>



cd RefParcel\_1

	< Farmer block/lot
content / coverage	one or several crop groups
applicants	single farmer
temporal aspect	multi-annual

«FeatureType» <b>FarBlock</b>
<ul style="list-style-type: none"> <li>+ farmerID: CharacterString</li> <li>+ farmingMode: CharacterString</li> <li>+ farmingLimitation: float</li> <li>+ perpastureID: CharacterString</li> <li>+ vinID: CharacterString</li> </ul>
<b>::ReferenceParcel</b> <ul style="list-style-type: none"> <li>+ uniqueID: CharacterString</li> <li>+ referenceArea: float</li> <li>+ effectiveDate: Date</li> <li>+/- digitisedArea: float</li> <li>+/- farmerArea: float</li> </ul>
<b>::PhyBlock</b> <ul style="list-style-type: none"> <li>+ landUseCover: CharacterString</li> <li>+ isLFA: boolean</li> </ul>
<b>::GM_Polygon</b> <ul style="list-style-type: none"> <li>+ boundary: GM_SurfaceBoundary</li> <li>+ spanningSurface[0..1]: GM_Surface</li> </ul>
<b>::GM_SurfacePatch</b> <ul style="list-style-type: none"> <li>+ interpolation: GM_SurfaceInterpolation = "planar"</li> <li>+ numDerivativesOnBoundary[0..1]: Integer = 0</li> </ul>

	<b>= Agricultural parcel</b>
content / coverage	one single crop group
applicants	single farmer
temporal aspect	annual

«Feature Type»  
**AgrParcel**

+ cropGroup: CharacterString  
+ perpastureID: CharacterString  
+ vinID: CharacterString  
+ paymentType: CharacterString

**::ReferenceParcel**

+ uniqueID: CharacterString  
+ referenceArea: float  
+ effectiveDate: Date  
+/- digitisedArea: float  
+/- farmerArea: float

**::FarBlock**

+ farmerID: CharacterString  
+ farmingMode: CharacterString  
+ farmingLimitation: float

**::PhyBlock**

+ landUseCover: CharacterString  
+ isLFA: boolean

**::GM\_Polygon**

+ boundary: GM\_SurfaceBoundary  
+ spanningSurface[0..1]: GM\_Surface

**::GM\_SurfacePatch**

+ interpolation: GM\_SurfaceInterpolation = "planar"  
+ numDerivativesOnBoundary[0..1]: Integer = 0

cd RefParcel\_1

	Cadastral parcel
content / coverage	do not match agricultural pattern
applicants	one or several farmers
temporal aspect	n/a

«FeatureType» <b>CadParcel</b>
<ul style="list-style-type: none"> <li>+ parcelAddress: CharacterString</li> <li>+ parcelName: CharacterString</li> <li>+ parcelOwner: CharacterString</li> <li>+ landUse: CharacterString</li> </ul>
<b>::ReferenceParcel</b>
<ul style="list-style-type: none"> <li>+ uniqueID: CharacterString</li> <li>+ referenceArea: float</li> <li>+ effectiveDate: Date</li> <li>+ digitisedArea: float</li> <li>+ farmerArea: float</li> </ul>
<b>::GM_Polygon</b>
<ul style="list-style-type: none"> <li>+ boundary: GM_SurfaceBoundary</li> <li>+ spanningSurface[0..1]: GM_Surface</li> </ul>
<b>::GM_SurfacePatch</b>
<ul style="list-style-type: none"> <li>+ interpolation: GM_SurfaceInterpolation = "planar"</li> <li>+ numDerivativesOnBoundary[0..1]: Integer = 0</li> </ul>

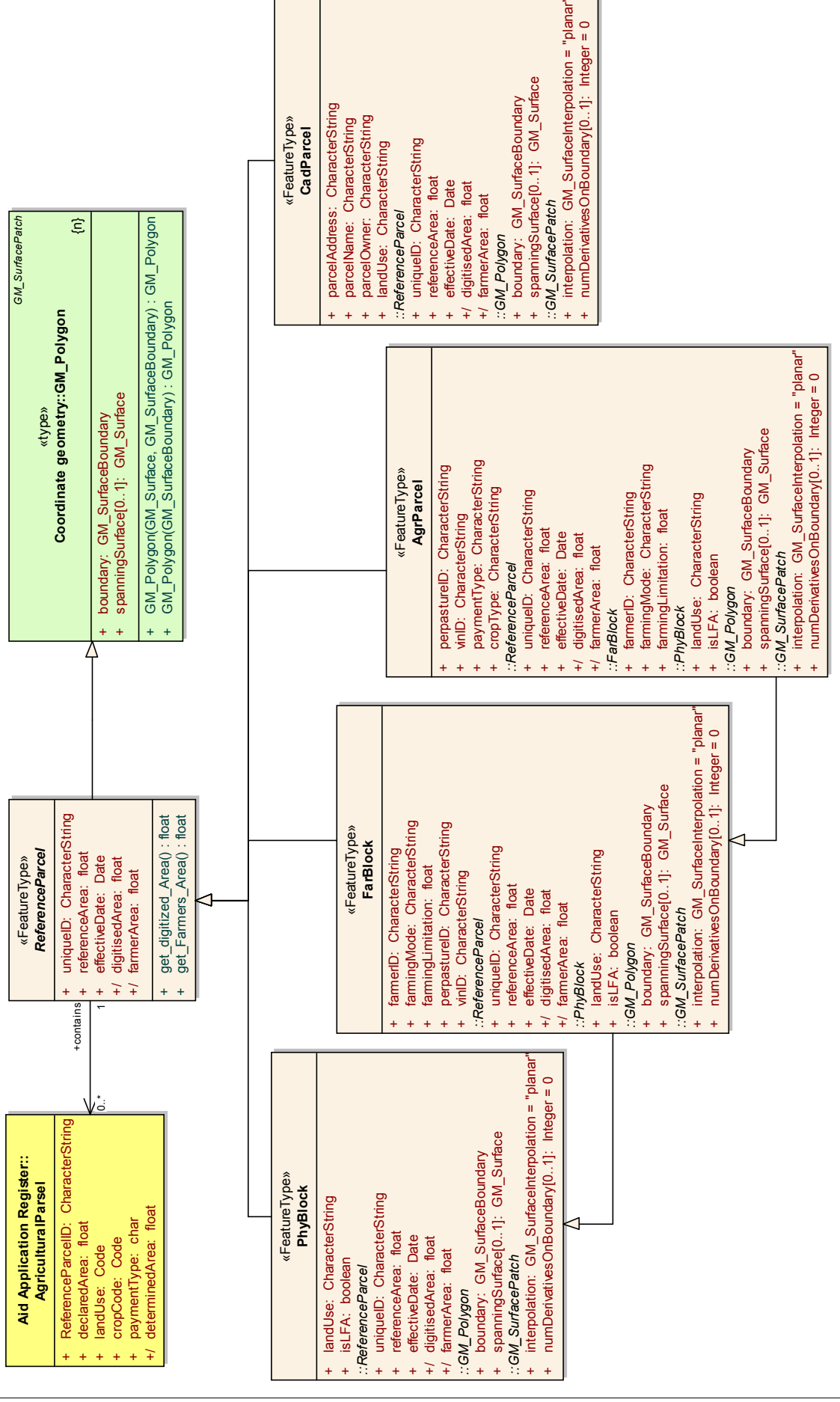


# Reference Parcel types

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cd RefParcel\_1





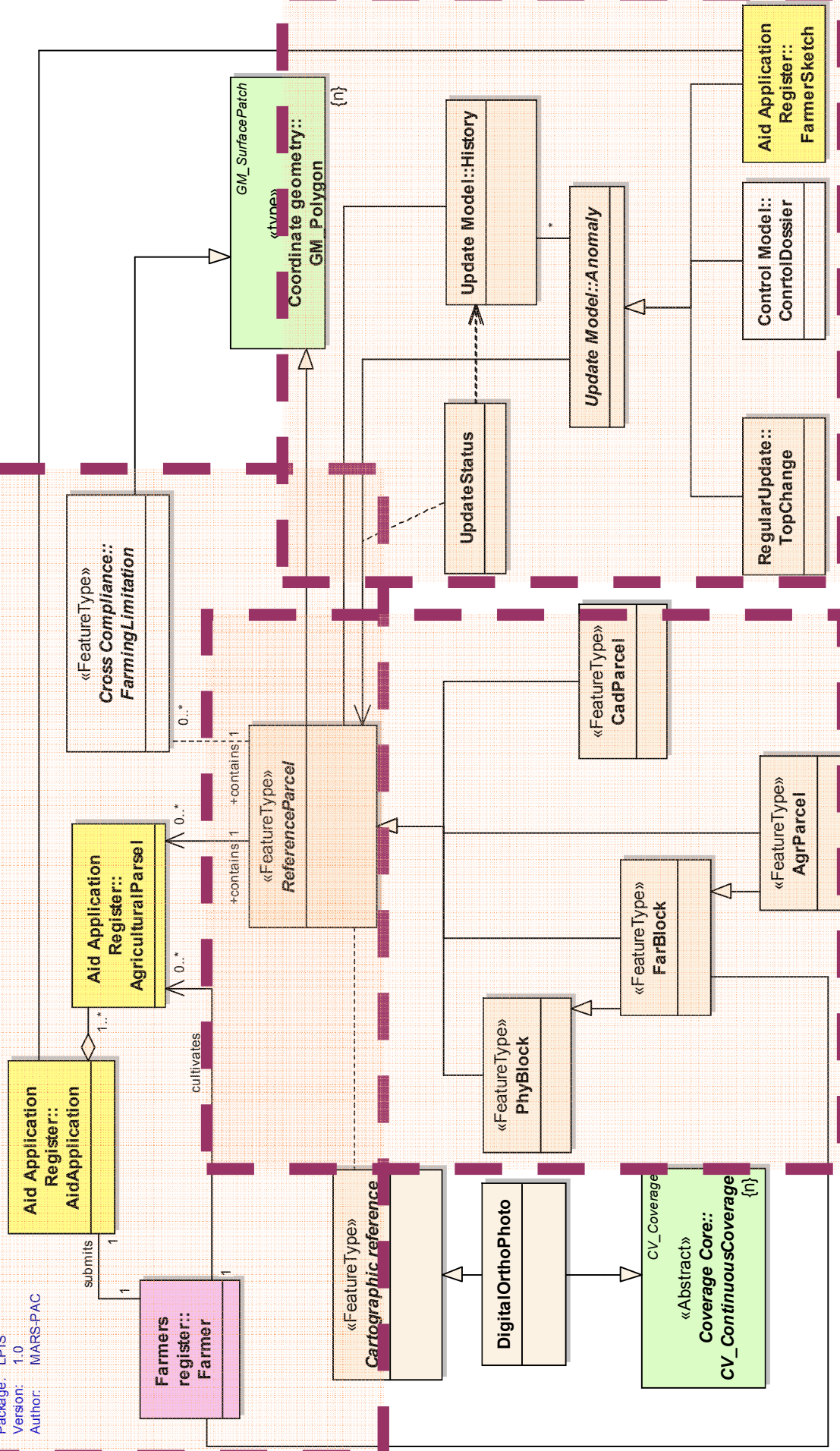
# Aggregated Schema

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cd Application Schema

Name: Application Schema  
Package: LPIS  
Version: 1.0  
Author: MARS-PAC





## **CAP Health Check: 4 spatial units in the Regulation** **we need to find place in the model:**

- **Crop**                      **land use**
- **Crop Group**        **forms Agricultural Parcel**
- **Eligible land**       **land cover, forms production block**
- **Holding**              **sum of production blocks**

## Results of the Questionnaire in 2006

Country	Type of land use recorded	RP	Payment scheme
DK, UK-NI	None	PB	SPS
HU	SAPS eligible/SAPS non eligible	PB	SAPS
SE	Agricultural land only	PB	SPS
LT	<ul style="list-style-type: none"> <li>- Agricultural blocks (b11)</li> <li>- Build-up blocks (b12) with small areas of cultivated land</li> <li>- Miscellaneous blocks (b13) contain all the other land cover (forests, non-eligible land, etc.)</li> <li>- Grassland blocks (b14)</li> <li>- Orchard blocks (b15)</li> <li>- Non-subsidized area blocks (b12003) are abandoned and treated as ineligible area (reference year 30/06/2003) and claimed for subsidies after 30/06/2003.</li> </ul>	PB	SAPS

## Results of the Questionnaire in 2006, continue

Country	Type of land use recorded	RP	Payment scheme
PL	1-forest; 2-tree or bushes; 3-water; 4-roads; 5-industrial area; 6-habitats; 7-other; 8-permanent grasslands; 9-orchards; 10-arable land; 11-gardens	CadP	SAPS
DE-Bavaria	farmland, permanent grassland, permanent orchard, vineyard	FB	SPS
FI	Field, forest (forestation and environmental schema) and pasture.	FB	SPS
BE-FL	All types	AP	SPS
IE	Forage; Arable; Set-aside; Forestry; Other plus 250 crop types...	AP	SPS

## Art 44(2) Council Reg (EC) No 1782/2003

“Eligible hectare’ shall mean any agricultural area of the holding taken up by arable land and permanent pasture except areas under permanent crops, forests or used for non agricultural activities

→ **The land cover concept**

cd RefParcel\_2

<b>«Feature Type» PhyBlock</b>	<ul style="list-style-type: none"><li>+ landUseCover: eligibleCode</li><li>+ isLFA: boolean</li></ul> <i>::ReferenceParcel</i> <ul style="list-style-type: none"><li>+ uniqueID: CharacterString</li><li>+ referenceArea: float</li><li>+ effectiveDate: Date</li><li>+/- digitisedArea: float</li><li>+/- claimedArea: float</li></ul>
<b>«CodeList» EligibleCode</b>	<ul style="list-style-type: none"><li>+ arableLand:</li><li>- permanentPastures:</li><li>+ grassland:</li><li>+ oliveTrees:</li><li>+ nonAgricultural:</li><li>+ permanentCrops:</li><li>+ forest:</li></ul>

## Art. 49 Comm. Reg (EC) No 796/2004

the following **crop groups** shall be distinguished as appropriate:

- (a) areas for the purposes of the single payment scheme,
- (b) areas for which a different rate of aid is applicable;
- (c) set-aside areas ... and, where applicable, set-aside areas for which a different rate of aid is applicable;
- (d) forage areas declared for the purposes of Article 131 of Regulation (EC) No 1782/2003 (Stocking density);
- (e) forage areas other than pasture land and other than areas used for the production of arable crops, within the meaning of Article 132(3) (b) and of Article 132(3) (c) of Regulation (EC) No 1782/2003
- (f) pasture land within the meaning of Article 132(3) Regulation (EC) No 1782/2003 declared for the purposes of that Article;
- (g) areas for the purposes of the Single Area Payment scheme in accordance with Article 143b of Regulation (EC) No 1782/2003 (Single Area Payment scheme);
- (h) areas declared by producer groups in accordance with Article 15a Comm. Reg (EC) No 796/2004; (hops payments)→ **The land use concept**

# For Agricultural Parcel (spatial or alpha-numerical)

## paymentType::PaymentCode & cropType::cropCode

cd RefParcel\_1

«FeatureType» AgrParcel
<ul style="list-style-type: none"> <li>+ paymentType: paymentCode</li> <li>+ cropType: CropCode</li> <li>+ perpastureID: CharacterString</li> <li>+ vineyardID: CharacterString</li> </ul> <p><i>ReferenceParcel</i></p> <ul style="list-style-type: none"> <li>+ uniqueID: CharacterString</li> <li>+ referenceArea: float</li> <li>+ effectiveDate: Date</li> <li>+ digitisedArea: float</li> <li>+ claimedArea: float</li> </ul> <p><i>FarBlock</i></p> <ul style="list-style-type: none"> <li>+ farmerID: CharacterString</li> <li>+ farmingMode: CharacterString</li> <li>+ farmingLimitation: float</li> </ul> <p><i>PhyBlock</i></p> <ul style="list-style-type: none"> <li>+ landUseCover: eligibleCode</li> <li>+ isLFA: boolean</li> </ul>

«CodeList» Aid Application Register:: paymentCode
<ul style="list-style-type: none"> <li>+ SPS:</li> <li>+ setAside:</li> <li>+ durumWheat:</li> <li>+ proteinCrop:</li> <li>+ rice:</li> <li>+ energyCrops:</li> <li>+ startchPotato:</li> <li>+ arableRegionAid:</li> <li>+ arableAreapay:</li> <li>+ seeds:</li> <li>+ areaPasture:</li> </ul>

«CodeList» Class1
<ul style="list-style-type: none"> <li>+ noCrop:</li> <li>+ wheat:</li> <li>+ rye:</li> <li>+ barley:</li> <li>+ oats:</li> <li>+ vines:</li> <li>+ linseeds:</li> <li>+ .....</li> </ul>



## CodeList::paymentType & CodeList:PaymentCndpCode for attribute paymentType of AgriculturalParcel (separately for SPS and SAPS countries )

cd Aid Application					
<b>AgriculturalParcel</b> <ul style="list-style-type: none"> <li>+ ReferenceParcelID: CharacterString</li> <li>+ declaredArea: float</li> <li>+ paymentType: paymentCode</li> <li>+ paymentCNDP: paymentCndpCode</li> <li>+ cropCode: Code</li> <li>-/ determinedArea: float</li> </ul>	<table> <tr> <th>«CodeList» PaymentCode</th><th>«CodeList» paymentCndpCode</th></tr> <tr> <td> <ul style="list-style-type: none"> <li>- SPS:</li> <li>- set-a-side:</li> </ul> </td><td> <ul style="list-style-type: none"> <li>- durum_wheat:</li> <li>- protein_crop:</li> <li>- rice:</li> <li>- energy_crops:</li> <li>- starch_potato:</li> <li>- arable_regionalaid:</li> <li>- arable_areapay:</li> <li>- seeds:</li> </ul> </td></tr> </table>	«CodeList» PaymentCode	«CodeList» paymentCndpCode	<ul style="list-style-type: none"> <li>- SPS:</li> <li>- set-a-side:</li> </ul>	<ul style="list-style-type: none"> <li>- durum_wheat:</li> <li>- protein_crop:</li> <li>- rice:</li> <li>- energy_crops:</li> <li>- starch_potato:</li> <li>- arable_regionalaid:</li> <li>- arable_areapay:</li> <li>- seeds:</li> </ul>
«CodeList» PaymentCode	«CodeList» paymentCndpCode				
<ul style="list-style-type: none"> <li>- SPS:</li> <li>- set-a-side:</li> </ul>	<ul style="list-style-type: none"> <li>- durum_wheat:</li> <li>- protein_crop:</li> <li>- rice:</li> <li>- energy_crops:</li> <li>- starch_potato:</li> <li>- arable_regionalaid:</li> <li>- arable_areapay:</li> <li>- seeds:</li> </ul>				

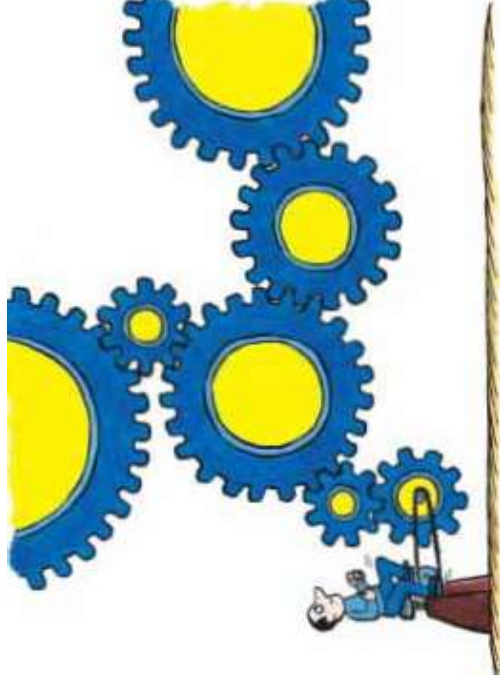
## Conclusions

**Standard methodology** is in place and used by others geomatics domains.

Use of standard methodology insure **interoperability** of LPIS data with other domains (INSPIRE)

Careful verification of the first version of the model is needed

Conformaty test in selected MS together with MS experts





**Thank you for your attention!**