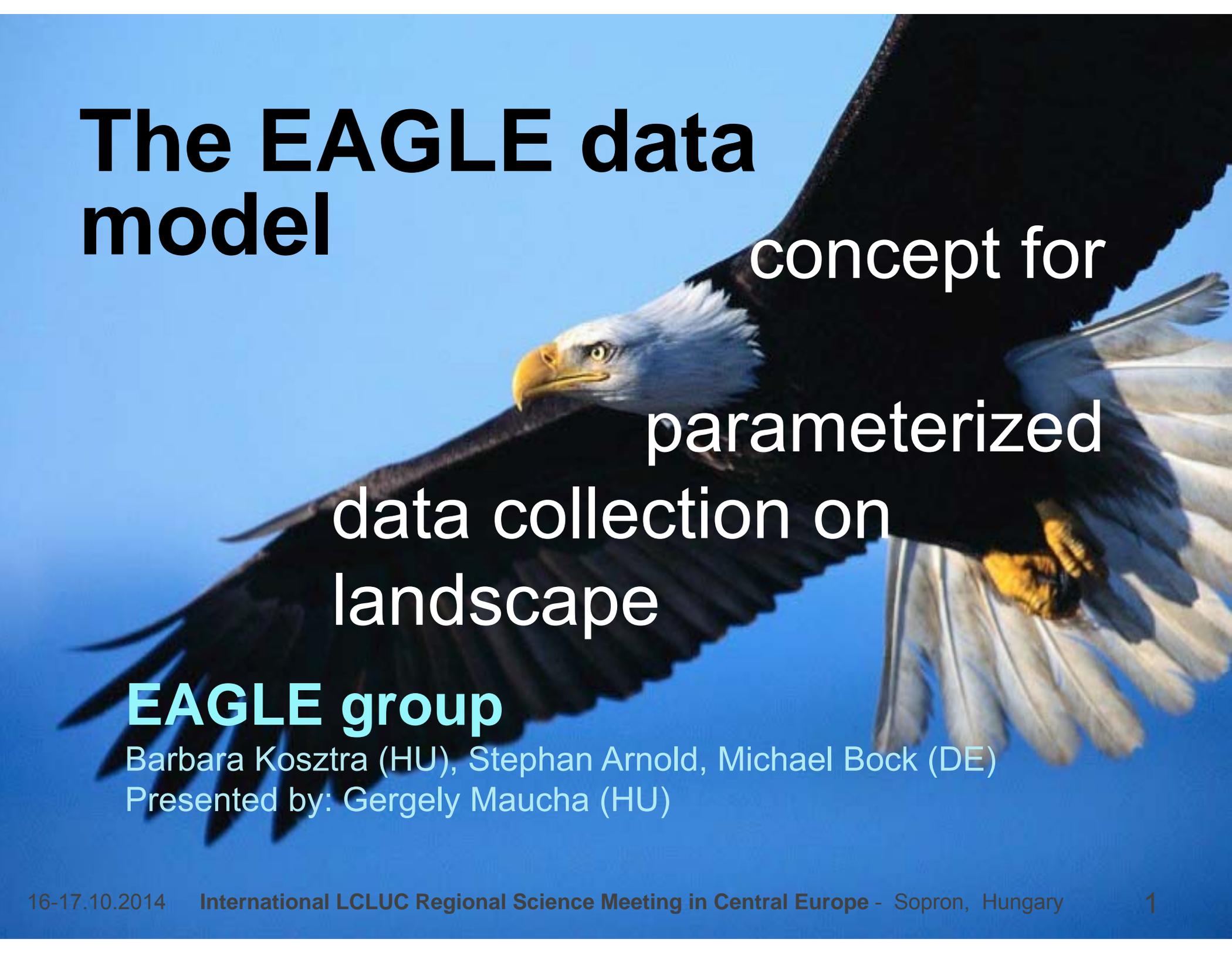


The EAGLE data model



concept for
parameterized
data collection on
landscape

EAGLE group

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Presented by: Gergely Maucha (HU)

Who is EAGLE?



- **EAGLE** = EIONET Action Group on Land monitoring in Europe (Eionet: expert network of European Environmental Agency - EEA)
- Voluntary, independent, open working group
- LC/LU experts from:
 - National Reference Centers (NRC) Land Cover,
 - INSPIRE TWGs,
 - ETC SIA partners,
 - FP7 HELM consortium
- Founded through self-initiative of experts from various European countries (AT, CH, CZ, DE, ES, FI, HU, NL, NO, PT, UK)
- So far self-financing (apart from travel costs and seconding of experts)



Current situation in land monitoring

Legend

- Continuous Urban Fabric (S.L. > 80%)
- Discontinuous Dense Urban Fabric (S.L. : 50% - 80%)
- Discontinuous Medium Density Urban Fabric (S.L. : 30% - 50%)
- Discontinuous Low Density Urban Fabric (S.L. : 10% - 30%)
- Discontinuous Very Low Density Urban Fabric (S.L. < 10%)
- Industrial, commercial, public utility and sports units
- Isolated Structures
- Airports
- Port areas
- Other roads and associated land
- Fast transit roads and associated land
- Railways and associated land
- Construction sites
- Mineral extraction and dump sites
- Sports and leisure facilities
- Green urban areas
- Forests
- Agricultural + Semi-natural areas + Wetlands
- Land without current use
- Water bodies

Urban Atlas

Tree Cover Density

1% Tree Cover Density

Forest Type

- Coniferous Forest
- Broadleaved Forest
- Non-Forest

GIO HRL Forest



Bodenbedeckung und -nutzung, Landschaft (LUCAS) (lan)

- Bodenbedeckung (lan_lcv)
 - Überblick über die Bodenbedeckung nach NUTS-2-Regionen (lan_lcv_ovw)
 - Mit künstlich angelegten Flächen bedeckter Boden nach NUTS-1-Regionen (lan_lcv_art)
 - Mit Grünland bedeckter Boden nach NUTS-2-Regionen (lan_lcv_grs)
 - Mit Heideflächen bedeckter Boden nach NUTS-2-Regionen (lan_lcv_shr)
 - Mit bewaldeten Flächen bedeckter Boden nach NUTS-2-Regionen (lan_lcv_woo)
 - Mit Gewässern und Feuchtgebieten bedeckter Boden, NUTS-2-Regionen (lan_lcv_wat)
 - Bewaldete Flächen nach Größe der Fläche nach NUTS-2-Regionen (lan_lcv_wo_si)
 - Bewaldete Flächen nach Kronendichte, % (lan_lcv_wo_ca)
 - Überblick über Bodenbedeckung und -nutzung nach NUTS-2-Regionen (lan_lcv_ovw)
- Bodennutzung (lan_lu)
 - Überblick über die Bodennutzung nach NUTS-2-Regionen (lan_lu_ovw)
 - Bodennutzung in der Landwirtschaft nach NUTS-2-Regionen (lan_lu_agr)
 - Bodennutzung mit Umweltverträglichkeit, NUTS 0 Regions (lan_lu_heu)
 - Bodennutzung für Dienstleistungen und Wohngebiete nach NUTS-2-Regionen (lan_lu_inf)

LUCAS

EUNIS Habitat Classification: criteria for Level 1

(number) refers to explanation in the following table

EUNIS Habitats

Soil Sealing

Levels of sealed soil

- Sealed: 1 - 29%
- Sealed: 30 - 49%
- Sealed: 50 - 70%
- Sealed: 80 - 99%
- Sealed: 100%

GIO HRL

CLC

FLÄCHEN

- GEPRÄGTE FLÄCHEN
 - 141 Städtische Grünflächen
 - 142 Sport- und Freizeitanlagen
 - 143 Gewerbe- und Verkehrsflächen
- STRAUCH- UND KRAUTVEGETATION
 - 321 Natürliches Grünland
 - 322 Heiden und Moorheiden
 - 324 Wald-Strauch-Übergangsstadien
- OFFENE FLÄCHEN OHNE / MIT GERINGER VEGETATION
 - 331 Strände, Dünen und Sandflächen
 - 332 Felsflächen ohne Vegetation
 - 333 Flächen ohne Vegetation
 - 334 Brachflächen
 - 335 Gletscher und Dauerschneegebiete
- FEUCHTFLÄCHEN
 - 411 Sümpfe
- FEUCHTFLÄCHEN AN DER KÜSTE
 - 421 Salzwiesen
 - 423 In der Gezeitenzone liegende Flächen
- WASSERFLÄCHEN
 - 511 Gewässerläufe
 - 512 Wasserflächen
 - 521 Lagunen
 - 522 Mündungsgebiete
 - 523 Meere und Ozeane
 - Flächen außerhalb des Bearbeitungsgebietes

EAGLE principles - Object orientation

Classifications

- Grassland \neq pasture
 \neq lawn
 \neq natural grassland

Characterization

- Growth density
 - closed
 - sparse
- Moisture
 - wet soil
 - surface water
- Use
 - intensive
 - extensive
 - sports
- Management
 - Multiple mowing
 - Single mowing
- Ecosystem type
 - Inland marsh



EAGLE principles - Decomposing landscape



© Ursus Wehrli

Content of EAGLE model

Information on landscape described with three separate main blocks...

I.) **LAND COVER** Components – LCC

Abiotic (Artificial + Natural), Vegetation, Water Surfaces => no classes, but elements

II.) **LAND USE** Attributes – LUA

Agriculture, Forestry, Residential, Transportation etc.

III.) **CHARACTERISTICS** – CH

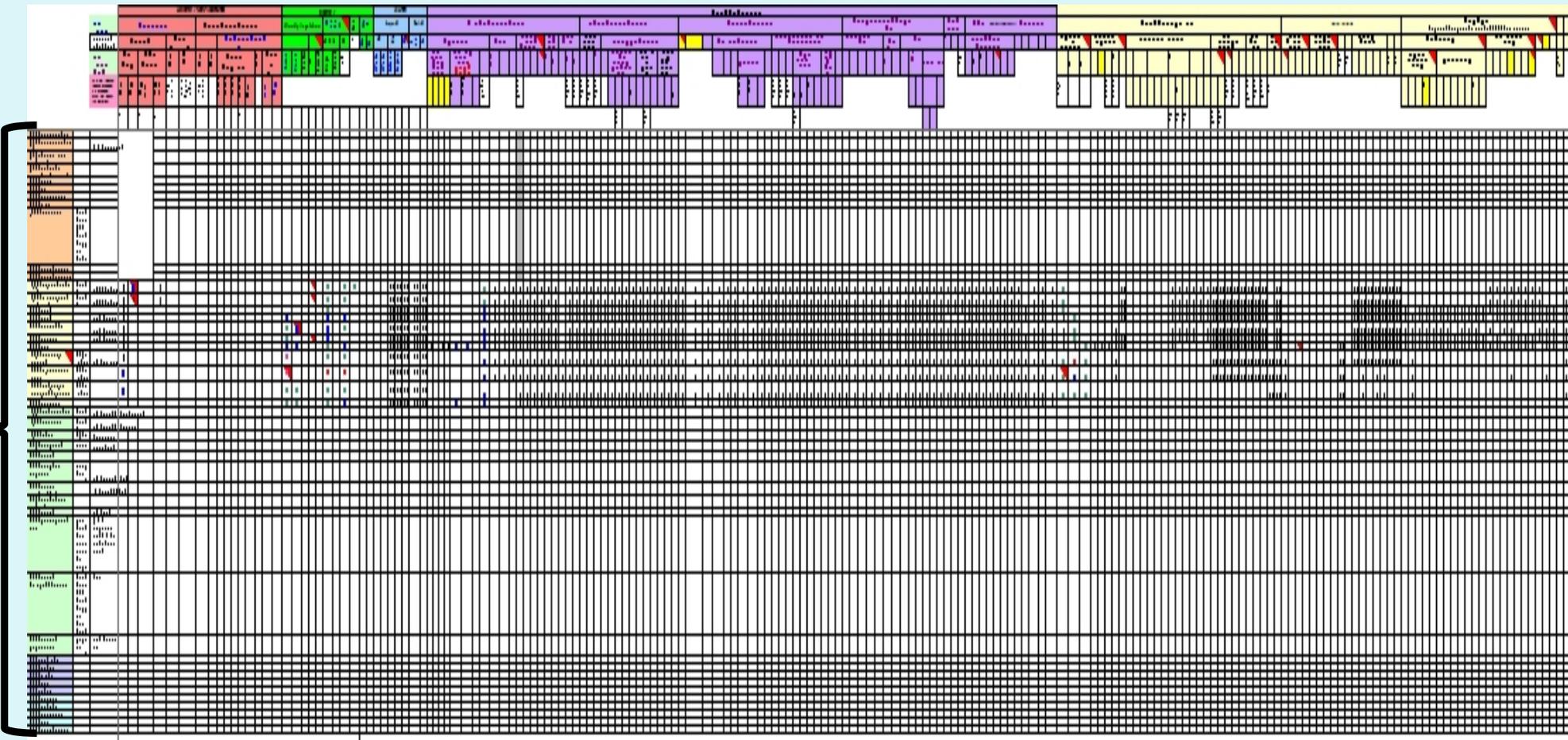
further information on: spatial pattern, bio-physical parameters, ecosystem types, cultivation measures, land management practices, temporal pattern etc.

Structure of the EAGLE Matrix

I. LCC block

II. LUA block

III. CH block

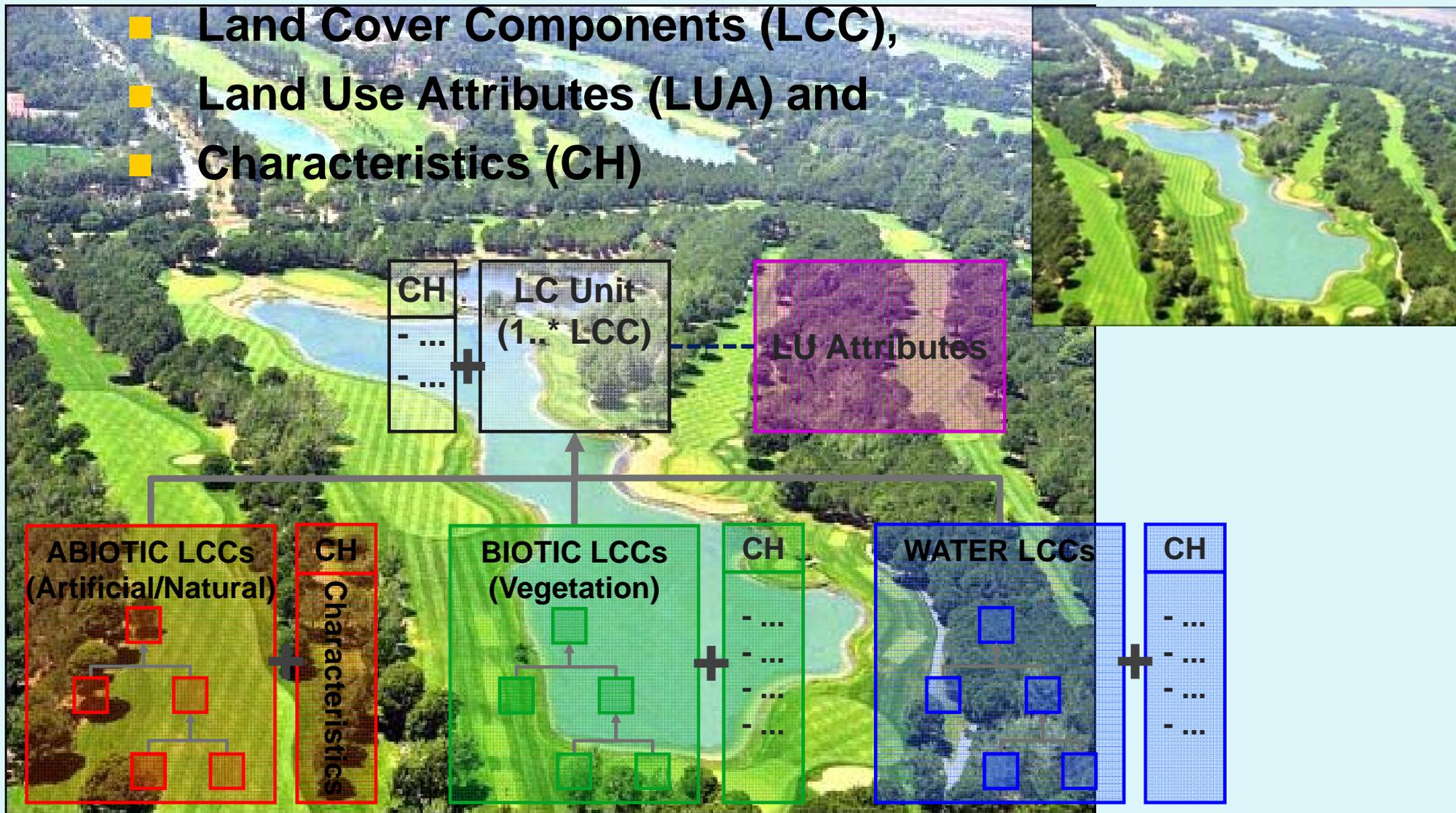


CORINE /other system's classes

Structure of the EAGLE data model

■ Description of Landscape with help of

- Land Cover Components (LCC),
- Land Use Attributes (LUA) and
- Characteristics (CH)



How to use EAGLE matrix:

Describing „village“ with EAGLE model

Land cover components (LCC):

- conventional buildings,
- broadleaved trees,
- herbaceous plants,
- open sealed surfaces

Land use attributes (LUA):

- permanent residential,
- agriculture/production for own consumption,
- road network

Further characteristics (CH):

- soil sealing degree = 35%
- built-up pattern = discontinuous, single houses



© Gyorgy Büttner

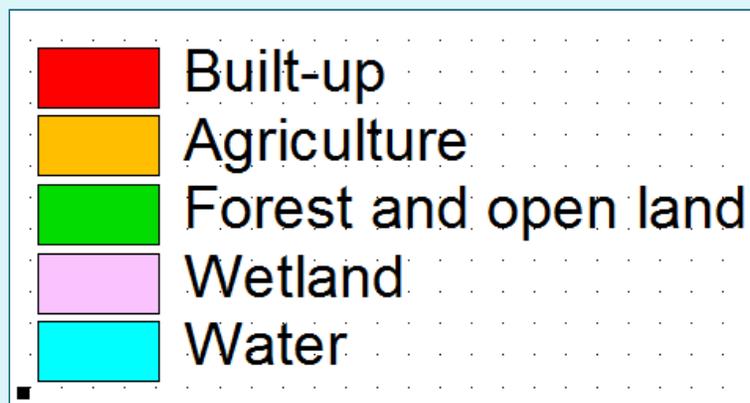
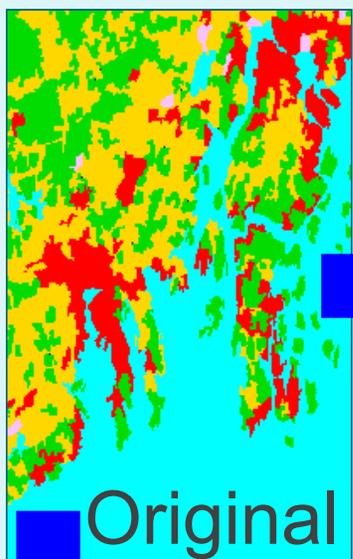
Representing land

Alt. 1: Classification and delinestation of polygons

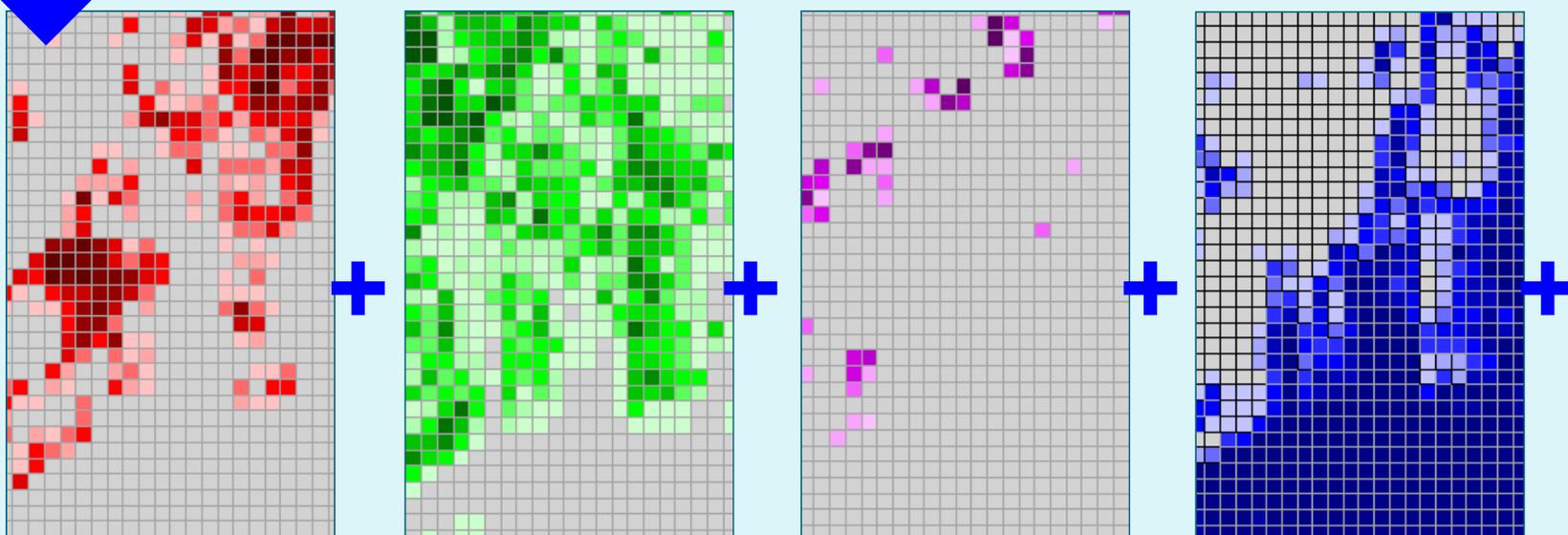
Alt. 2: Independent diagnostic criteria



Raster versus Grid



Raster: 1 (dominant) single value per pixel



Grid: multiple layer data (% , abs.) stored in every grid cell

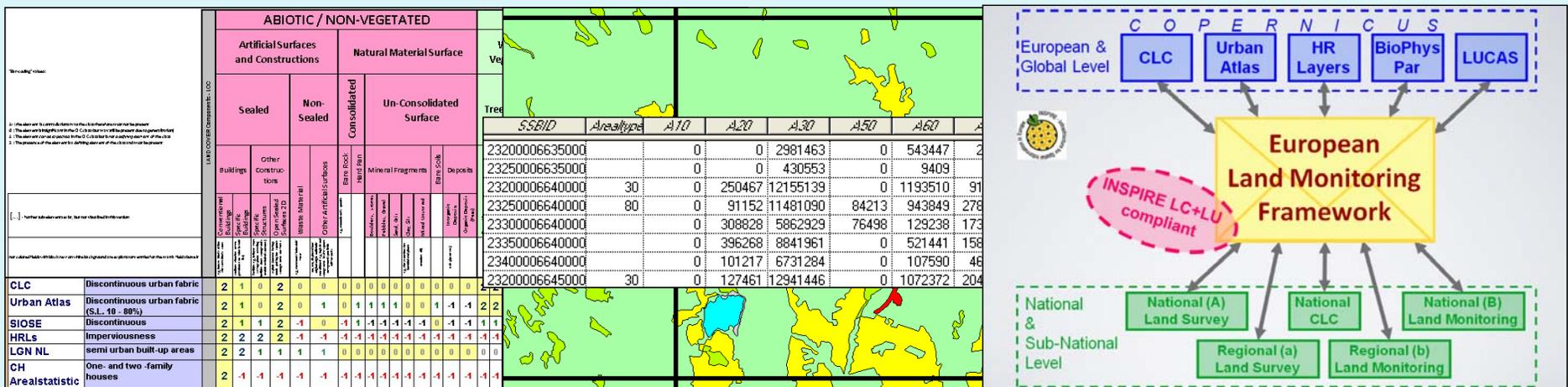
Uses of EAGLE matrix/model

EAGLE matrix

- Tool for **analytic decomposition** of class definitions
- **Semantic translation** between different classification systems – NOT yet another classification system!

EAGLE model

- **Description of land surface units**
- **Conceptual basis** for harmonized future European Land Monitoring Framework



EAGLE test case I. - Enhancement of CORINE Land Cover nomenclature guidelines

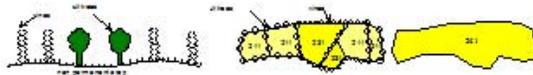


Fig. 55 Representative demonstration of the olive trees associated with arable lands on example from Portugal

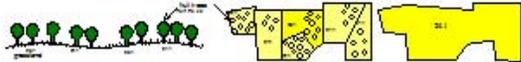
Generalisation:

According to the bio-climatic zone, the heading could be described under two illustrations:

- articulated landscapes.



- small plot and orchard patterns.



Particularity of class 241:

No particularity was identified in this class.

242 Complex cultivation patterns

Mosaic of small cultivated land parcels with diverse annual crops, pasture, and/or permanent crops, eventually with scattered houses or gardens.

This heading is applicable for:

- mosaic of land parcels - 15 ha of at least two of the following three cultivation types: arable crop land, pasture and permanent crop land, none of them occupying more than 75% of the area;
- mosaic of parcels of permanent crops (fruit trees, berry plantations, vineyards and olive groves);
- complex cultivation pattern areas with scattered houses, or garden huts (covering less than 30% of the patchwork area), situated in proximity of rural or urban settlements and used for growing agricultural crops, fruit, and vegetable for own consumption;
- hobby city gardens primarily for agricultural production use;
- vineyards occupying between 25% and 50% of area, intermixed with other cultivation types (242) in a mosaic pattern.

This heading includes:

- parcels of arable crops (occupying less than 75% of the area)

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- parcels of permanent crops, such as vineyards, fruit orchards, olives (each type occupying less than 50% of the area);
- parcels of permanent grassland (pastures, meadows);
- kitchen gardens;
- regular buildings, huts (occupying less than 30% of the area);
- sealed or non-sealed (dirt or tar macadam) roads.

This heading is not applicable for:

- market gardening (class 211);
- nurseries cultivation (class 211);
- in spite of strong fragmentation, the areas with more than 75% of area under rotation system (class 211);
- complex cultivation pattern areas with scattered houses occupying more than 30% of the patchwork area (class 112);
- city gardens, allotment gardens primarily for recreational use (class 142);
- in spite of strong fragmentation, the areas with more than 75 % of area under crop rotation system (class 211);
- mosaic of parcels where a single permanent crop type (vineyard, fruit plantation, olive groves) occupy more than 50% of area (classes 22x);
- arable and permanent crops located on the same parcel in an intermixed pattern (class 241);
- complex cultivation areas where patches of natural or semi-natural components occupy > 25% of the area (class 243).

This heading excludes:

No entry

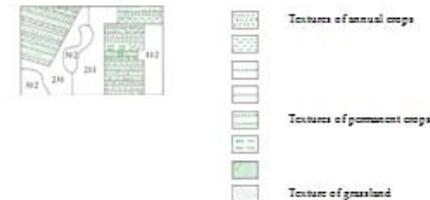


Fig. 56 A generalised pattern of the class 242



Fig. 57 Representative demonstration of the quoted class on example of complex cultivation patterns in Central part of Slovakia

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EAGLE test case II. – EAGLE for habitats

Habitats are related to both species and RS reflectances

→ link between field surveys and earth observation information

Stakeholder requirement: EEA foresees Natura 2000 monitoring be part of Copernicus local component

ETC-SIA IP2014 Task 1.8.1.2: Assessment of EAGLE model for habitat mapping

Goal: assessing EAGLE ability for habitat monitoring

EAGLE tested for semantic decomposition of General Habitat Categories (GHC)

Result: EAGLE found to be suitable for

- improving habitat nomenclatures
- translating between classes of different habitat classification systems,
- serving as a data model for collecting information

Next steps and future perspectives

EAGLE so far worked as voluntary expert group, concept development being a self-initiative of land monitoring experts

EAGLE now included in Copernicus 2014 work programme and implementation plan as “future development to be supported”
→ Copernicus funding (via EEA) for proof of concept – under way

New data situation:

SENTINEL generation ahead, opened LANDSAT archives
=> tackle and improve temporal (so far unsolved) issues

Strategic aspects:

Go forward towards the operational implementation of a new land monitoring framework

Thank you for your attention!



Further information: sia.eionet.europa.eu/EAGLE

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