

LADM COUNTRY PROFILES DEVELOPMENT



aspects to be
reflected and considered

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LADM Edition I
&
LADM Edition II

Country Profiles
LADM Edition I



Conclusions
&
Future Work

Proposed
Methodology

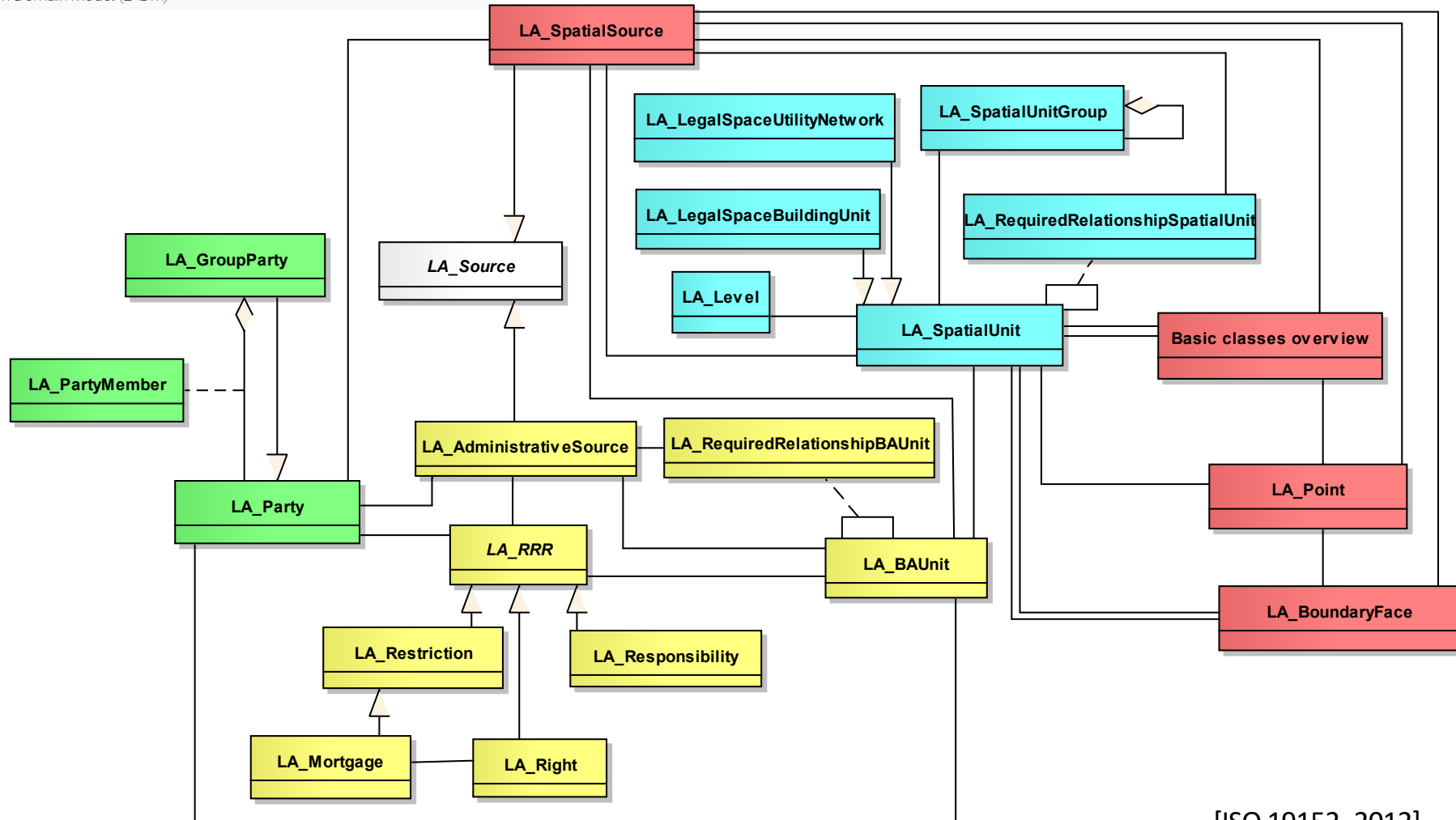
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L A D M

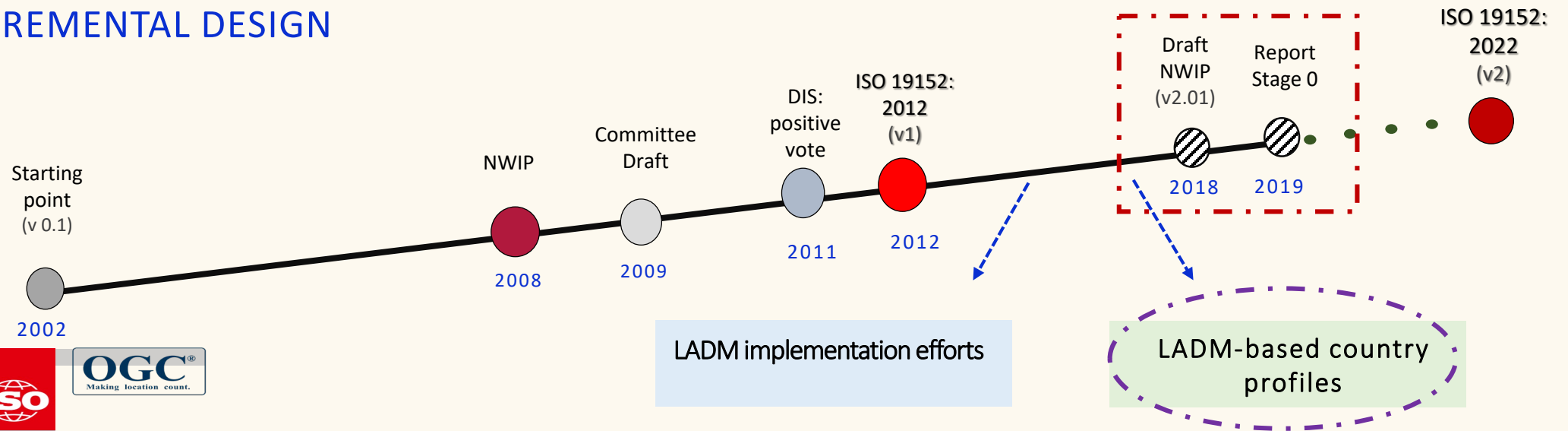
- ✓ ISO
19152:2012
Edition I
- ✓ Revision
process
→ Edition II

ISO 19152:2012 Preview

Geographic information -- Land Administration Domain Model (LADM)



LADM INCREMENTAL DESIGN



New project → to meet new requirements

Multipart standard :: new modules, informative Annexes

taxation/valuation spatial planning land indicators

- LADM country profiles
- Spatial Units & LADM Spatial Profiles
- LADM processes
- LADM and IHO S-121
- LADM and IndoorGML
- LADM encodings

Enhanced 3D and 4D support

Volunteered land administration and crowdsourcing information

INVOLVED ORGANIZATIONS

OGC Making location count.

FIG

FAO FIAT PANIS

ISO ISO/TC 211

UN-GGIM

ITC

IHO

TU Delft

UNITED NATIONS OFFICE OF LEGAL AFFAIRS (OLA)

THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

UN HABITAT FOR A BETTER URBAN FUTURE

RICS

kadaster

- Colombia
- Croatia
- Cyprus
- Czech Republic
- Greece
- Hungary
- Indonesia
- Israel
- Japan
- Korea
- Malaysia
- Montenegro
- Poland
- Portugal
- Queensland, Australia
- Republic Srpska
- Russian Federation
- Serbia
- South Africa
- The Netherlands
- Trinidad and Tobago
- Turkey
- Victoria, Australia
- ...

LADM REVISION

MultiPart approach



New NWIPs to be developed

PART 1

Land Administration
Fundamentals

PART 3

Marine Space /
Marine Geo-regulations

PART 5

Spatial Planning

PART 2

Land Tenure /
Land Registration /
Land Interests

PART 4

Land Valuation

PART 6

Implementation(s)

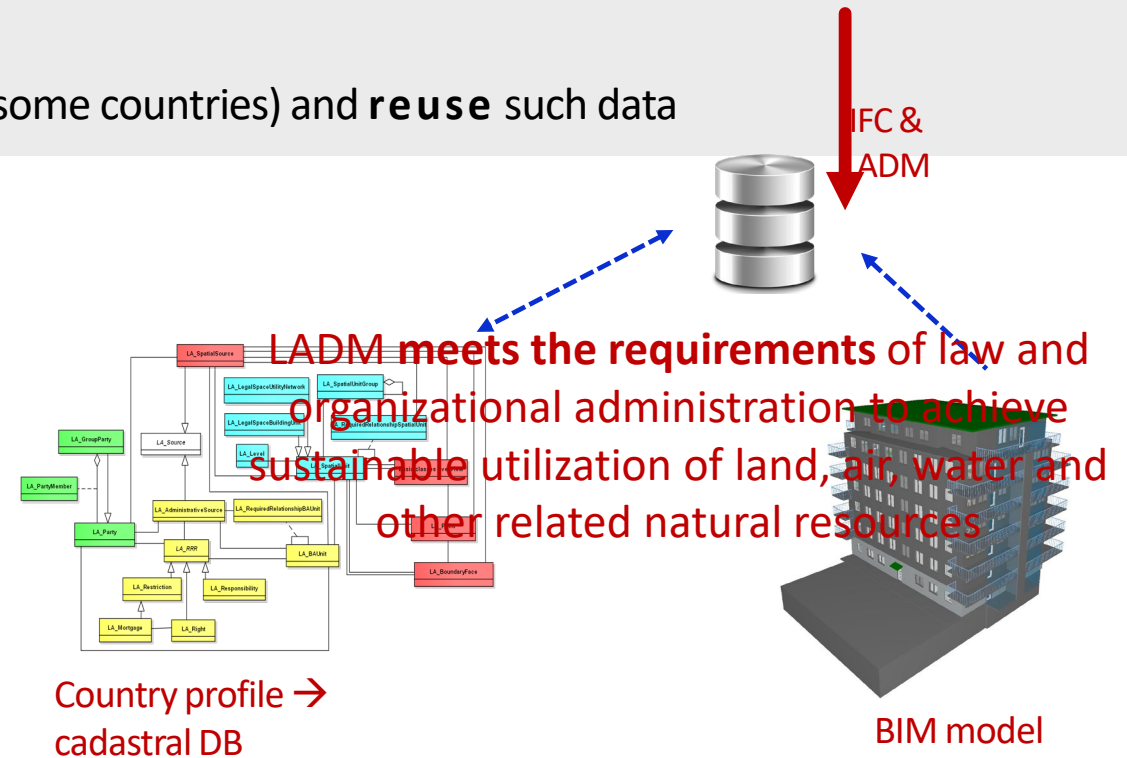


2 L A D M
Edition I
Country profiles

- ✓ Harmonization and interoperability at international/EU level (shared concepts & vocabulary)
- ✓ Standardization will result in improved industry support
- ✓ Supported/ promoted/ funded by international organisations: World Bank, FIG, IHO, RICS
- ✓ A standardization support for registration of 3D spatial units
- ✓ First steps to establish 3D Cadastre
- ✓ Management and administration of specific domain areas: archaeological sites; underground utilities; public (State) property; natural resources; marine space; agricultural land uses.
- ✓ Need to integrate/ communicate with BIM databases (obligation in some countries) and reuse such data

WHEN

- ✓ Already established a Land Administration System
→ need for modernisation/ reform/ renewal
- ✓ Not fully established LAS
→ harmonization with international standards
- ✓ Not yet established
→ opportunity to register directly 3D parcels & international compatibility



HOW



the authors of those profiles
did not follow a specific methodology to
develop them

- needs & requirements of the model
- 2 categories of CP: 1) holistic approach & 2) focused approach to a specific part of the LAS
- subject to the knowledge on LADM concept & classes
- level of maturity of the existing LAS
- number of organisations involved in current situation
- need to integrate with other databases
- countries only use the parts they need to → each country profile follows a different approach

PARAMETERS

examined

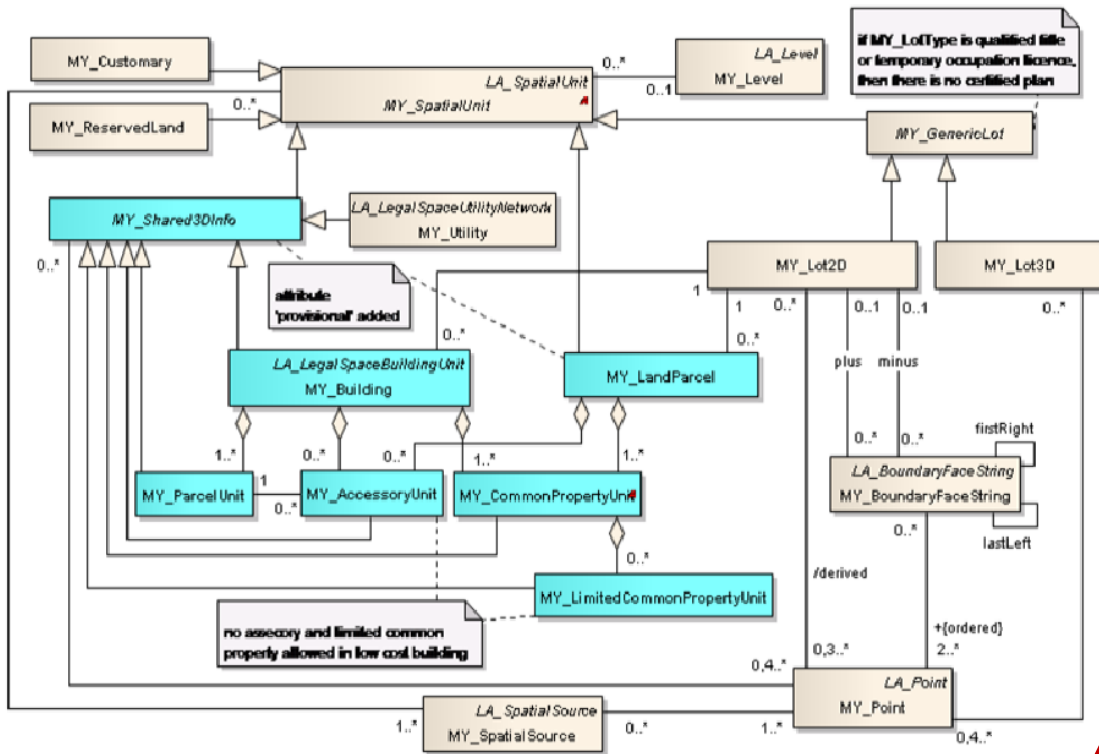
- ✓ Existing Land Administration System
 - ✓ Mapping with LADM classes
 - ✓ Conceptual Model/ UML
- ✓ Conformance Level test (Annex A, ISO19152)
- ✓ Technical Implementation
 - ✓ Contributors/
Created by

REFLECTION



Example Country profile:: Malaysia

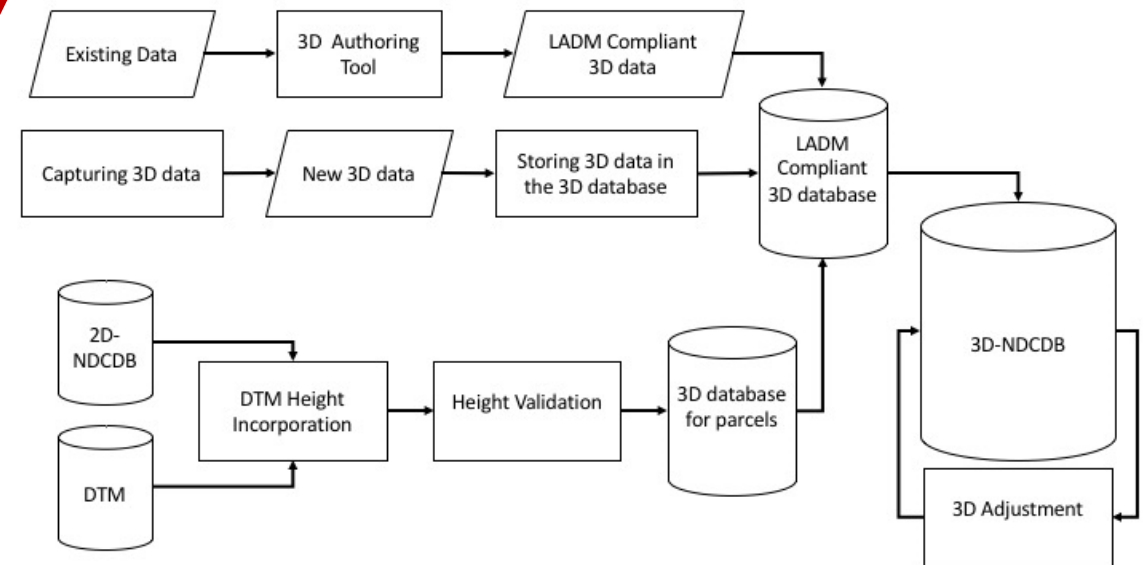
FUNDAMENTAL RESEARCH



(sources: NA Zulkifli et. al. 2014; Jamil H. et. Al. 2017)

APPLIED RESEARCH

SUSTAINABLE DEVELOPMENT GOALS



(Rajabifard A. et. al. 2018) 10



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Methodological
steps to develop
a
country profile

- ✓ technical aspects
(principles of data modelling, UML notation, code lists, etc.)
- ✓ non-technical aspects (institutional and legal aspects, etc.)

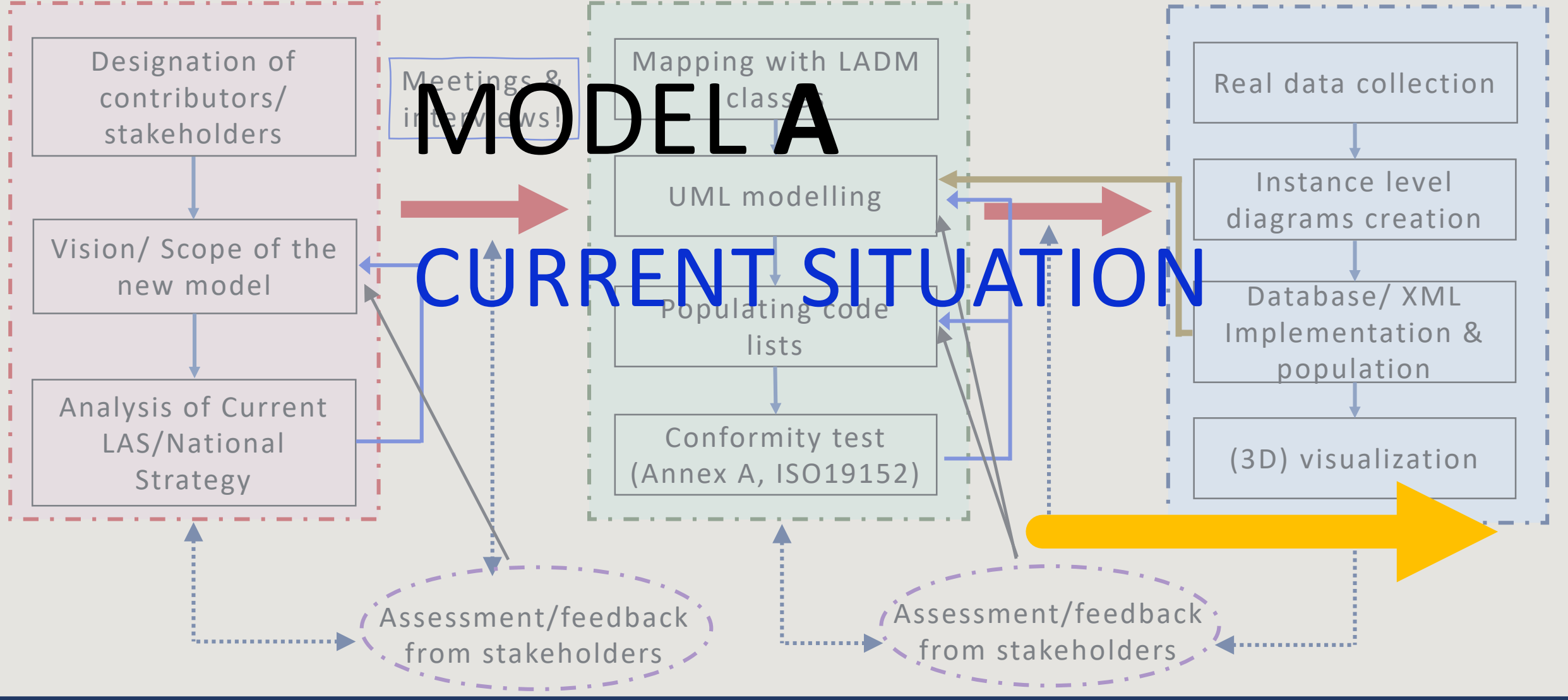
PHASE I - SCOPE

PHASE II - CREATE

PHASE III - TEST

MODEL A

CURRENT SITUATION

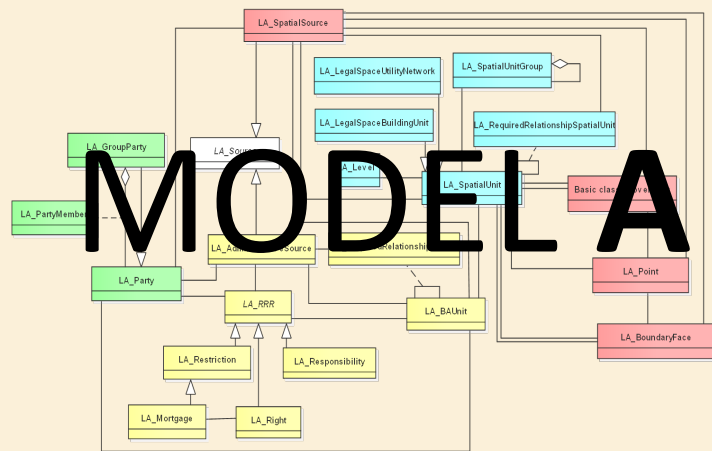
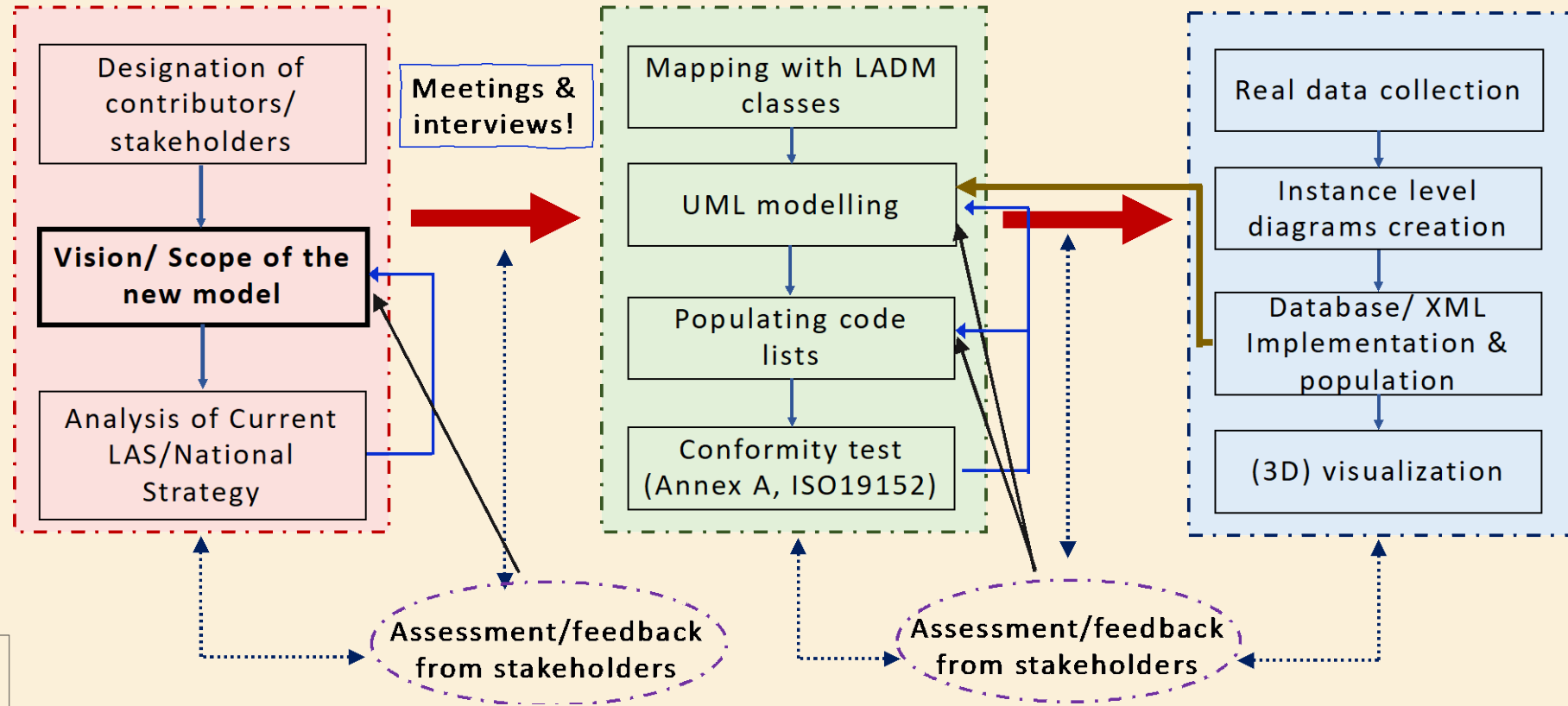


PHASE I

PHASE II

PHASE III

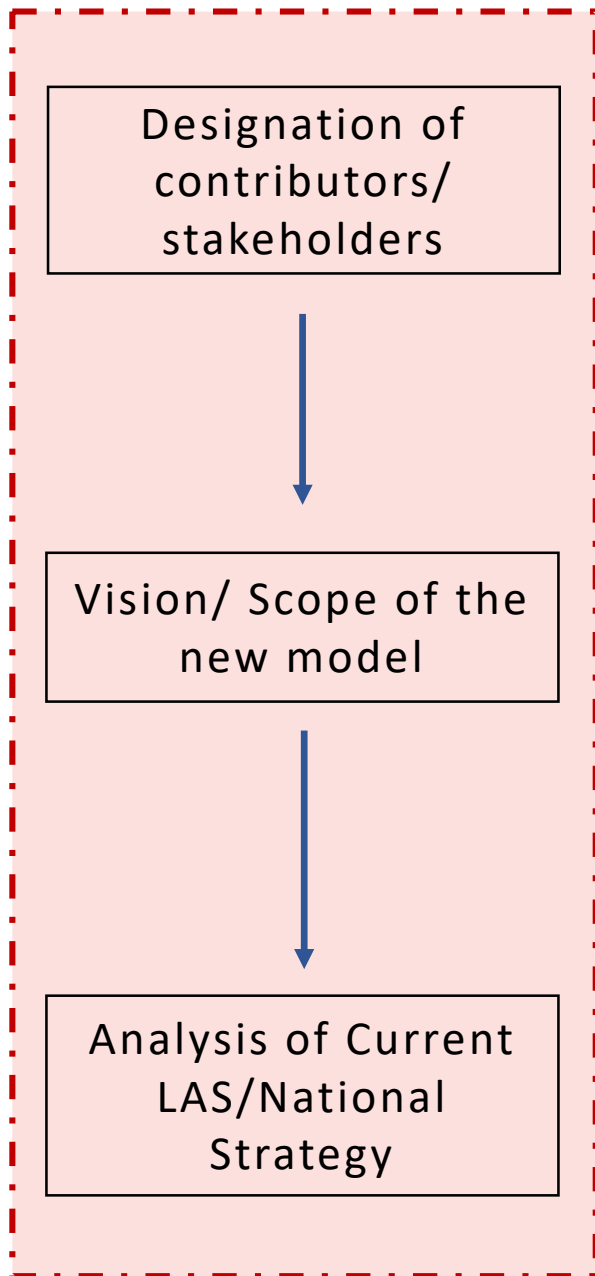
NEW SCOPE
(extended →
LADM Edition II)



MODEL B

FUTURE SITUATION

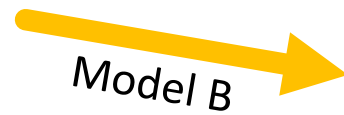
PHASE I



- National Mapping Agencies
- Governmental Organisations
- Academic Community



- current situation of the jurisdiction



- **future proof model** → new elements that are not registered at all, or they are not registered by the mapping authority
- **Wider scope of LADM Edition II:** valuation/taxation, spatial planning, marine environment



- Requirements' analysis: national legislative framework & other relevant regulations.
- Current RRRs & code lists, enumerations
- Current documentation, data model & data dictionaries
- New strategies (BIM, etc.)

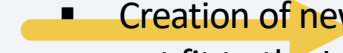
Iteration!

Mapping with LADM classes



- mapping the key concepts of the existing model(s) with LADM classes

UML modelling



- Inheritance from LADM core classes using a prefix
- Creation of new classes to serve the needs of the country, only when the existing concepts do not fit to the LADM Edition I classes;
 - MDA approach
 - Includes technical and modeling aspects, such as: definition of a prefix for the jurisdiction, evaluations, new classes to be added, inheritance from LADM core classes, etc.
- Addition of new attributes, if needed, to address the national needs and requirements;
- Keep the associations as defined in LADM;
- Adjusting cardinalities according to national regulations and/or define relevant constraints to be imposed;
 - the more LADM core classes are being used, the less complex the profile will be
- Addition of new values to existing code lists. Use hierarchical structure of code lists or think about adopting CaLAtThe
- Usage of the external classes to link the model with current external registries.

Conceptual design

Populating code lists

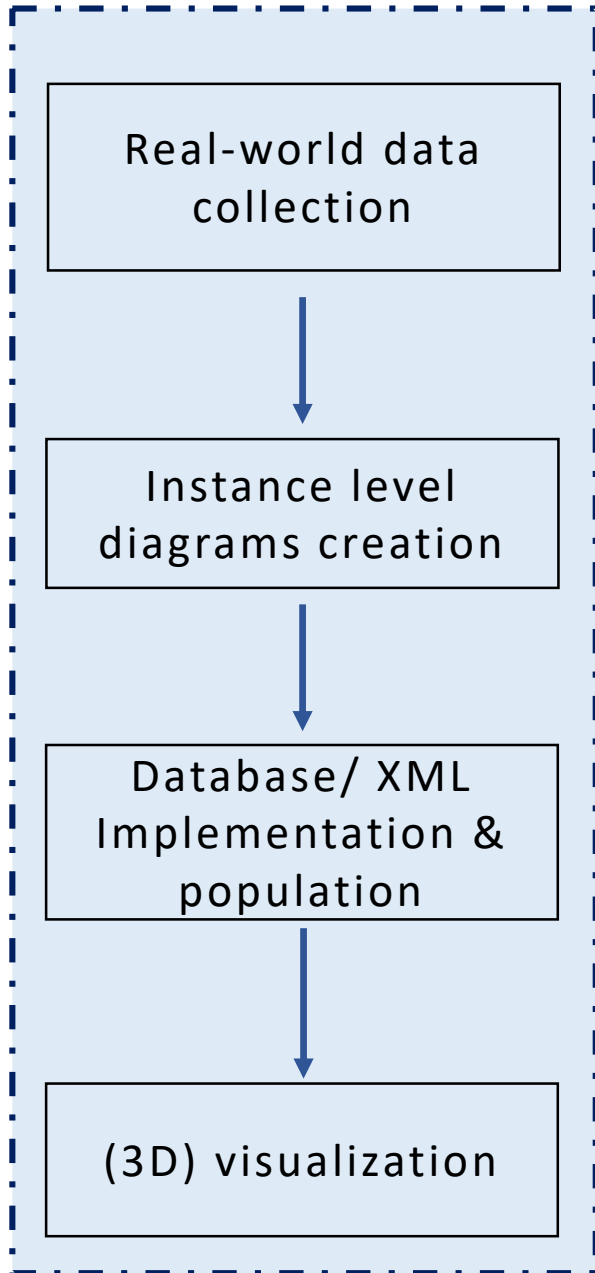
Conformity test



- conformity with ISO 19152 should be tested, according to Annex A of ISO 19152:2012 Edition I

Iteration!

PHASE III



- Involve the stakeholders/ contributors to provide real-world data (administrative & spatial)



- Create instance level diagram for use cases & indicate with different colours which authority is responsible for which class/ attribute
- Do the same at the future profile to monitor the changes on the responsibilities of the authorities



- UML model to be translated into database schema and stored in relevant software (e.g. PostgreSQL and PostGIS) for the implementation of the profile



- Visualisation & query of the country profile in (3D web) environment

Iteration!

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Conclusions

Future Work

✓ Need for an established, flexible methodology to build LADM country profiles

- Study and analyze requirements derived from national (existing) LAS, legislative framework & national strategies (e.g. BIM adoption)
- Involve government, industry and academia, organize interviews & meetings
- Identify and underline the role of involved authorities
- Assessment and feedback to be given at the end of each phase - - if needed repeat a phase of the methodology
- Use real world data (spatial & non-spatial) to test the country profile
- Implementation of the profile in a database and visualization

Annex D of LADM Edition II

inventory of the developed of country profiles →

Collect,
store,
maintain,
organise &
disseminate

Provide generic guidelines to set a framework for country profiles development respecting the differences of the various LA systems and their maturity level

Which organisation will be responsible for this inventory/registry (ISO, FIG, UN statistical division)?

- ❖ **based on the needs of the different LA systems** (deeds, titles, strata titles, etc.) → provision of detailed matching with LADM classes & outline more specific methodological steps for each system to facilitate design decisions // *ISO meetings to assign subgroups with experts*
- ❖ code lists usage: proposed by LADM, introduce new ones or extend the existing ones with new values // *to avoid complexity & redundancy → hierarchical structure*
- ❖ Semantic technologies (e.g. SKOS, RDF, linked data, and ontologies), CaLAtHe to be used for further refinement of code list values or semantic relationships between the terms → *Annex J, LADM Edition II*
- ❖ *Select one country to implement the proposed methodology and assess it*

- **level of compliance** (Annex A of LADM Edition I):: which organisation is responsible to decide and certify this level of compliance? // *certification from relevant national organisation(s)*
- **software compliant** with LADM implementation & its level of compliance

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THANK YOU!



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Technical
University of
Athens

