3D CADASTER IN INDONESIA

Proposal for migration to 3D Cadastre Data Management System In Indonesian SDI

KENNISCENTRUM OPEN DATA

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Agung Indrajit, M.Sc

2004-2006,2009-2016 (Geospatial Information Authority-Bogor)
- Head of Division of Geospatial Data Management
- Head of Division of Fundamental Geospatial Data Standardization
- Senior Engineer at Geospatial Intelligence Unit
- Engineer at Earth Monitoring Projects

2007-2008 (Deutsche Luft Raumfahrt, Oberpfaffenhofen)
- Part Time Database Developer for Satellite Imageries
- Full Time Geospatial Data Mining for Earthquake and Tsunami Modelling

2001-2004 (Chevron Texaco-Sumatra)
- GIS Systems Developer

1999-2000 (Institute Technology of Bandung-Bandung)
- Teaching and Research Assistant

Master of Science from Technische Universitaet Muenchen 2008
Post Graduate Courses (UN CSSTEAP-India, UNSW-CSIRO Australia, ICPLST-Taiwan)
Bachelor from Institute Technology of Bandung 2000

Past and Current Affiliation :

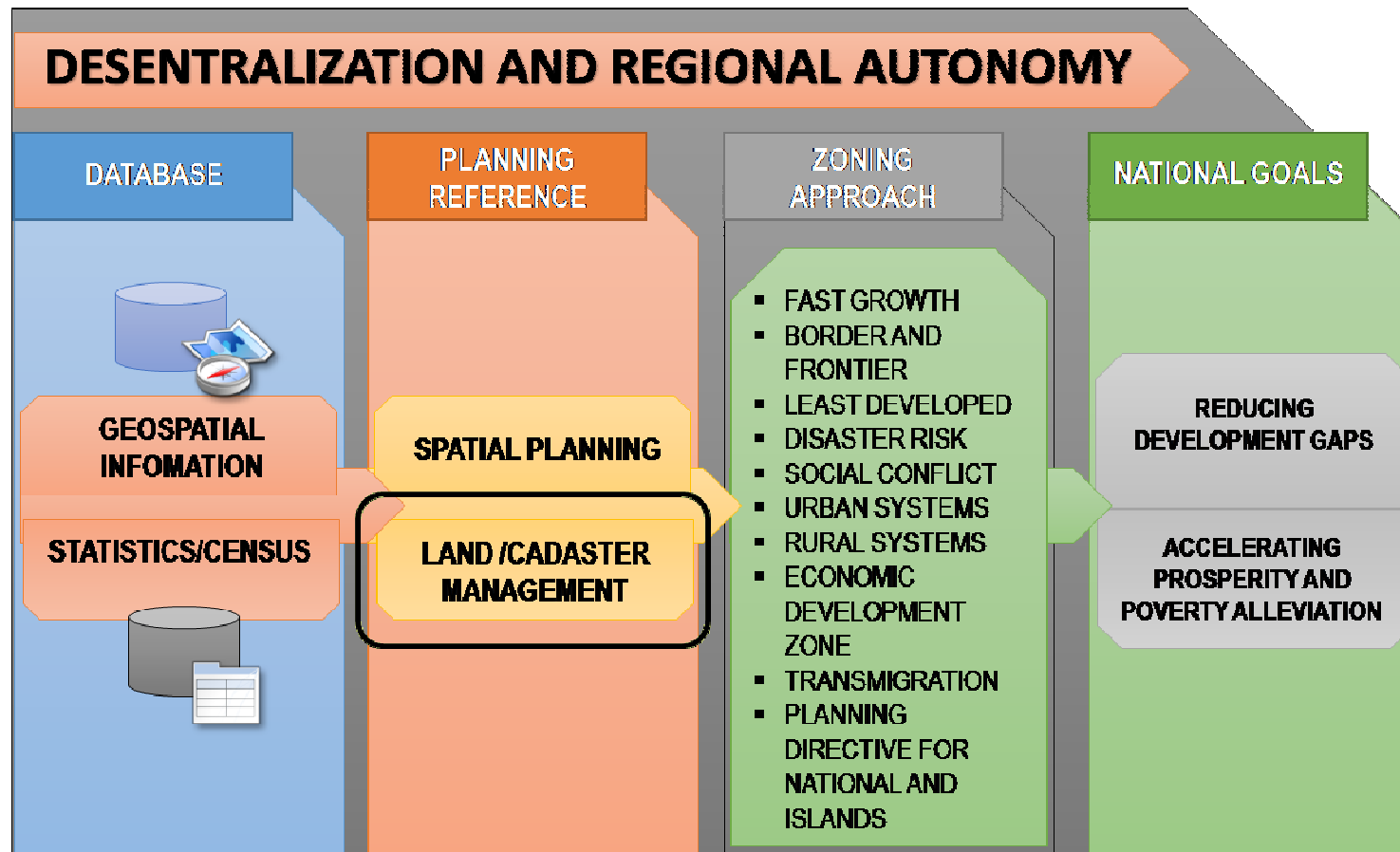KENNISCENTRUM OPEN DATA

OTB TU Delft

BADAN INFORMASI GEOSPASIAL

PUSAT INFRASTRUKTUR DATA SPASIAL

Research and Strategic Issues
IKATAN SURVEYOR INDONESIA
Indonesian Surveyors Association
member of Fédération Internationale des Géomètres (FIG)

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Cadastral Information for Indonesia
Importance to National Development 2014-2019

DESENTRALIZATION AND REGIONAL AUTONOMY

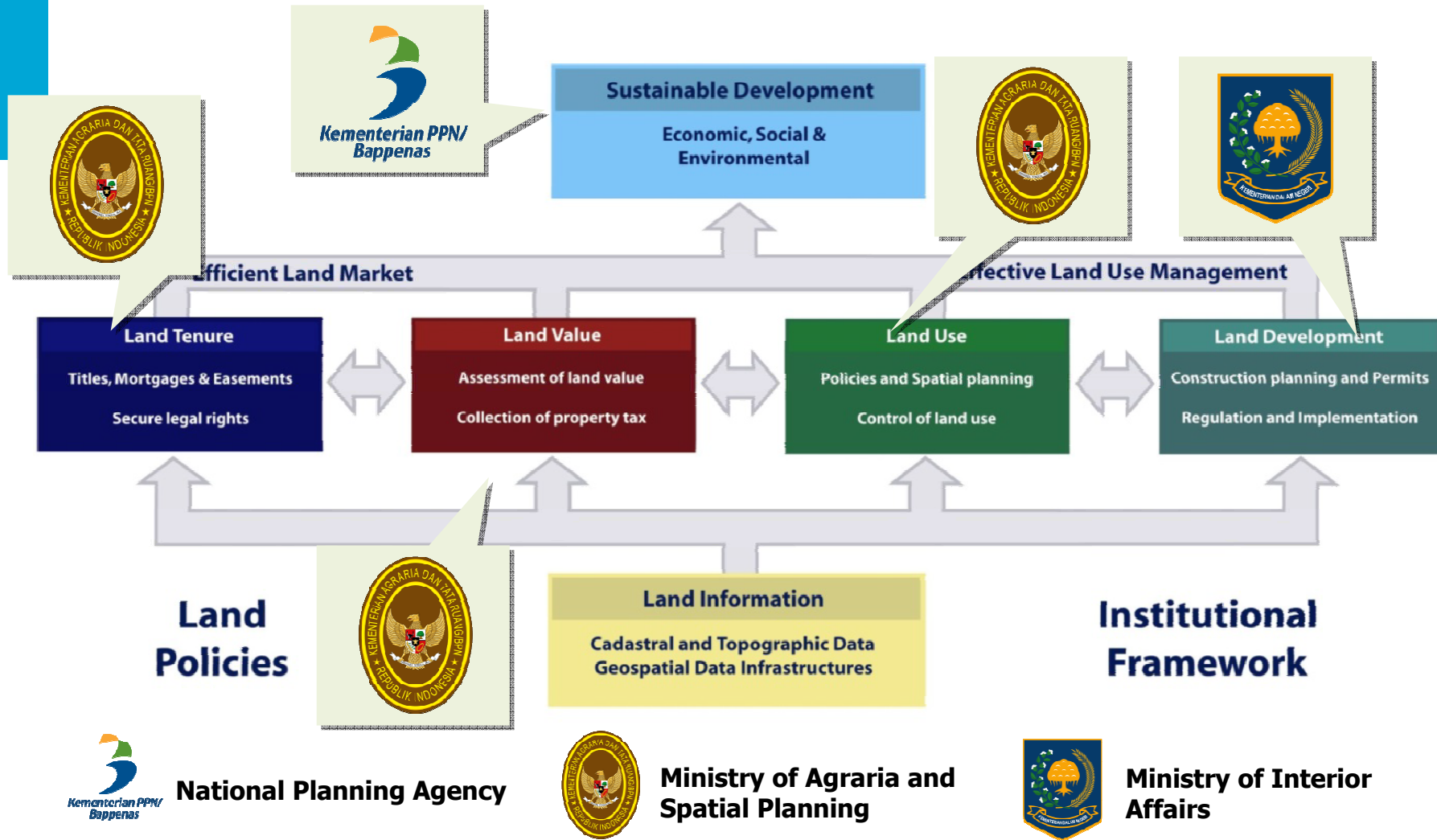| DATABASE	PLANNING REFERENCE	ZONING APPROACH	NATIONAL GOALS
GEOSPATIAL INFOMATION	SPATIAL PLANNING	FAST GROWTH	REDUCING DEVELOPMENT GAPS
STATISTICS/CENSUS	LAND /CADASTER MANAGEMENT	BORDER AND FRONTIER	ACCELERATING PROSPERITY AND POVERTY ALLEVIATION
		LEAST DEVELOPED	
		DISASTER RISK	
		SOCIAL CONFLICT	
		URBAN SYSTEMS	
		RURAL SYSTEMS	
		ECONOMIC DEVELOPMENT ZONE	
		TRANSMIGRATION	
		PLANNING DIRECTIVE FOR NATIONAL AND ISLANDS	

Cadastral Stakeholder in Indonesia
On Nationwide Policy

Fig. 2. Legal and Institutional framework (Enemark, 2014)

Cadastral Stakeholder in Indonesia
in Operational (City/Municipal)

Law and Policy
under Ministry of Agraria
and Spatial Planning

Land Tenure

City-wide
LIM

Land Values

Land Use

Finance
and Taxation
under local governments

Planning, Environment,
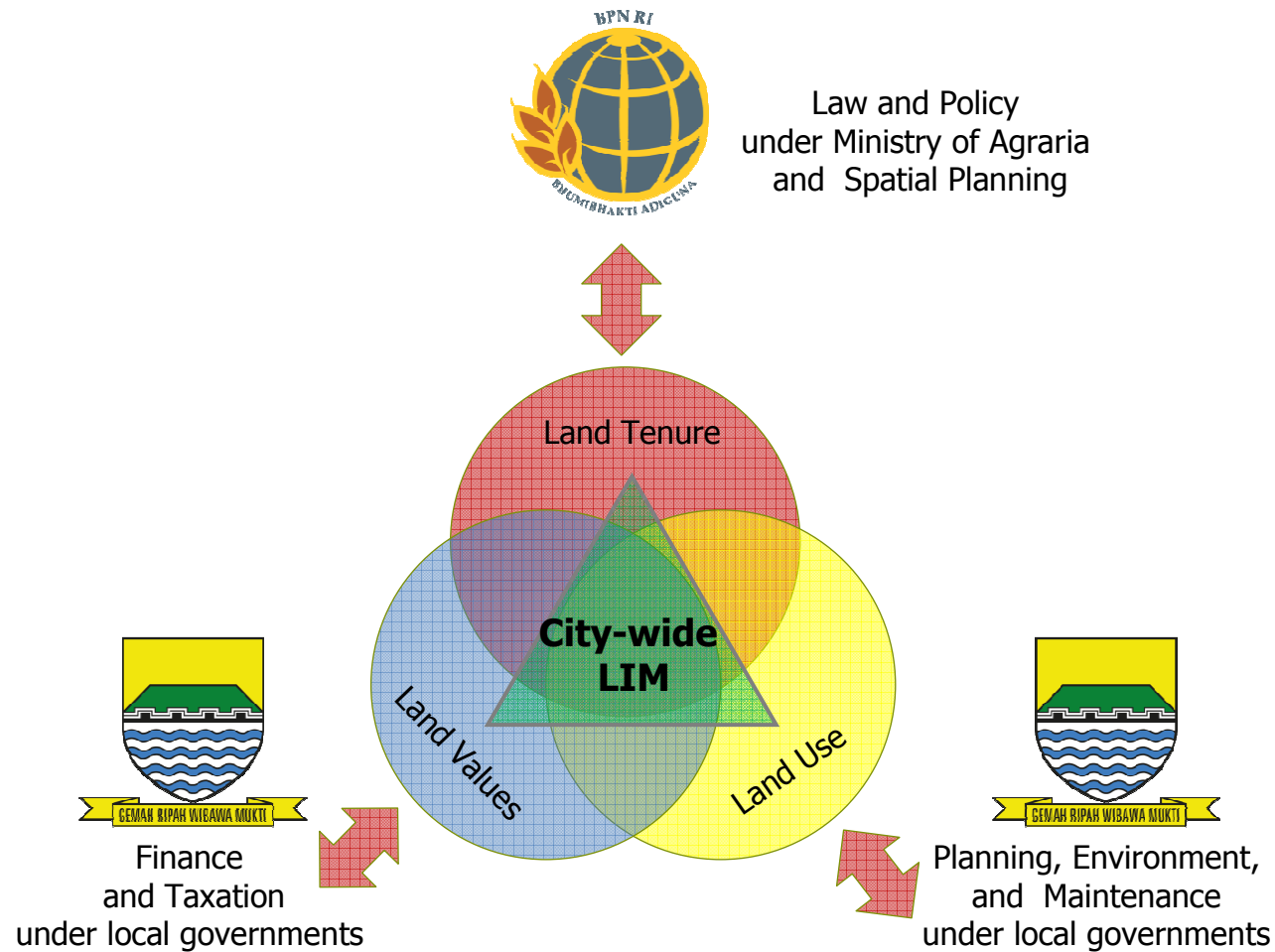and Maintenance
under local governments

Fig 3. City-wide LIM for City of Bandung, status 2016
(Adapted from FIG, 2002).

Cadastral Data Management
Migration to LADM

CLASS IN LADM	CLASS IN LAND REGISTRATION ACTIVITIES
LA_Party, LA_GroupParty	• Land Owner (people, organizations) • Customer
LA_BAUnit	• Basic property unit
LA_RRR, LA_Right, *LA_Restriction,* *LA_Responsibility*	• Right
LA_SpatialUnit	• Parcel • 2DBuilding • 3DBuilding
VersionedObject	• VersionedObject
LA_Source *LA_AdministrativeSource* *LA_SpatialSource*	• Application • AdminDocuments • SurveyReports

Cadastral Data Management
Indonesian Profile: Core
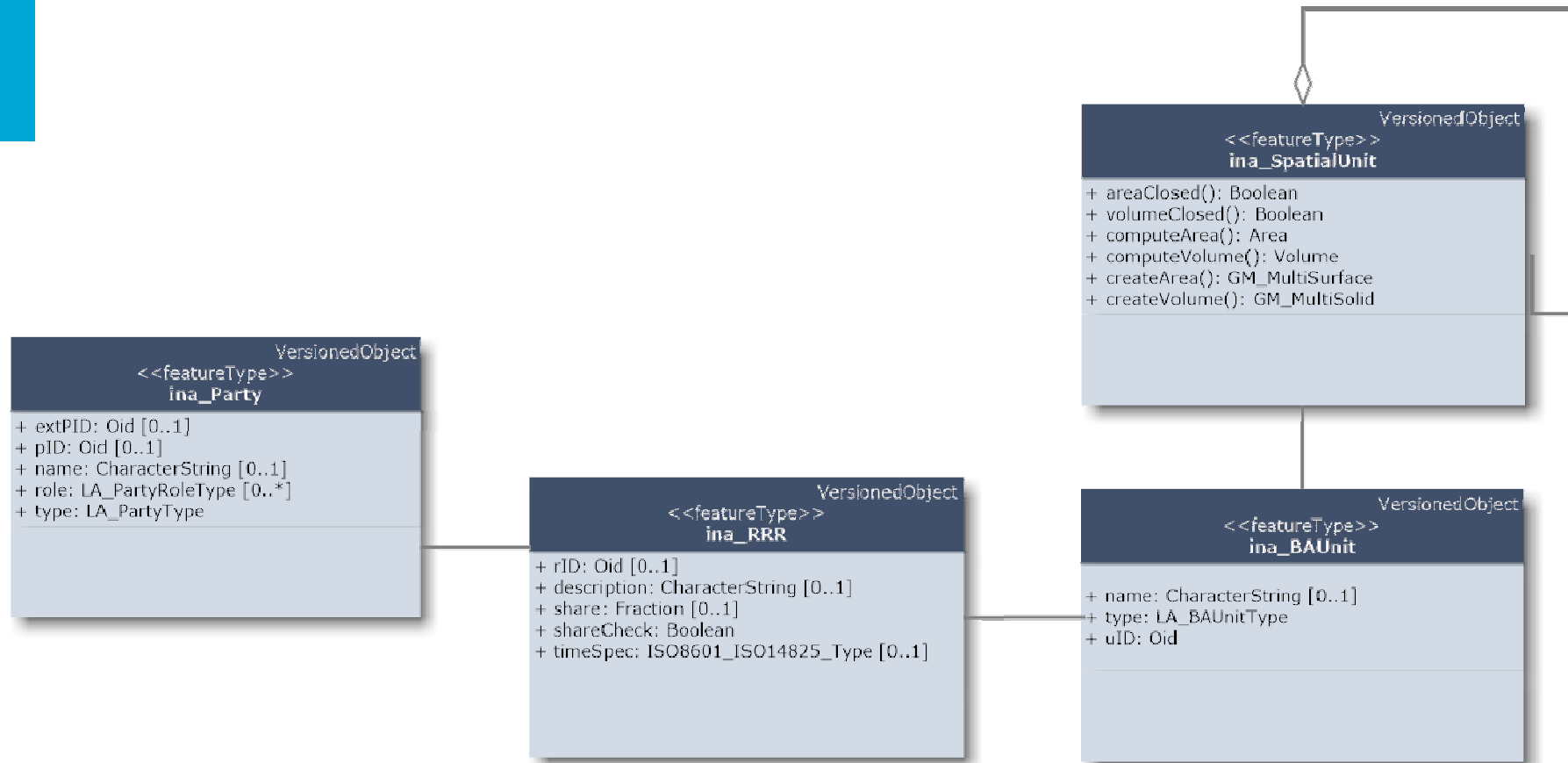
Cadastral Data Management
Indonesian Profile: Party

Cadastral Data Management
Indonesian Profile: Administrative
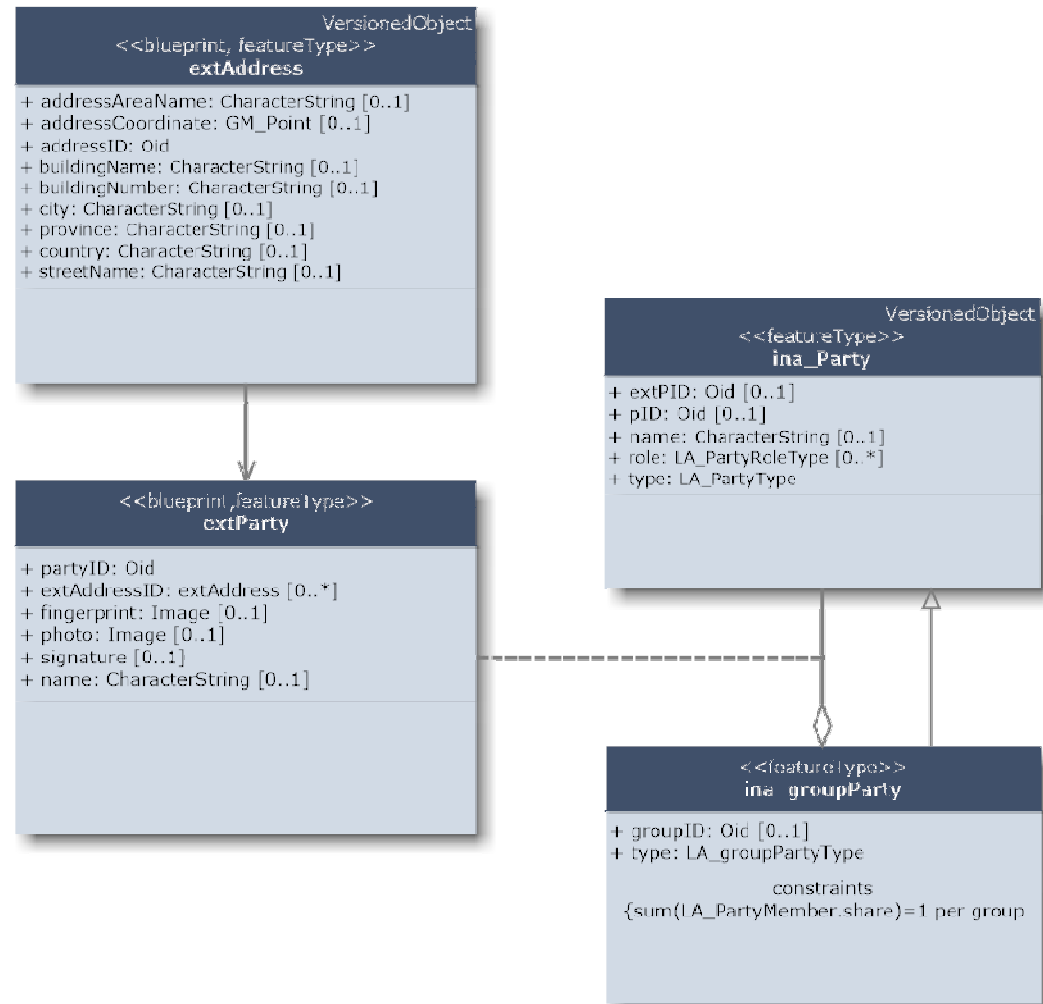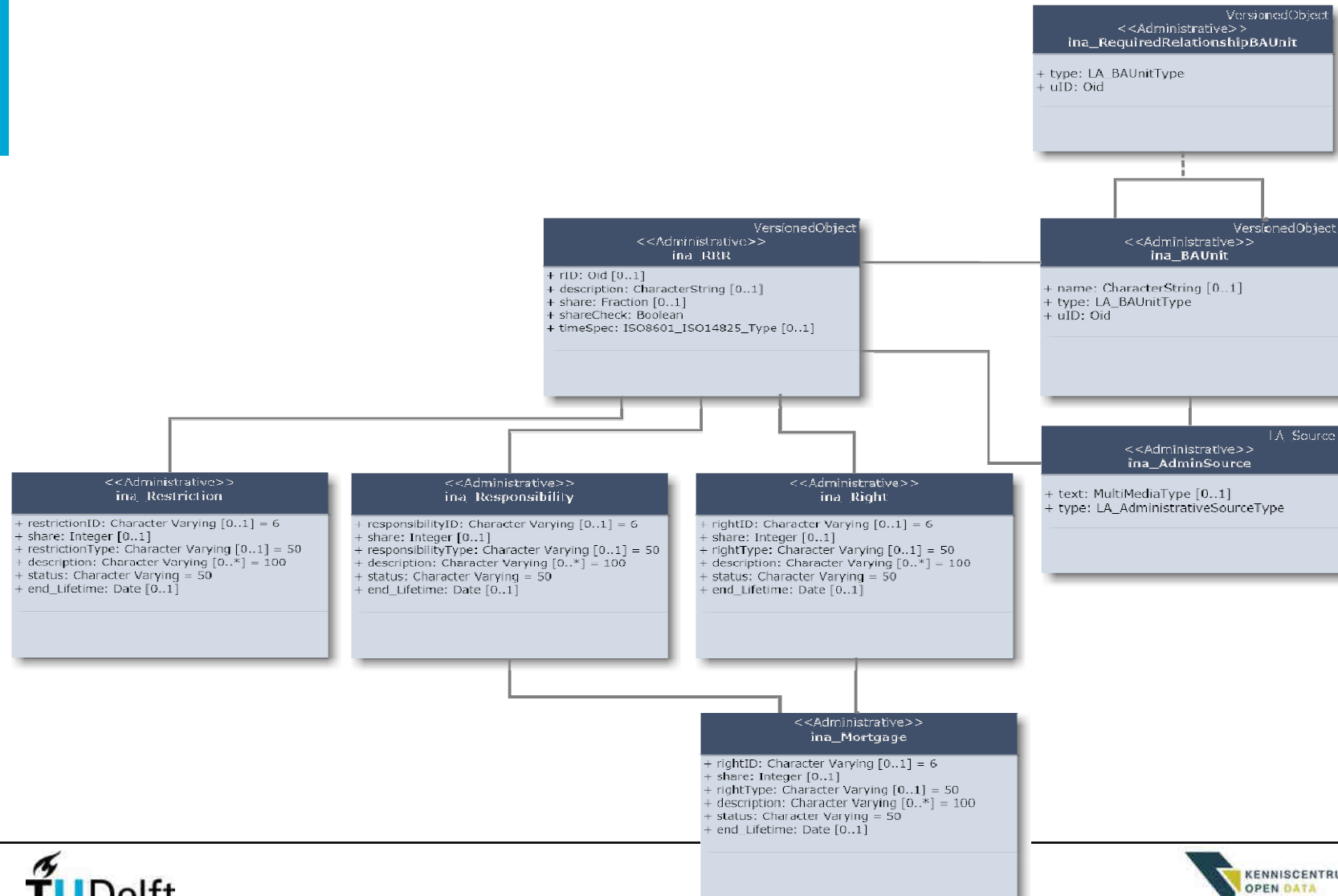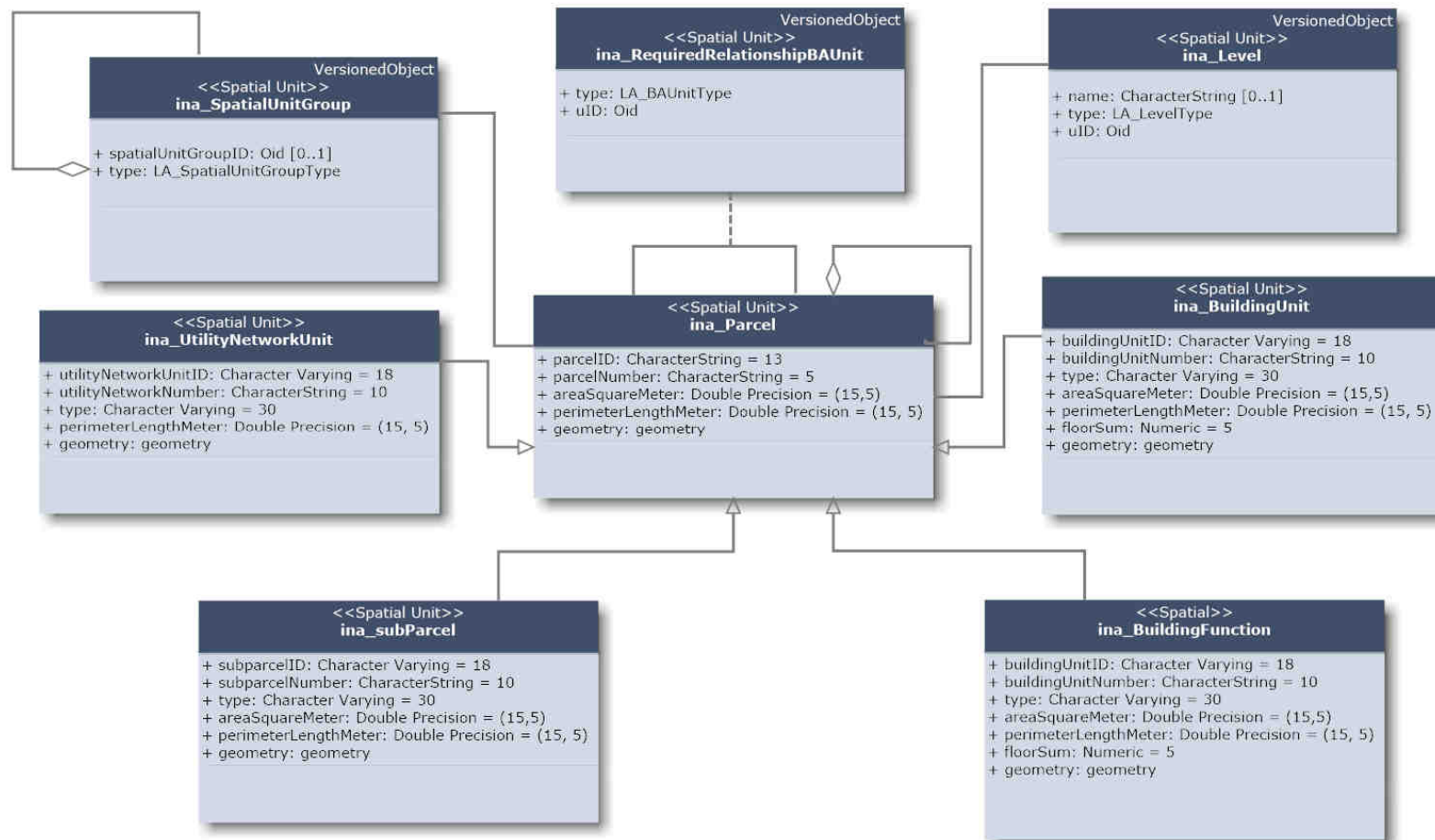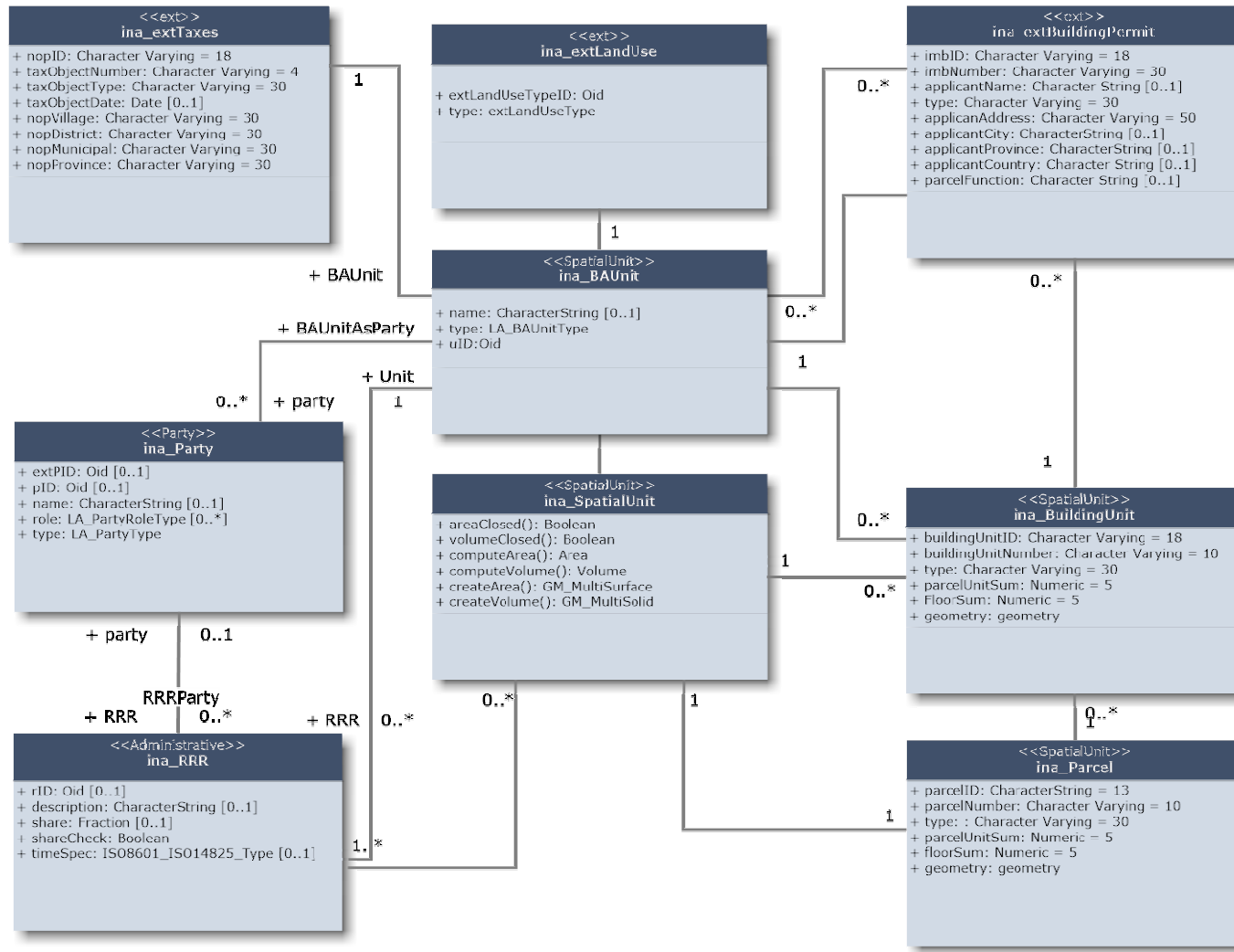
Cadastral Data Management
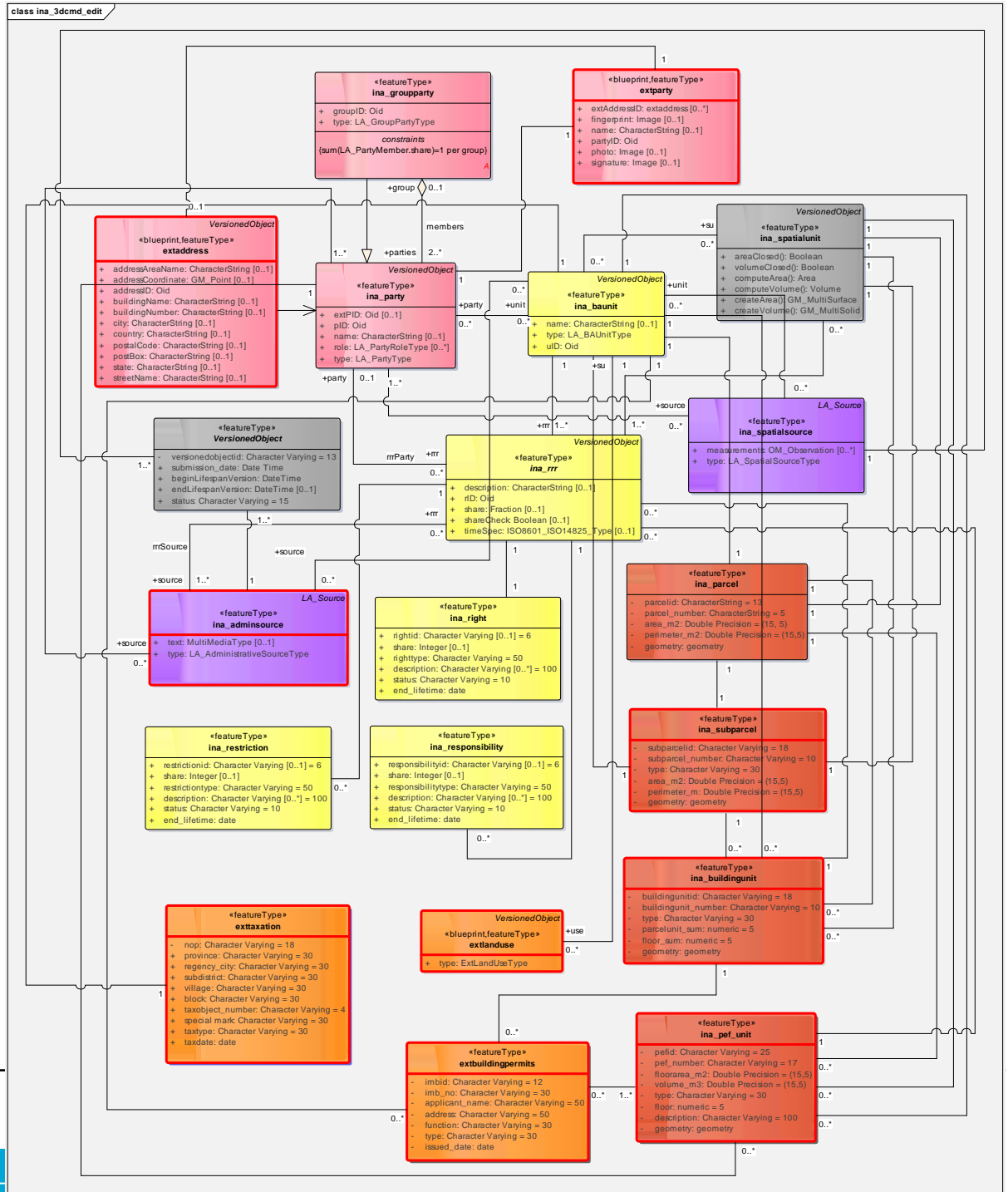## Indonesian Profile: Spatial

Cadastral Data Management
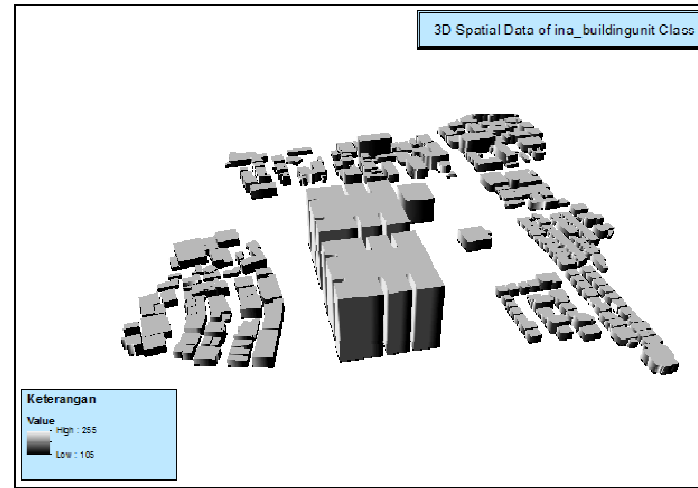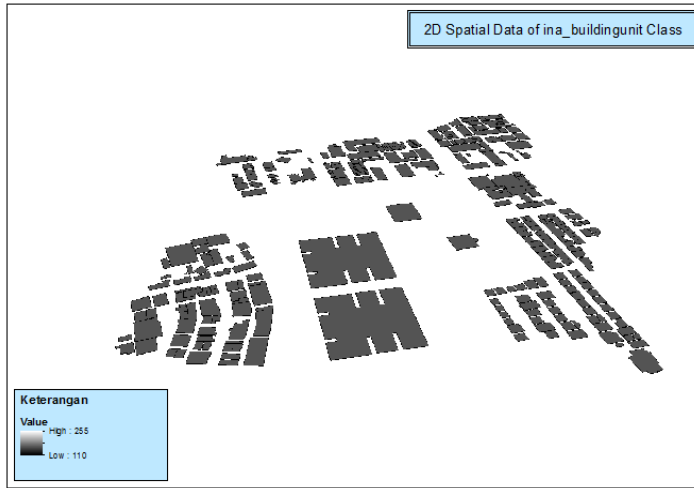## Indonesian 3D LADM Profile+(Finance+Legal+Planning)

Cadastral Data Management
Indonesian Profile

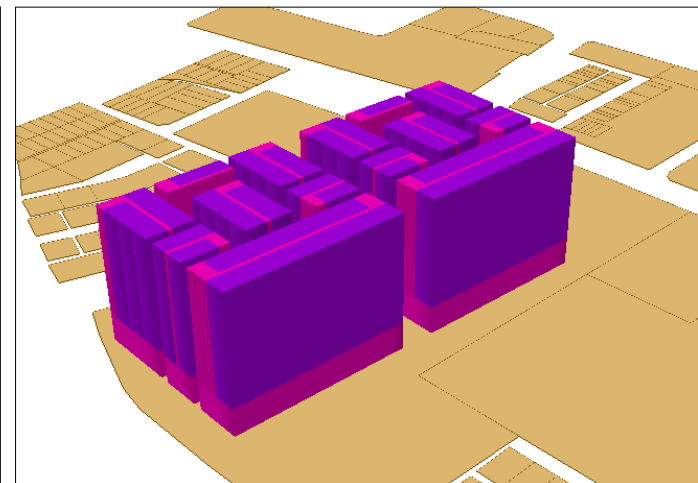comparison to existing study at Center for SDI at ITB

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class ina_3dcmd codelist

«CodeList» **partyrole**
+ citizen
+ bank
+ certified surveyor
+ conveyor
+ employee
+ farmer
+ money provider
+ notary
+ state administrator
+ surveyor
+ group party
+ owner

«CodeList» **patytype**
+ natural person
+ non-natural person
+ BAU group
+ group

«CodeList» **spatialsourcetype**
+ field sketch
+ gnss survey
+ orthophoto
+ relative measurement
+ topomap
+ video

«CodeList» **admindocumenttype**
+ Deed
+ LandCertificate
+ CourtDecision
+ MortgageCertificate
+ BiddingSummary

«CodeList» **grouppartytype**
+ association
+ baunitgroup
+ family
+ tribe

«CodeList» **righttype**
+ dispute
+ right of apartment unit
+ right of occupancy
+ right of ownership
+ right to use
+ right to construct building
+ right to cultivate
+ right to manage
+ usufruct
+ waqf

«CodeList» **restrictiontype**
+ admin public servitude
+ monument
+ mortgage
+ no building
+ servitude

«CodeList» **subparceltype**
+ implasemen
+ non-implasemen

«CodeList» **buildingunittype**
+ residential building
+ commersial building
+ industrial building

«CodeList» **parcelunittype**
+ apartment
+ office
+ restaurant
+ retail
+ shop house
+ shop office
+ stall
+ supermarket
+ parking
+ factory
+ clinic
+ condominium
+ service apartment
+ public housing
+ private housing
+ low cost housing
+ flat
+ transit housing
+ fitness center

«CodeList» **responsibilitytype**
+ monument maintenance
+ waterway maintenance

«CodeList» **exttaxspecialmark**
+ rural / urban area
+ plantation
+ forestry
+ non-oil and gas mining
+ oil and gas mining
+ strata title

«CodeList» **exttaxtype**
+ land
+ building
+ real estate

«CodeList» **equipmenttype**
+ unknown
+ stairs
+ passage
+ air space
+ lift
+ emergency exit
+ parking
+ play ground
+ swimming pool
+ garbage room
+ others

«CodeList» **facilitytype**
+ parking
+ flower park
+ store
+ ramp
+ others

«CodeList» **extlutype**
+ agriculture
+ housing
+ industry
+ nature
+ recreation

class ina_3dcmd_edit

«featureType» **ina_groupparty**
+ groupID: Oid
+ type: LA_GroupPartyType
constraints
{sum(LA_PartyMember.share)=1 per group}

«blueprint,featureType» **extparty**
+ extAddressID: extaddress [0..*]
+ fingerprint: Image [0..1]
+ name: CharacterString [0..1]
+ partyID: Oid
+ photo: Image [0..1]
+ signature: Image [0..1]

VersionedObject
«blueprint,featureType» **extaddress**
+ addressAreaName: CharacterString [0..1]
+ addressCoordinate: GM_Point [0..1]
+ addressID: Oid
+ buildingName: CharacterString [0..1]
+ buildingNumber: CharacterString [0..1]
+ city: CharacterString [0..1]
+ country: CharacterString [0..1]
+ postalCode: CharacterString [0..1]
+ postBox: CharacterString [0..1]
+ state: CharacterString [0..1]
+ streetName: CharacterString [0..1]

VersionedObject
«featureType» **ina_party**
+ extPID: Oid [0..1]
+ pID: Oid
+ name: CharacterString [0..1]
+ role: LA_PartyRoleType [0..*]
+ type: LA_PartyType

VersionedObject
«featureType» **ina_baunit**
+ name: CharacterString [0..1]
+ type: LA_BAUnitType
+ uID: Oid

VersionedObject
«featureType» **ina_spatialunit**
+ areaClosed(): Boolean
+ volumeClosed(): Boolean
+ computeArea(): Area
+ computeVolume(): Volume
+ createArea(): GM_MultiSurface
+ createVolume(): GM_MultiSolid

LA_Source
«featureType» **ina_spatialsource**
+ measurements: OM_Observation [0..*]
+ type: LA_SpatialSourceType

«featureType» **VersionedObject**
+ versionedobjectid: Character Varying = 13
+ submission_date: Date Time
+ beginLifespanVersion: DateTime
+ endLifespanVersion: DateTime [0..1]
+ status: Character Varying = 15

VersionedObject
«featureType» **ina_rrr**
+ description: CharacterString [0..1]
+ rID: Oid
+ share: Fraction [0..1]
+ shareCheck Boolean [0..1]
+ timeSpec: ISO8601_ISO14825_Type [0..1]

LA_Source
«featureType» **ina_adminsource**
+ text: MultiMediaType [0..1]
+ type: LA_AdministrativeSourceType

«featureType» **ina_right**
+ rightid: Character Varying [0..1] = 6
+ share: Integer [0..1]
+ righttype: Character Varying = 50
+ description: Character Varying [0..*] = 100
+ status Character Varying = 10
+ end_lifetime: date

«featureType» **ina_parcel**
+ parcelid: CharacterString = 13
+ parcel_number: CharacterString = 5
+ area_m2: Double Precision = (15, 5)
+ perimeter_m2: Double Precision = (15,5)
+ geometry: geometry

«featureType» **ina_restriction**
+ restrictionid: Character Varying [0..1] = 6
+ share: Integer [0..1]
+ restrictiontype: Character Varying = 50
+ description: Character Varying [0..*] = 100
+ status: Character Varying = 10
+ end_lifetime: date

«featureType» **ina_responsibility**
+ responsibilityid: Character Varying [0..1] = 6
+ share: Integer [0..1]
+ responsibilitytype: Character Varying = 50
+ description: Character Varying [0..*] = 100
+ status: Character Varying = 10
+ end_lifetime: date

«featureType» **ina_subparcel**
- subparcelid: Character Varying = 18
- subparcel_number: Character Varying = 10
- type: Character Varying = 30
- area_m2: Double Precision = (15,5)
- perimeter_m: Double Precision = (15,5)
- geometry: geometry

«featureType» **ina_buildingunit**
- buildingunitid: Character Varying = 18
- buildingunit_number: Character Varying = 10
- type: Character Varying = 30
- parcelunit_sum: numeric = 5
- floor_sum: numeric = 5
- geometry: geometry

«featureType» **exttaxation**
- nop: Character Varying = 18
+ province: Character Varying = 30
+ regency_city: Character Varying = 30
+ subdistrict: Character Varying = 30
+ village: Character Varying = 30
+ block: Character Varying = 30
+ taxobject_number: Character Varying = 4
+ special mark Character Varying = 30
+ taxtype: Character Varying = 30
+ taxdate: date

VersionedObject
«blueprint,featureType» **extlanduse**
+ type: ExtLandUseType

«featureType» **extbuildingpermits**
- imbid: Character Varying = 12
- imb_no: Character Varying = 30
- applicant_name: Character Varying = 50
- address: Character Varying = 50
- function: Character Varying = 30
- type: Character Varying = 30
- issued_date: date

«featureType» **ina_pef_unit**
- pefid: Character Varying = 25
- pef_number: Character Varying = 17
- floorarea_m2: Double Precision = (15,5)
- volume_m3: Double Precision = (15,5)
- type: Character Varying = 30
- floor: numeric = 5
- description: Character Varying = 100
- geometry: geometry

Cadastral Data Management
With Indonesian 3D LADM Profile

2D Spatial Data of ina_buildingunit Class

Keterangan
Value
High : 255
Low : 110

3D Spatial Data of ina_buildingunit Class

Keterangan
Value
High : 255
Low : 105

Law No.20/2011: building consist of function: main function, equipment, and facility

Legend:
Equipment
Parcel Unit

Cadastral Data Management
Land Information System and SDI in Indonesia

Fig. 6: Nature and Relations
between SDI components
(Rajabifard, 2001)

Land Information System	SDI Approach
LADM	Standards
Information infrastructure	Access Network
	Data
Land Policies	Policies
Institutional framework	People

Cadastral Data Management
Land Information System and SDI in Indonesia

Geospatial Information	Approach	
	Technical	Non-technical
Cadastre Layers	Information systems: collecting, managing, and distribution of cadastral and registry layers on national systems	*National Land Agency*
		Cadastre and Land Registry Layers At Cadastre Offices and Organizations
Other Geospatial Layers	Information Infrastructure: developing, maintaining, and facilitating data sharing	As a Clearinghouse to Indonesian SDI
		Regulations, Agreements, Capacity Building

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Cadastral in Indonesian SDI
Geospatial Information Sharing facilities

Fig 2. Current setting: Cadaster Data Services
connected to Indonesian SII (Indrajit, 2012)
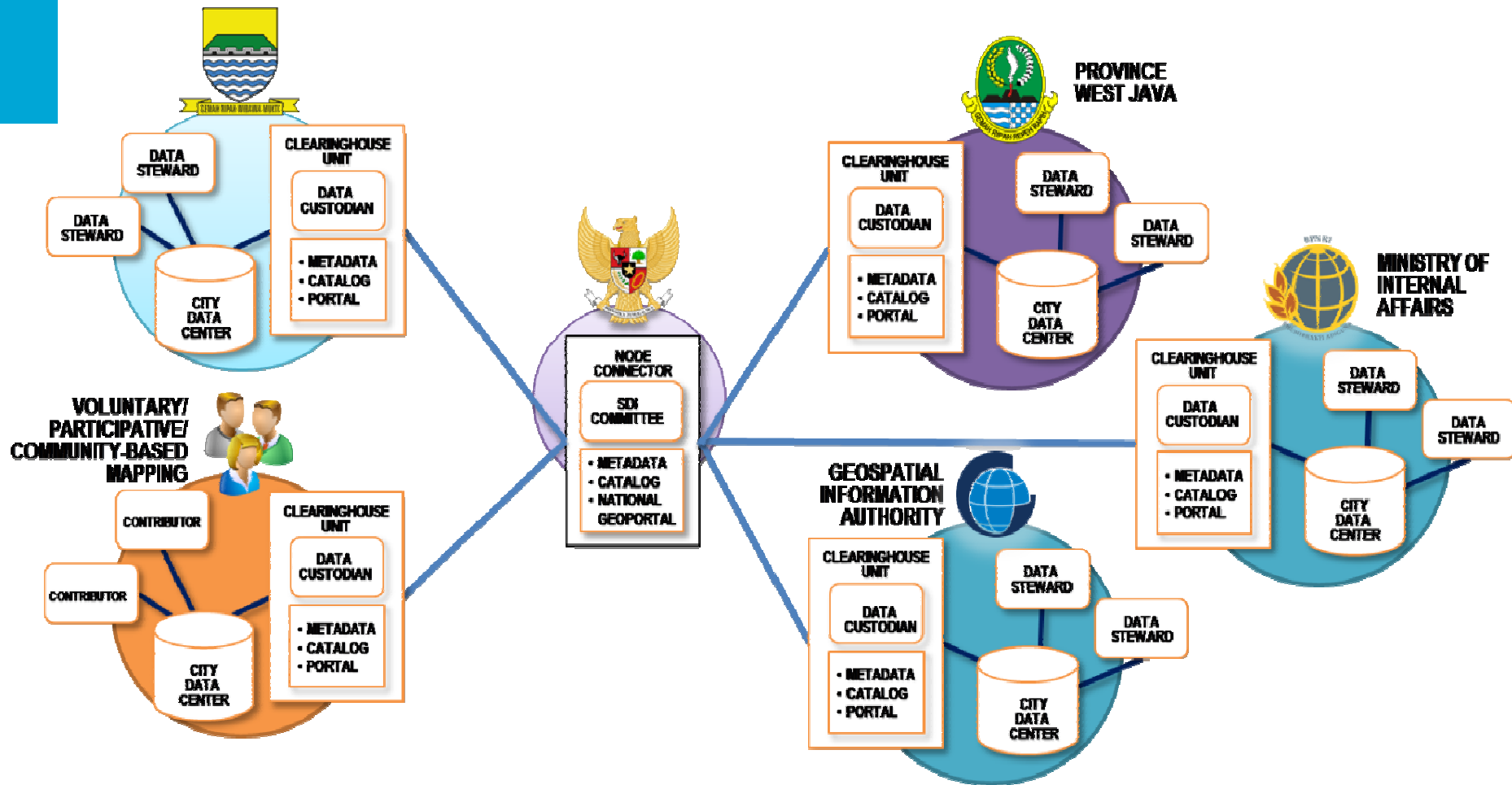
Geospatial Information in Open Government Indonesia:

Indonesan SDI Geoportal - http://tanahair.indonesia.go.id
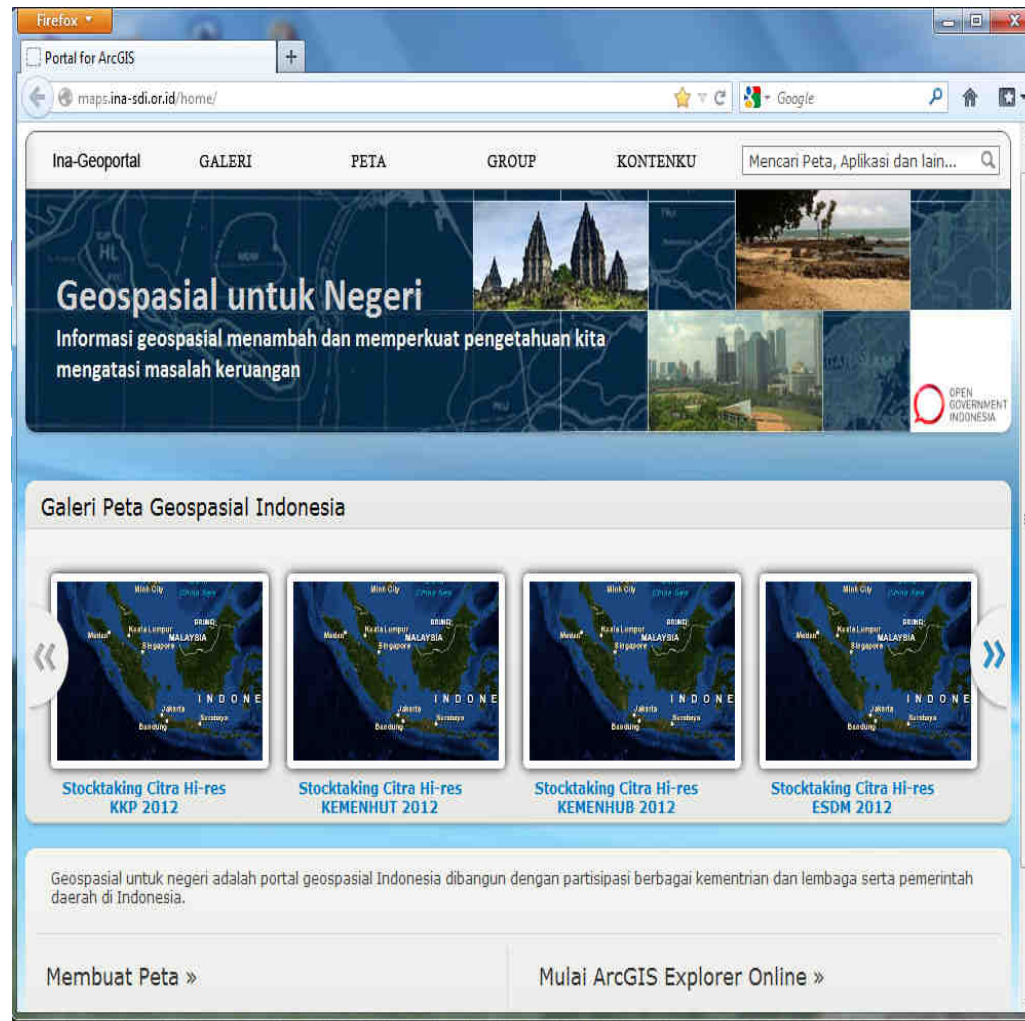
Geospatial Information in Open Government Indonesia:

Cadastral WebGIS: http://peta.bpn.go.id
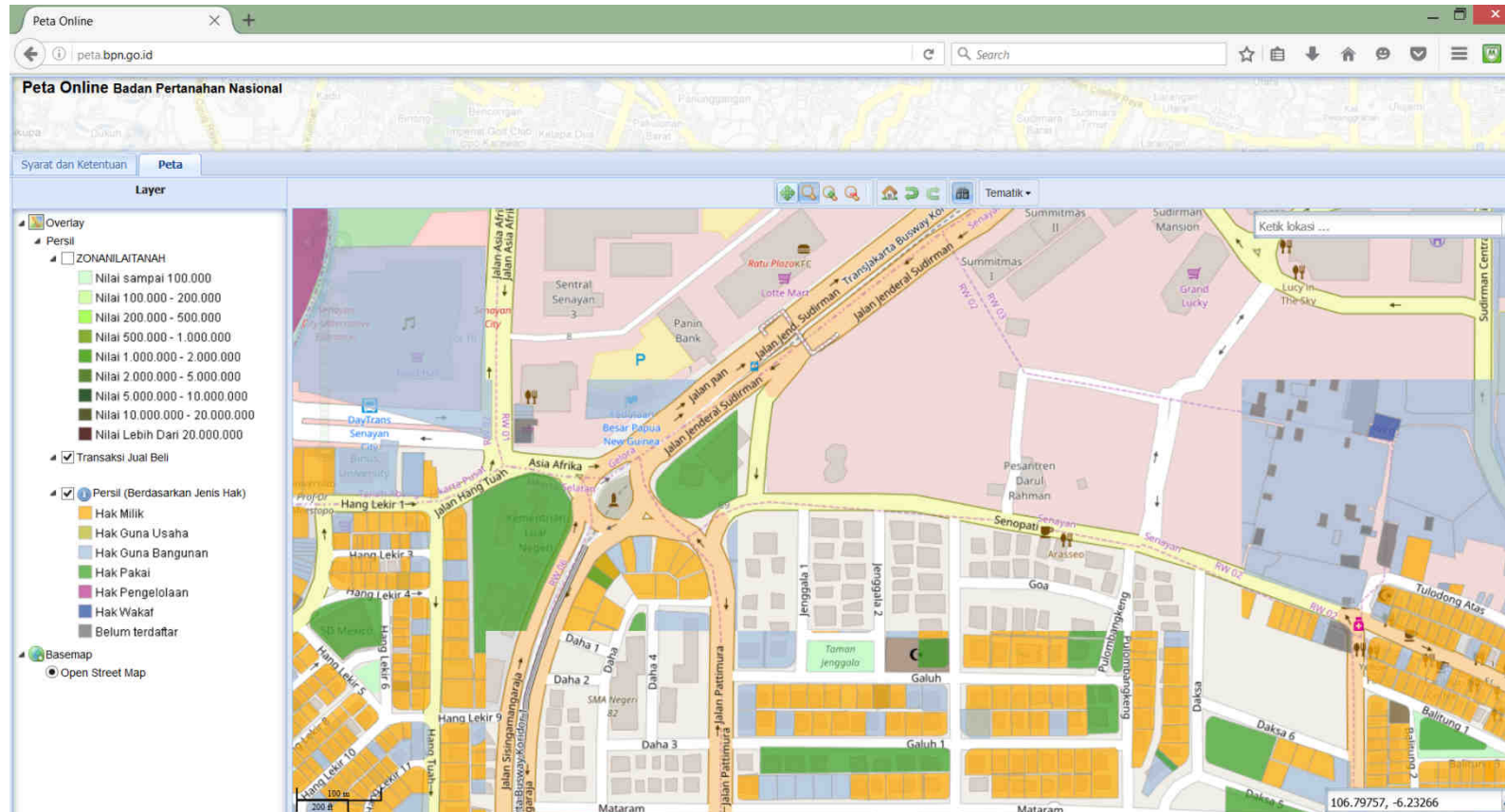
Toward 3D Cadastre Management in Indonesia:
A Temporary Conclusion and Suggestion

1. Institutional Arrangement for Land Administration and Building Data Management (National Land Agency, National Geospatial Information Authority, and Local Government)

2. City government should be promoted as Data Steward to Land Tenure, Land Values (incl. Taxation), and Land Use (incl. Planning, Environment, Maintenance) to get better decision making and giving services to its citizen and to detect changes in Cities.

3. LADM Standardization should be able to accommodate/linked to Finance, Legal, and Planning information/databases.

4. Urgency for cities to have 3D City Model for 3D cadastre and ability to manage Land Information System.

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Toward 3D Cadastre Management in Indonesia:
A Temporary Conclusion and Suggestion

Class	Note
SubParcel	A class for parcel block, which has special utilization
BuildingUnit	A class for building unit
SubBuildingFunction	A class for sub building function such as offices, equipment unit, and facility unit
extBuildingPermit	A class for the external registration of building permit
extTaxes	A class for the external registration of taxation data
extParty	A class for an external registration of parties
extAddress	A class for an external registration of addresses
extLandUse	A class for an external registration of Land Use Data
spatialSource	A subclass for class LA_Source to store simple information of data

Thank You