UNIVERSITY IN NOVI SAD, SERBIA
FACULTY OF TECHNICAL SCIENCES

LADM – EXPERIENCES AND CHALLENGES IN IMPLEMENTATION

Miro Govedarica, Aleksandra Radulović, Dubravka Sladić, and Dragana Popović

LADM 2018 Workshop, Zagreb, Croatia

Laboratory for Geoinformatics

Introduction

This paper presents:

- activities in development of LADM based cadastral profiles in Serbia, Montenegro and Republika Srpska - entity in Bosnia&Herzegovina
- how these profiles have been implemented in the form of a techical solution that operates in cadastral offices
- what challenges have been encountered during the process.

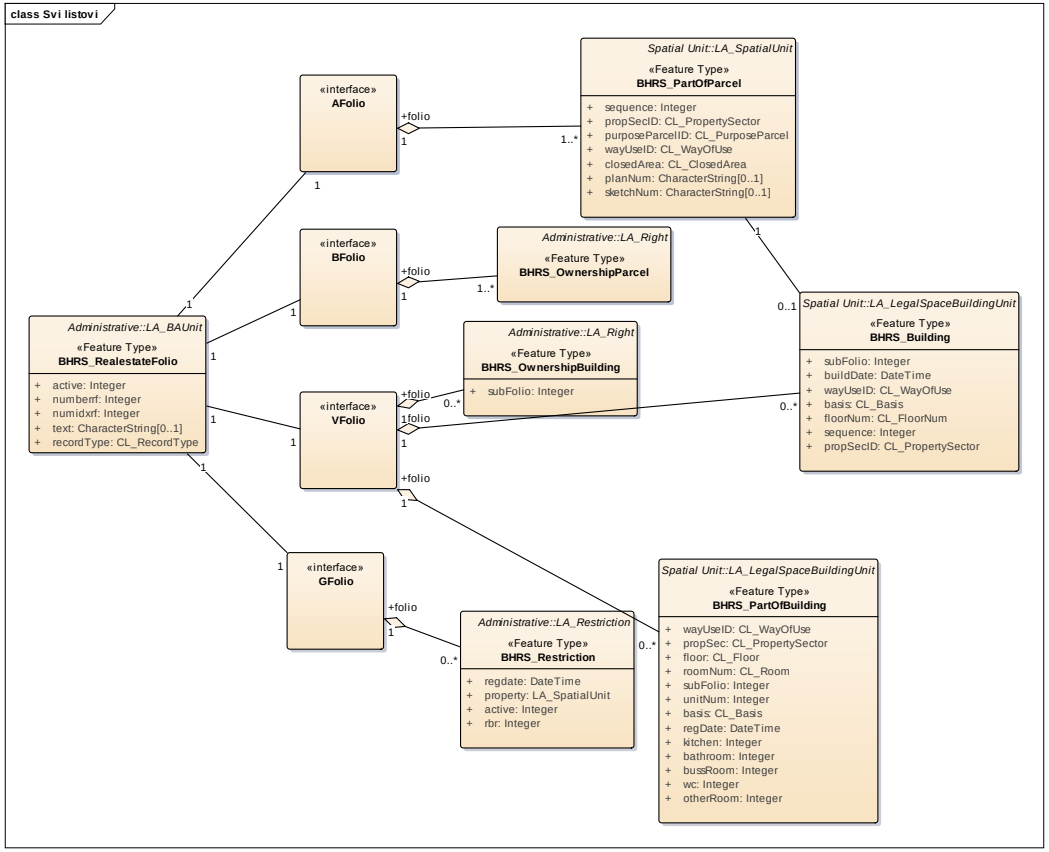
LADM profiles

Steps in profile development:

- analysis of appropriate national law and other relevant documents
- analysis of the international standards and literature review
- analysis of the current land information system (LIS) in specific region
- conceptual modeling
- development of standardized domain model
- profile verification

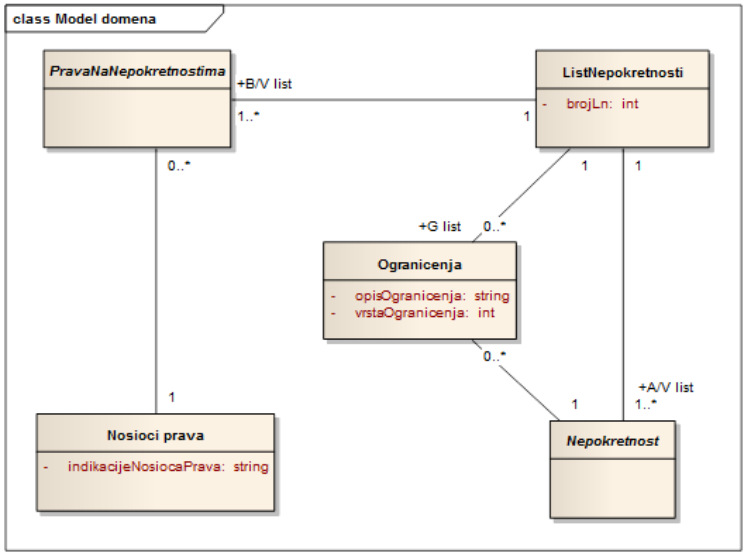
Case: Republika Srpska

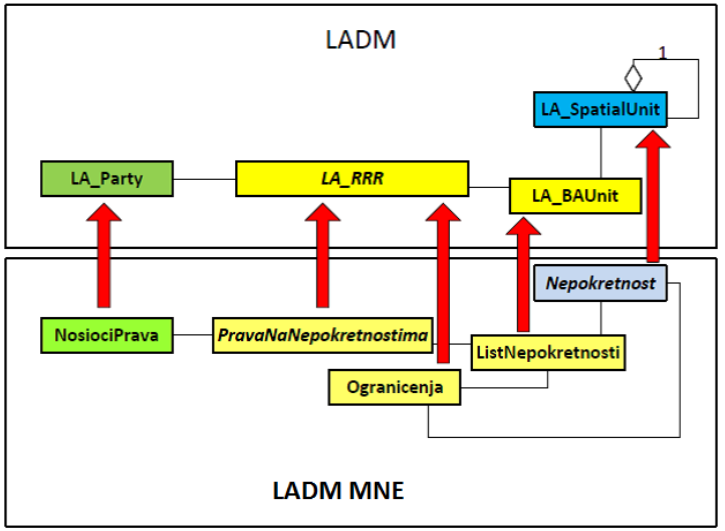
- Based on the Law on Survey and Cadastre (2011) and real estate folio document - “one to many” concept
- Challenges:
  - several types of registers for maintaining cadastral data
  - additional attribute which takes values from code list and indicates the register to which concept belongs



Case: Montenegro

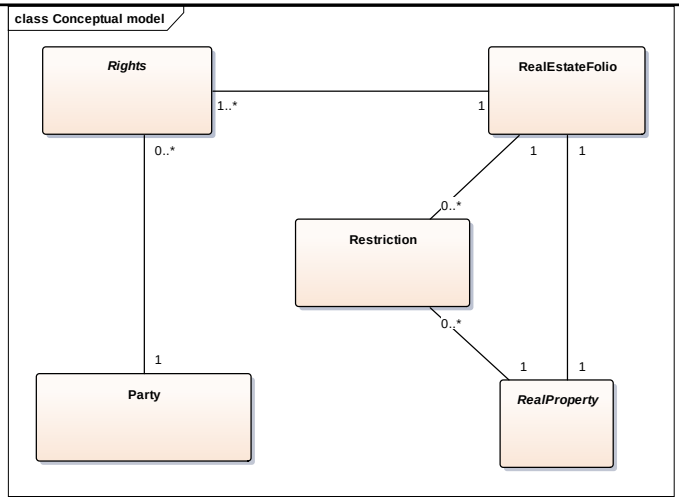
- Based on the Law on State Survay and Cadastre of Montenegro (2007) and real estate folio document - “one to many” concept
- Challenges:
  - land cadastre and real estate cadstre
  - additional attribute which takes values from code list and indicates the register to which concept belongs

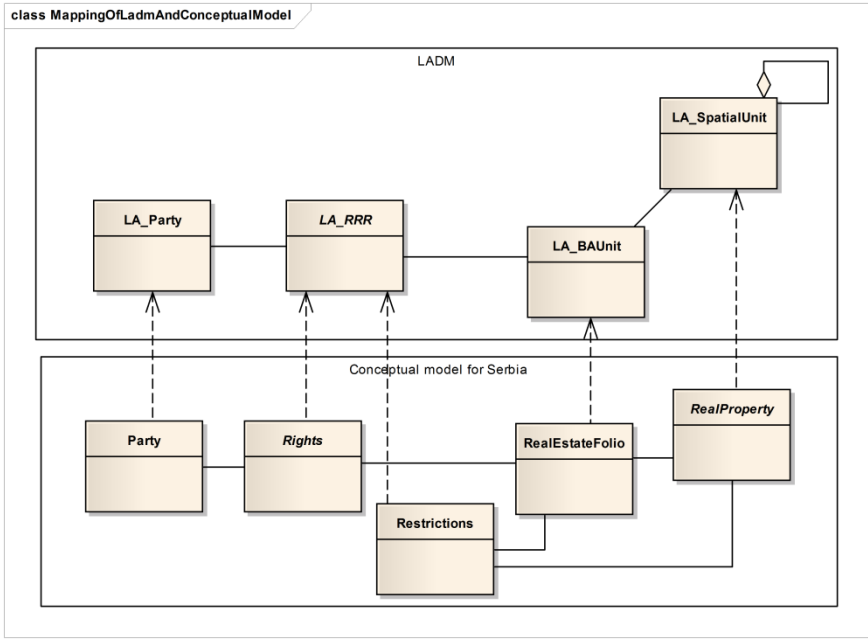




Case: Serbia

- Based on the Law on State Survey and Cadastre (2009) and real estate folio document – “one to one” concept
- Challenges:
  - existing data organized by the outdated law (“one to many” concept)
  - lack of data integrity
  - different data models from municipality to municipality





Similarities and differences between profiles

All of three profiles are conformant to all classes from low and medium level and to several classes from high level of conformance

LADM class	Serbian profile class	Montenegrin profile class	Republika Srpska's profile class	CL
LA_Source	RS_Source	MNE_Source	BHRS_Source	1
Party package				
LA_Party	RS_Party	MNE_Owner	BHRS_Owner	1
LA_GroupParty	RS_GroupParty	MNE_GroupOwner	BHRS_GroupOwner	2
LA_PartyMember	RS_PartyMember	MNE_OwnerMember	BHRS_OwnerMember	2
Administrative Package				
LA_RRR	RS_RRR	MNE_RRR	BHRS_RRR	1
LA_Right	RS_Right	MNE_Ownership	BHRS_OwnershipParcel	1
LA_Right	RS_Right	MNE_Ownership	BHRS_OwnershipBuilding	1
LA_Restriction	RS_Restriction	MNE_Restriction	BHRS_Restriction	2
LA_Restriction	RS_Notice	-	-	2
LA_Restriction	RS_Easement	-	-	2
LA_Responsibility	-	-		-
LA_BAUnit	RS_BAUnit	MNE_RealestateFolio	BHRS_RealestateFolio	1
LA_Mortgage	RS_Mortgage	MNE_Restriction	BHRS_Restriction	2
LA_AdministrativeSource	RS_AdministrativeSource	MNE_AdministrativeSource	BHRS_AdministrativeSource	1
LA_RequredRelationshipBAUnit	RS_RequredRelationshipBAUnit	-	-	3
Spatial Unit Package				
LA_SpatialUnit	RS_SpatialUnit	MNE_SpatialUnit	BHRS _SpatialUnit	1
LA_SpatialUnit	RS_Parcel	MNE_Parcel	BHRS _Parcel	1
LA_SpatialUnit	RS_PartOfParcel	MNE_PartOfParcel	BHRS _PartOfParcel	1
LA_SpatialUnit	RS_Building	MNE_Building	BHRS _Building	1
LA_SpatialUnitGroup	RS_SpatialUnitGroup	MNE_CadastralMunicipality	BHRS _CadastralMunicipality	2
LA_SpatialUnitGroup	RS_SpatialUnitGroup	MNE_AdministrativeMunicipality	BHRS_AdministrativeMunicipality	2
LA_SpatialUnitGroup	RS_SpatialUnitGroup	MNE_City	BHRS_City	2
LA_SpatialUnitGroup	RS_SpatialUnitGroup	MNE_Country	BHRS_Country	2
LA_SpatialUnitGroup	RS_SpatialUnitGroup	MNE_CadastralDistrict	BHRS_CadastralDistrict	2
LA_LegalSpaceBuildingUnit	RS_LegalSpaceBuildingUnit	MNE_PartOfBuilding	BHRS_PartOfBuilding	3
LA_LegalSpaceUtilityNetwork	RS_LegalSpaceUtilityNetwork	MNE_LegalSpaceUtilityNetwork	BHRS_LegalSpaceUtilityNetwork	3
LA_Level	RS_Level	MNE_Level	BHRS_Level	2
LA_RequredRelationshipSpatialUnit	RS_RequredRelationshipSpatialUnit	-	-	3
Surveying And Representations Subpackage				
LA_Point	RS_Point	MNE_Point	BHRS_Point	2
LA_Point	RS_Point	MNE_BasePoint	BHRS_BasePoint	2
LA_Point	RS_Point	MNE_DetailPoint	BHRS_DetailPoint	2
LA_SpatialSource	RS_SpatialSource	MNE_SpatialSource	BHRS_SpatialSource	2
LA_BoundaryFaceString	RS_BoundaryFaceString	MNE_PolyLine	BHRS_PolyLine	2
LA_BoundaryFaceString	RS_BoundaryFaceString	MNE_LineSegment	BHRS_LineSegment	2
LA_BoundaryFaceString	RS_BoundaryFaceString	MNE_Polygon	BHRS_Polygon	2
LA_BoundaryFace	-	-	-	-

Similarities and differences between profiles

- All three profiles are based on the real estate document due to the common history
- "One to many" concept of the real estate folio in Montenegro and Republika Srpska
- "One to one" concept of the real estate folio in Serbia
- Real estate cadastre is fully established only in Serbia
- Data migration is complex for Serbia since the data structures differ from municipality to municipality with a lack of relations between tables and they are based on outdated law

Region	Real estate folio document	„One to many" concept	„One to one" concept	Real estate cadastre established	Migration
Serbia	yes	no	yes	yes	complex
Montenegro	yes	yes	no	not fully	easy
B&H Republika Srpska	yes	yes	no	not fully	easy

Land Information System (LIS)

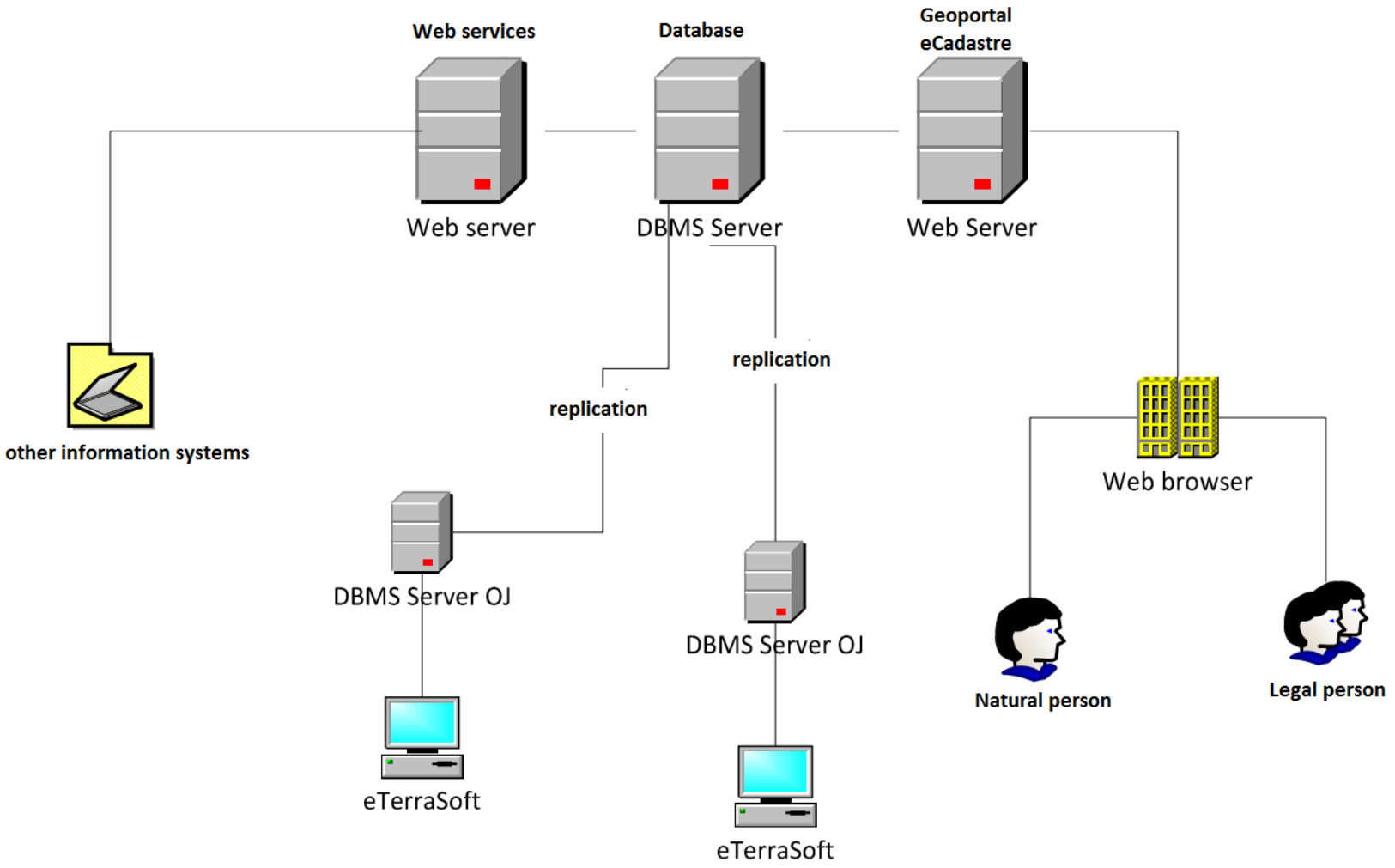
Three main subsystems of LIS:

- land register containing alphanumeric data about land, buildings, rights, restrictions and parties
- cadastre containing spatial data about land parcels and buildings
- office management for handling requests made by natural and legal persons

Technical solution consists of:

- module for maintaining cadastral data
- module for maintaining office management
- module for search and overview of cadastral and office management data through web – eCadastre
- customized GIS tool
- Geoportal
- Cadastral web services

Land Information System (LIS)



Challenges in LIS implementation

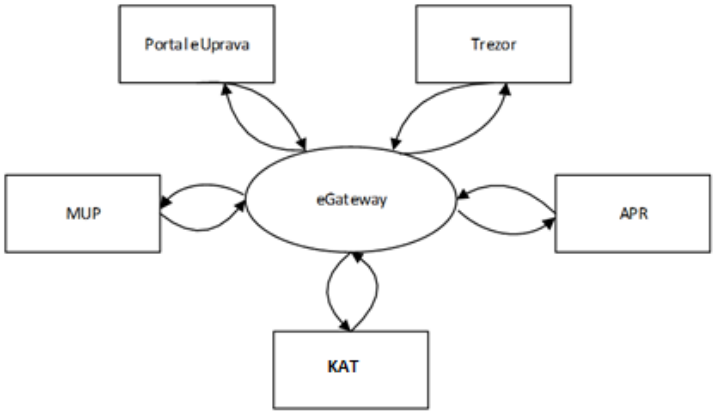
- Republika Srpska:
  - all mentioned modules were implemented in practice except the cadastral web services
  - challenges : overcome the problems of old low-functional equipment and absence of good data center as well as data links, lack of necessary information from the geodetic authority...
- Montenegro:
  - modules for maintaining cadastral (alphanumeric) data, office management module, cadastral web services and eCadastre were implemented in practice
  - challenges: based on previous bad cadastral procedures which resulted that real properties of half of the city were stored in one real estate folio.
- Serbia:
  - office management module and cadastral web services for the eGovernment were implemented
  - challenges: old equipment, data center exists but not functional for cadastral data since LIS application is DOS based, poor data links, lack of cooperation

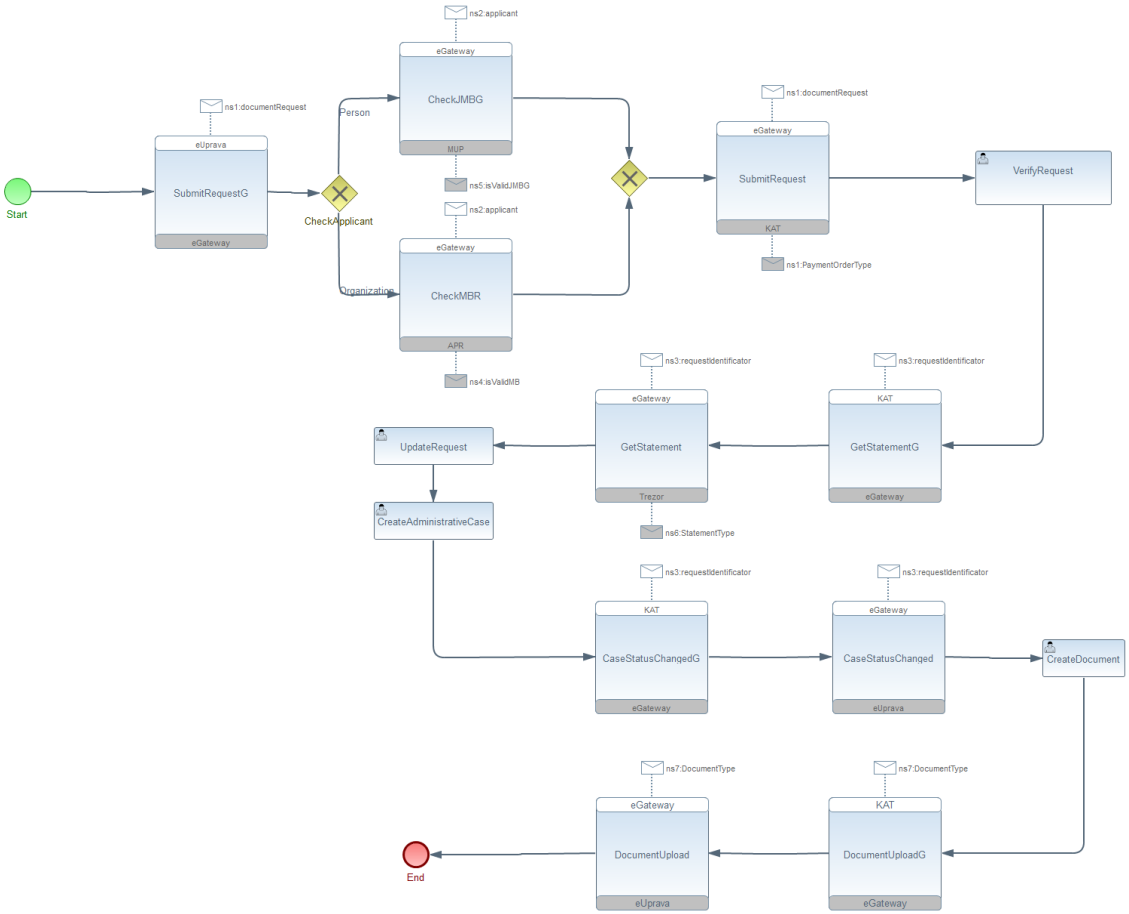
Electronic services for LIS

- Three types of services are developed
  - eCadastre service,
  - Web services to support integration with information systems of cooperative organizations and
  - geoportal services

Cadastral Web services

- for the information systems of other organizations (banks, Ministry of internal affairs, Ministry of finances, business registry agencies, etc.)
- for the work of the eGoverment portal





e-Cadastre

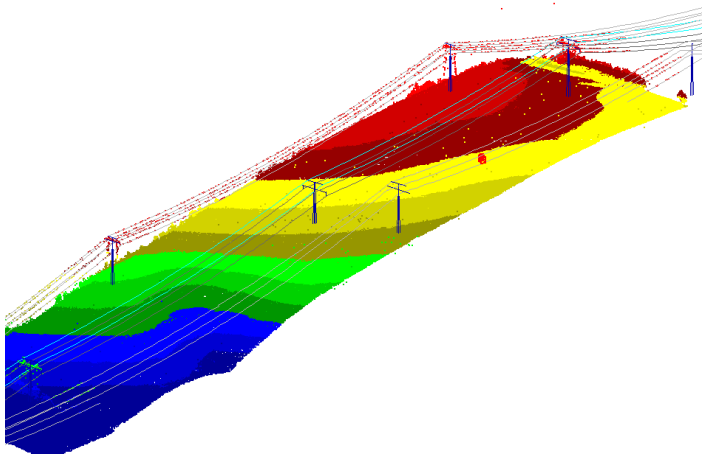
- online access to real-time data from real-time cadastral records via a web browser
- enables internal and external users to view cadstral and office management data
- different search criterias
- issuing of electronically signed documents and making requests for registered users like notaries...

Geoportal

- Geoportal is established and maintained by the mapping agencies as part of the Spatial Data Infrastructure and provides view of layers of spatial data, including parcels and buildings
- data is published as WMS, WFS and WCS
- only registered users can download data for a certain fee, therefore data is not open for general public

Disscussion on 3D for LIS

- We are using and analyzing the applicability of the technologies for acquisition of 2D and 3D data that can provide input to real estate and utility network cadastre:
  - Laser Scanner - LIDAR data
  - Global Navigation Satellite System (GNSS)
  - Ground Penetrating Radar (GPR)
- Formats that can be used for mapping 3D rights:
  - CityGML



Conclusion

This paper presents:

- challenges in development LADM profiles for Serbia, Montenegro and Republika Srpska
  - all three are conformant on medium level and several classes from high level
- how land information systems in these regions are organized
- similarities and differences between three systems
- implementation and challenges in these systems
- verification of profiles in implementation
- since the production of 3D data is increasing in these countries, this input can be used for registering 3D legal space in cadastre
- future work will include research on procedures of mapping and registration of 3D legal space by linking CityGML or BIM to LADM profiles.

Thank you very much for your attention!

Questions?