UNIVERSITY OF NOVI SAD
FACULTY OF TECHNICAL SCIENCES

LADM BASED TAXATION MODEL IN MONTENEGRO: USING BIM IN TAXATION PROCESS

Aleksandra RADULOVIĆ, Dubravka SLADIĆ and Miro GOVEDARICA, Serbia
Dušan RAIČEVIĆ, Montenegro

Geoinformatics Laboratory

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INTRODUCTION

- valuation and taxation processes are of great importance
- analysis of the legal regulations and laws, as well as the way of functioning of the tax administration procedure in Montenegro is performed
- LADM based tax administration model for Montenegro is developed
- potential mapping of entities from the BIM model to the appropriate code lists of the building quality and other attributes is presented
- Since the amount of data for the building quality is quite large, it is often not entered in practice but a predefined building quality coefficient is entered for each building.
- Automating this process by using BIM would solve this problem for new buildings

PROPERTY TAXATION IN MONTENEGRO

- Tax administration procedure in Montenegro is prescribed by the 'Law on property tax' (2019).
- The basic criteria for determining the market value of real property are:
  - average market price per m2,
  - purpose of the real property,
  - size of the real property,
  - the place where the real property is located,
  - quality of the real property and
  - other elements that may have an impact on the market value of the real property.
- Detailed criteria and methodology for determining the market value of real property are prescribed by the Government of Montenegro within the 'Regulation' (2011).

PROPERTY TAXATION IN MONTENEGRO

$$buildValue = price * area$$

$$zoneVal = \left(buildValue - buildValue * \left(\frac{coefOld * (year - constYear)}{100} \right) \right) * coefZone$$

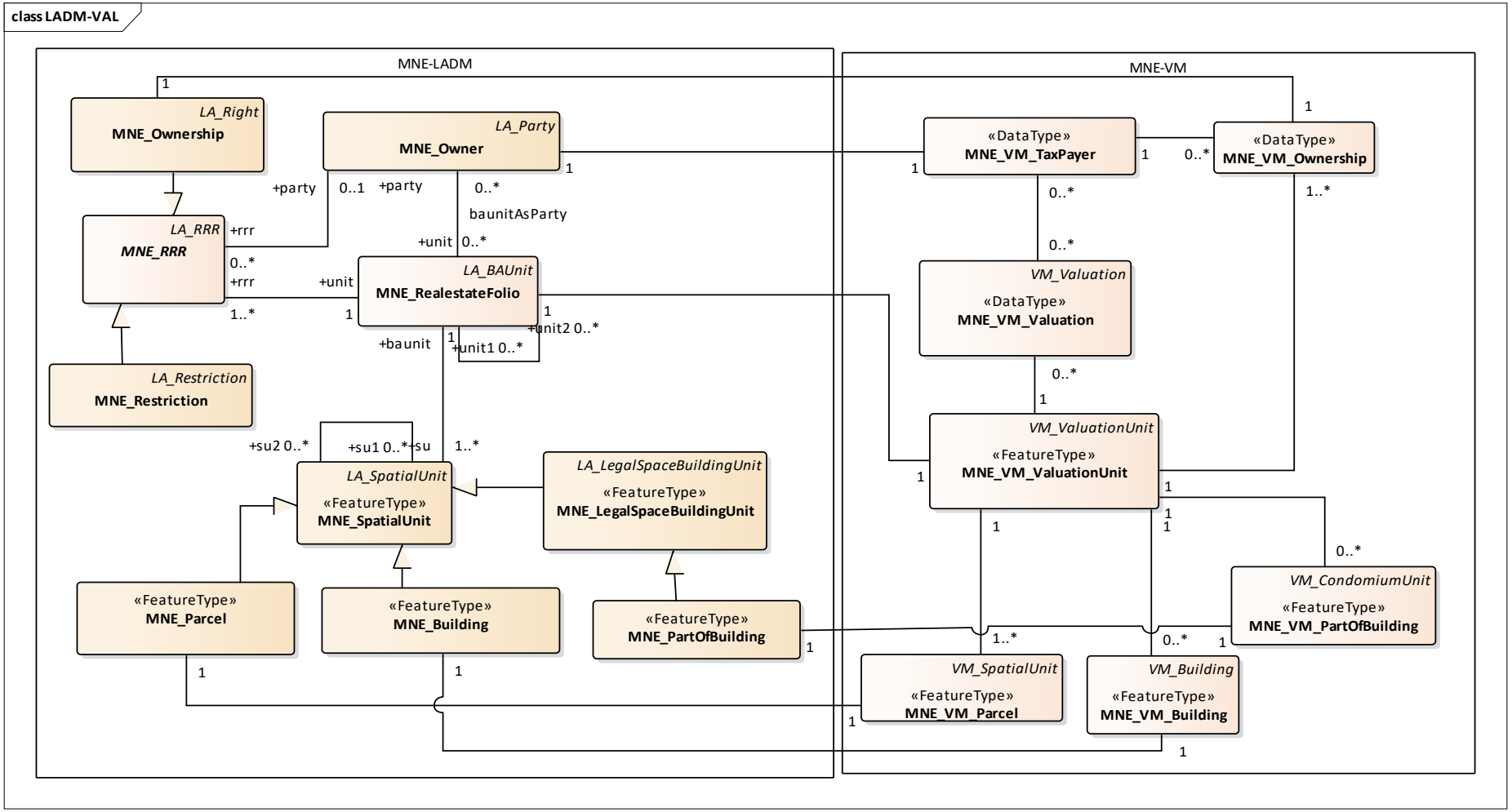
$$qualVal = \left(\frac{\sum_{n=1}^{n} (qualBuild_n)}{coefQualTotal} \right)$$

$$rateVal = \frac{\left(\frac{shareNum}{shareDen} * qualVal * zoneVal * taxRate \right)}{100}$$

$$inhabVal = rateVal - rateVal * \frac{coefInhab}{100}$$

$$taxVal = inhabVal - inhabVal * \frac{coefMemb}{100}$$

LADM BASED DATA MODEL FOR PROPERTY TAXATION IN MONTENEGRO



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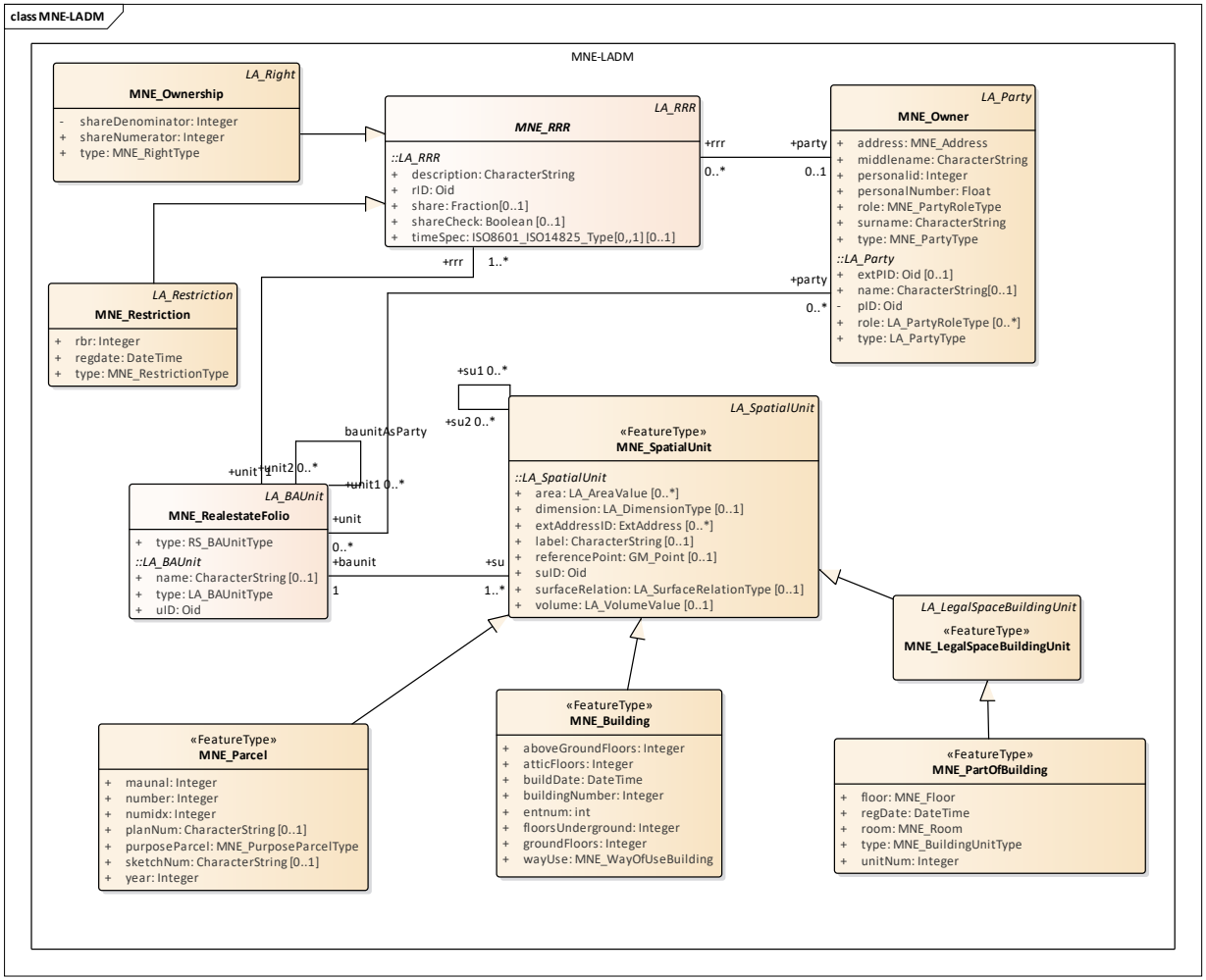

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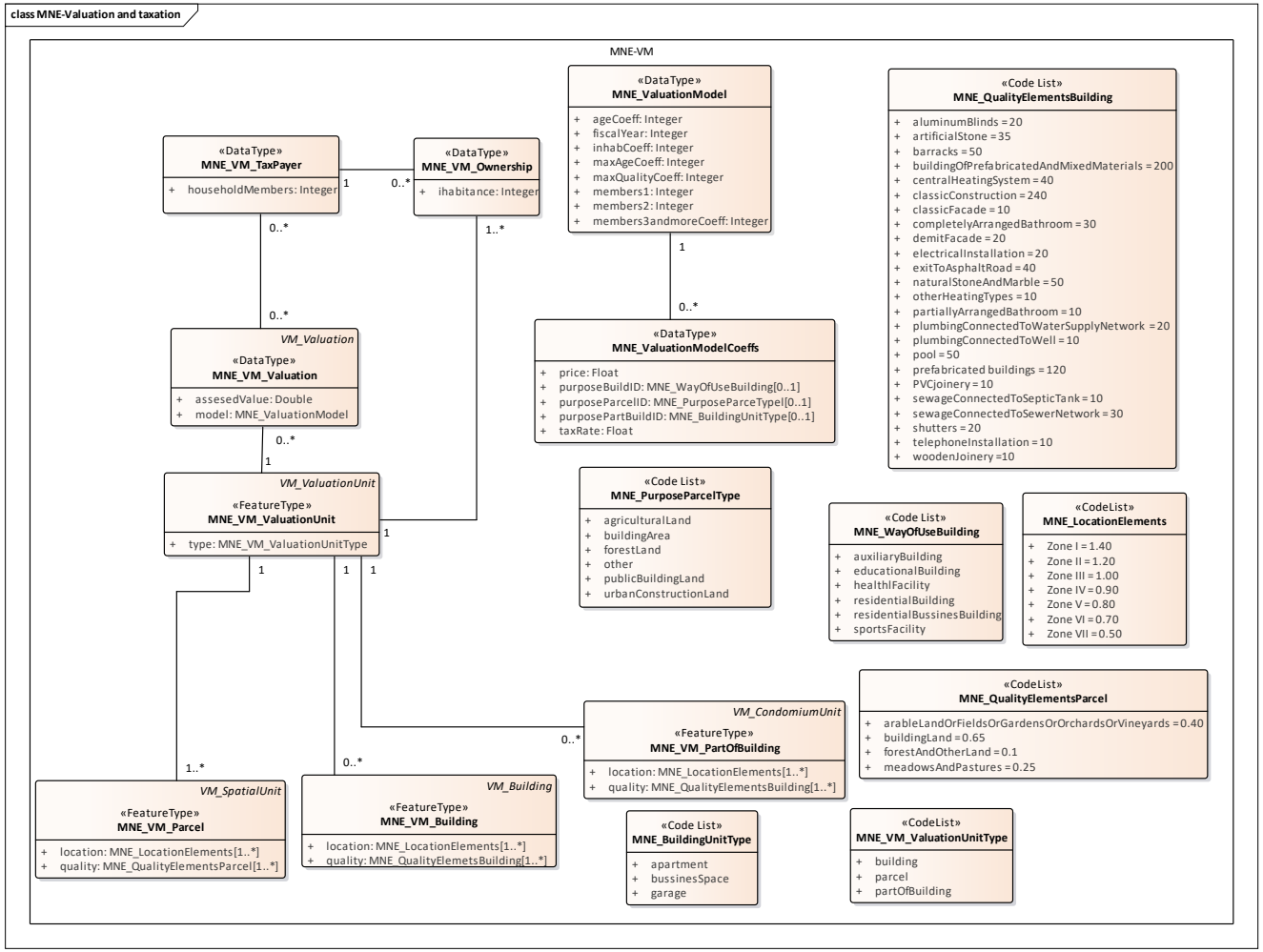
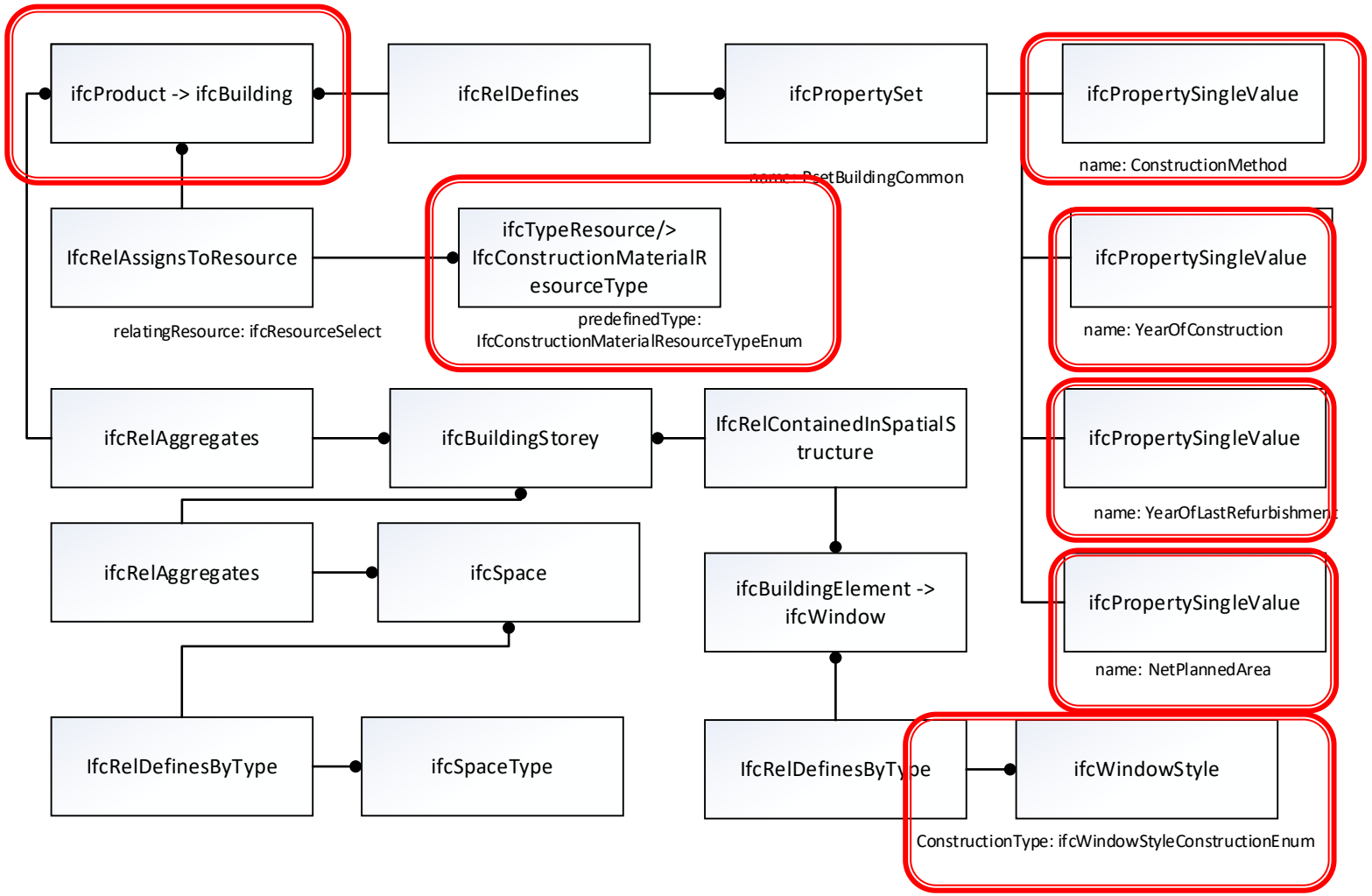


USING BIM FOR BUILDING QUALITY ASSESMENT

- the Municipality of Bar is pilot municipality
- caracterized by rapid urbanization
- new buildings have a BIM model which can be used at least two other purposes
  - An input for 3D Cadastre
  - to extract information relevant for calculation of taxes, such as quality of the building, building age

USING BIM FOR BUILDING QUALITY ASSESMENT



Quality parameter	Quality description	IFC mapping
1. Building construction	1.1. Buildings made of unfired brick or barracks 50 points; 1.2. Prefabricated buildings (wooden, sheet metal, iron) 120 points; 1.3. Buildings made of prefabricated elements and mixed materials 200 points; 1.4. Classic construction (hard material) 240 points;	ifcBuilding - Pset_BuildingCommon - ConstructionMethod (ifcLabel) IfcConstructionMaterialResourceTypeEnum (AGGREGATES – Construction aggregate including sand, gravel, and crushed stone. CONCRETE – Cast-in-place concrete. DRYWALL – Wall board, including gypsum board. FUEL – Fuel for running equipment. GYPSUM – Any gypsum material. MASONRY – Masonry including brick, stone, concrete block, glass block, and tile. METAL – Any metallic material. PLASTIC - Any plastic material. WOOD – Any wood material. NOTDEFINED – Undefined resource. USERDEFINED – User-defined type
2. Building treatment (exterior)	2.1. Classic facade 10 points; 2.2. Demit facade and brick-clad facade 20 points; 2.3. Artificial stone 35 points; 2.4. Facade lined with natural stone or marble 50 points;	IfcConstructionMaterialResourceTypeEnum (AGGREGATES – Construction aggregate including sand, gravel, and crushed stone USERDEFINED – User-defined type)
3. Equipment of construction facilities	3.1. Window 3.1.1 PVC 10 points; 3.1.2 Wooden joinery 10 points; 3.1.3 Aluminum blinds 20 points; 3.1.4 Shutters - shutters 20 points;	ifcWindow, ifcWindowStyle, IfcWindowStyleConstructionEnum (ALUMINIUM, HIGH_GRADE_STEEL, STEEL, WOOD, ALUMINIUM_WOOD, PLASTIC, OTHER_CONSTRUCTION, NOTDEFINED)
4. Sanitary equipment	4.1. Completely decorated bathroom (bath - shower, toilet, sink) 30 points; 4.2. Partially decorated bathroom, 10 points per apartment;	IfcSpaceType/LongName , IfcSanitaryTerminalTypeEnum (BATH, SHOWER, SINK, TOILETPAN, WASHHANDBASIN, WCSEAT)
5. Water supply	5.1. Plumbing connected to the water supply network, 20 points per apartment; 5.2. Plumbing connected to the well - hydrophore 10 points;	IfcPipeSegment/ IfcPipeSegmentType / IfcPipeSegmentTypeEnum
6. Sewage	6.1. Sewerage connected to the sewerage network, per apartment 30 points; 6.2. Sewage connected to the septic tank, per apartment 10 points;	IfcWasteTerminalTypeEnum (FLOORWASTE – Pipe fitting, set into the floor, that collects waste water and discharges it to a separate trap, USERDEFINED - User-defined type.)
7. Electrical Installation	7.1. Electrical installation 20 points; 7.2. Telephone installation 10 points;	IfcCableSegment / IfcCableSegmentType /IfcCableSegmentTypeEnum, IfcElectricDistributionBoard / IfcElectricDistributionBoardType /IfcElectricDistributionBoardTypeEnum
8. Heating	8.1. Central heating 40 points; 8.2. Other heating (solid fuel, liquid and electric) 10 points;	IfcSpaceHeater / IfcSpaceHeaterType, IfcSpaceHeaterTypeEnum (CONVECTOR / RADIATOR / USERDEFINED)
9. Elements that increase the value of an object	9.1. Swimming pool 50 points; 9.2. Exit to the asphalt road 40 points	IfcConstructionEquipmentResourceTypeEnum (PAVING - Roads or walkways such as asphalt or concrete)

CONCLUSION

- we developed LADM based conceptual model for property valuation and taxation in Montenegro
- based on this conceptual model, a database and a web-based software solution were developed in Municipality of Bar
- we introduced the idea of using BIM to extract quality parameters of building that are used for valuation and taxation to provide automation, which are otherwise entered manually and are very often incorrect in practice
- without appropriate quality information the similar amount of tax would be assigned to moderate real properties and exclusive properties.
- the income of taxes is important for local self-governments, especially since Bar is a touristic place and there are a lot of luxury real properties for which a larger tax should be paid.
- Future work :
  - development of IFC extension for property valuation
  - expanding the developed model to include tourist tax

Thank you for your attention!