DIGITAL URBAN MINING PLATFORM FOR CIRCULAR ECONOMY

BIMstocks

The strong population growth and urbanization are increasing the global resources and energy consumption. The building stock has great potential to serve as raw material reservoir, however currently there is a lack of comprehensive knowledge about the actual building stock, which is the largest obstacle for reusing and recycling of materials and elements.

The main goal of BIMstocks is to develop a method for a consistent digital documentation of the material composition of the existing building stock for modeling the secondary raw materials cadaster and prediction of the recycling potential, by creating a catalogue of BIM-Objects of typically Viennese buildings and follow-up generation of as-built BIM-Models, thus enabling an upscaling to city level. Analyzing and scanning of 10 different use cases, which will represent the variety of typical Viennese buildings, will enable the upscaling to city level. The final aim is to generate a GIS-based Urban Mining Platform, which embeds the obtained information of the use cases and predicts the recycling potential, the material flow and waste mass.

The main use of the obtained results from BIMstocks is the increase of recycling rates by applying urban mining strategies, for which the generated public urban mining platform serves as a basis.

SCI_BIM

Building stocks and infrastructures are the largest material stock of industrial economies. The aim of SCI_ is increasing of resources and energy efficiency using gamification concept, through coupling of technologies and methods for capturing and modelling (as-built BIM) of buildings and assets (geometry and material composition). Using a real case (TU Wien, Aspanggründe) the Integrated Data Capturing and Modelling Methods will be tested and evaluated in terms of costs and benefits. Thereby for capturing of geometry we will use laser scanning and photogrammetry, and for capturing of material composition Ground Penetrating Radar (GPR). Finally, a Proof of Concept for the suitability of GPR for material capturing and modelling via semi-automatic Scan to BIM process for generation of information-rich as-built BIM from a Point-Cloud will be compiled, which would enable efficient generation of models for Material Passports. Thereby Material Passports deliver useful information for the material cadaster as well as for the assessment of the material value of a building.

FRAMEWORK

DATA GATHERING

GEOMETRY

MATERIAL

PRE-PROCESSING FOR BIM

POINT-CLOUD

MODEL CREATION

ENRICHED BIM
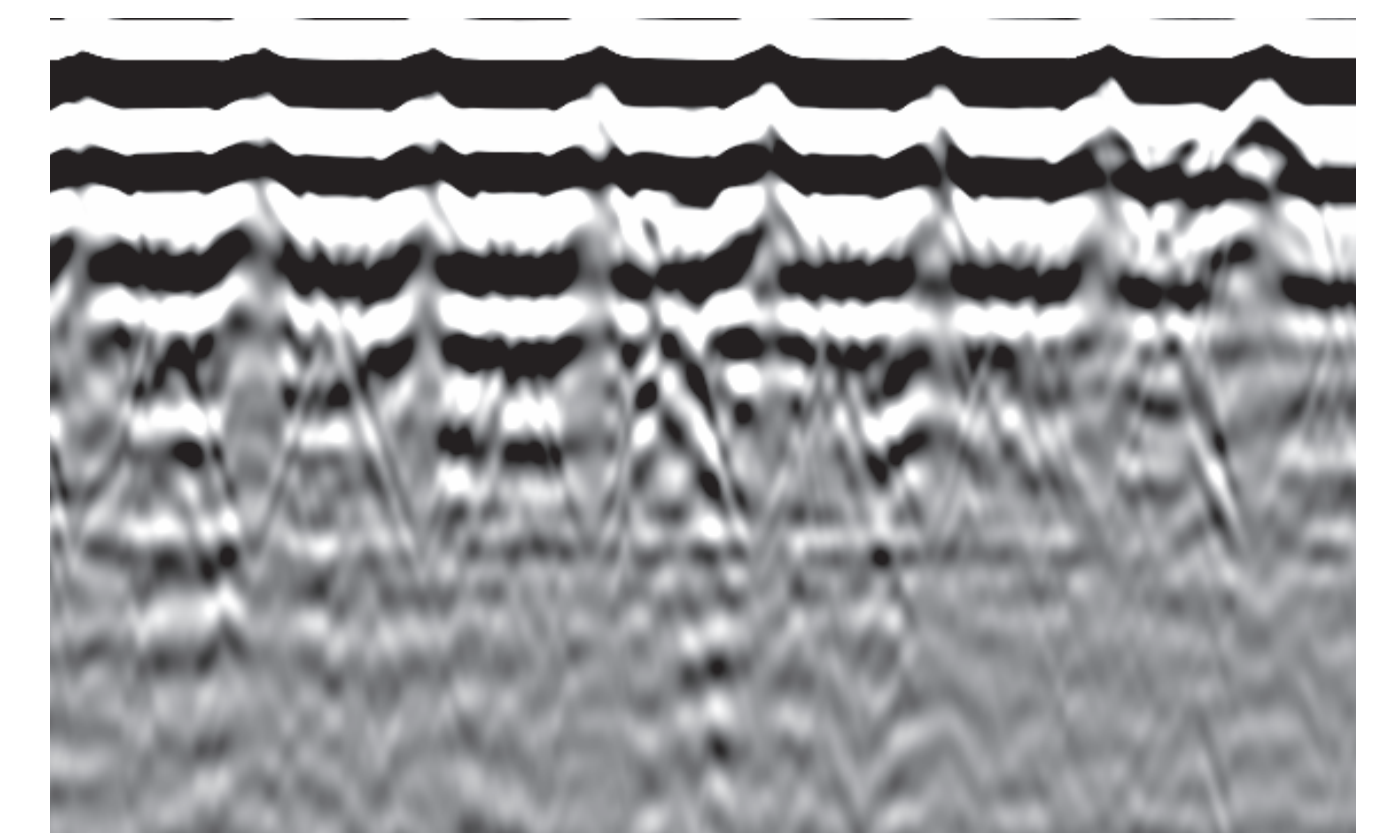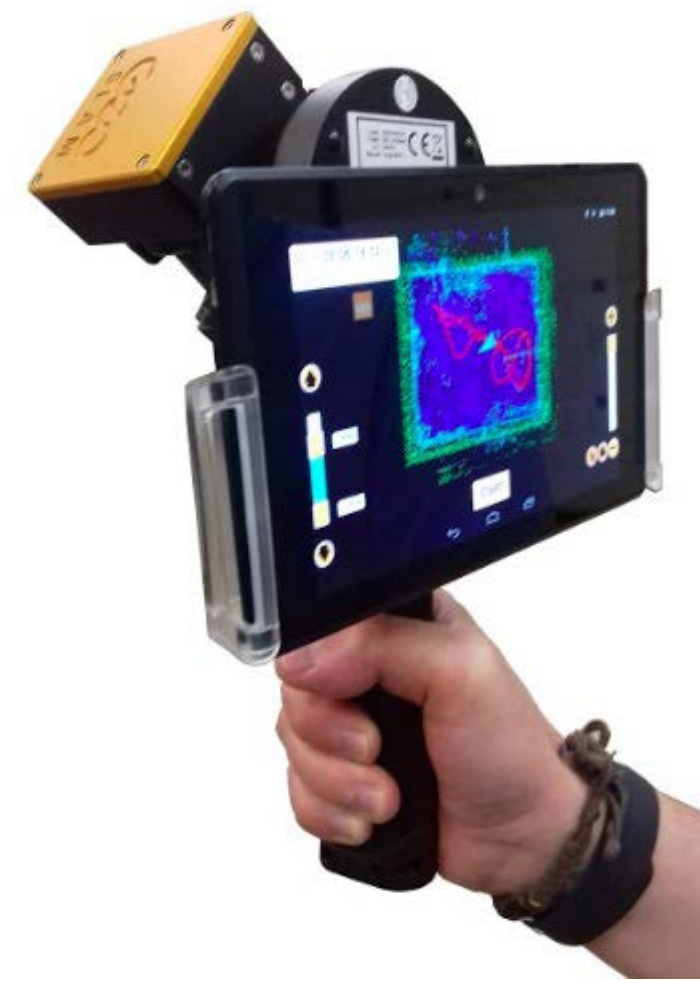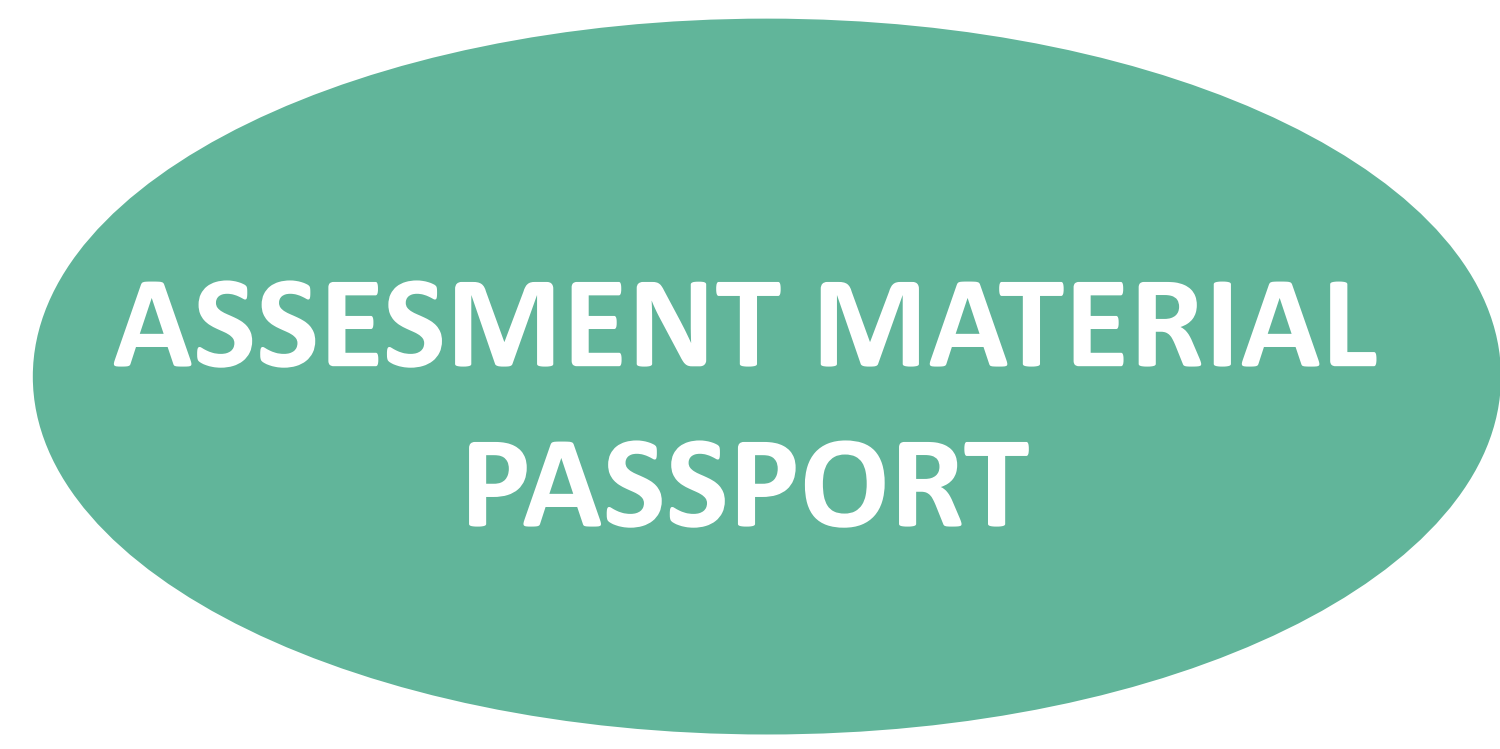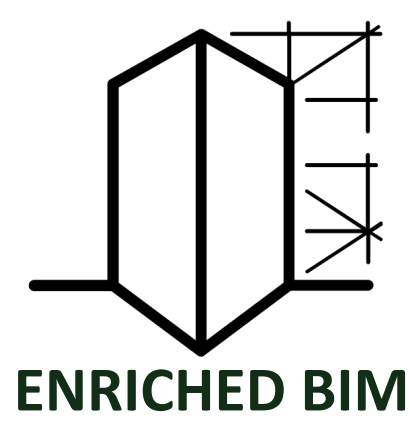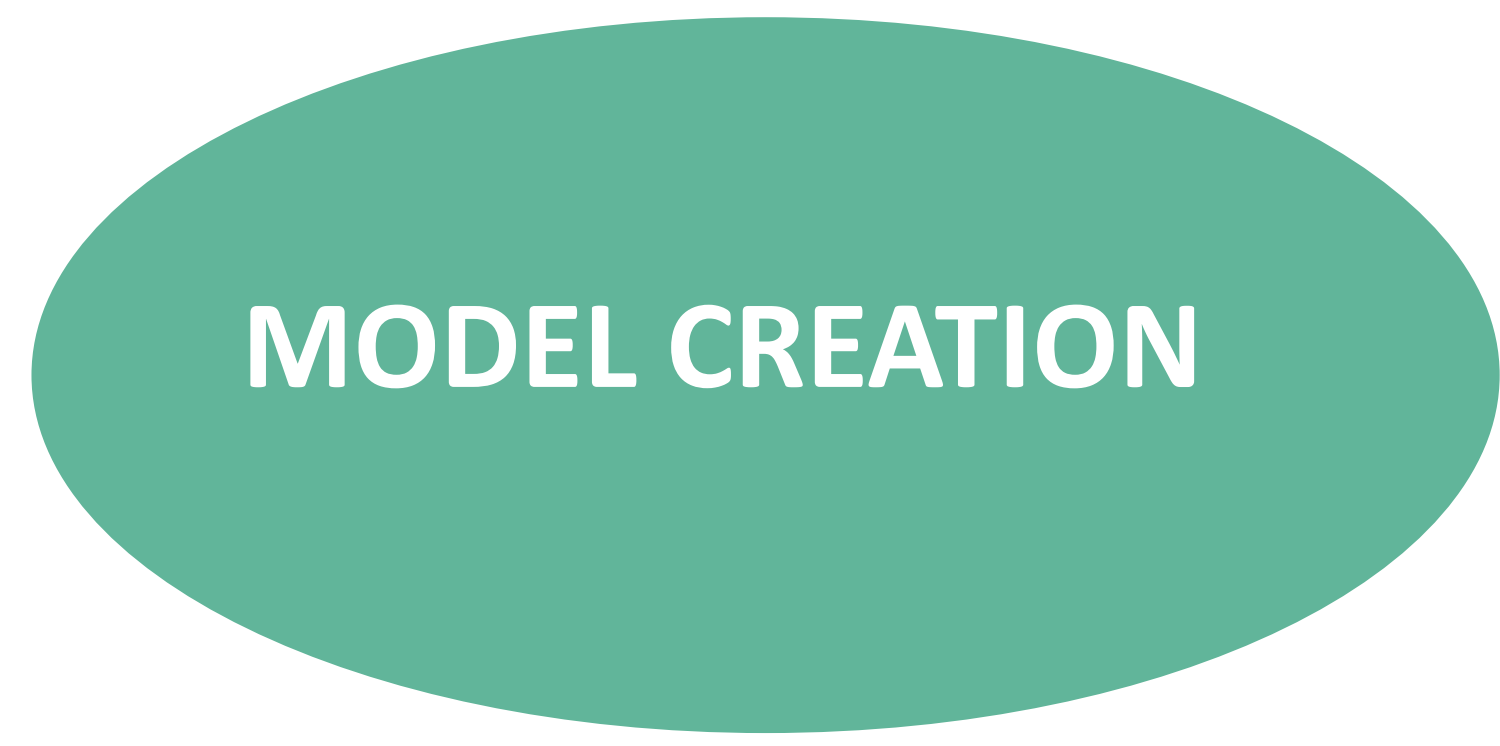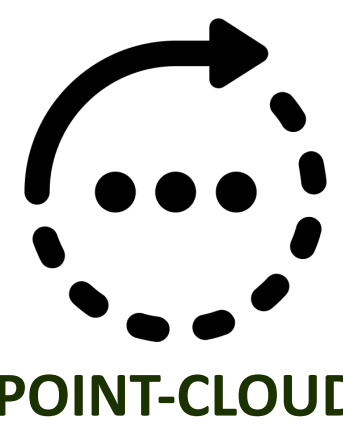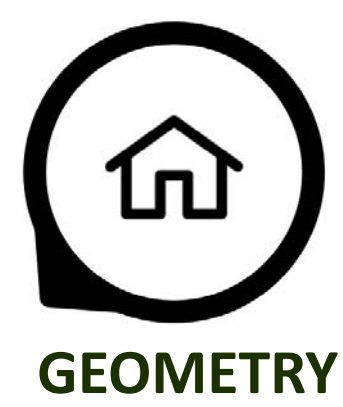
MATERIAL PROPERTIES

MATERIAL LIST

ASSESMENT MATERIAL PASSPORT

RESULT

BIM-BASED Material Passport

RECYCLING POTENTIAL OF THE BUILDING	Recycling grade	Share of recycling (t)	Share of waste (t)
1 (86 - 100%)			
1,5 (72 - 86%)			
2 (58 - 72%)			
2,5 (44 - 58%)	2,5	638	700
3 (31 - 44%)			
3,5 (17 - 31%)			
4 (3 - 17%)			
4,5 (-11 - 3%)			
5 (-25 - -11%)			

DIGITAL URBAN MINING PLATFORM

PREDICTION OF MATERIAL STOCK

1 Quelle: https://www.mertind.com/bolivia/index.php/productos-scaning/laser-scanner/mineria-2/zeb-revo-rt-detail   2 Quelle: http://home.agh.edu.pl/~karcz/inneGeoradary.html