# Geodesy and Cartography at the Slovak University of Technology: Education, Innovation, and Research in Surveying

Alojz Kopáčik, Ján Erdélyi

STU SvF

SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA
FACULTY OF CIVIL ENGINEERING

www.svf.stuba.sk

# Slovakia – Bratislava – STU – Faculty of Civil Engineering (SvF)



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# Slovak University of Technology in Bratislava (STU)

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**STU in numbers:**

- **168 664** graduates
- **10 976** students
- **7** faculties (schools)
- **1** institute
- **740** research projects
- **400** study programmes
- **250** contractual research projects
- **116** framework agreements with foreign universities
- **90** international projects
- **1 280** teaching and research staff

**STU offers**:

**unity of education and scientific research**, engineering and arts

**theoretical-practical learning** methods (link to Mining academy in Banská Štiavnica)

direct **cooperation with industry** & strong **international links**

# Slovak University of Technology in Bratislava (STU)

- Faculty of Civil Engineering

- Faculty of Mechanical Engineering

- Faculty of Electrical Engineering and Information Technology

- Faculty of Chemical and Food Technology

- Faculty of Architecture and Design

- Faculty of Material Sciences and Technology

- Faculty of Informatics and Information Technologies

Institute of Management
Lifelong Learning Institute
STU Research Centre
Multimedia Centre, Computing Centre, Publishing House,
Student Houses, Academic Sports Centre

# Slovak University of Technology in Bratislava (STU)
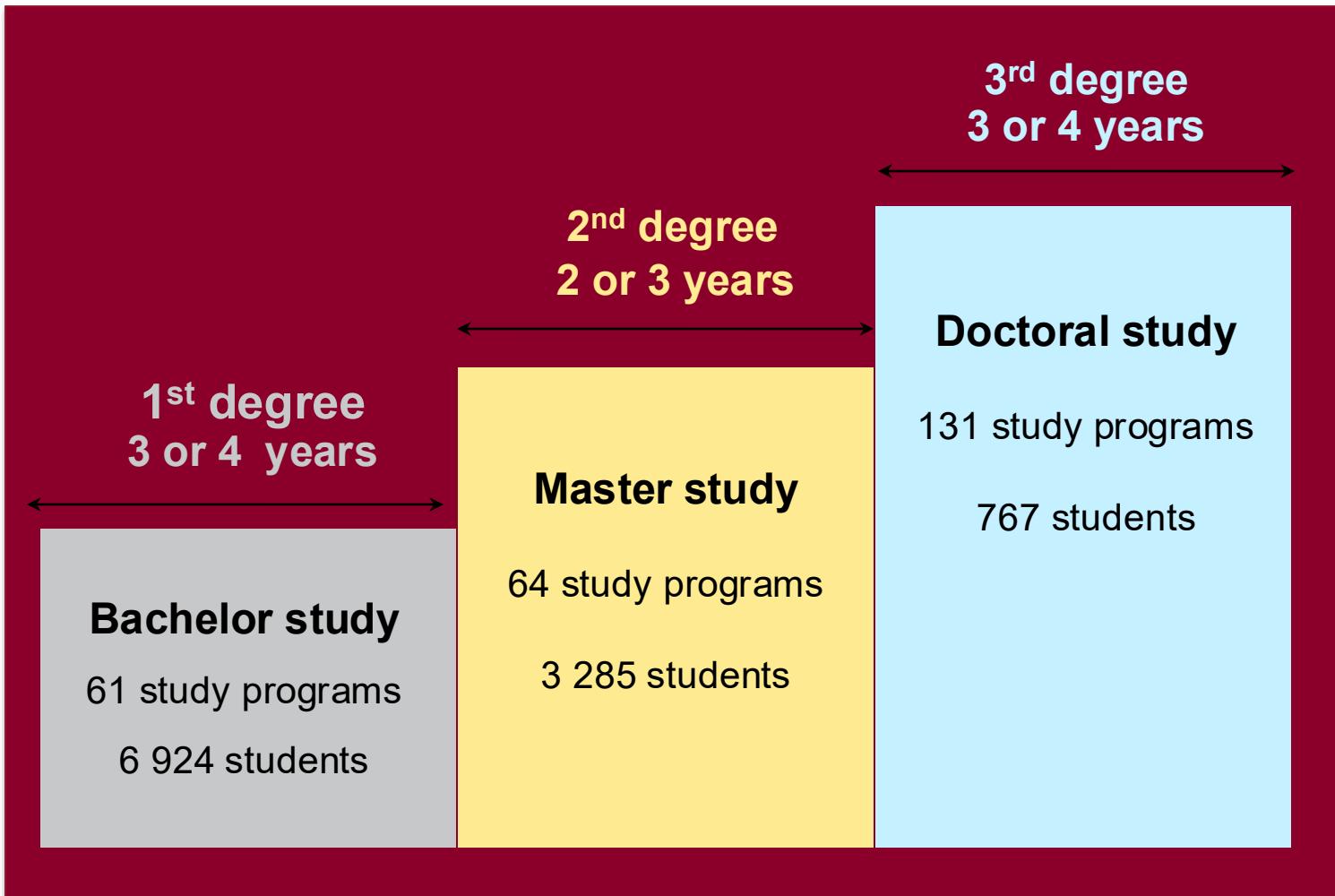
**3rd degree**
**3 or 4 years**

**2nd degree**
**2 or 3 years**

**1st degree**
**3 or 4  years**

### Doctoral study

131 study programs

767 students

### Master study

64 study programs

3 285 students

### Bachelor study

61 study programs

6 924 students



dizajn

chémia

STU

The Faculty of Civil Engineering (SvF) was founded in **1938** as the first faculty of the Slovak University of Technology. It was originally located in both Košice and Martin.

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The education started at **December 1st,1938** in study programmes

**Surveying**
Water Engineering
Transportation Engineering

**Diploma No1** – student of the Surveying study programme

The **first lady**, whit STU Diploma
was also student of the Surveying study programme

**Departments and Institute**

- Department of Architecture
- Department of Building Construction
- Department of Building Services
- Department of Building Technology
- Department of Concrete Structures and Bridges
- Department of Geotechnics
- Department of the Humane Sciences
- Department of Hydraulic Engineering
- Department of Land and Water Resources Management
- Department of Languages
- Department of Materials Engineering and Physics
- Department of Mathematics and Descriptive Geometry
- Department of Physical Education
- Department of Sanitary and Environmental Engineering
- Department of Steel and Timber Structures
- Department of Structural Mechanics
- **Department of Surveying**
- **Department of Global Geodesy and Geoinformatics**
- Department of Transportation Engineering
- Institute for Forensic Engineering



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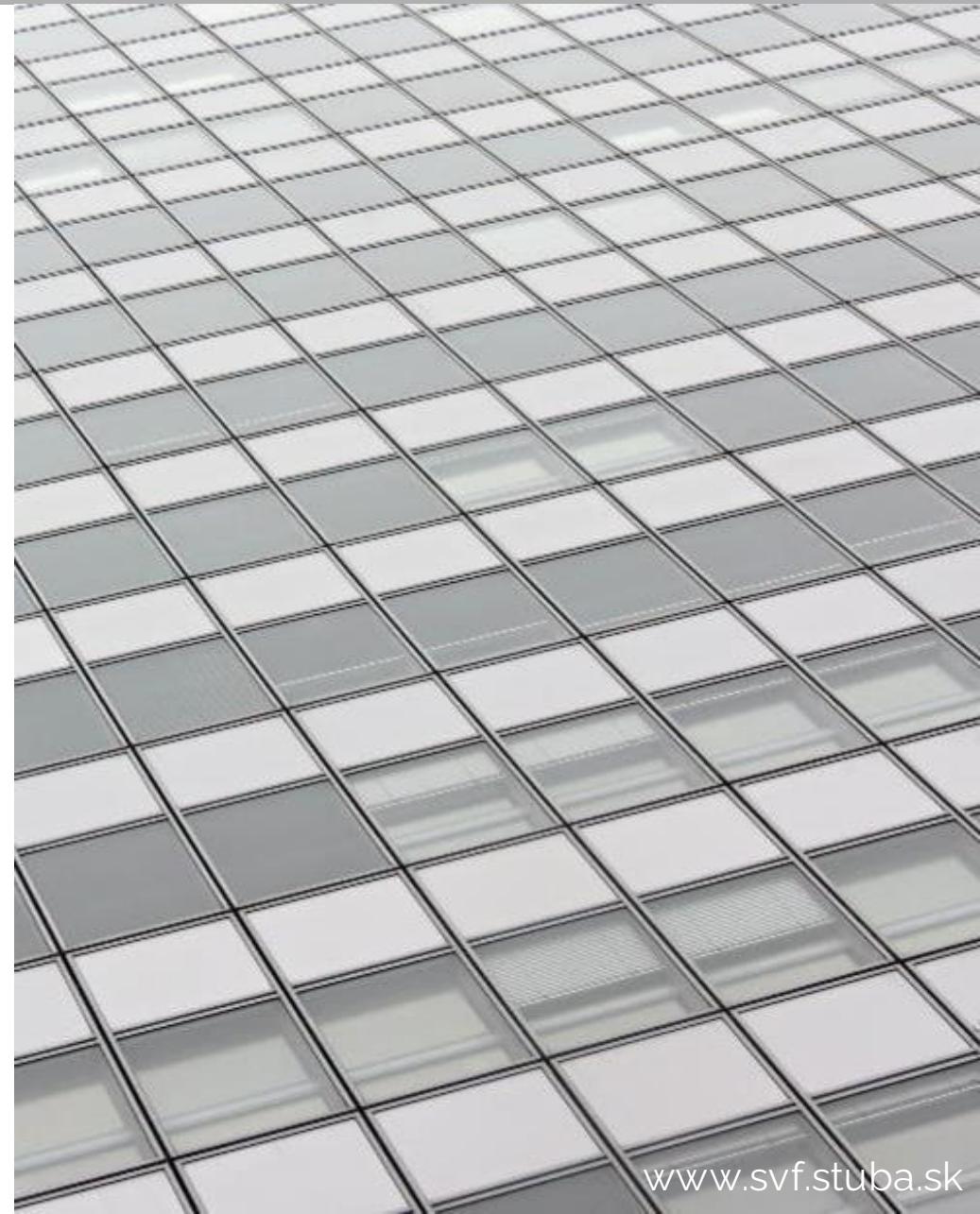
# System of study

Bachelor studies - B.Sc.

180 credits*
3 years**

→

Master studies - M.Sc.

120 credits
2 years

→

Doctoral studies - Ph.D.

4 years

**2032 students in 2024/2025**      **485 students in 2024/2025**      **117 students in 2024/2025**

*Building Structures and Architecture 240 credits*
**Building Structures and Architecture 4 years*

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## Bachelor study programs

- Civil Engineering (CE) – taught in English and Slovak



**Civil Engineering**
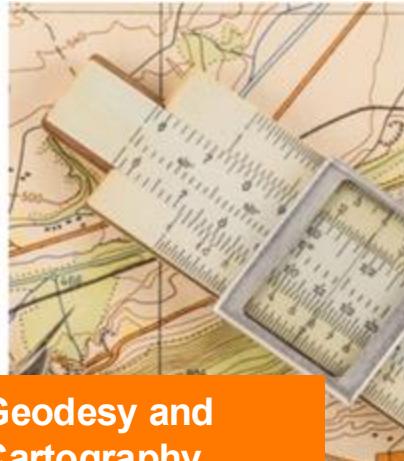
**Geodesy and Cartography**
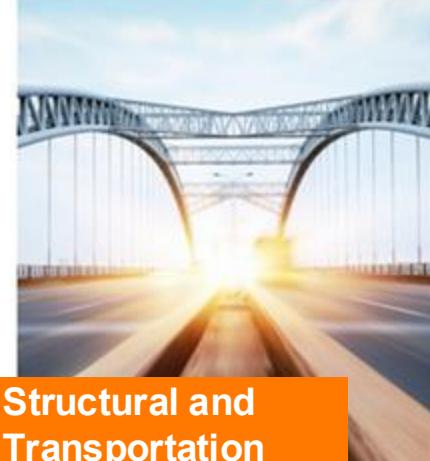
**Structural and Transportation Engineering**

**Landscaping and Landscape Planning**

**Mathematical and Computational Modelling**

**Building Construction and Architecture**

**Building Technology and Management**

**Hydraulic Engineering and Water Resources Management**

**S T U**
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## Geodesy and Cartography

| Bachelor studies - B.Sc. | | Master studies - M.Sc. | | Doctoral studies - Ph.D. |
|---|---|---|---|---|
| 180 credits*<br>3 years** | → | 120 credits<br>2 years | → | 4 years |
| **ca 169 students** | | **ca 41 students** | | **12 students** |

*Building Structures and Architecture 240 credits*
**Building Structures and Architecture 4 years*

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# *Departments – geodetic education*

**Department of Surveying**

- Geodesy I, II, III
- Engineering Surveying I, II
- Industry Surveying
- Mine Surveying
- Photogrammetry I, II
- Remote Sensing
- Cadastre I, II
- Urban Planning I, II
- Legislation in Geodesy and CE
- Field Measurements I, II, IV

- Geodesy for CE (Slovak, English)

**Department of Global Geodesy and Geoinformatics**

- Error Theory
- Data Processing I, II
- Geoinformatics I, II
- Global Geodesy
- Geodetic Astronomy
- Satellite geodesy, GNSS
- Cartography
- Topography
- Geodetic Projections
- Programming, SW development, IT applications
- Field Measurements III, IV
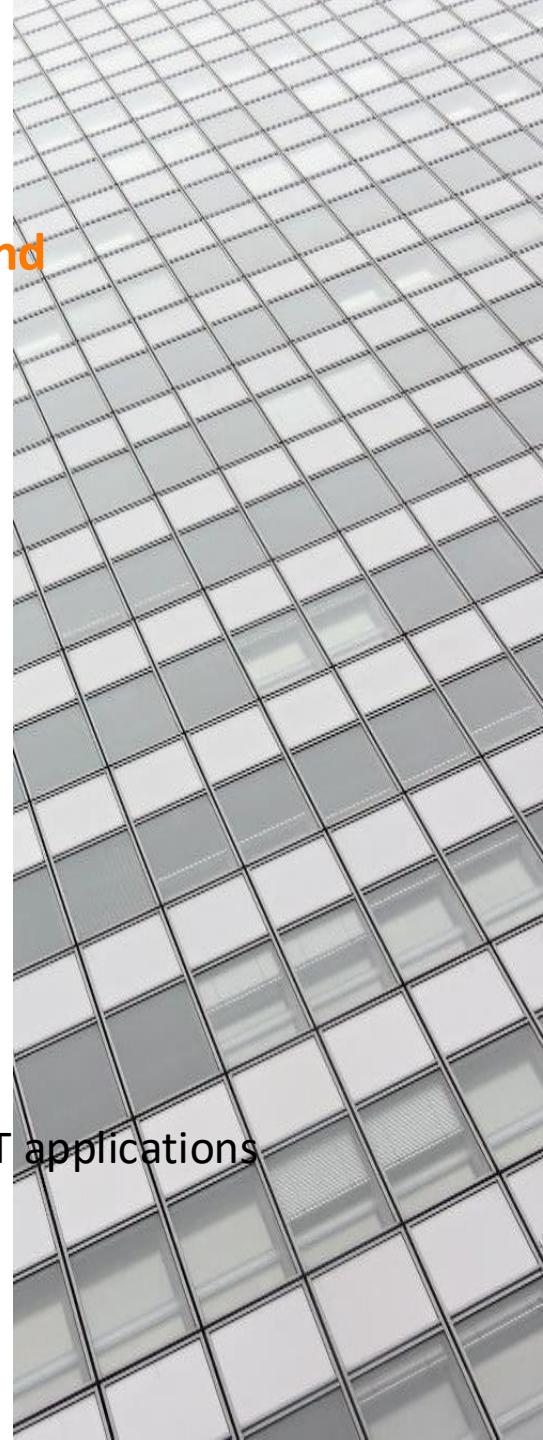
## Research activities



**Indoor environment of buildings**

**Load-bearing structures**

**Structural materials**

**Water works, climate change and land protection**

**Positioning, navigation and geoinformatics**
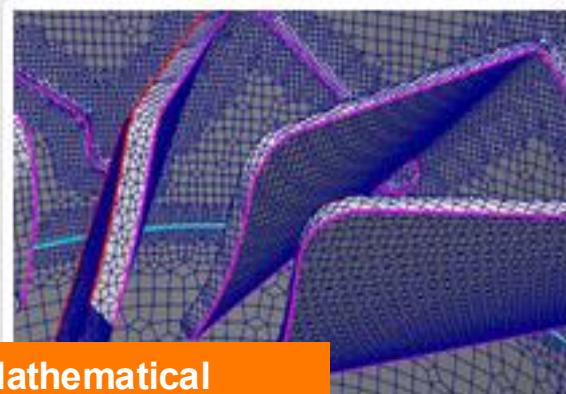
**Mathematical modeling of practical tasks**

Laboratories:



**Central laboratories - STU Boundary Layer Wind Tunnel**



**Central laboratories – Laboratory of load-bearing structures**

Laboratories:



**University science park**

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Causes of landslides



Bridges monitoring
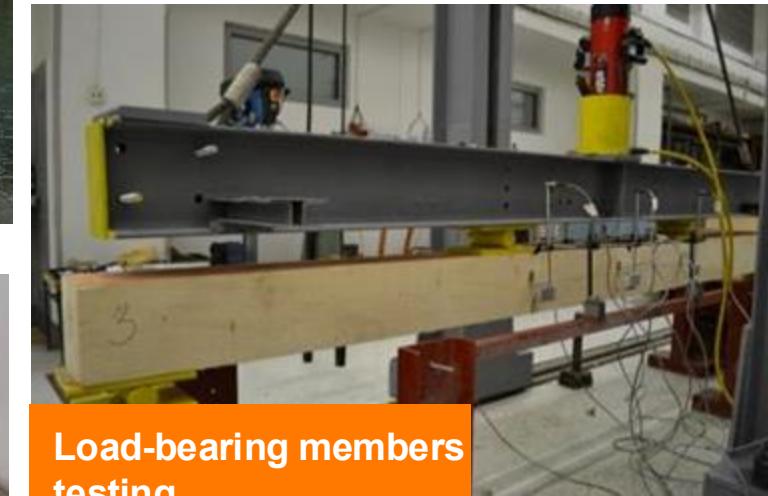


Load-bearing members testing



Stability of slopes
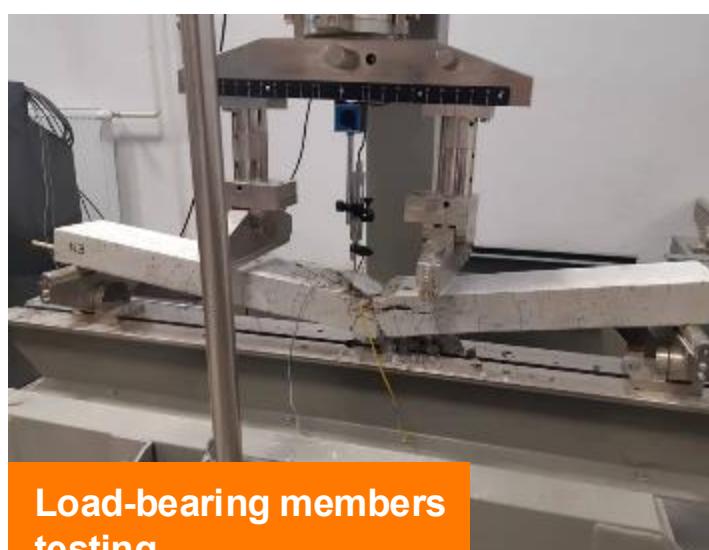


Load-bearing members testing
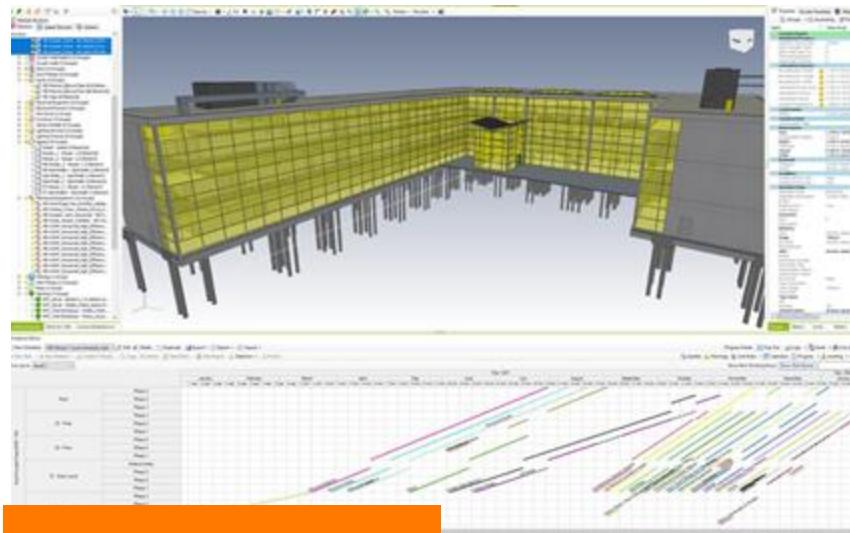
BIM
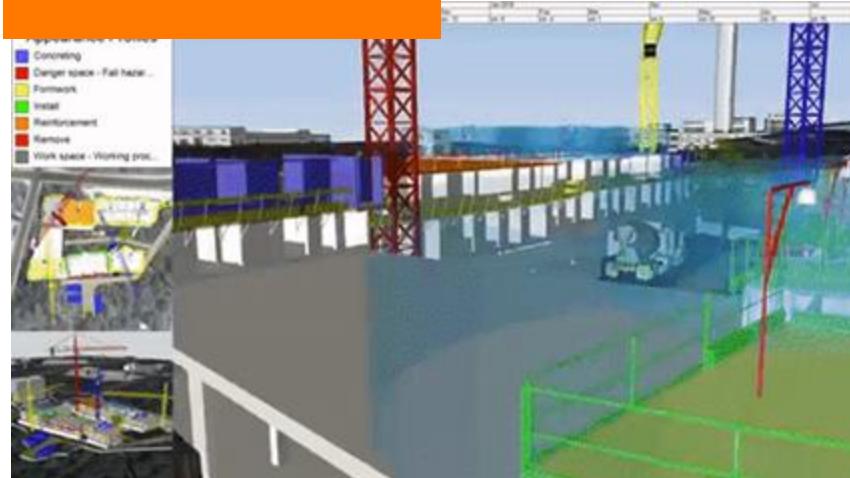
Objects digitalisation

- **Point cloud adjustment**

- **Modeling – creation of the BIM model**
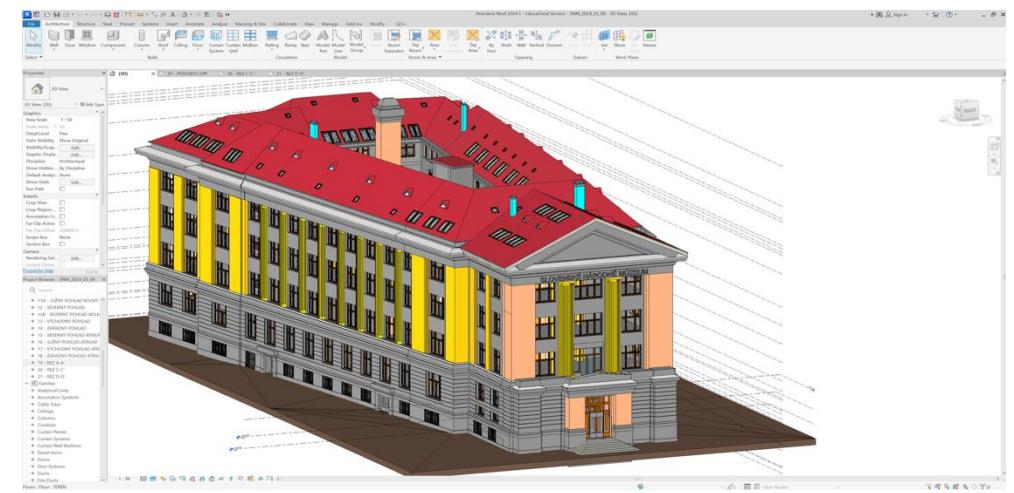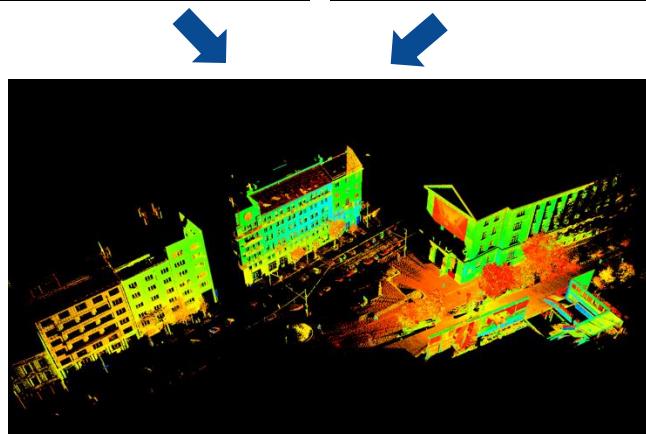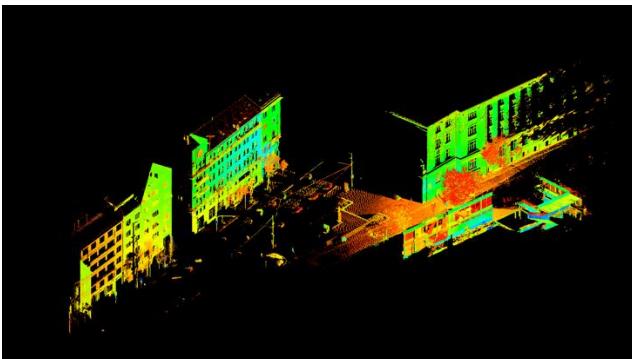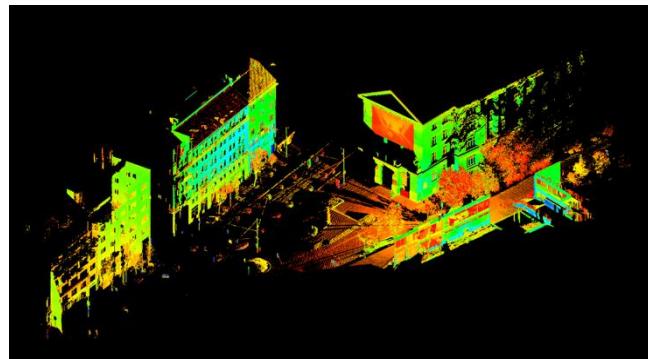
- **Modeling – creation of the BIM model**

  - **Verification**

  - **2D documentation - floor plans, cross-sections, elevations, quantity take-offs**

  - **Industry Foundation Classes (IFC) format (IFC2x3 and IFC4)**
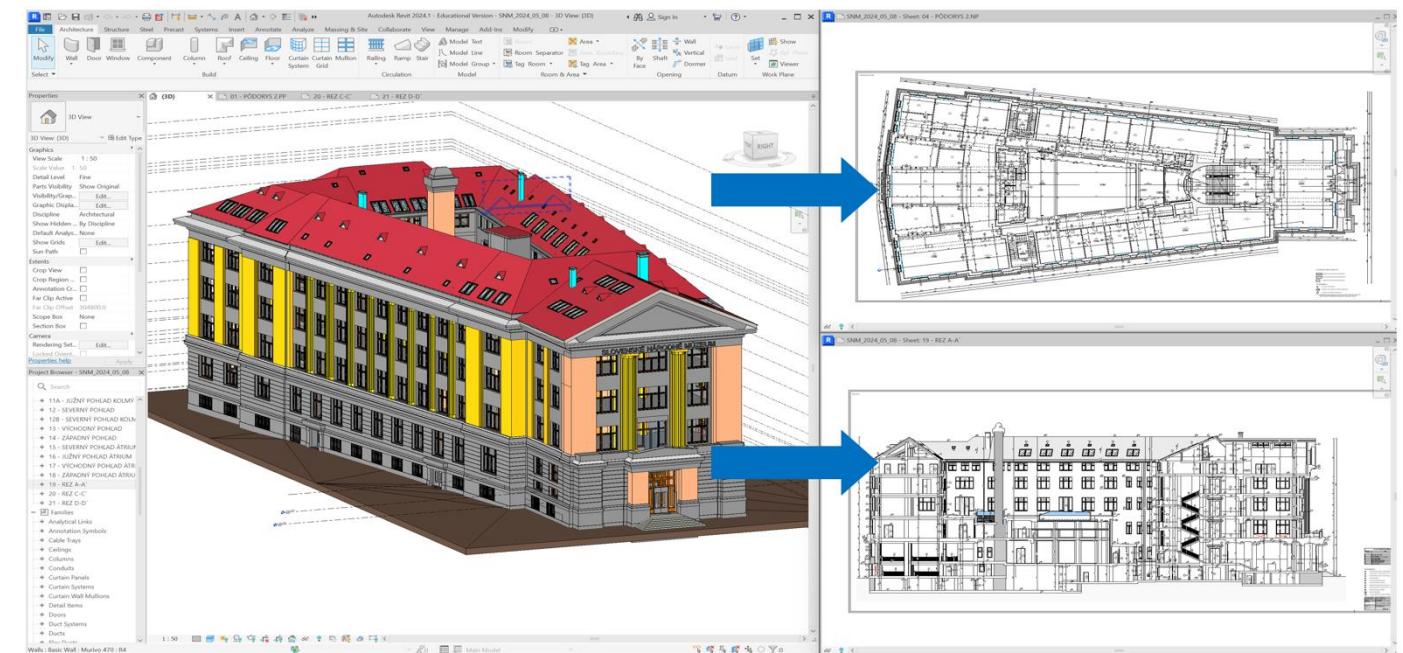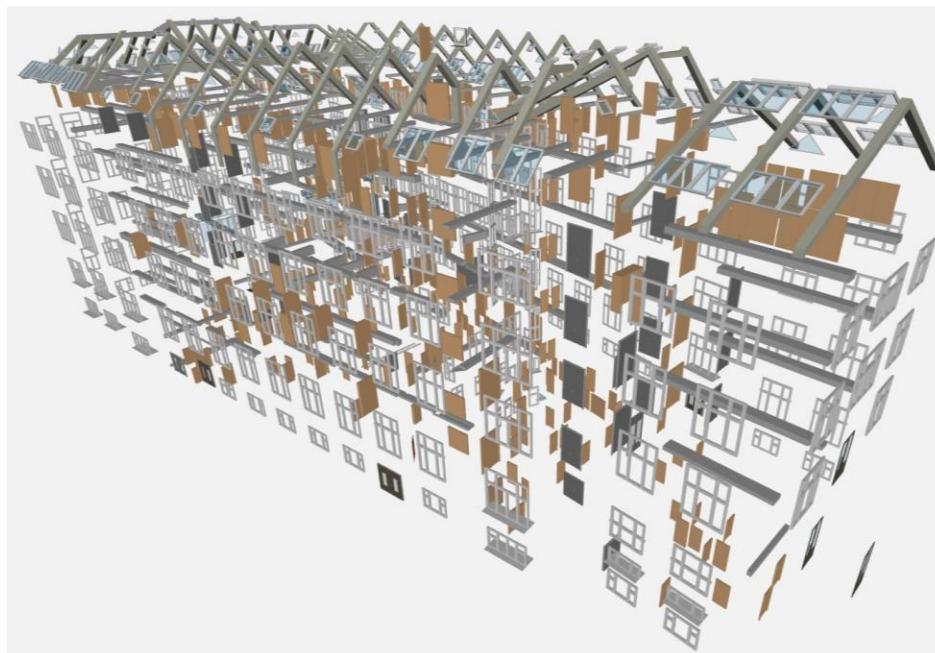
# Mobile mapping system

- Mapping indoor spaces
- Combination of 5 sensors:
  - 3D LiDAR – Velodyne Puck VLP-16
  - 3x 2D LiDAR – RPLIDAR S2L
  - Stereo camera – ZED2
  - IMU – STIM300
  - 2x rotary encoders
- Data collection by ROS (Robot Operating System)
- Processing by SLAM (Simultaneous Localization And Mapping)
- Results:
  - 3D point cloud
  - Trajectory
- Possibility of modifying



Velodyne Puck VLP-16

3x RPLIDAR S2L

STIM300

ZED2

2x rotary encoders

## Mobile mapping system

- 22 095 360 points

- Histogram:
  - d <= 0,05 m – 54 %
  - 0,05 m < d <= 0,10 m – 23 %
  - 0,10 m < d <= 0,15 m – 12 %
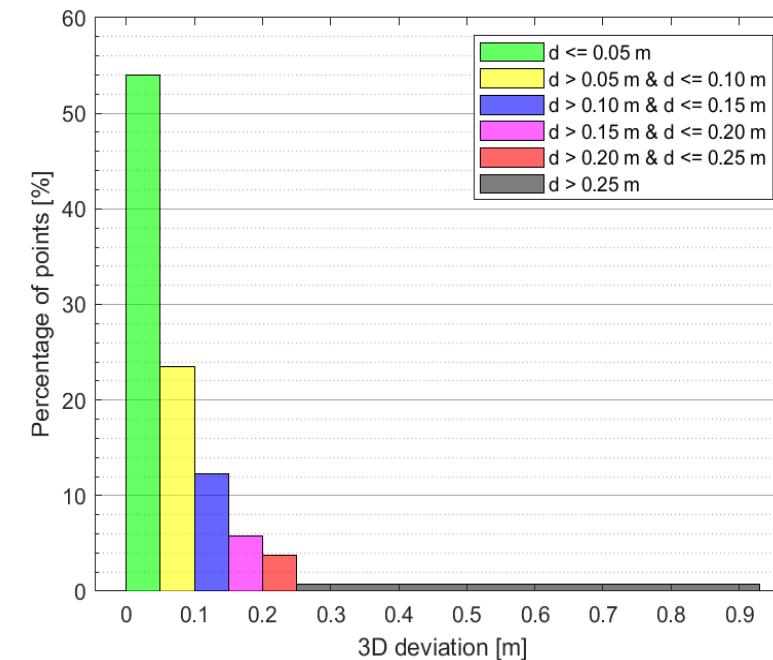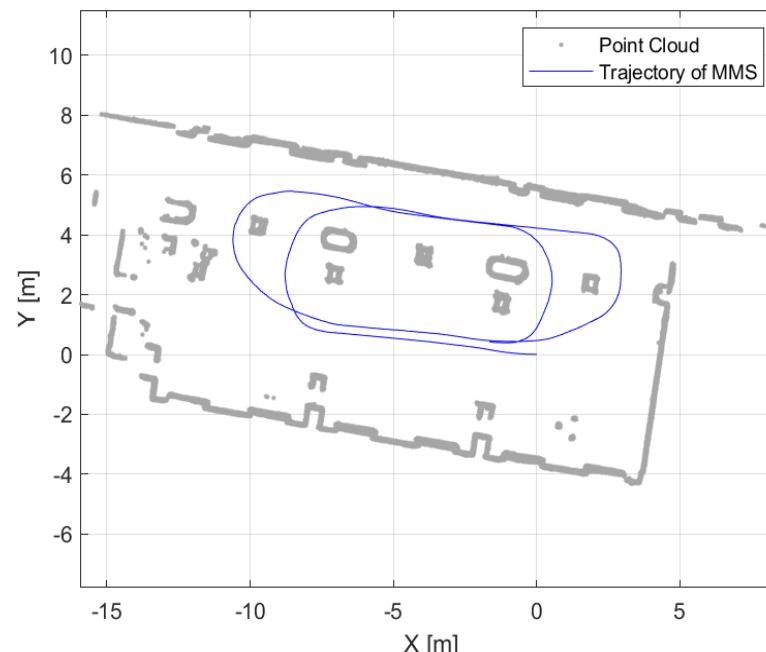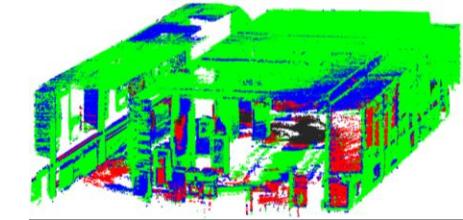
# Slovak Journal of Civil Engineering (SJCE)

https://sciendo.com/journal/SJCE

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