



## Usage of a Multidisciplinary GIS Platform for the Design of Building Structures

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Institute of Geodesy



Institute of Water Structures



Institute of Computer Aided Engineering and Computer Science



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## Integration of Needs in Many Technical Building Branches

### Study programme - Civil Engineering

#### Specialization - Water Management and Water Structures

- Institute of Water Structures in the field of GIS application in water management
- Institute of Landscape Water Management,
- Institute of Municipal Water Management,



Faculty of Civil Engineering

#### Specialization - Constructions and Traffic Structures

- Institute of Railway Constructions and Structures

Institute of Computer Aided Engineering and Computer Science is warranting the functioning of infrastructure of the information technologies.

### Study programme - Geodesy and Cartography

#### Specialization - Geodesy and Cartography

- Institute of Geodesy in the field of data capture and geodata presentation →
- Information System of Cadastre of Real Estates

### Study programme - Architecture of Building Structures

... other building branches don't realize that GIS is needed.



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## Multidisciplinary Integration of Needs



Faculty of Architecture

### Study programme - Architecture and Urban Design

Subjects: - Development planning of the city and region  
- Graphic techniques - visualisation and animation



Faculty of Business and Management

### Study programme - System Engineering and Informatics

Specialization: Management informatics

Subjects: Date and functional modeling  
Database systems

### Study programme - Management and Economics

Specialization: Company Management and Economics,  
Subjects: Strategic Management  
Information support of processes  
Applied informatics



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## Optional Selectable Interdisciplinary Subject BUT

### Spatial Information Systems

(opened since 2006/2007, guaranteed by study programme **Geodesy and Cartography**)

1. Introduction, definition of GIS, development, relations, geographical object, homeomorphism.
2. Information systems: types, design methods
3. Overview of database systems. relational algebra, SQL, spatial indexes and queries, data mining (cluster analysis, artificial neural networks, genetic algorithms)
4. Basic of graph theory, selected tasks on graph structures
5. Topology approach: mathematics, pragmatic - DIGEST standard
6. Data models in GIS (raster, vector, matrix data)
7. Digital Terrain Model (raster, vector, TIN)
8. Data capture, metadata, data quality and accuracy - standards
9. Map algebra: model, operators, functions, tasks
10. Spatial analysis: history, objective, types (measured and classify functions, overlay, focal functions, join functions)
11. Current trends and developments of GIS



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## Platforms of GIS



### ESRI ArcGIS

- 10 different moduls of ArcGIS +Leica Extensions for ArcGIS
- in total 300 licences
- operation via BUT academic network interface



### Intergraph GeoMedia

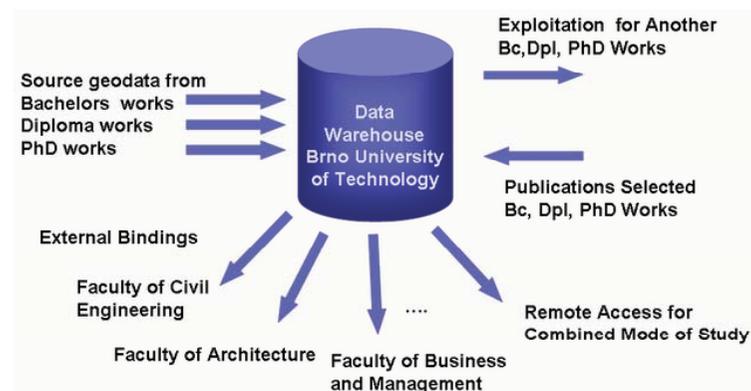
- Registered Research Laboratory (RRL)
- in total 30 students' licences with 1 year validity



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## Multidisciplinary Data Warehouse of BUT Conception



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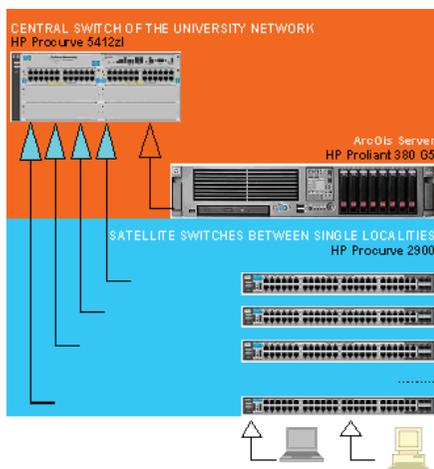
## Hardware and Software Guarantee GIS

### HP Proliant DL380 G5 rack server in following configuration:

- processor – 2x Quad-Core Intel Xeon Processor E5440 (2.83 GHz, 80 Watts, 1333 FSB)
- memory – 32GB RAM PC2-5300 Fully Buffered DIMMs (DDR2-667) with Advanced ECC
- disc space – 8x 146GB HDD SAS 10000 rps. Hot-plug
- net interface – 2x Gbit LAN
- redundant supplies and fans

### Software platforms:

- Windows 2003 Server R2 – 64 bit version.
- Disc subsystem RAID-5 mode with one disc in hot-swap mode.
- Database Microsoft technologies MS SQL 2008 in 64 bit



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## Multidisciplinary Data Warehouse of BUT

- digital state map work
- orthophoto
- digital thematic maps of large scale
- digital terrain models and laserscanning
- satellite data
- historical maps and documents
- catalogue of maps



Multidisciplinary data warehouse is operated by authorized access through academic network BUT.



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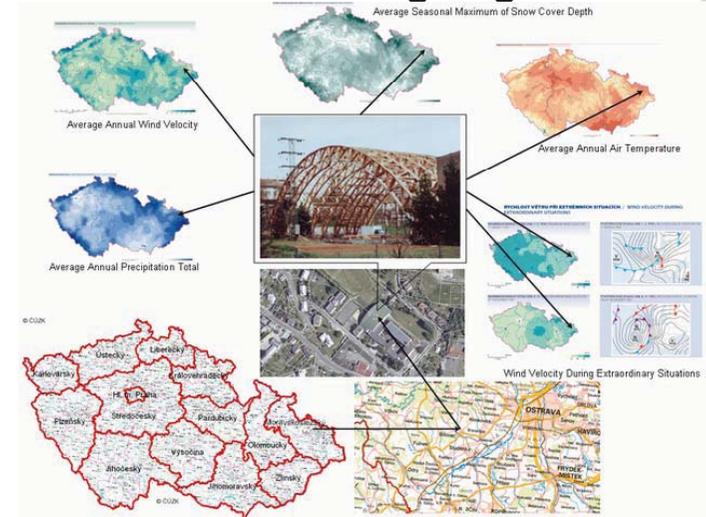


## Digital State Map Work

- **Fundamental Base of Geographic Data CZ (ZABAGED) and Geonames, middle scale, full volume, vector format - in extent of 99 map sheets, district Brno and environs, area of Jeseníky mountains, district Velké Meziříčí, format DGN, SHP**
- **State map 1:5 000 (SM 5) , vector format, 32 map sheets, district Brno,**
- **Raster map 1:50 000 (RMZ 50) , 8 map sheets,**
- **Raster map 1:25 000 (RMZ 25) , 20 map sheets,**
- **Raster map 1:200 000 (RMZ 200) , 1 map sheet**
- **Raster map 1:500 000 (RMZ 500) , 1 map sheet**
- **Raster map 1:1 000 000 (RMČR 1M) , 1 map sheet**
- **Cadastral maps and data of Real Estates - district Brno - cadastral area - Veveří – SPI, area Moravian Karst (cad. area Jedovnice) – graphic data (SGI), description data (SPI).**



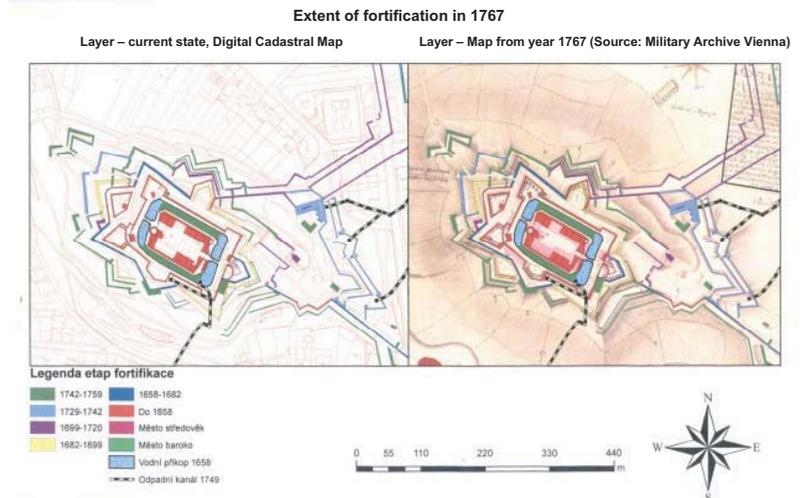
## GIS and Structures Designing



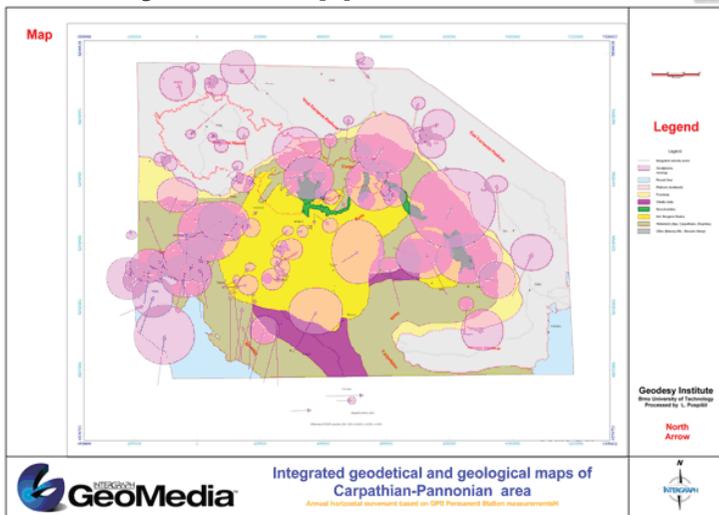
## GIS of Viticultural Cycle-way



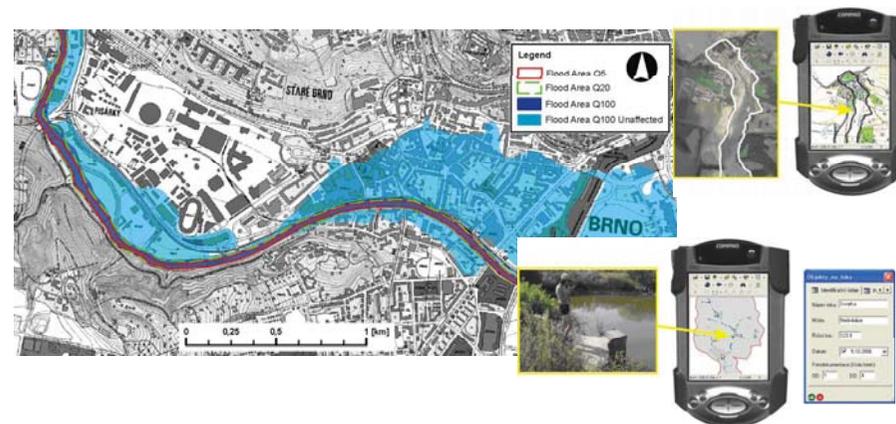
## GIS of Špilberk Castle



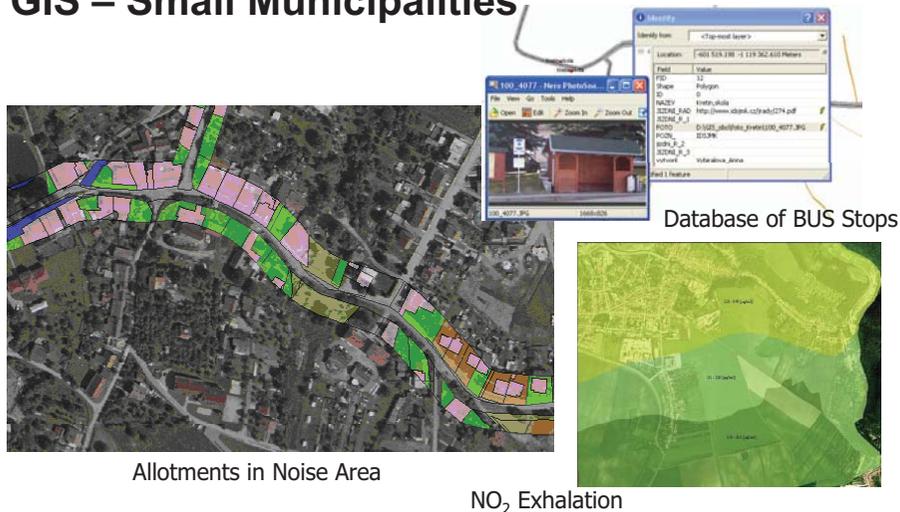
# GIS – Geodynamic Applications



# GIS – Evaluation of Flood Hazard



# GIS – Small Municipalities

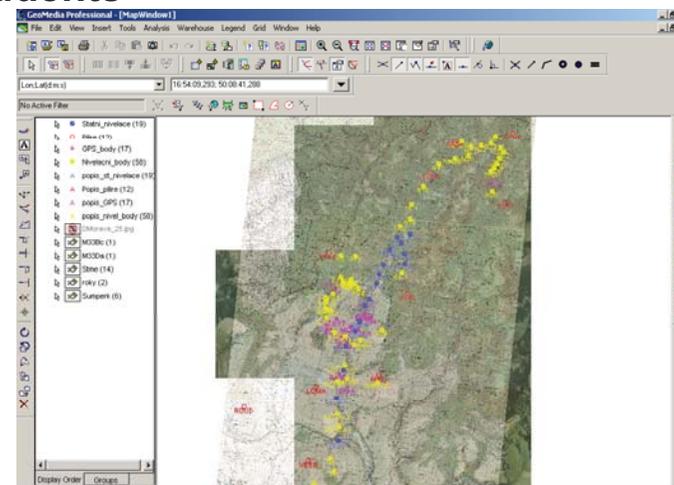


Allotments in Noise Area

NO<sub>2</sub> Exhalation

Database of BUS Stops

# GIS – Localities for Field Training of Students



## Conclusions

- integration of extensive needs of branches at FCE,
- usable for the whole faculty,
- platform usable also by other faculties BUT,
- usable for full-time and combined mode of study,
- graduate theses, lifelong learning, CPD, eventually complementary activity.

**Immediate benefit is** in extension and higher quality of GIS education and for another subjects using geographic data at Faculty of Civil Engineering BUT.

### Long-time effects:

- enhanced assert of graduates in practice which is the main criterion for evaluation of the tuition
- possibility of offer creation of specialized subjects within lifelong learning for building practice and public administration

... Thank you for your attention