Danylo Shkundalov

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EDUCATION

2018 - 2022 **PhD Researcher in Civil Engineering**
Vilnius Gediminas Technical University, Vilnius, Lithuania
Thesis: BIM, GIS and Web Environments Integration for Solving Multifaceted Problems in a Construction Project.

2015 - 2017 **Master of Science in Civil Engineering**
Vilnius Gediminas Technical University, Vilnius, Lithuania
Thesis: Development of visualization methods for BIM and Digital City models using Web Graphic Library (WebGL).
Project page: www.webbim.do.am

2010 - 2015 **Master of Science in Geoinformation System and Technology**
Kyiv National University of Construction and Architecture, Kyiv, Ukraine
Thesis: Research of tools for storing and analysing raster geospatial data in the object-relational database - management system.

WORK EXPERIENCE

May 2018 - May 2019 **Web Application Developer**
"Financial Global Solutions", Warsaw, Poland

- Developed the core front-end for the Banking Transaction Management System components: transaction queue management, SWIFT/SEPA message management.
- Developed and optimized the core JavaScript library.
- Proposed and implemented multiple solutions for UI and UX.
- Used Agile Methodology in development (daily meeting, planning poker, 1to1 meeting, logging and reporting)

Technologies:
JavaScript, HTML, CSS, Bootstrap, PhP, REST

May 2015- Sept 2015 **Geoinformatics Engineer, Developer**
"MAGELLAN GIS", Kyiv, Ukraine.

- Developed add-ons for GIS system for optimisation and automation of the object's digitalisation processes.
- Created a tool for automatization of the layer's verification procedures.
- Cartography and digitalization of the Kyiv city.

Technologies:
ESRI ArcGIS, Delphi, TCP/IP protocol, Digitals GIS, Digitals Script language,

June 2013 - August 2013 **Internship:**
"KNUCA", Kyiv, Ukraine

- Cartography and digitalization of the Kyiv city.
- Planning the territory of the Kyiv city using GIS software.
- Developed DataBase for storing and processing georaster data.

Technologies:
ESRI ArcGIS, PostgreSQL/PostGIS, SQL, Delphi, TCI/IP

SKILLS

Programming: **JavaScript, HTML, CSS (SCSS), WebGL (Three.js), Bootstrap, React.js, PHP, SQL, Delphi, REST, Node.JS**
Engineering: **Autodesk Revit**
GIS: **ArcGIS, ContextCapture**
Other: **SketchUp, 3D modelling, IT and Project Management, Project Requirements Analysis**

Soft skills: Dedicated team player focusing on quality and usability. My passive skills are automation and optimisation of the workflow/tasks. My strengths are logical and analytical thinking, initiative and leader approach, creativity, attention to detail, great educability, self-motivation, ability to work independently and as a part of a team.

LANGUAGES

Ukrainian: Native
English: Full professional proficiency
French: Beginner
Russian: Native

HOBBIES

Programming and 3D modelling for games, table tennis, music (I play piano and guitar), cooking.
I love to experiment with hot sauces and collect recipes during my travels all over the world.

PORTFOLIO

Danylo Shkundalov

Web-based Special Decision-Support System for BIM Model Processing

The web-based special decision-support system (SDSS) was developed by me in the content of the dissertation and is designed for processing BIM models in the Web environment within connection of GIS environment and databases, geospatial analysis and multi-criteria decision-making analysis. Based on the bibliometric analysis of the state-of-the-art related to BIM, GIS and Web environments integration and according to the determined issues and gaps multiple investigations and developments was performed which expands the possibilities of highlighted above integration for solving multifaceted problems in a construction project. Specifically, in-model objects' relations development for BIM model representation, objects' coordinates recalculation, development of crane selection and operation analysis (Figure 2 a), development of method for visibility analysis (Figure 2 b), development of method for automation of multi-criteria analysis (Figure 2 c), etc. The developed web-based platform allows processing BIM models presented by IFC and JSON structures, loading of the batched 3D mesh model of the real-world representation, connection of databases, execute multiple geospatial analysis and perform multi-criteria analysis starting from gathering the values of the criteria and ending with multiple fuzzy methods, such as Fuzzy TOPSIS, fuzzy COPRAS and fuzzy EDAS.
Since I was the only one developer of the whole system, the biggest challenge was in time limits and huge amount of researches related to both theoretical and practical parts of the development, which forced to work on the high load. The result of this project was presented in multiple international conferences and scientific articles.

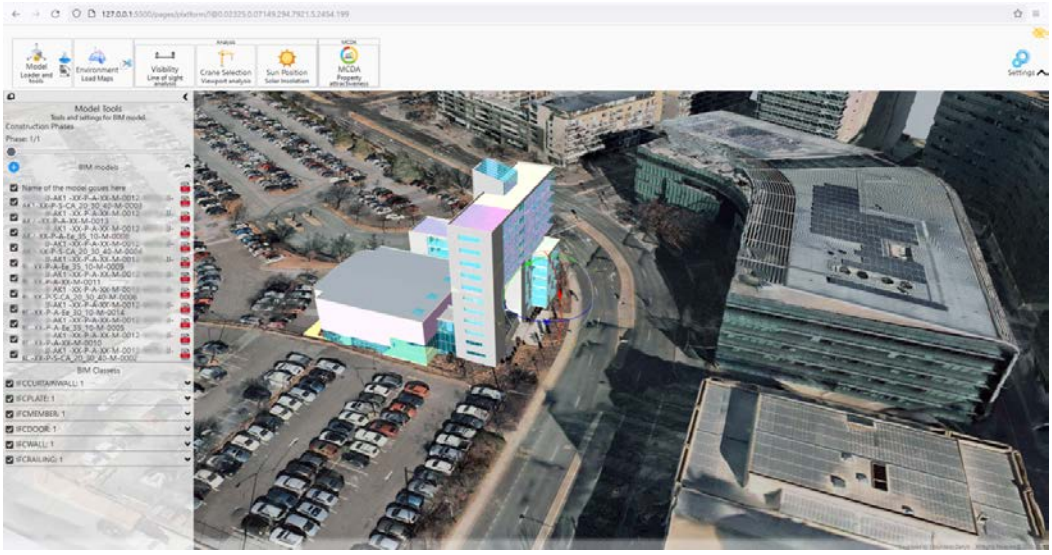
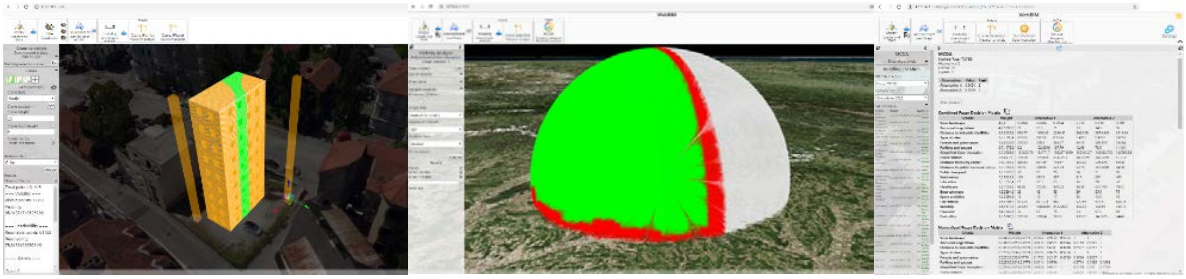


Figure 1. Web-based SDSS: IFC model processing



a) b) c)

Figure 2. Web-based SDSS: a) Crane selection and operation analysis; b) Visibility analysis using proposed method; c) Multi-criteria decision-making analysis

Technologies:

JavaScript, Three.js, HTML, CSS, Bootstrap	Web page and logic for all kind of analyses
Autodesk Revit	Modelling of multiple IFC file
Bentley, ContextCapture, ArcGIS Pro	3D mesh model of the real environment

Transaction Management System

Transaction Management System for processing banking messages in SEPA and SWIFT formats. I developed the core front-end for the web application components: transaction queue management (Figure 3) and message management (Figure 4). The development is based on recursive functions, the message structure is regulated by classificators and counterparties.

As this is a banking project, it was decided to reject all dependencies from third-party libraries, therefore the technological solution is based on the library developed with pure javascript. Such an approach allowed the implementation of flexible solutions for specific project needs. For example, the system was developed in such a way that it can be manipulated in the same manner as green screens due to flexible UX implementation that includes keyboard navigation through all the management processes including screens navigation. Additionally, the clients were using green screens that allowed to conclude, that very likely old monitors are in use. Therefore, the solution got a flex grid layout based on Bootstrap to provide a fully responsive interface to support old clients and be comfortable for the new ones. One of the biggest advantages and challenges of this project was the strict requirements on “WHAT” should be implemented, and no restrictions on “HOW” that need to be achieved. Because of this, I’ve got freedom in development that led to new challenges, researches and exceptional results.

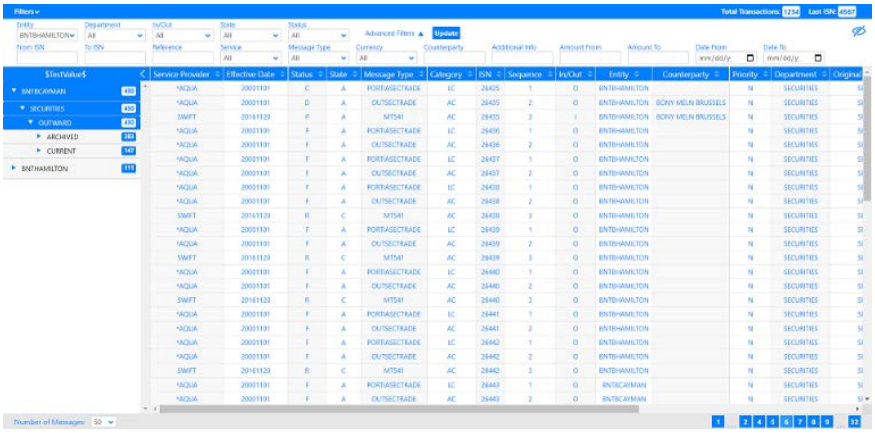


Figure 3. Transaction queue management

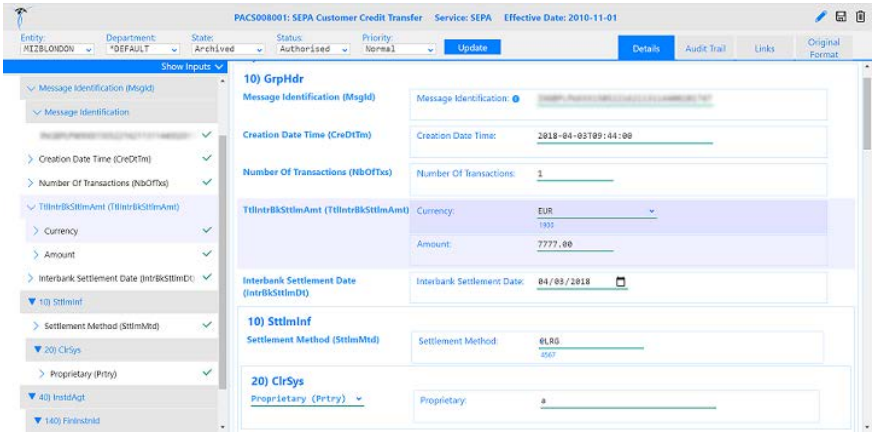


Figure 4. Message management

Technologies:

JavaScript, HTML, CSS	Functionality and style
Bootstrap	Grid system

The Web-based BIM Internet Platform

www.webbim.do.am

The main challenge of this project was to integrate the BIM, GIS and Web environments and make them interact. The project aims to visualize and process the BIM model in the condition of real-world representation (Figure 5). This project was developed to fulfil my curiosity as it was one of the first of its kind. With time this development has significantly grown and became to be my master's thesis.
The key advantages of the proposed method are:

- ability to share and publish the BIM model representation on the web,
- combination of GIS and BIM data,
- implementation of GIS analysis (Figure 6, a),
- simulation of the real environment using 3D mesh model (Figure 6, b),
- possibility to inspect the BIM model,
- 3D model and attributive information linking with the possibility to display, modify and edit the model and its data directly inside the web environment,
- open door to Digital City mapping and cartography on the web.

The introduced approach can be used as a new part of BIM execution planning and expand the opportunities of construction companies to attract more customers. The proposed method expands the information exchange between the contractor and the client, making it possible to jointly solve emerging project issues in real-time in the web environment.

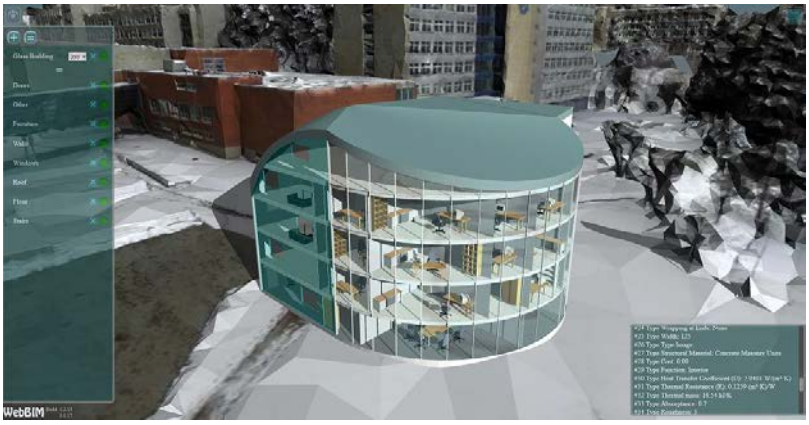


Figure 5. Web-based BIM internet platform: model inspection tool

Technologies:

JavaScript, Three.js, HTML, CSS	Manipulation and inspection tools, web page and logic
Autodesk Revit	Modelling of buildings
Bentley, ContextCapture	3D mesh model of the real environment

a) b)

Figure 6. Web-based BIM internet platform: a) shadow analysis; b) visibility from the windows

Museum of Romanticism in Opinogora

www.muzeumromantyzmu.pl

The website for the state institution "Museum of Romanticism in Opinogora". The institution requested a solution that would provide the opportunity to build the customizable pages of the website by non-professional users. Because of such requirements, it was decided to build the project based on a WordPress solution. However, as the requirements were beyond the default WordPress functionality, the new theme for WordPress and multiple plugins were developed. To allow the best user experience, the theme got a myriad of additional settings with a simple user-friendly interface, such as: theme settings, footer and banners builder, event-calendar positioning, elements styling and typisation, gallery blocks and image processing, Google map blocks, etc. The main challenge of this project was that to fulfil all client requirements, the WordPress solution had to be expanded with extra functionality for both server-side and client-side processing developed with PHP and JavaScript. Such development involves multiple researches and tests, nonetheless, this implementation allowed to deliver a flexible and fully customizable solution (Figure 7).

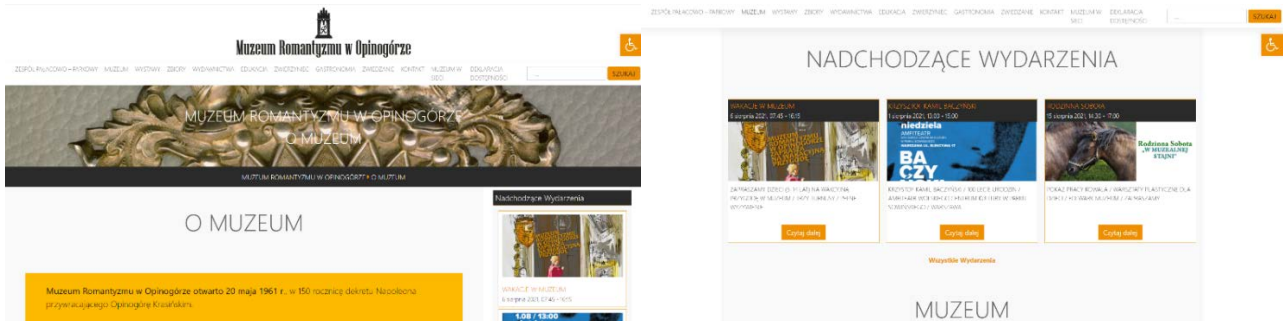


Figure 7. a) Page type: main container and sidebar b) Page type: main container with events

Short description:

WordPress, PHP, JavaScript	The logic for server-side and client-side functionality
SASS, CSS, Bootstrap	Design of the web page

Network Store Products

The project aimed to process data from database where data contains city lists, shop lists and products. All products can be compared by price and filtered by categories.
The project was created with React.js technology using React classes. The challenge of this project for me was to implement it using unfamiliar technology in the shortest time as a proof of concept. The highlighted project represents my educability and ability to bring qualitative results under tight deadlines. The development took 9 days (Figure 8).

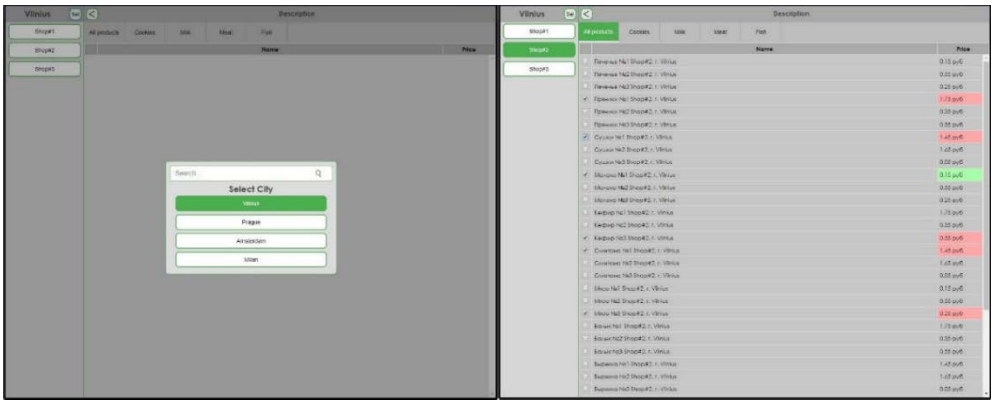


Figure 8. React-based concept of the products filtering

Technologies:

React.js	Creation of classes
JavaScript	The logic for props and states
CSS	Design of the web page

Digitals Checker

The main goal of this development is to provide the opportunity to “check” the projects of the company before delivering them to the customer (Figure *9*). The developed program contains functionality for detection of "none specified" layers that are not described in qualifier and functionality for checking of all layers in the project to have the same parameters as in qualifier. Additionally, parameters and objects of the layer can be inspected, modified and removed. In the output of this procedure, the project is standardised in response to the requirements, which increase the quality of the project and the company as well. Usually, the procedures highlighted above are performed manually, which might result in drawbacks and mistakes due to the “human factor”. Such issues can be avoided by reasonable automation and optimization, which was successfully implemented in this project.

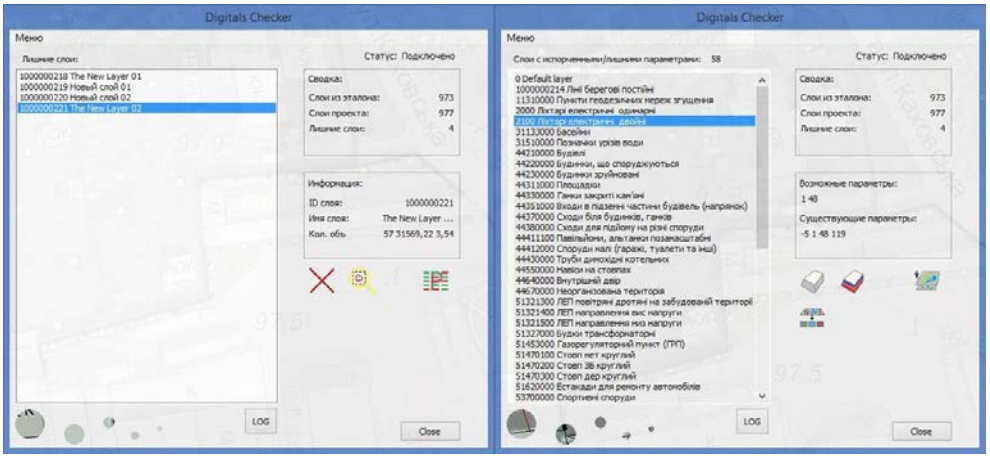


Figure 9. a) Layers inspector b) Parameters inspector

Technologies:

Delphi	Program developing, TCP/IP connection
Digitals	Classifier and layers parameters exchange

GIS City Modelling and Analysis

This project aimed to create a 3D model of the Vilnius city in the ArcGIS software and perform GIS analysis (Figure 11). The analysis includes military analysis in conditions of the existing city situation, visibility analysis that calculates sidelines from observation points to the object's points, premises cost estimation based on windows visibility analysis, shadow analysis. The project has been developed in the condition of a master’s thesis.

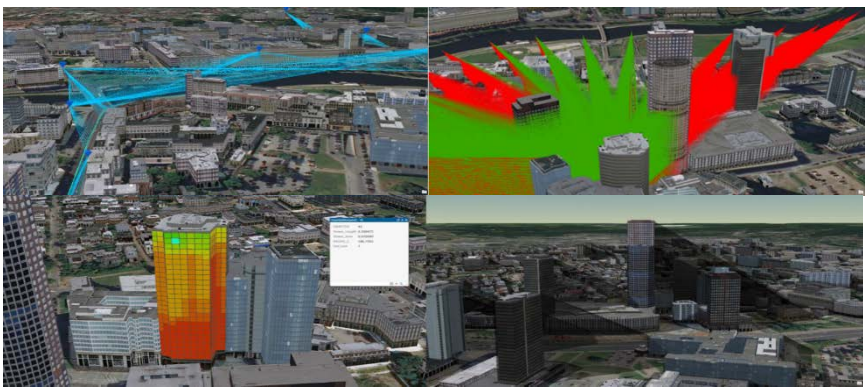


Figure 10. GIS analysis of the Vilnius city model

Technologies:

Python	ArcGIS command-line requests
ESRI ArcGIS	DB processing, city mapping, GIS analysis
ESRI CityEngine	3D model of the city for physical calculations

Point Cloud Modelling

In the context of the need for reconstruction in cramped conditions in the historical part of cities, the design and engineering of existing buildings and structures can be challenging and time-consuming. Figure 10 represents a reconstruction project of the church in Solomianka park, Kyiv, Ukraine. Step-by-step modelling of such a complicated structure would take a lot of the designer's time. In this regard, I decided to apply a cloud of points technology to create a model of the church and prepare it for Web environment processing. The cloud of points was made by Leica P30 ScanStation for the modelling of the structure. The modelling was made with Autodesk Revit and a model of the building was created. Small parts of the model were modelled in Blender and SketchUp. The resulting model can be imported into the Web environment. The final render is done with 3Ds Max and Photoshop.

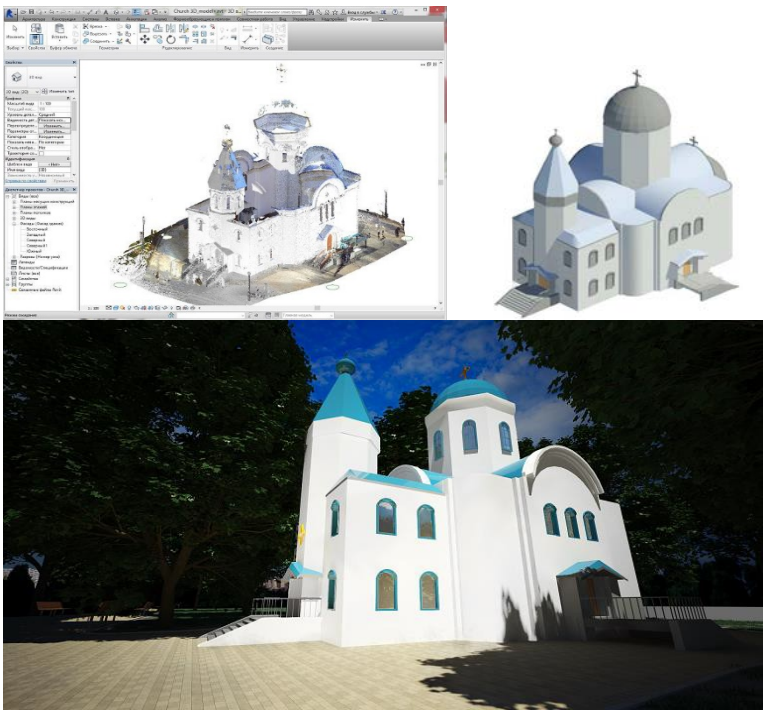


Figure 11. Church reconstruction with a cloud of points technology

Technologies:

Autodesk Revit	Buildings model reconstruction
Blender, SketchUp	Small parts modelling
3Ds Max, Photoshop	Render of the projects
Leica P30 ScanStation	Cloud points of the building