WEB GIS SOLUTION FOR URBAN PLANNING DOCUMENTATION WORKFLOW

Livia Nistor-Lopatenco[1*], *Andrei* Iacovlev[1]

[1]Technical University of Moldova, MD 2004 Chisinau, 168, Stefan cel Mare Bd., Republic of Moldova

Abstract. The goal of this work is to study the use of WEB GIS open source solution for workflow organizing of urban planning documentation: zoning permit, building permit, occupancy permit, utilities connection. A web GIS solution Giscuit.Com developed by a moldavian company VEC.MD was used as a framework for implementation of test version of a specialized website Primaria.Giscuit.Com. Giscuit is a cost-effective web mapping platform built on powerful, cutting-edge, open source geospatial components. The goal is to make it as easy as possible to build more secure, reliable and modern web GIS applications. With Giscuit users stay in control of their content through centralized management of vector and raster spatial data. Giscuit allows users to visualize, share, edit and analyze geospatial data. It has powerful web-based administrator panel with features like data import, layer styling, user management, permissions management, publishing data and more. It is compliant with the Open Geospatial Consortium standards, this is achieved through OpenLayers or PHP MapScript supporting several OGC standards like WMS, WFS, WMC etc. Giscuit provides a scalable GIS server platform that can be deployed on a single Linux or Microsoft Windows machine, it can be distributed across multiple servers or deployed on cloud infrastructure.

1. Introduction

Urban planning is a technical and political process concerned with the development and design of land use and the built environment, including air, water, and the infrastructure passing into and out of urban areas, such as transportation, communications, and distribution networks. Urban planning deals with physical layout of human settlements. The primary concern is the public welfare, which includes considerations of efficiency, sanitation, protection and use of the environment, as well as effects on social and economic activities.

Urban planning is considered an interdisciplinary field that includes social science, engineering and design sciences. It is closely related to the field of urban design and some urban planners provide designs for streets, parks, buildings and other urban areas. Urban planning is also referred to as urban and regional planning, regional planning, town planning, city planning, rural planning, urban development or some combination in various areas worldwide. Urban planning guides orderly development in urban, suburban and rural areas. Practitioners of urban planning are concerned with research and analysis, strategic thinking, architecture, urban design, public consultation, policy recommendations, implementation and management. Enforcement methodologies include governmental zoning, planning permissions, and building codes, as well as private easements and restrictive covenants.

Urban planners work with the cognate fields of architecture, landscape architecture, civil engineering, and public administration to achieve strategic, policy and sustainability goals. Today urban planning is a separate, independent professional discipline. The discipline is the broader category that includes different sub-fields such as land-use planning, zoning, economic development, environmental planning, and transportation planning.[1]

Urban planning documentation consists of approved copy and graphics (drawings, specifications, information, plans, schemes, maps, passports of buildings, etc.) that regulate planned usage of territory, including building. Urban planning documentation, like any other paper documentation, must be digitized in order to facilitate access to information and simplify the work of specialists.

*Corresponding author: livia.nistor@fcgc.utm.md

Processing these materials correctly requires special technologies for scanning and conversion of data into electronic format.

The difficulty of processing such documentation lies in the variability of materials and uniqueness of information, much of which is provided in manuscript form. [2]

2. Purpose

The purpose of this work is to study the using of WEB GIS open source solution for workflow organizing of urban planning documentation: zoning permit, building permit, occupancy permit, utilities connection.

3. Methodology

A web GIS solution Giscuit.Com developed by a moldavian company VEC.MD was used as a framework for implementation of test version of a specialized website Primaria.Giscuit.Com [11] – Local Public Authorities geoportal.

Giscuit is a cost-effective web mapping platform built on powerful, cutting-edge, open source geospatial components. The goal is to make it as easy as possible to build more secure, reliable and modern web GIS applications. With Giscuit users stay in control of their content through centralized management of vector and raster spatial data. Giscuit allows users to visualize, share, edit and analyze geospatial data. It has powerful web-based administrator panel with features like data import, layer styling, user management, permissions management, publishing data and more. It is compliant with the Open Geospatial Consortium standards, this is achieved through OpenLayers and PHP MapScript supporting several OGC standards like WMS, WFS, WMC, KML, GML, CSW etc. Giscuit provides a scalable GIS server platform that can be deployed on a single Linux or Microsoft Windows machine, it can be distributed across multiple servers or deployed on cloud infrastructure. [10]

Web GIS solution key components:

- MapServer [7]

- OpenLayers

- PHP MapScript

- Geodatabase POSTGIS [3]

Key feature of the Giscuit platform is administrator panel. It provides full web-based control over crucial tasks:

- user management
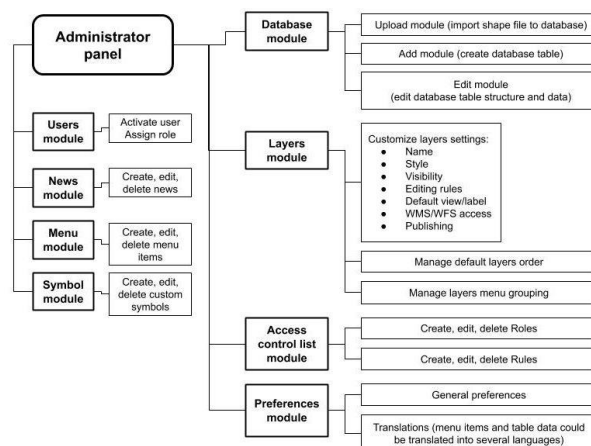
- data management

- layers management

Fig. 1. Giscuit administrator panel components

Urban planning documents workflow is based on Law 163 from 09.07.2010 [4]

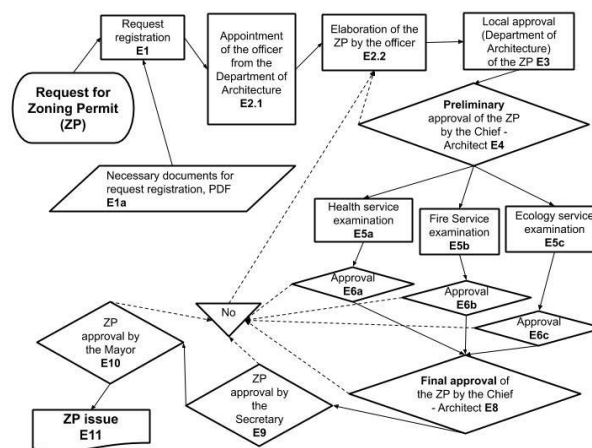The urban planning documents workflow will be analyzed on the zoning permit example

Fig. 2. Zoning permit workflow

For the zoning permit a spatially enabled PostGIS table "CertUrban" was created. The structure of the table allows to store all necessary information regarding zoning permit. Spatial feature type is polygon, which represents zoning permit region of interest.

Fig. 3. Zoning permit database table

For the zoning permit elaboration next user roles are established:

- specialist – user role who will elaborate zoning permit

- sefsectie – user role for head of the sub department, where zoning permit is elaborated

- sefdirectie – user role for head of the department, where zoning permit is elaborated

- sefarhitect – user role for the chief architect of the municipality

- pompier – user role for the responsible person of the fire service

- sanitar – user role for the responsible person of the public health service

- ecolog – user role for the responsible person of the ecology service

For the simplicity WEB GIS system for management urban documentation will be called further as Giscuit.

The zoning permit workflow runs next way:

1. Specialist receives zoning permit elaboration request by email, sent via the "one window" system electronic queue (like a "electronic ticket").

2. Specialist logins into Giscuit, identifies location and draws a polygon, which represents zoning permit coverage. Specialist analyzes attached documents,
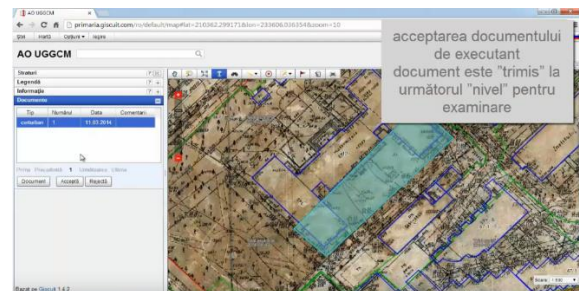
master plan, regulations etc. and fills zoning permit specifications. Document can be previewed as PDF with watermarks "NOT APPROVED". After finishing he "sends" via electronic queue document to his boss for approval. This means that this document is closed for any edits. Document is sent to the next level.
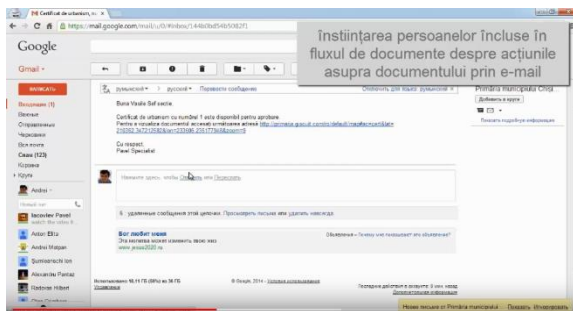
Fig. 4. Specialist elaborated zoning permit
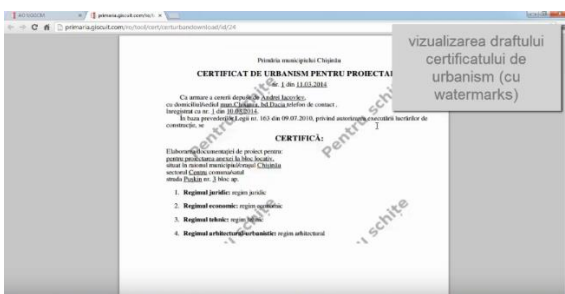
Fig. 5. Zoning permit PDF with watermarks

3. SefSectie (specialist boss) receives via email a notification that zoning permit is waiting for his approval. He logins into Giscuit, checks electronic queue and selects necessary document. If there are some mistakes, he can return document to the specialist with some remarks. Specialist will get an email notification about some problems with document and should fix the issues. In case document is ok, SefSectie approves it. Document is sent to the next level.
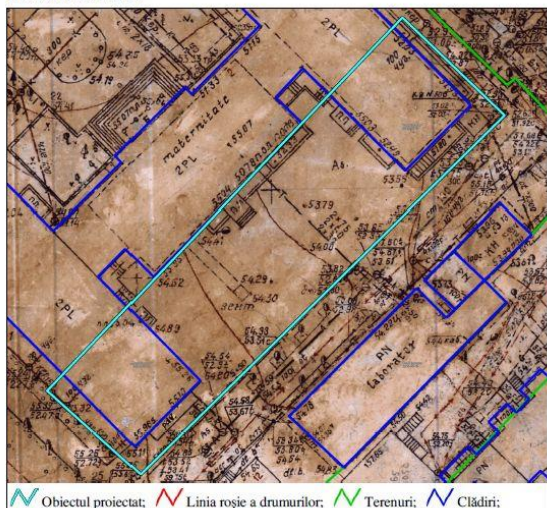
Fig. 6. Notification via email

4. SefDirectie (SefSectie boss) receives via email a notification that zoning permit is waiting for his approval. He logins into Giscuit, checks electronic queue and selects necessary document. If there are some mistakes, he can return document to the SefSectie with some remarks. SefSectie will get an email notification about some problems with document and should fix the issues. In case document is ok, SefDirectie approves it. Document is sent to the next level.

5. SefArhitect (SefDirectie boss) receives via email a notification that zoning permit is waiting for his approval. He logins into Giscuit, checks electronic queue and selects necessary document. If there are some mistakes, he can return document to the SefDirectie with some remarks. SefDirectie will get an email notification about some problems with document and should fix the issues. In case document is ok, SefArhitect approves it. Document is sent to the next level.

6. Pompier, Sanitar and Ecolog each receives via email a notification that zoning permit is waiting for their approval. Each of them logins into Giscuit, checks electronic queue and selects necessary document. If

there are some mistakes, each of them can return document to the SefArhitect with some remarks. SefArhitect will get an email notification about some problems with document and should fix the issues. In case document is ok, each of them approves it.

SefArhitect now receives a notification that zoning permit has all approvals and can finally approves it. That means it is closed for any edits, cannot be deleted and now PDF can be generated without any watermarks.

4. Results

A web-based workflow (via only internet browser) was elaborated for next types of urban planning documentation: zoning permit, building permit, occupancy permit, utilities connection.

A lot of OGC compliant data sources can be integrated in decision making process: oftofoto, cadastral parcels, utilities etc. [8] PostGIS database allows storing data of different types and large size: vector and raster layers, pdf documents etc. [3]

Fig. 7. Overlaying different layers: cadastre, 1:500 raster

Authorized person can check any time at what step is zoning permit elaboration, who is working on it now. Important feature is that zoning permit is a spatial object – and all attributive data are referenced to it, not inverse when location is only an attribute.

5. Conclusions

A web GIS opensource based solution is:

- extremely work and cost effective for Local Public Authorities for managing urban planning documentation

- time saving through automation

- increasing transparency in the permit approval process

Photogrammetry, Geoinformatics – Modern Technologies and Development Perspectives".

References

1. Wikipedia, urban planning, https://en.wikipedia.org/wiki/Urban_planning
2. Municipality.tech, Digitization of urban-planning documentation https://municipality.tech/services/digitization-of-urban-planning-documentation/
3. Geodatabase POSTGIS (http://www.postgis.org)
4. LEGE Nr. 163 din 09.07.2010 privind autorizarea executării lucrărilor de construcție
5. T. Castraveț, G. Bejenaru, L. Căpățînă, V. Dilan Inițiere în SIG, curs universitar, Chișinău 2013;
6. References of Law number 254, 17.11.2016 regarding national spatial data infrastructure;
7. MapServer software, http://mapserver.org
8. Geoportal NSDI of Moldova http://www.inds.gov.md/geoportal_inds
9. QuantumGIS software, http://www.qgis.org
10. Giscuit software, http://www.giscuit.com
11. Local Public Authorities geoportal, https://primaria.giscuit.com