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SMART INTEGRATED E-PERMITTING PLATFORM FOR URBAN PLANNING AND CONSTRUCTION MANAGEMENT

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Abstract

This paper proposes a conceptual Smart Integrated e-Permitting Platform for urban planning and construction authorization, designed to address fragmented administrative workflows and limited interoperability between public institutions in Romania. The model integrates beneficiaries, design firms, local authorities, county councils, and technical approval providers within a unified digital environment that supports standardized document management, real-time tracking, and coordinated approval processes. Recognizing the structural imbalance and limited technical capacity within rural administrations, this framework standardizes end-to-end information flows. Furthermore, the conceptual design directly aligns with recent legislative reforms, specifically the strict 15-day response deadlines and tacit approval mechanisms established under Emergency Ordinance no. 31/2025. By structuring the system into a layered architecture and aligning it with European interoperability principles, the proposed solution successfully reduces administrative delays, improves transparency, and provides a highly scalable foundation for future digital governance and broader regulatory integration.

Key words*: construction authorization, digital public administration, interoperability, smart e-permitting system, urban planning.*

INTRODUCTION

Romania's construction and urban planning framework operates within a highly regulated environment, where administrative procedures depend on continuous document exchange between multiple public institutions. These workflows are essential for issuing permits, monitoring compliance, and ensuring that construction activities respect legal and technical standards.

In practice, digital support for these processes remains fragmented. Existing software solutions are generally developed for local administration use, most often at the level of town halls. They are primarily focused on the preparation and management of urban planning certificates and building permits, with only limited extension toward document handling in later phases such as project reception. However, these tools do not support a coherent, end-to-end flow of information across institutions. As a result, communication between authorities is still partially dependent on isolated systems, manual transmission of documents, and non-standardized procedures.

In many cases, obtaining a building permit requires, in addition to the urban planning certificate, a series of approvals from relevant authorities such as environmental protection agencies, water management authorities, electricity distribution operators, gas suppliers, and other public utility providers. These approvals are frequently still requested and submitted through physical documentation or via unstructured electronic communication (email), while the use of dedicated digital platforms remains inconsistent and varies significantly across institutions. In this context, the Romanian e-government portal (e-guvernare.ro) provides a general digital infrastructure for public services, enabling the online submission of certain administrative requests and documents through authenticated electronic channels. However, its role remains limited to that of a generic access point for e-services, without supporting a unified or domain-specific workflow for urban planning

procedures. As a result, the processing and management of documents continue to be distributed across separate institutional systems, with no end-to-end integration between authorities involved in the permitting process. Some partial solutions do exist, such as the National Agency for Cadastre and Land Registration platform ANCPI.ONLINE, but these systems operate independently and are not integrated into a unified permitting workflow, lacking real interoperability between institutions.

Within this context, the development of a unified digital platform that integrates all relevant public authorities and institutions becomes a relevant and timely objective. Such a system would not replace existing institutional responsibilities but would support them by structuring communication across all involved entities, including urban planning departments, environmental protection agencies, water management institutions, and utility providers. It would standardize document flows, reduce administrative fragmentation, and improve traceability throughout the entire authorization process, from the issuance of the urban planning certificate to the final approval of construction and the reception of works.

The aim of this study is therefore to propose a conceptual framework for an integrated e-permitting system that facilitates document management and interinstitutional collaboration at national level.

This objective reflects the need to move beyond fragmented administrative tools and toward a coherent digital architecture capable of supporting efficient, transparent, and coordinated decision-making across all institutions involved in the urban planning and construction authorization process.

MATERIALS AND METHODS

Current Status and Context of Urban Planning Documentation Management

This section is grounded in the professional experience of one of the authors, gained within a rural local public administration in Romania, where responsibilities in the field of urbanism and landscaping were carried out for a period of nearly three years, some time ago. This experience, developed through direct involvement in daily administrative activities, provided a practical understanding of how urban planning documentation was managed in real operational conditions at that time, including the constraints, working routines, and administrative limitations that shaped the process of issuing and processing official documents.

A key operational challenge in rural administrations concerns the tracking and management of urban planning certificates and building permits within their legal validity periods. Although these documents are governed by clearly defined regulatory timeframes, their monitoring is still predominantly manual, as most administrative records are maintained in physical, paper-based archives. This approach limits the ability to ensure real-time tracking of document status, deadlines, and dependencies between successive approvals.

A further recurring challenge concerns the acquisition and coordination of technical endorsements. The urban planning authorization process requires multiple approvals from various institutions, each operating through distinct administrative channels. This fragmented structure leads to sequential validation steps, extended processing times, and limited visibility over the status of ongoing applications.

In practice, this issue was observed in the interaction between the administration, property owners, and the professionals responsible for preparing urban planning documentation (such as architects and designers). Delays often appeared not because of the documentation itself, but as a result of the lack of synchronized communication and coordination between the involved institutions. This created difficulties in tracking progress and completing the approval chain within reasonable timeframes.

The regulatory framework governing urban planning and construction authorization in Romania is extensive and subject to continuous revision. For personnel newly assigned to responsibilities in this field within local public administrations, the initial adaptation phase often requires substantial training, given the need to navigate a dense network of primary

legislation, secondary regulations, and methodological norms.

As of 2026, the applicable legal framework includes several relevant updates that directly influence administrative practice:

1. Authorization of Construction Works

Law no. 50/1991 regarding the authorization of construction works, as amended and supplemented. A milestone structural reform was introduced via GEO / OUG *(Government Emergency Ordinance / Ordonanță de Urgență a Guvernului)* no. 31/2025, which radically streamlined permitting procedures by establishing strict 15-day response deadlines for issuing entities and implementing a tacit approval mechanism to eliminate administrative delays, alongside earlier key updates such as Law no. 193/2019.

2. Methodological Norms for Application of Law no. 50/1991

The Methodological Norms for the application of Law no. 50/1991, approved by Order no. 839/2009, as amended and supplemented. The application rules were significantly aligned with primary legislation through Order no. 3454/2019 and other Laws and Regulations.

3. Spatial Planning and Urbanism

Law no. 350/2001 on spatial planning and urban planning, supplemented and amended over time with numerous laws (such as law 151/2019) and GEOs.

Administrative Workflow for Urban Planning Documentation

The organization of Urbanism and Spatial Planning activities within Romanian public administration shows a clear structural imbalance between urban and rural institutions. In urban town halls and county councils, these departments are generally stable and well defined, with dedicated personnel such as architects and urban planning specialists. In contrast, rural administrations often operate with minimal human resources in this field, where urbanism responsibilities are frequently managed as a one-person department.

In most rural town halls, urbanism responsibilities are assigned to a single employee or a very small administrative unit, reflecting limited internal specialization in urban planning. According to Article 36 of Law no. 350/2001 on spatial planning and urbanism, as subsequently amended, local public authorities may organize urban planning activities either through specialized internal structures or through interinstitutional cooperation mechanisms, including County Council technical structures and intercommunity development associations (ADIs). This legal framework enables rural administrations to rely on external technical support, for the verification and administrative processing of urbanism certificates and building permits. Such cooperation is especially relevant in cases involving new special constructions (eg. company headquarters, factories) or renovations for historical monuments where technical requirements exceed local administrative capacity, etc.

RESULTS AND DISCUSSIONS

The Urban Planning and Building Permit Approval Workflow

Accordingly, Law 50/1991 regarding the authorization of construction works, with subsequent amendments and completions, establishes the competence of issuing urban planning documents depending on both the location of the investment and the nature of the proposed works. In general, local public administrations (commune, town, or city mayor's offices) are competent to issue Urban Planning Certificates for most construction works carried out within the administrative-territorial unit. County councils intervene in specific cases expressly provided by law, particularly for certain categories of works of broader territorial interest or for situations that exceed the competence of local authorities, as regulated under Article 3 of the same law and related normative provisions.

Thus, the allocation of competence is not determined solely by the intravilan or extravilan status of the property, but also by the legal classification and technical characteristics of the investment, as defined by the applicable legislation on urban planning and construction authorization.

Within this regulatory framework, the Urban Planning Certificate represents the first administrative document required to initiate any construction, major modernization, or

demolition intention. This document has a strictly informative character and does not grant the right to execute works. Instead, it establishes the legal, economic, and technical regime of the property, the applicable urban planning requirements, and the complete list of necessary approvals and endorsements required for further procedural steps.

When the Urban Planning Certificate is issued for construction, rehabilitation, or demolition works, obtaining a Building becomes a mandatory and legally binding requirement. The Building Permit is the administrative act through which the competent authority authorizes the execution of works, based on technical documentation prepared by authorized professionals and on all approvals required through the Urban Planning Certificate.

The process continues with the preparation of the Technical Documentation for the Building Permit, developed by an authorized architect or designer in accordance with the requirements specified in the Urban Certificate. This documentation includes technical drawings, written explanations, and all required approvals issued by competent authorities, each following its respective administrative procedure.

Finally, the Building Permit is issued only if the submitted documentation fully complies with the legal provisions in force, the urban planning regulations, and all requested approvals, representing the final administrative act that allows the actual commencement of construction works.

Figure 1 illustrates the main stages involved in granting the Urbanism Planning Certificate by rural town halls, following the submission of an application by the beneficiary. The diagram captures the essential administrative and procedural steps associated with this process.

The workflow for obtaining a Building Permit follows a procedural structure similar to the one presented in Figure 1. The process begins with the submission of the application and the related technical documentation (DEAC) by the beneficiary, followed by the verification and analysis of the submitted documents by the responsible administrative authority. Depending on the characteristics of the project, the procedure may also involve institutional consultations and the validation of additional approvals before the final authorization is granted.

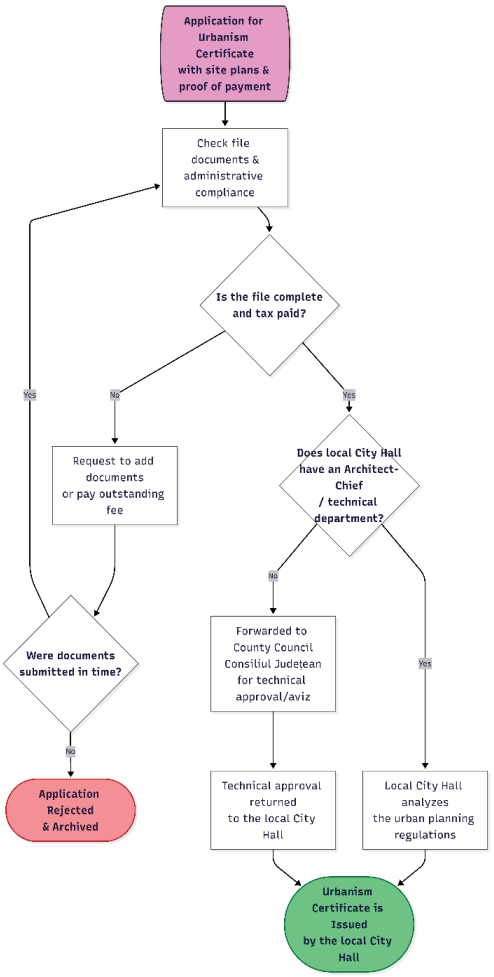


Figure 1. Diagram illustrating the process for issuing an Urbanism Certificate requested from a rural town hall. (The diagram was generated using the Mermaid Live Editor - mermaid.live)

As previously mentioned, the DTAC (Documentation for the Technical Approval of Construction) comprises the complete technical and architectural documentation of the project, including architectural, structural and installation plans, compliance with urban planning regulations, as well as the set of required technical studies and endorsements, all of which are integrated within the documentation submitted for obtaining the building permit.

In the process of managing urban planning documentation for certificates, permits, and authorizations, several procedural verifications are carried out as part of the administrative workflow. These include the verification of the completeness of the submitted documentation, the consistency and correctness of technical plans, as well as the validity of supporting documents and previously obtained approvals. While these steps are essential for ensuring compliance at the operational level, they are not further detailed within the scope of this study.

From a regulatory perspective, Law 50/1991 regarding the authorization of construction works, with subsequent amendments and completions, establishes the institutional competences for granting urban planning documents, depending on both the location of the investment and the nature of the proposed works. In general, local public administrations (commune, town, or city mayor's offices) are responsible for granting Urban Planning Certificates for most construction works within their administrative-territorial jurisdiction, while county councils intervene only in specific cases expressly provided by law.

Following the granting of the Urban Planning Certificate or the Building Permit, in cases where the procedure involves the approval of the urban planning department within the County Council, a copy of the document is transmitted to the Council for archival and record-keeping purposes, in accordance with administrative procedures.

After obtaining the Construction or Demolition Permit, and prior to the commencement of works, the beneficiary is required to notify both the issuing authority (the mayor's office or the County Council) and the County Inspectorate for Construction. Upon completion of the works, a final notification must also be submitted, accompanied by a request for the organization of the reception at the completion of works, which represents the formal closure of the construction process.

During the management of urban planning documentation, administrative staff must also consider additional operational aspects, such as the payment of applicable fees, the validity of submitted documents, and their expiration dates. Although these elements are relevant to the overall administrative workflow, they are not addressed in detail within the scope of this study.

Each of these notifications plays an important role in ensuring the proper legal and procedural development of construction activities. Accordingly, the public authority that issued the permit is responsible for registering, processing, and responding to all requests submitted by beneficiaries.

All such requests and notifications, typically accompanied by supporting documentation, must be carefully managed by public administration staff. This process is time-consuming, particularly in cases requiring multiple institutional approvals. For this reason, a well-structured and integrated information system that enables efficient document exchange between institutions and supports their subsequent management could significantly improve administrative efficiency in this field.

Architecture and Functional Design of the Smart Integrated E-Permitting System

An Information System (IS) is an integrated environment composed of hardware, software, people, and processes, designed to collect, process, and transform data into meaningful and valuable information (Hasan, 2018).

An e-permitting system is an integrated e-government platform that digitizes the submission, processing, coordination, and approval of permit applications within administrative procedures, enabling a more structured and data-driven management of authorization workflows in the construction sector (Amer et. al., 2025) and Information Technology refers to the set of technologies used within a system, typically including hardware, software, databases, and communication networks. It can be defined as the "field concerned with the study, design, development, implementation, support, and management of computer-based information systems" (Florida Tech, 2020).

The proposed system aims to develop a centralized platform that integrates all stages and all actors involved in the urban planning and construction authorization process.

The starting point is represented by users (beneficiary) who require urban planning documents, either for construction purposes or

for various interventions on existing properties. These users can interact directly with public administration bodies and with professionals responsible for preparing the necessary technical documentation.

The platform also includes public institutions with decision-making authority in managing urban planning documents, such as town halls (municipalities) and county councils. These entities manage the analysis, verification, and approval process of documentation, in accordance with the competencies established by the applicable legislation.

Another essential component consists of architectural and urban planning firms responsible for preparing the technical documentation required to obtain certificates and construction permits. Integrating these actors into the system enables workflow standardization and reduces information fragmentation.

At the same time, the platform connects the institutions responsible for issuing the various endorsements and approvals required within DTAC documentation (Technical Documentation for Construction Authorization), such as utility providers and infrastructure operators in sectors including electricity distribution companies, water and wastewater utilities, natural gas suppliers, and other technical service providers involved in the coordination and validation of public infrastructure connections. These institutions contribute through technical assessments specific to their areas of expertise, and the digitalization of their interaction reduces approval times and improves process traceability.

From a conceptual perspective, this platform represents a proposed model rather than an already implementable system within the current legislative framework. Its full operational deployment would require regulatory adaptations and institutional alignment. However, it is designed in accordance with the broader European and national direction toward administrative digitalization and interinstitutional interoperability, which has become increasingly prominent in recent years, as EU policy frameworks emphasize improved governance of interoperability activities and the adoption of common operational models for delivering digital public services that account for the needs of citizens and businesses across Member States (European Commission, 2017).

Through this integrated approach, the system aims to create a unified framework of collaboration between citizens, designers, local authorities, and approval institutions, with the goal of increasing the efficiency of the entire administrative workflow.

At platform level, users are organized according to distinct roles, including project beneficiaries, architectural and design firms, and public institutions involved in the authorization process. Each beneficiary is digitally linked to the firm responsible for preparing their technical documentation, enabling continuous collaboration within a single integrated system.

Through a personal account, both beneficiaries and design professionals can monitor at any time the full status of their applications and documents in progress. The platform provides clearly defined workflow stages such as “registered”, “in progress”, “under review”, “pending approval”, “approved”, or “rejected”, ensuring transparency and a clear understanding of the administrative process. The same tracking logic applies to all requested endorsements and approvals issued by competent authorities, allowing design firms to centrally manage and monitor all required approvals within a unified digital environment.

The platform also integrates the role of the State Inspectorate in Construction (ISC), which performs control and verification activities during the authorization process, ensuring compliance with applicable technical and legal regulations.

The operational workflow of the platform starts with the submission of a request by the beneficiary through the system interface. The design firm prepares and uploads the technical documentation, which is then automatically routed to the competent authorities and utility providers for review and approval. Each institution evaluates the documentation in parallel or sequentially, depending on regulatory requirements, while the system continuously updates the status of the process. Once all necessary approvals are collected, and the technical documentation is ready, the local authority issues the final authorization, and the

complete file is archived digitally within the system.

The proposed system can be conceptually structured into three main architectural layers: the user interface layer, the application and workflow management layer, and the data and interoperability layer. This layered approach ensures separation of concerns, scalability, and efficient coordination between different institutional actors.

The Unified Modelling Language (UML) is a standardized visual modelling language used for specifying, visualizing, and documenting the structure and behaviour of software systems (Koç, 2021). It provides a consistent graphical notation that allows complex systems to be represented in a clear and structured manner, facilitating communication between stakeholders involved in system design and development.

The Unified Modelling Language (UML) defines 14 officially recognized types of diagrams. These diagrams are divided into two main categories: structural diagrams (which show what a system is made of) and behavioural diagrams (which show how a system acts and interacts) (Dennis et al., 2015).

Among the various UML diagram types, use case diagrams play a fundamental role in the early stages of system analysis, as they capture the functional requirements of a system from the perspective of external users. These diagrams provide a high-level overview of the system's expected functionalities, illustrating how different actors interact with the system and what services the system is intended to deliver. As such, they contribute to validating requirements and ensuring alignment between system design and user expectations.

The construction of a use case diagram involves identifying the system boundary, defining the relevant actors, specifying the use cases, and establishing the relationships between them. In UML notation, the system is represented as a boundary box, actors are depicted as external entities interacting with the system, use cases are represented as ellipses, and relationships are illustrated using connecting lines that define interactions and dependencies.

Figure 2 presents a UML Use Case diagram that illustrates the proposed structure of the e-Permitting platform. The diagram highlights the main actors involved in the urban planning and construction authorization process, including beneficiaries, design firms, public authorities, utility providers, and the State Inspectorate in Construction. It also depicts the key interactions between these actors and the system, emphasizing the main functional areas supported by the platform, such as document submission, approval workflows, and status monitoring. The diagram was developed using PlantUML (https://www.plantuml.com/), an open-source tool that generates UML diagrams from textual descriptions, facilitating diagram maintenance, reproducibility, and version control.

Although use case diagrams effectively capture system functionalities and actor interactions, they do not describe the chronological order in which these interactions occur. To address this limitation, UML sequence diagrams are used to model the temporal flow of messages exchanged between participants during the execution of a process. By representing interactions in time sequence, these diagrams provide a detailed view of system behaviour and support the analysis of workflow execution and coordination among system actors (Dennis et al., 2015).

While the Use Case diagram establishes the static structural boundaries, specific roles, and high-level functional requirements of the proposed platform, it does not capture the temporal progression of administrative tasks. To address this dimension, a dynamic perspective is essential for analysing how information, technical validation files, and official notifications are structurally exchanged over time between the involved entities. Accordingly, Figure 3 presents a UML Sequence diagram that details the chronological workflow and message routing logic, mapping out the precise interactions from the initial project collaboration down to the final electronic issuance of the building permit.

The combined application of Use Case and Sequence diagrams enhances the overall system modelling process by addressing both functional and behavioural aspects of the platform. While the Use Case model focuses on system functionalities and user interactions, the Sequence model captures the exchange of

information and coordination mechanisms required for process execution. This integrated modelling approach provides a clearer understanding of system requirements, workflow dependencies, and communication flows, supporting the design and implementation of the proposed e-Permitting platform (Dennis et al., 2015).

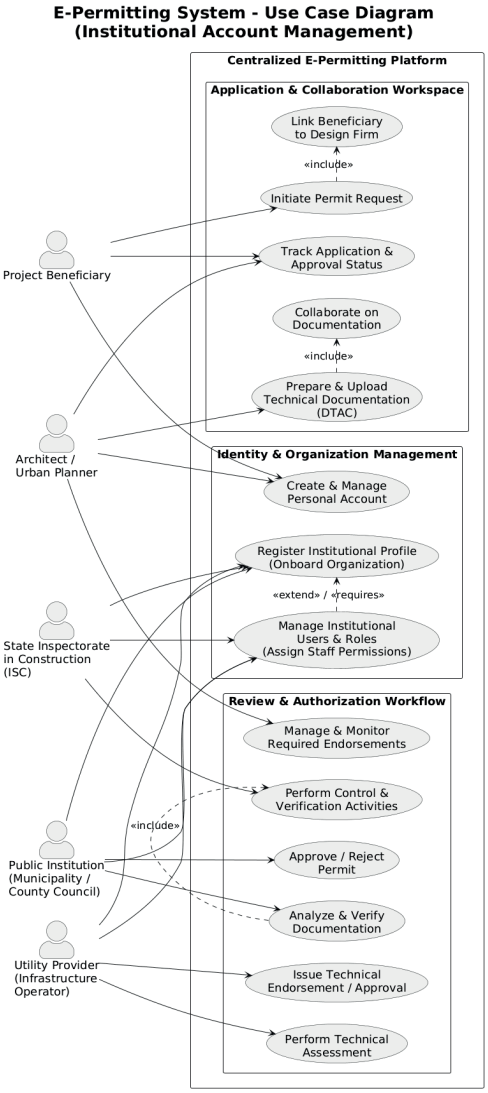


Figure 2. UML Use Case diagram proposing the structure of the e-Permitting platform, illustrating the main actors and their interactions within the urban planning and construction authorization process. The diagram was created using PlantUML (https://www.plantuml.com/)

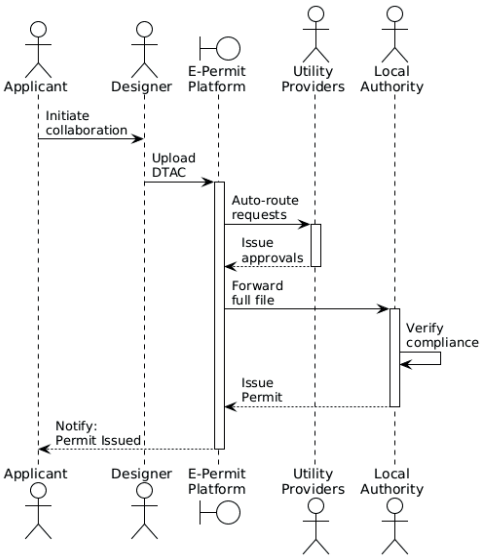


Figure 3. UML Sequence diagram illustrating the chronological flow of interactions and document routing during the permitting process
(The diagram was generated using PlantUML)

While a comprehensive UML model would typically involve multiple diagram types, the Use Case and Sequence diagrams presented here provide an adequate representation of the proposed platform by capturing both its functional requirements and the main interaction workflows.

This chapter presented the conceptual architecture and functional design of the proposed e-Permitting platform. The analysis highlights its potential to function as an integrated digital environment aimed at enhancing coordination, transparency, and efficiency across the urban planning and construction authorization process.

The proposed model supports the transition toward fully digital administrative processes, reducing fragmentation and improving communication between all entities involved in the authorization workflow. This UML-based representation supports the conceptual validation of the proposed solution prior to implementation.

CONCLUSIONS

The proposed smart integrated e-permitting platform demonstrates significant potential to improve the efficiency and transparency of

urban planning and construction authorization processes. By integrating all relevant actors within a unified digital environment, the system reduces fragmentation and supports more coherent interinstitutional collaboration.

A key advantage of the model lies in the optimization of document management processes at the level of local public administrations, particularly in rural areas where administrative capacity is often limited. The digitalization of communication between town halls, county councils, design firms, and technical approval authorities can significantly reduce processing times and administrative delays.

The implementation of such a system requires institutional coordination and regulatory adaptation. Existing legislative frameworks would need to be aligned with the requirements of fully digital workflows, including secure electronic document exchange, standardized approval procedures, and interoperability between public authorities.

From an architectural perspective, the system can be extended to include additional institutional actors involved in the authorization process, such as environmental protection agencies, emergency inspectorates, public health authorities, and other specialized entities issuing technical endorsements. This extensibility ensures scalability and adaptability to complex regulatory contexts.

Although the proposed model is conceptual in nature, it provides a structured foundation for future developments in digital governance within the construction and urban planning sector. Its implementation would require multidisciplinary collaboration between IT specialists, legal experts, and public administration stakeholders to ensure functional and regulatory coherence.

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