

CivicArc: A Digital Platform for the Documentation and Valorization of Italian Communal Palaces

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Abstract—Italian town halls — the *broletti*, the *palazzi del popolo* and the post-unification *municipi* — are living repositories of civic identity, woven into the urban fabric of hundreds of Italian towns and cities. However, there is currently no digital infrastructure dedicated to documenting and comparing these buildings on a national scale. This article presents CivicArc, a web platform developed as part of the PRIN research project “Historical Atlas of Town Halls”, which serves both as a national census and as a tool for promoting urban cultural heritage. Built using Django, MongoDB and Docker, the platform offers a secure editorial workspace for an interdisciplinary team of scholars and a georeferenced public consultation site. Currently, CivicArc contains 235 catalogued town halls, 1,338 iconographic records, 458 historical figures and 1,044 bibliographic sources. This paper focuses on the event-driven, reliability-focused data model — whose document schema follows established MongoDB modelling patterns — and on the two-tier architecture that separates in-depth academic documentation from curated public dissemination.

Index Terms—Digital Cultural Heritage; Communal Palaces; Historical Atlas; NoSQL; MongoDB; Django; Smart Cities; Civic Architecture

I. INTRODUCTION AND MOTIVATION

Town halls are among the buildings that contribute most to defining the identity of Italian cities: they are at once architectural monuments, seats of local government and repositories of civic memory [1], [2]. A town hall is rarely the result of a single construction project: medieval walls may house Renaissance halls, 19th-century façades and contemporary offices. Although GIS systems and digital methods are now fundamental to the management of cultural heritage [3], there is currently no digital platform dedicated to Italian town halls. Information regarding their architecture, historical events, iconography and uses remains scattered across local archives, regional monographs and unlinked census records.

CivicArc, developed as part of the PRIN project ‘Historical Atlas of Italian Town Halls’, fills this gap on two levels. Firstly, it constitutes the first national census of these buildings, making the relevant data searchable, citable and accessible from a cartographic perspective. Secondly, it serves as an infrastructure for the enhancement of urban civic heritage, connecting scholars, local administrators, cultural institutions and the public through a georeferenced consultation site, thereby contributing directly to the digital dimension of smart urban communities.

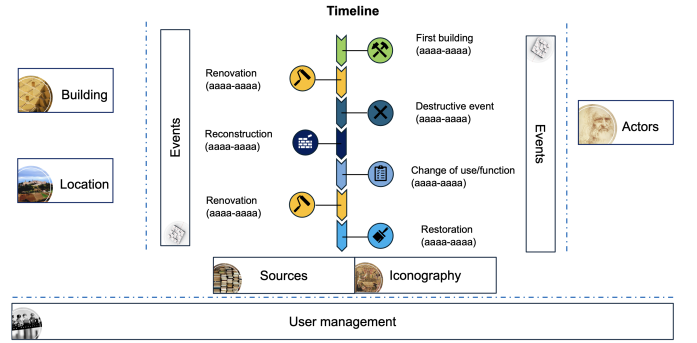


Fig. 1. CivicArc data model. The BUILDING entity is the atomic unit of the atlas; all temporal, iconographic, and bibliographic information is anchored to it through typed, reliability-tagged sub-records.

II. DATA MODEL

The data model, illustrated in Fig. 1, revolves around the central entity BUILDING, which represents a single municipal building. Each building is linked to a GEO entity representing either a current *municipality* (imported from ISTAT) or a locality/hamlet within a municipality. Each building includes a structured list of EVENTS, a set of DECORATIVE ELEMENTS, a list of USES AND FUNCTIONS over time, a list of the ICONOGRAPHIES present, and a bibliography of SOURCES.

The model adopts an event-centred representation inspired by CIDOC-CRM [4]: every significant moment in a building’s history — construction, extension, demolition, restoration or change of use — is recorded as a typed EVENT bearing its own date range, responsible actors, bibliographic justification and a four-level reliability tag (documented / circumstantial / conjectural / unknown). The same tag applies to entries relating to decorative elements and iconographic records, making uncertainty a first-level attribute of the data rather than a footnote. This design reflects the documentary reality of layered historic buildings, where precise dates and unequivocal attributions are the exception rather than the rule, and is, to our knowledge, uncommon in cultural heritage platforms.

The document schema is built on MongoDB [5], following established patterns for document-oriented data modelling [6]: related sub-records, such as events, decorative elements

and uses, are stored as arrays embedded within the parent BUILDING document, utilising MongoDB's atomic retrieval semantics so that a complete record of the building is retrieved in a single query. Independent entities naturally shared across buildings — actors and bibliographic sources — are stored in separate collections and referenced by identifier via the extended reference pattern, keeping updates consistent across the corpus. A lightweight relational database handles only authentication and authorisation.

The GEO entity stores the ISTAT identifier, the complete administrative hierarchy, the historical names of municipalities, and demographic data from the censuses of 1861, 1911, 1961 and 2021, enabling analyses that correlate architectural history with territorial change.

III. PLATFORM ARCHITECTURE AND FEATURES

The stack is lightweight and entirely open source. Django provides the backend, the authorization system (administrators, editors, read-only users) and the RESTful endpoints via the Django REST Framework. The interactive map of the building uses Leaflet on OpenStreetMap tiles. MongoDB operates as a three-node replica set to ensure high availability and reliability. All services are containerised using Docker Compose (Django/uWSGI, Nginx and three MongoDB nodes), making the environment reproducible and easy to redeploy across partner institutions.

A. Editorial Workbench

The editorial area is accessible only to authenticated researchers and serves as the main platform for documentation. As illustrated in Fig. 2, the editorial dashboard provides an immediate overview of the corpus: a Leaflet map of all catalogued buildings and pie charts showing coverage by resource type and region. The building editor is structured as a module divided into collapsible blocks: register, historical profile, events, decorative elements, uses and functions, iconography, and bibliography. Each block containing time-limited information displays a reliability selector (colored badge); the selected level is stored with the record, displayed in the user interface and propagated to the exported reports that serve as the basis for the atlas's peer-reviewed publications (each is assigned a DOI upon final release). A graphical timeline within the building record offers editors an immediate visual overview of all the events, uses and decorative campaigns tracked. Dedicated sections manage the shared entities of the corpus: geographical units contain historical administrative data; iconographic records are searchable by type, date and actor; bibliographic sources follow the Zotero model; and each figure is cross-linked to the palaces in which they played a role.

B. Public Consultation Site

The public website (<https://atlante.civarc.it>) requires no registration and is carefully curated: it features a georeferenced map of the buildings featured, a search page with filters for period and geographical area, and a summary profile for each

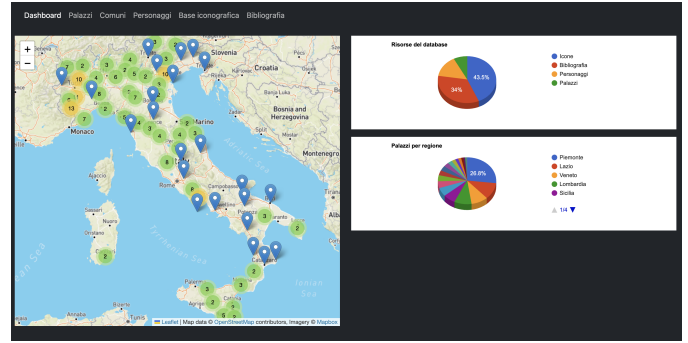


Fig. 2. Editorial dashboard of CivicArc: the map shows all catalogued palaces; pie charts summarize corpus coverage by resource type and region.

building that includes location details, a brief historical note, a gallery of images, and links to related academic publications. This is a deliberate design choice: the complete scientific documentation — events marked with reliability indicators, iconographic analyses, and transcriptions of sources — resides in the publications themselves, each of which can be cited via DOI. The public part of the platform serves as a structured search gateway and a georeferenced access point to the atlas, rather than a replica of the editorial archive.

IV. CONCLUSIONS AND FUTURE WORK

To our knowledge, CivicArc is the first nationwide digital platform dedicated to Italian town halls. With 235 buildings catalogued, 1,338 image records, 458 historical figures and 1,044 bibliographic sources, it demonstrates that a lightweight open-source stack can support a high-level scientific infrastructure. Its contributions are: (i) an event-driven, reliability-aware data model built with MongoDB document patterns; (ii) a two-tier architecture separating scholarly documentation from curated public access; and (iii) the first georeferenced census of Italian communal palaces. Planned extensions include the integration of 3D models (glTF), a FAIR-compliant API aligned with CIDOC-CRM for integration with the Italian National Heritage Infrastructure (I.PaC), and the integration of generative AI for more customisable data analysis and research.

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