Development of a business case on the concept and potential impact of implementing Digital Building Permits (DBP) within the EU construction sector

BEST PRACTICES on Digital Building Permits in the EU

EU BIM Task Group
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Executive summary

The European construction sector faces a persistent bottleneck in its building permitting processes, typically slow, fragmented, and largely paper-based. These inefficiencies delay housing delivery, increase administrative costs, and exacerbate the sector's productivity gap compared to other industries. To address this, the European Commission (DG GROW) tasked the EU BIM Task Group to assess the concept and potential impact of implementing digital building permits, provide a comprehensive analysis of current practices and systems related to building permit processes and to evaluate the benefits and challenges of transitioning to a digital format, including potential efficiency gains, cost savings, and reduction of administrative delays.

By analysing six frontrunner countries Austria, Estonia, Finland, Germany, the Netherlands and Spain the study identifies both the transformative potential and the practical challenges of digitalising permitting systems. Digital permitting, especially when built on openBIM and interoperable data standards, has proven to significantly enhance efficiency, transparency, compliance, and innovation. Benefits include faster approvals, improved data sharing, and stronger alignment with sustainability and housing policies.

At the same time, the transition faces notable challenges: high initial investment costs, limited municipal capacity, fragmented legal frameworks, data-security concerns, and a lack of digital literacy in permitting authorities. Case studies show that frontrunner nations succeed when reforms combine technological innovation with legal clarity, public-private collaboration, and training. Estonia and Finland have demonstrated nationwide adoption, while Vienna and Madrid provide replicable urban models for BIM-based permitting.
The digitalisation of building permits is not merely an administrative reform, it is a strategic enabler for multiple EU objectives. It supports the European Green Deal and Renovation Wave by accelerating climate-neutral housing, contributes to Construction 2050's digital ambitions, and embodies the New European Bauhaus principles of sustainability, inclusion, and beauty. Moreover, by enabling "type approvals" for prefabricated and standardised housing, digital permitting can accelerate affordable housing delivery and boost industrialised construction.

The study recommends the European Commission to play a central coordinating role by establishing:

- A harmonised legal basis for BIM-based permitting, recognising openBIM as the EU-wide standard.
- Common data requirements and machine-readable rule libraries to ensure interoperability.
- Funding mechanisms and shared digital infrastructures to support smaller municipalities.
- Capacity-building programmes to bridge digital skills gaps and ensure equitable access.
- Expansion of the framework to include renovation workflows, linking permitting reforms to climate and housing strategies.

In conclusion, digital building permitting has evolved from a pilot concept to a viable, scalable solution. When embedded in coherent policy, legal, and technical frameworks, it offers a pathway toward a more efficient, transparent, sustainable and competitive European construction ecosystem.

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Abbreviations

2D	Two-Dimensional
3D	Three-Dimensional
4D / 5D BIM	Dimensions of BIM including time and cost
AI	Artificial Intelligence
API	Application Programming Interface
AR	Augmented Reality
ASFINAG	Autobahnen- und Schnellstraßen-Finanzierungs-Aktiengesellschaft
ASI	Austrian Standards Institute
ASPRIMA	Asociación de Promotores Inmobiliarios de Madrid
BCF	BIM Collaboration Format
BIG	Bundesimmobiliengesellschaft (Austrian Federal Real Estate Company)
BIM	Building Information Modelling
BIM TG / EU BIM Task Group	European Union Building Information Modelling Task Group
BR	Building Regulations
BRISE	Building Regulations Information for Submission Environments
BRISE-Vienna	BIM-based approval process project in Vienna
bSDD	buildingSMART Data Dictionary
CAD	Computer-Aided Design
CDE	Common Data Environment
DBP / DBPs	Digital Building Permit(s)
DG ENV	Directorate-General for Environment
DG GROW	Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
DigiGO	Dutch national digitalisation program for construction
DSGO	Digitaal Stelsel Gebouwde Omgeving
EC	European Commission
ECU	Entidad Colaboradora Urbanística
EHR	Estonian Building Registry
EIA	Environmental Impact Assessment
ELAK	Elektronischer Akt (Electronic File Management System)
EU	European Union
EU BIM TG	EU BIM Task Group (short form)
GIS	Geographic Information System
GML	Geography Markup Language
Green Deal	EU strategy for climate neutrality
IDM	Information Delivery Manual
IDS	Information Delivery Specification
IFC	Industry Foundation Classes
InfraBIM	Infrastructure Building Information Modelling

INSPIRE	Infrastructure for Spatial Information in Europe
ISO	International Organization for Standardization
ISO 16739-1	Standard for IFC schema
ISO 19650	Organization and digitization of information about buildings and civil engineering works
ISO 29481-1	Standard for Information Delivery Manual
ISO 7817-1	Level of Information Need standard
IVU	Informe de Viabilidad Urbanística
LBO	Landesbauordnung (State Building Code)
LOG	Level of Geometry
LOI	Level of Information
MADRIDdbp	Madrid Digital Building Permit project
MBO	Musterbauordnung (Model Building Code)
MBO2BIM	Model Building Code to BIM
MVD	Model View Definition
MVP	Minimum Viable Product
NEIA	Net Zero Industry Act
OIB	Österreichisches Institut für Bautechnik
OIB Guidelines	Technical guidelines under Austrian building regulations
openBIM	Open Building Information Modelling
ÖBB	Österreichische Bundesbahnen
PDF	Portable Document Format
PMC	Preliminary Market Consultation
PoC	Proof of Concept
RAVA3Pro	Finnish national digital building permit project
REST API	Representational State Transfer Application Programming Interface
SaaS	Software as a Service
SIGSA / SLIM	Sistemas de Información Geográfica y de Gestión Administrativa
TU Wien	Technische Universität Wien
UVP	Umweltverträglichkeitsprüfung
UVP-G	Umweltverträglichkeitsprüfungsgesetz
ÜBN	*Ühtsed BIM Nõuded* (Common BIM Requirements)
VBWT	Vereniging Bouw- en Woningtoezicht
VBWT Survey	Vereniging Bouw- en Woningtoezicht survey (Netherlands)

1. Introduction

1.1. Why is this study necessary

This study has been assigned to the EU BIM Task Group, an established group of public procurers, policy makers and public estate owners, who bring together the collective expertise and purchasing power for a successful implementation of BIM in Europe and for the digital transformation in construction and in the built environment[1], by the European Commission (DG GROW) in order to assess the concept and potential impact of implementing Digital Building Permits (DBPs) across the EU construction sector.
Building permits, while essential for ensuring compliance, safety, health and quality are frequently seen as one of the most significant bottlenecks in construction and renovation projects. Long lasting, fragmented and often paper-based processes not only slow down housing delivery but also contribute to the sector's productivity gap compared to other industries.
There are some already demonstrated advantages for DBP[2]: cost, quality and time efficiency, transparency, better compliance and accuracy, data availability and interoperability and a strong impetus to innovation and modernisation of administrative services.
There is also clear indication about the following challenges: high initial costs, risks for excluding non-digitised companies, resistance form staff used to analogue methods, lack of digital literacy and culture in the permitting authorities, risks for data security and data breaches (eg cyberattacks).

1.2. Purpose of the study

By analysing the current state of permitting systems in the six leading EU Member States[3] - Austria, Estonia, Finland, Germany, the Netherlands, and Spain - this study assesses the concept and potential impact of implementing digital building permits within the EU construction sector through a comprehensive analysis of their current practices and systems and evaluates benefits and challenges of transitioning to digital building permits within the EU construction sector. It provides estimations about the potential for increased efficiency, cost savings, and reduction of administrative delays in the process in the above 6 Member States. It also explores any regulatory and technical challenges and identifies common data requirements for DBP It includes an analysis of stakeholders' opinions, regulatory frameworks, technical and non-technical barriers, and differences between Member States.
Finally, this study highlights how digital permitting can accelerate approvals, reduce administrative burdens, and create a more competitive European construction market, particularly in reference to an acceleration in affordable housing and industrialised construction. It further

Figure 1: Six EU Member States

[1] https://eubim.eu/
[2] Digital Transformation of Building Permits: Current Status, Maturity, and Future Prospects; Unveiling the actual progress of Digital Building Permit: Getting awareness through a critical state of the art review; Online Electronic Permitting Raising Efficiency; Twinning the path of digital building permits and digital building logbooks – Diagnosis and challenges - ScienceDirect; https://open-research-europe.ec.europa.eu/articles/5-90/v2
[3] DocsRoom - European Commission

identifies transferable practices, shared challenges and common data requirements that could underpin a future EU-wide framework.

1.3. Political Context

The study is firmly embedded in Europe's wider strategic objectives for housing, climate neutrality, and digital transformation. The *Construction 2050 Alliance* sets out a vision of an innovative and resilient construction sector able to meet future social and environmental challenges. Construction permitting is a central component of this transformation: unless authorisation processes are simplified and digitalised, investments in housing and infrastructure will not achieve their intended impact. The *European Green Deal* and its *Renovation Wave* highlight the urgency of decarbonising Europe's building stock. Renovation works are frequently delayed by complex permitting, making digitalisation a key enabler of climate-neutral housing. The *New European Bauhaus* brings in a cultural and social dimension, insisting that Europe's buildings and public spaces must embody sustainability, inclusivity, and beauty. For such projects to move from vision to reality, authorisation processes must be efficient, transparent, and interoperable. Finally, the *Affordable Housing Initiative*[4] is the current European Strategy addressing the housing supply constraints and focusing on their solutions. Faster, more predictable permitting directly contributes to reducing delivery times and costs, thereby easing affordability pressures[5]. In this way, DBPs serve as a structural, technical, and cultural reform that links administrative efficiency to construction efficiency and social advantages.

1.4. Methodology and sources

The study employed a mixed-method research approach, combining both desk-based and stakeholder-driven sources:

- Desktop research mapped national strategies, pilot projects, regulatory frameworks and digitalisation initiatives across the six countries.
- Case studies were developed for each Member State, tracing the evolution of permitting systems from paper to digital, identifying technical and legal enablers and assessing efficiency gains where possible.
- Comparative analysis distilled cross-country findings into common challenges, success factors and opportunities for EU-level alignment.

This approach ensures that the study reflects not only the evolution, policy frameworks, technical systems, legal and regulatory frameworks and data use but also the lived experience of municipalities, professionals and applicants navigating the permitting process[6].

1.5. Country-specific approach and preliminary findings

The study was organised around six national case studies, each chosen for its relevance in illustrating a distinct stage of digital maturity:

- Austria - Analysis focused on the decentralised permitting landscape, with the City of Vienna's BRISE-Vienna project as a pioneering case of openBIM-based submissions. Interviews with municipal authorities and professional chambers highlighted both

[4] https://single-market-economy.ec.europa.eu/sectors/proximity-and-social-economy/social-economy-eu/affordable-housing-initiative_en
[5] Digital Transformation of Building Permits: Current Status, Maturity, and Future Prospects, https://www.mdpi.com/2075-5309/13/10/2554
[6] The sources are included in the relevant country chapter

technical successes and legal obstacles, particularly the lack of recognition of BIM as a binding submission format.

- Estonia - The national EHR (Building Registry) provided a unique example of a centralised digital permitting system. Research traced the integration of BIM-based submissions into this platform and assessed the February 2024 nationwide rollout of automated rule checking. Interviews with the Estonian Land and Spatial Development Board and software partners provided insight into governance, technical architecture and stakeholder adoption.
- Finland - Fieldwork examined the strong national ecosystem built around Lupapiste (Cloudpermit) and Trimble, alongside RAVA projects that are pushing toward automated IFC-based code checking. Stakeholder interviews with municipalities and software providers revealed the role of new building act legislation as an enabler and the need for structured training to ensure local adoption.
- Germany - Research focused on fragmented federal-state approaches, pilot projects such as MBO2BIM and ongoing municipal trials in North Rhine-Westphalia. Interviews with ministries, city authorities (e.g. Dortmund, Bochum) and software developers provided evidence of progress in rule digitisation but also highlighted the legal rigidity of current building codes, which remain a major barrier to automation.
- Netherlands - The study combined analysis of national frameworks such as digiGO and the Omgevingswet with local pilot projects in Rotterdam and The Hague. Interviews with VBWT (the national building control association) and municipal officials confirmed the gap between high-level national ambition and slow local uptake. A new project on BIM-based permit checking packages was identified as a promising turning point.
- Spain - Research centred on the City of Madrid's MADRIDdbp project, the first comprehensive attempt to digitise permits using BIM and open standards. Interviews with ASPRIMA (developers' association), municipal staff and software providers highlighted lessons from public–private collaboration, early regulatory parametrisation and the link between digital permitting and housing policy goals.

Together, these six case studies provided complementary perspectives: frontrunners such as Estonia and Finland demonstrate what full-scale BIM integration looks like; Austria and Germany highlight the constraints of federal and legal fragmentation; the Netherlands illustrates the risks of a gap between vision and municipal capacity; while Spain shows the potential of targeted local innovation linked to housing policy.

1.6. Working questions and approach

The study is guided by a set of working questions: - How do permitting processes currently function across the six Member States[7] and what levels of digitalisation have been achieved? What efficiency, cost and time savings can be demonstrated from digital permitting initiatives? What role do BIM and open standards play[8] and what common data requirements could underpin interoperability across the EU? Which legal, regulatory, technical and organisational barriers hinder adoption,and how might they be overcome? How can digital permitting be aligned with EU policy frameworks to accelerate housing delivery, sustainability and competitiveness? By addressing these questions through comparative evidence, the study develops a business case and policy roadmap for DBPs that balances ambition with feasibility. It highlights that while legal frameworks, capacities and cultures vary across Member States,

[7] See Annex III Average and Maximum Processing Times for Building Permits in the 6 leading EU countries
[8] See Annex II Standards for Building Permits in the 6 leading EU countries

the trajectory is shared: moving from paper to data-driven permitting is not only possible but essential for Europe's housing and climate ambitions.

2. Country profiles

2.1 Austria

2.1.1. Overview

In Austria, the building permit approval process is regulated at the federal state level. Each of the nine federal state building regulations defines its own procedural steps, resulting in differences in depth, deadlines, and detail requirements. Nevertheless, a typical process can be outlined:

1. Submission of the building application by the building applicant or planner, traditionally in paper form or as PDF documents, increasingly via electronic building procedures ("digital building file").
2. Formal review by the local building authority (e.g. in Vienna MA37) to ensure that the documents are complete and in the correct form.
3. Factual review for compliance with building regulations, zoning and development plans and ancillary laws (e.g., monument protection, environmental law, fire protection).
4. Statements from specialist agencies (e.g. fire brigade, environmental authority) and, if necessary, additional requests for documents.
5. Neighbour consultation or building negotiations on site or at the office, in which affected residents can raise subjectively relevant objections under public law.
6. Decision: granting or refusal of the building permit. In practice, procedures can take from a few weeks to over two years, depending on the size of the project, objections, and the personnel capacity of the authority.

In addition, each federal state regulates spatial planning and regional planning through its own regional planning law. These laws determine which areas may be used for which purposes and lay down the principles of spatial development. However, the exact building regulations (building height, building density, etc.) and the exact designations (e.g. building land, green space) are determined by the municipalities and cities. Another component of Austrian building law are the Guidelines of the Österreichisches Institut für Bautechnik (OIB)[9] They define technical requirements (e.g. fire protection, energy efficiency) for various aspects of construction and ensure uniform standards throughout Austria. If the OIB guidelines are complied with, no further expert opinions or reports are required from the building applicant for the areas covered.

Current BIM maturity:
The BIM method is primarily promoted by large clients in Austria. Large public sector clients (ASFINAG, BIG, ÖBB) and various pilot projects and research initiatives have a particularly high level of BIM maturity. As a result, the openBIM methodology is also a focus for these clients in Austria.

In the private sector, BIM is mainly used by larger offices and construction companies (architecture, structural engineering, building services engineering). Smaller offices often still work on a 2D basis, but are facing growing pressure from clients.

[9] https://www.oib.or.at/kernaufgaben/oib-richtlinien/richtlinien/oib-richtlinien-2023/

Implementation is progressing more slowly in the public sector. While large public clients already require BIM, municipalities and building authorities are lagging behind. Traditional submissions are still based almost exclusively on 2D plans.

An initial breakthrough was achieved by the EU founded project BRISE-Vienna: the City of Vienna, together with the TU Wien, the Chamber of Civil Engineers and the company ODE, is developing a fully-fledged openBIM approval process in which IFC models are checked and validated in a semi-automated process. The City of Vienna was also the first municipality to issue the first information requirements for an openBIM submission[10]. Currently, a hybrid submission of openBIM + pdf plans is possible. In the course of this BRISE Vienna, a four-stage maturity stage was developed:[11]

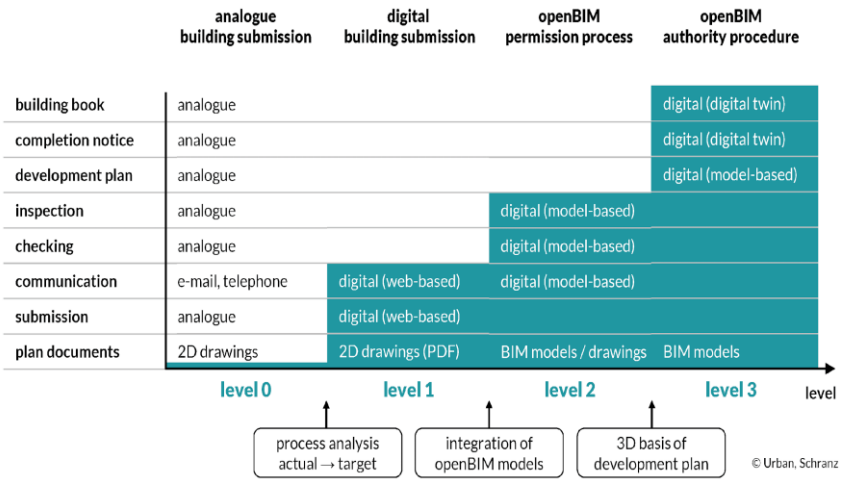

Figure 2: Four-stage maturity

With around 2.03 Million inhabitants – equivalent to around 22% of the total Austrian population – the city of Vienna is clearly playing a pioneering role in the field of digital building submissions. This is also made possible by its own research and development budget, which other municipalities do not have in this form. In principle, however, the building process in Austria is highly decentralised: building permits are issued by the building authorities of the 2,095 municipalities and cities. For many of these municipalities, the independent introduction of BIM submission would be neither organisationally nor financially feasible. Therefore, the experience gained in Vienna is being shared and processed at a supra-regional level, among other things by the "openBIM-Bauverfahren" (openBIM Building Process) working group at the Austrian Standards Institute (ASI), which coordinates knowledge transfer and standardisation.

In Austria building permitting process varies by state, with no nationwide maximum processing times. However, the European Commission's 2018 report indicates that the average processing time for building permits in Austria is approximately **1 to 3 months**, with additional time required for Environmental Impact Assessments (EIAs) if applicable[12]. The building permit procedures vary by state. In some regions, maximum processing times range from 8 to 24 weeks. However, these times can differ based on the complexity of the project and the specific municipality[13].

Demand vs. supply of BIM in permitting

There is high demand for digitised processes, especially from chartered Architect and property developers who plan using BIM and want to avoid duplication of work (creating 2D plans from models). On the part of the authorities, there is often a lack of technical infrastructure, trained personnel, and uniform specifications. In addition, there are legal obstacles: 2D plans are still the authoritative document in building regulations. This leads to a mismatch: projects are created in BIM, but the authorities are not yet able to process this information systematically.

[10] https://ucm.buildingsmart.org/de/use-cases/3452/en
[11] Urban et al
[12] EUR-Lex
[13] https://www.researchgate.net/publication/257527312_Comparison_of_building_permit_procedures_in_European_in_European_Union_countries

2.1.2. Evolution

Timeline and lessons learned:
The evolution from paper-based approval to the openBIM process is described using the City of Vienna as an example, as it is the only municipality that already has BIM submission in pilot

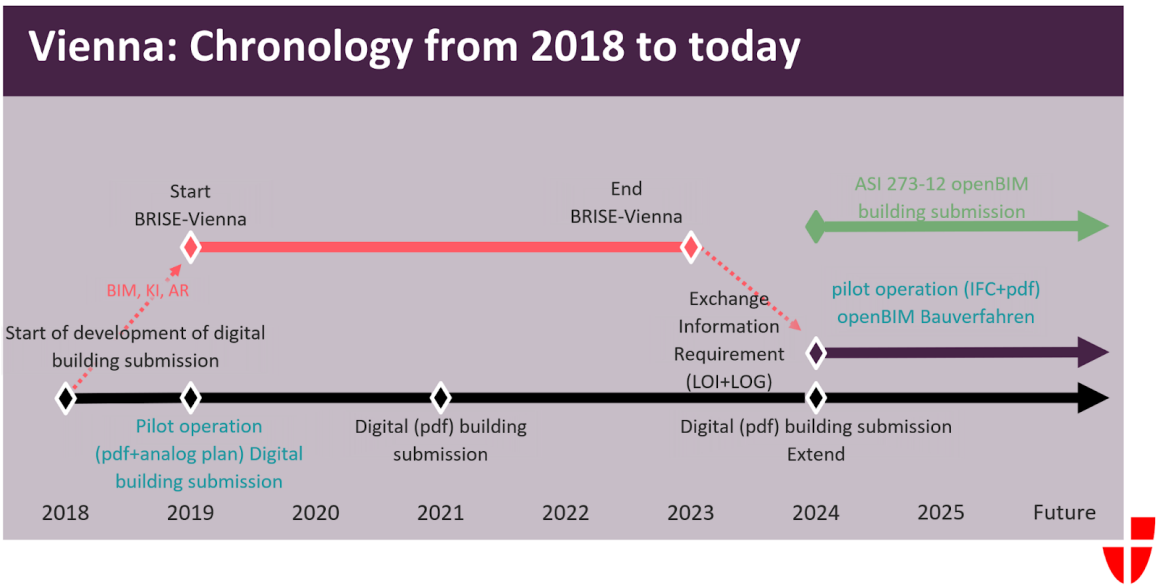

Figure 3: Timeline

operation. The evaluation was carried out in phases, from proof of concept to project and pilot operation to standardisation. Each phase built on the results of the previous one. The focus was initially on technical feasibility (tracking, automation), then on legal and organisational framework conditions and finally on integration into operational use. The milestones are described in Figure 3.

In the past, traditional paper submissions were the standard documents for the approval process. **In 2018**, the City of Vienna began developing a digital building application system. The initial focus was on creating a web-based platform that would allow applications to be managed digitally and the relevant databases of the authorities involved to be networked with each other. At the same time, the first pilot studies on BIM were launched by TU Wien, the company ODE, and the City of Vienna. Already in this phase, BIM, artificial intelligence (AI), and augmented reality (AR) were identified as key technologies of the future.

The pilot phase for digital submissions began **in 2019**: building applications could now be submitted digitally as PDF files. However, due to legal requirements, it was still necessary to submit the plans in paper form as well. It was not until an amendment to the law in 2021 that fully digital submissions based exclusively on PDF files became possible.

The European research project BRISE-Vienna, which aimed to develop an openBIM approval process, **also** started **in 2019**. An IFC-based model process was developed, which defined, tested and validated step-by-step requirements for BIM models and associated checking routines. Finding a balance between high model requirements (LOI+LOG) and the automatability of building regulations proved to be a major challenge. Various publications on the topic have been published as part of the research project[14].

[14] Publications | TU Vienna

With the **official end of the project in 2023**, the implementation of the research results in the operational authority process began. The first milestone was the publication of the information requirements (Level of Information + Level of Geometry, LOI+LOG) of the City of Vienna[15].
A hybrid phase has been running since 2024, in which a combined submission of BIM model and PDF is possible for the first time. Evaluation is ongoing based on practical project experience and adjustments to standards and legal frameworks. At the same time, intensive knowledge exchange with other federal states and municipalities is taking place at national level in the ASI working group 273.12.

Based on the experiences from the BRISE Vienna research project, the strategic goal of the City of Vienna is to achieve a 50% reduction in the current processing time with a pure IFC submission.

Outlook:
The next step is to implement a pure BIM submission (without PDF plans). To do this, three key issues must be resolved:

- a legislative amendment that allows submission based exclusively on BIM,
- the integration of dimension lines directly into the model,
- and the scalability of the checking software for all submissions.

Lessons learned from transitions (more detailed description in Urban et all[16], 4.5):

- Model pre-checking as the key to acceptance

Early pre-checks of BIM models have proven to be indispensable. This means that models can be pre-checked at any time using specific check criteria without this counting as a submission. They reduce subsequent iterations in the process and create trust between planners and authorities. This is a new step in the process, but it brings massive advantages for both sides (planners and authorities).

- Start development with model pre-checking

Model pre-checking is a very good start for an openBIM submission, as the checks do not yet have any legal consequences and can therefore help to reduce inhibitions on the part of the authorities. At the same time, planners can implement the required information requirements and provide feedback. The third major advantage is that it is possible to start at any time (no legal adjustments necessary). A a web service and checking software is needed to proceed.

- Gradual development

The transition from paper → PDF → BIM+PDF → pure BIM submission shows that a gradual introduction is necessary. Each phase served to evaluate, train and adapt processes, software and legal frameworks before the next step could be taken.

- Balance in information requirements

Overly detailed model requirements jeopardise acceptance. It was crucial to strike a balance between sufficient depth of information for automated checks and practical handling for planners. This is a crucial development step and also very time-consuming and should not be underestimated. Fewer properties always mean either more complex checking rules or no checking of certain legal sections.

- Early involvement of stakeholders

The success of the BRISE Vienna project was largely based on the involvement of all key players – authorities, planners, civil engineers, clients and training institutions. This allowed technical requirements, legal issues and training needs to be coordinated jointly.

- Promoting acceptance through training and pilot projects

[15] https://ucm.buildingSMART.org/de/use-cases/3452/en
[16] Urban et al

Training courses for public building authority employees and planners, as well as pilot projects with real-life projects, were crucial in breaking down barriers and building trust in the new method. Three training levels for public authority employees were developed as part of the research project.

- Legal framework as a bottleneck

Technically, a pure BIM submission was already feasible during the project period. However, legal approval (e.g. obligation to submit plans, building regulations) proved to be a limiting factor. Without accompanying amendments to the law, the process remains hybrid.

- Start with a model pre-check (agile development)

The model pre-check is ideal as an introduction to an openBIM submission. Since the results do not yet have any legal consequences, it helps to reduce inhibitions on the part of the authorities. At the same time, planners can implement the required information requirements in a practical manner and provide valuable feedback. Another key advantage is the low barrier to entry: no legislative changes are required for implementation. With a web service and suitable checking software, the model pre-check can be started at any time.

2.1.3. Technical and organisational architecture

Many municipalities now offer online platforms through which PDF applications can be submitted and processed. There are also efforts to further digitise national platforms and databases for cadastral and land registry systems. In addition, the electronic official notification system (eLAK) supports the digitisation of building law procedures and ensures a more transparent and efficient process. Elak is a nationwide exchange standard for public authorities. OpenBIM submission (and PDF plan) is currently only used in Vienna.
Basically, the development of the openBIM submission was based on the Austrian-wide elak system. For stage 1 of the digital building submission, a web-based submission platform was developed through which building applicants can upload PDFs. This platform is linked to the city administration's internal databases (e.g. zoning and development plans, address and cadastral data). A BIM model can also be uploaded to this platform. This is then automatically sent to the verification engine in the future operational system and the verification report is stored in elak as a PDF and BCF file. An openBIM submission is therefore not a completely new development, but can be embedded in the existing digital platforms for digital building submissions. (software ecosystem map in BRISE-Vienna[17]).
Solibri was used for the automated checks, supplemented by specially developed checking routines in Java[18]. During the pilot phase, the requirements for checking software for operational implementation were reviewed.
In order to ensure a consistent workflow, a strong focus was placed on interfaces and standards. IFC forms the data backbone; in addition, BCF was used for commenting and IDS for information requirement. A major discussion between openBIM and closed BIM (native) was not necessary, as a closedBIM implementation is not feasible from a legal and practical point of view (dependence, archiving).

2.1.4. Legal and regulatory framework

Role of national legislation: obstacle or enabler?
The Austrian construction process is highly federalised: each of the nine state building regulations defines its own rules, which means that there is currently no uniform BIM submission. In practice, this means that building applications must still be submitted in 2D plans. Although there are initiatives such as that of the City of Vienna, there is still no legal basis that recognises an IFC model as a purely legally binding submission document.[19]

[17] buildings-14-01135-g009.png (3207×3486)
[18] https://doi.org/10.1016/j.dibe.2024.100499, https://doi.org/10.1016/j.autcon.2023.105092
[19] BIM checking software requirements in the scope of the Vienna building authority)

As a result, national legislation currently acts more as an obstacle. Only through targeted amendments – such as the 2021 amendment to the Vienna Building Regulations, which allows purely digital PDF submissions – are the first steps towards enablement being taken.

How regulation supports (or fails to support) automation
For partially or fully automated testing, it is necessary to convert building regulations into rules that can be interpreted by machines. Currently, the regulations (e.g. OIB guidelines, state building regulations) are available in text form, which is legally precise but sometimes difficult to automate technically. In the BRISE-Vienna project, legal were therefore mapped to model requirements (LOI+LOG) and implemented in rule-based checking routines.
However, the problem remains that not all regulations can be clearly parameterised. Examples:

- Geometric requirements (e.g. escape route widths) can be interpreted technically.
- Uncertain legal terms – such as "local building practices" – cannot be checked in a fully automated manner. There are essentially two approaches to dealing with this in practice:
- Parameterisation by consensus: In consultation with the authorities, specific parameters or permissible value ranges can be defined to serve as technical checking criteria.
- Visual support: Alternatively, models can be enhanced with graphical aids that make it easier for administrators to assess them without formal automation.

Regulation therefore has a very strong influence on whether a legal matter can be checked automatically or not.

2.1.5. Data strategy

Authorities in Austria must rely on open standards in order to avoid discrimination based on software when submissions are made. The relevant standards are listed in Annex II.
The data strategy aims at permanent archiving in open formats: IFC is a database for the building. In addition, work is currently underway to generate new IFC domain models for test results (e.g. escape routes) by contractor.

Although PDF represents a first step towards digitisation, it only changes the workflow slightly. The reason for this is that PDF documents are machine-readable but not machine-interpretable. Lines, areas or text in PDFs do not contain any semantic information about whether they refer to a wall, a door or an escape route, for example.

In contrast, IFC is a structured, semantically enriched standard that can be used like a database. Objects in the model are clearly classified (e.g. IfcWall, IfcDoor, IfcSpace) and can therefore be specifically read, linked and checked. This improves quality and reduces the time required for approval.
This enables completely new workflows, such as:

- Model pre-checks that ensure completeness and data quality even before submission,
- Semi-automated approval checks that reduce the workload for reviewers and speed up procedures.
- automatic version comparisons that allow changes between plan statuses to be tracked.

In this way, openBIM submissions contribute significantly to improving the quality of documents and shortening the approval process.

2.1.6. Scope and domain integration

- The use of BIM in the approval process currently focuses on new buildings. Focus of pilot projects, especially residential and office buildings.
- Renovations/conversions: technically possible, but not yet reflected in the processes.
- However, GIS integration is an important component of an openBIM approval process.
- InfraBIM: (roads, bridges, tunnels) is being strongly promoted in Austria by ASFINAG and ÖBB, but is not yet part of the building authority procedures and often requires an environmental impact assessment. The UVP in Austria is regulated by the Environmental Impact Assessment Act (UVP-G). The assessments are not carried out by the building authorities of the municipalities, but by the federal states. There is no openBIM pilot phase there yet.

2.1.7. Impact and value

The evaluations in Vienna show clear added value:

- Time savings: Semi-automated checks (e.g. escape routes, fire protection) reduce processing time.
- Quality improvement: Preliminary model reviews help to identify incomplete or incorrect submissions at an early stage.
- Transparency: AR-supported neighbourhood hearings improve understanding of planned projects and reduce conflicts.
- Knowledge transfer: Standardisation at national level (ASI 273.12) also benefits smaller municipalities that do not have their own development resources.
- Costs: Nationwide implementation requires investment in IT, training and change management – but efficiency gains are expected in the medium term.

The implementation in Vienna shows that openBIM submission is already possible today. However, for a pure BIM submission without PDF plans, three essential further developments were necessary, which are currently being worked on:

- Amendment to the law recognising IFC models as binding documents
- Integration of dimensions (IfcAnnotation) and scale in the model
- Scalable checking software

For broad acceptance among planners, it is crucial to define the model requirements to an appropriate extent. Requirements that go beyond what is actually relevant for testing lead to increased modelling effort and declining acceptance. At the same time, transparent communication of information requirements is necessary: planners must be able to understand which attributes are required for which model objects and to which test step or legal provision this information is assigned.
Once an efficiency review has been accomplished the estimated benefits can be specified in numbers.

2.2. Estonia

2.2.1 Overview

Estonia’s digital permitting landscape and BIM maturity
Estonia has emerged as a European leader in the digital transformation of public sector services ,and the building permitting domain is no exception. Central to this transformation is

the Estonian Building Registry (EHR)[20], a fully web-based national platform that manages the entire lifecycle of construction-related procedures. Operated under the Estonian Land and Spatial Development Board (prior to 2025 under the Ministry of Climate), EHR integrates design conditions, permit applications, occupancy certificates and other authorisations into a structured, legally binding workflow. This centralised platform acts not only as a digital service interface but also as a governance framework — enabling transparent, accountable and interoperable decision-making across stakeholders and institutions.

The push toward BIM-based permitting stems from a broader policy ambition: to triple productivity in Estonia's construction sector by 2030[21]. This is to be achieved through systemic digitalisation and standardisation efforts encapsulated in the national e-construction programme. Within this context, Building Information Modelling (BIM) is not treated as an isolated innovation but as a foundational component of future regulatory infrastructure.

The architectural, engineering and construction (AEC) industry in Estonia demonstrates relatively high BIM maturity compared to its European peers[22]. IFC-based model exchange is common in large and mid-sized design firms, while national real estate developers and public sector clients increasingly demand structured model deliverables. However, the permitting domain has historically lagged behind, constrained by fragmented legislation, subjective interpretation of codes and document-centric workflows dominated by PDFs.

Existing permitting workflow (EHR)

The standard permitting workflow in Estonia is administered via the EHR and is common across all 79 municipalities. Applicants submit their documents through a form-driven interface, where metadata is automatically validated against national registries — including cadastral, address and zoning systems. Permit authorities can assign tasks, issue comments and approve or reject submissions directly in the system. However, under the traditional process, key bottlenecks persist:

- Design documents are submitted in PDF format, requiring manual interpretation.
- Regulatory checks rely on human review of drawings and explanatory letter.
- Errors in classification, area calculation, or accessibility provisions often trigger revisions.
- Many processes remain semi-transparent or fragmented across departments.

These limitations result in delays, inconsistency and increased administrative workload. Moreover, municipalities must involve several authorities (e.g. fire safety, utilities, heritage, environment) in each permit decision — each using their own documentation formats and interpretation criteria. The overall review process can take weeks or months, especially for complex or contested cases. Figure 4 illustrates the average building permitting times for all buildings that need building permit by Building Code[23] in calendar days in Estonia from 2017 to 2024[24]. The blue line represents the national average across all 79 municipalities, while the orange line highlights data from the capital city, Tallinn. In Tallinn, permitting durations tend to be longer due to the scale of developments and the complexity of regulatory requirements, especially when compared to smaller municipalities. The statistics is a slightly different if only erecting new buildings with purpose of housing is being observed in 2017-2024: mean time is 101 and median time 58 calendar days.

[20] https://livekluster.ehr.ee/ui/ehr/v1 - EHR website, accessed 26.08.2025
[21] https://eehitus.ee/wp-content/uploads/2019/07/e-construction-platform-vision-ENG.pdf
[22] https://build-up.ec.europa.eu/en/resources-and-tools/publications/analysis-adoption-bim-across-eu
[23] Building Code Annex 1 https://www.riigiteataja.ee/aktilisa/1080/7202/5039/Lisa_1_01072023.pdf#
[24] Building Registry information portal: https://livekluster.ehr.ee/ui/ehr/v1/infoportal/proceedinglength

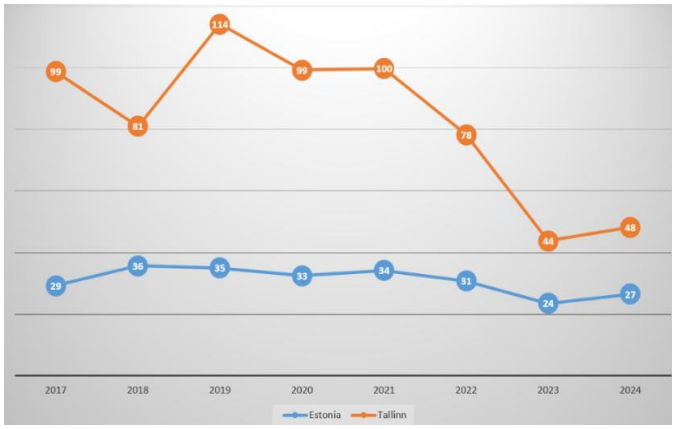

Figure 4: Average permit issuing times in calendar days in Estonia (Source: Building Registry)

Strategic shift to BIM-based permitting

To address these inefficiencies, Estonia has developed a national BIM-based permitting solution, embedded directly into the EHR. Rather than replacing the existing PDF pathway, this new digital channel allows applicants to submit structured, IFC-format building models as the basis for their application. These models are automatically pre-checked against a set of regulatory rules (currently 47 checks) and visualised in a simplified 3D viewer for permit reviewers.

The result is a **semi-automated process** that reduces administrative burden, speeds up decision-making and increases regulatory transparency. Importantly, the solution is built on **open standards** (IFC, BCF), integrated with national data registries and designed for horizontal scalability across all municipalities. The rollout in February 2024 marks the first nationwide implementation of BIM-based permitting in Europe.

2.2.2 Evolution

From paper-based permitting to BIM-integrated workflows

Estonia's transition from traditional permitting to BIM-based workflows did not happen overnight. Instead, it was the result of a deliberate, step-by-step innovation process. While the EHR had already digitised document submission, it became clear that real improvements in speed, quality and consistency could only be achieved through machine-readable, model-based information.

In 2019, the Ministry of Economic Affairs and Communications, with support from the European Commission's Structural Reform Support Service (SRSS), initiated a proof-of-concept project to explore whether Building Information Models (in IFC format) could be automatically checked against legal requirements. This marked a shift in thinking—from simply managing documents online to enabling true regulatory automation using structured data.

What followed was a multi-year development process involving legal analysis, technical pilots, software development and collaboration across municipalities, ministries and software partners. This effort culminated in the official launch of Estonia's BIM-based permitting channel in early 2024, now available across all 79 municipalities.

Key Development Milestones

The BIM-based permitting initiative progressed through several phases between 2019 and 2024, each contributing to its legal, technical and organisational maturity:

1. Proof of Concept (2019)

- Led by Future Insight B.V., the initial PoC demonstrated that IFC-format models could be uploaded, validated and checked against basic regulatory constraints.
- Nine compliance checks were developed, including space area minimums, storey counts, evacuation routes and facade alignment.
- Algorithmic checking was prioritised over rule-based logic to avoid dependence on highly structured or perfect BIM models.
- Stakeholder feedback confirmed strong support from municipalities, architects and public authorities.

2. Technical and legal feasibility, platform development and integration (2020–2023)

- Further analysis was conducted on the Estonian Building Code and Planning Act to identify which legal provisions could be translated into automated rules.
- National BIM requirements (ÜBN) were developed, defining the IFC entities and property sets necessary for rule-based validation.
- Open standards were prioritised, including IFC for data and BCF for feedback
- Agile development processes were adopted to allow parallel progress on backend systems, UI design, rule definition and legal alignment.
- The BIM.works engine was integrated as a backend service into the EHR system.
- A new BIM module was developed, allowing IFC file upload, rule execution, comment exchange and model visualisation within a web-based interface.
- 47 automated compliance checks were implemented, among others covering fire safety, accessibility, spatial use.
- Feedback from municipalities guided UI simplification and role-based access.
- Web-based solutions were chosen to avoid installation burdens and requirements for expensive hardware to accommodate the needs of BIM software.
- Pilot cases were conducted to test legal acceptance, user experience and rule reliability.

3. National launch and adoption (2024)

- On 14 February 2024, the BIM-based pathway was officially launched in all 79 municipalities.
- By the beginning of 2025, the first two full building permits had been issued using the BIM pathway.
- The system is now operational alongside the traditional PDF pathway, with growing interest from industry and local authorities.

Key drivers and lessons learned

- *Public-sector leadership* was critical: Estonia treated the BIM permitting solution not as a pilot or vendor product, but as national infrastructure.
- *Agile collaboration* between legal experts, software engineers and permit officers ensured feasibility at every step.
- *Modular design* enabled gradual scaling: The BIM engine, model viewer, rule database and submission interface are all loosely coupled services.
- *Avoiding overregulation* was essential: By allowing flexibility in IFC structures (rather than rigid schema enforcement), smaller firms could participate.

The Estonian experience illustrates that national-scale BIM-based permitting is achievable when built on a clear policy mandate, mature digital infrastructure and stakeholder co-creation. From inception to rollout, the process took approximately five years — and now provides a reference point for other EU Member States seeking to transition from document-based to data-driven regulation.

2.2.3 Technical and organisational architecture

System integration: Embedding BIM into the Estonian Building Registry

Estonia's BIM-based permitting system is not a standalone tool or pilot environment — it is fully embedded into the national permitting infrastructure via the HER, which is a legally binding, workflow-based digital platform, developed according to public service design

principles. The system is central to all construction-related procedures in Estonia, including building permits, design conditions, occupancy approvals and usage certificates.
To enable BIM-based submissions, a distinct **BIM module** was developed and integrated into the EHR using a modular microservice architecture. This module acts as a gateway for model upload, rule execution, metadata extraction, commenting and visualisation. It is tightly coupled to the EHR's main process engine, ensuring that BIM submissions follow the same legal and administrative workflows as traditional applications — but with enhanced automation and reduced manual input.

At the technical core of the system lies the **BIM.works engine** developed by BIM Base. This web-based service performs geometric and semantic validation of IFC models, running a suite of predefined compliance checks and returning results via the BIM Collaboration Format (BCF). Importantly, rule execution is server-based and does not require any desktop installation, making it fully accessible to all permit officers, regardless of local IT capacity.

Platform architecture and data flow
The overall architecture can be described as a layered, loosely coupled system composed of the following main components:

- *Frontend (EHR UI):* Web interface for permit applicants and reviewers, including model upload, model viewer, rule-check summaries and comment threads. Frontend is also a modular service based on microservice architecture, having BIM service UI as one component of many.
- *Backend Services:*

File management and versioning (linked to national e-construction platform)
BIM model parser (IFC reader and geometry processor)
Rule-checking engine (parameterised rule sets with logic scripts)
Metadata extractor (auto-populates permit forms from IFC fields)

- *Messaging and Logging:*

Asynchronous event queues for rule execution, result handling and notifications
Audit trail logging for traceability and legal accountability

- *Integration Layer:*

X-Road[25] connecting the BIM module and EHR overall to national registries (address, zoning, cadastral)
Compatibility with REST APIs for future third-party services

The system uses **open standards** wherever possible — IFC for model data, BCF for feedback and standardised JSON responses for metadata exchange. Models are processed in a secure sandbox environment and previous version deleted after review leaving only most valid version for showing in National Digital Twin. Metadata is retained according to legal archiving rules.

Rule checking and data automation
A key innovation in Estonia's system is its hybrid rule engine, which combines **rule-based logic** (e.g. minimum area, floor count) with **algorithmic analysis** (e.g. evacuation pathfinding, fall zone analysis). This allows for more robust automation even when input models are imperfect or incomplete — a necessary accommodation for real-world variation in IFC quality.

- *Mandatory rule execution:* Before submission, all applicants must run the checks and review results. They must respond to failed checks or acknowledge them explicitly.
- *Model-linked feedback:* Comments are attached directly to objects in the 3D viewer, using BCF anchors, enabling more intuitive communication between applicants and reviewers.

[25] https://e-estonia.com/solutions/interoperability-services/x-road/ Description of X-Road service

- *Data prefill:* The system auto-extracts values (e.g. gross floor area, number of units, building function) from the model to populate the permit application — a process that previously took 1.5–2 hours manually and is now completed in seconds.

All checks are traceable and updates to rule logic are versioned and managed centrally. While BIM.works remains a proprietary service, the rule syntax and logic framework are published and adaptable for other platforms or jurisdictions.

Organisational setup and governance

From a governance perspective, Estonia's approach is public-sector-led and embedded in institutional processes. Key actors include:

- *Ministry of Climate* – Strategic lead and funding authority; owns the Building Registry
- *Estonian Land and Spatial Development Board*– Responsible for software development, infrastructure and operation of the Building Registry
- *Municipalities* – End users of the permitting system; involved in UI testing and feedback
- *Domain experts and lawyers* – Translate national code clauses into logical expressions for rule-checking
- *Software partners* – Develop EHR and BIM services under the rules of public procurement

A formal agile roadmap guides development, with quarterly releases, stakeholder feedback loops and alignment with evolving legal frameworks. This ensures long-term sustainability and extensibility.

User experience and accessibility

Given the wide range of user competence, from BIM-proficient architects to non-technical municipal reviewers, Estonia's system was designed with simplicity as a core principle:

- The model viewer is **browser-based**, requiring no installation or GPU performance
- Reviewers interact with 3D models via a **minimal interface**: toggling layers, inspecting results and adding comments
- Applicants remain responsible for BIM model preparation and responding to rule outcomes
- The UI supports **role-based access**, ensuring clarity in responsibility and data flow

Early feedback suggests that even non-BIM users can now meaningfully engage in model-based permitting with limited training. However, some basic training is still necessary and the successful adoption of this new approach depends on providing very clear guidelines, support materials and consistent communication throughout the permitting process.

2.2.4 Legal and regulatory framework

Legislative context: enabling digital transformation

Estonia's transition to BIM-based permitting is inseparable from its broader legal and administrative reforms aimed at digitising the built environment. The initiative is explicitly aligned with Estonia's national e-construction programme, the Building Code (Ehitusseadustik)[26], the Planning Act (Planeerimisseadus)[27] and subordinate regulations that define technical and procedural requirements for buildings. Rather than introducing entirely new legislation to enable model-based permitting, Estonia chose a more integrative strategy: adapting the interpretation and implementation of existing laws to support digital workflows.
This legal strategy has two core pillars:

[26] https://www.riigiteataja.ee/akt/105032015001?leiaKehtiv Estonian Building Code
[27] https://www.riigiteataja.ee/akt/108072025036?leiaKehtiv Estonian Planning Act

1. **Functional equivalence**: BIM-based submissions are treated as legally equivalent to traditional document submissions if they meet the required information standards.
2. **Rule transparency**: All automated checks must be traceable to existing legislative clauses or publicly issued technical guidelines.

It is important to emphasise that automated checks do not have legal authority to make binding decisions. All permitting decisions are and will remain, the responsibility of human reviewers. The role of automation is to support human decision-making by quickly gathering, filtering and highlighting relevant information from the BIM model. This allows reviewers to focus their expertise and judgement where it matters most, while reducing manual workload, interpretation errors and delays.

This balanced approach ensures that automation enhances, rather than replaces, regulatory authority. It reinforces transparency, preserves legal accountability and improves the efficiency of routine validation tasks without compromising the legitimacy of the permitting process.

Regulatory bottlenecks and translation challenges

Despite Estonia's digital ambition, significant regulatory challenges must be overcome:

- *Lack of machine-readable regulation:* Most national codes are written in natural language and contain vague or context-sensitive terms (e.g. "sufficient lighting", "easy accessibility") that are difficult to formalise.
- *Ambiguity and fragmentation:* Compliance requirements are scattered across multiple legal documents, including building codes, fire safety regulations, accessibility standards and spatial planning laws — often with inconsistent terminology.
- *No standard process for rule extraction:* Determining which code clauses are suitable for automation required manual analysis by legal and technical experts.

To address these gaps, a multidisciplinary team translated a selection of high-impact rules into formal expressions for the rule engine. Each rule was:

- *Mapped to a specific clause or annex in national regulation*
- *Defined using parameterised inputs and conditions*
- *Categorised by severity, feasibility and domain (e.g. "fire safety", "geometry", "accessibility")*

The first version of the system includes 47 such rules, with a roadmap to expand this library over time. These rules were selected using an impact–effort matrix, prioritising those that offered high regulatory value while remaining technically feasible to automate. The current set represents approximately 10 to 15 percent of all potential rules relevant to the building permitting process. Rules that involve complex interpretation or public interest trade-offs (e.g. urban aesthetics, heritage compliance) are intentionally excluded from automation.

It is worth noting that while machine-readable regulation is a highly discussed topic across the EU and the subject of ongoing research in Horizon Europe projects like ACCORD, it is not the first priority in practical implementation. Before regulation can be made machine-readable, it must first be made:

- Clear — It must be explicitly stated what needs to be checked at the building permit stage.
- Measurable — The requirement must be expressible in quantifiable terms. For example, "the stair railing must prevent falling" is not directly measurable and therefore cannot be meaningfully automated.
- Finite in interpretation — There must be a limited and predictable range of acceptable outcomes. If a rule invites endless interpretive variation, it cannot be reliably automated.

Machine-readable formatting becomes relevant only after regulation is made understandable, measurable and controllable by machines. Until that point, the priority must be to improve the clarity and structure of the regulation itself, rather than rushing into digital codification of rules that remain ambiguous or cannot be reliably assessed.

Legal accountability and risk management
Automation introduces new forms of legal risk. Estonia has adopted several safeguards to manage these risks responsibly:

- *Structured human interaction:* Rule checks must be reviewed and confirmed by applicants. Failed checks require either correction or explicit acknowledgment.
- *Commenting and traceability:* All decisions, responses and outcomes are logged with audit trails and stored within the EHR.
- *Versioning and governance:* Rule logic and technical infrastructure are centrally managed, with documented updates tied to regulatory changes.

This hybrid model, which combines machine validation with human judgment, ensures legal defensibility while still reducing administrative burden.

Conclusion
Rather than waiting for perfect machine-readable law, Estonia has shown that meaningful automation can be achieved through careful alignment of existing regulation, technical interpretation and data standardisation. The system does not circumvent legal processes; it enhances them through structured logic, reduced ambiguity and consistent application. This balance between innovation and legal continuity is a critical success factor and a key lesson for other EU Member States considering similar reforms.

2.2.5 Data Strategy

Evolving towards structured information delivery
To improve consistency and validation efficiency, Estonia is gradually transitioning from loosely defined model expectations to machine-readable delivery specifications. In this context, two buildingSMART standards play an important role:

- Information Delivery Specification (IDS) allows formal definition of what data must be included in a model, how it should be structured and what constraints apply.
- buildingSMART Data Dictionary (bSDD) supports semantic alignment by linking property names and values to common reference vocabularies.

While Estonia's current BIM requirement guidelines (ÜBN) provide a national standard for data expectations, the transition to IDS will allow these rules to be digitally encoded and directly validated by the permitting engine. This improves automation quality and lays the groundwork for cross-border regulatory alignment.

Data strategy: from model submission to system integration
Beyond rule-checking, the system also extracts structured data from submitted models to support other functions within the permitting ecosystem. Examples include:

- Pre-filling metadata such as gross floor area, building type and number of apartments,
- Linking model geometry to 3D city models,
- Enabling future integrations with energy, cost and compliance databases.

This approach turns each BIM submission into a reliable data source that supports not just permitting, but also planning, infrastructure coordination and digital twin development. All model data, validation results and user actions are versioned and stored for auditability, in line with national archiving regulations.

Enabling the single source of truth
By anchoring model validation, metadata extraction and feedback within a unified workflow, Estonia is moving toward a single source of truth for building-related data. Each permit model becomes a reference point that can feed downstream processes — from construction monitoring to facilities management — reducing duplication and improving data integrity across the building life cycle.

Archiving, audit and longevity
To ensure long-term transparency and traceability:

- Rule execution results are stored as BCF and JSON files, alongside standard EHR documents
- Key events (upload, approval, rejection, comment) are logged and versioned
- All IFC models and their validation metadata are archived in accordance with Estonia's public record-keeping requirements

This enables post-hoc review, accountability and integration with future technologies such as digital building logbooks and lifecycle management systems.

2.2.6 Scope and Domain Integration

Applicability across building types
Estonia's BIM-based permitting system has been intentionally designed to handle a broad range of building types. The initial focus has been on **new residential and mixed-use buildings**, which represent a large share of permit applications and have relatively stable regulatory logic.
Key attributes of these use cases:

- Repetitive spatial structures (e.g. flats, stairwells)
- Clear classification systems (e.g. apartment, corridor, technical room)
- Well-defined minimum area, accessibility and fire safety requirements

These characteristics make them ideal for the first wave of semi-automated rule checks and reduce ambiguity in model interpretation. Early feedback indicates a significant reduction in revision cycles and faster decision-making when using the BIM pathway for new builds.

Renovation projects
The system also supports **renovation and reconstruction** projects — a domain of critical importance for Estonia's decarbonisation goals and EU initiatives such as the **Renovation Wave** and **Affordable Housing Initiative**. However, renovation projects present specific challenges:

- Existing buildings may lack digital documentation or accurate geometry
- BIM models must represent both existing and proposed states
- Rule logic often depends on thresholds or exemptions (e.g. only if more than 25% is altered)

To address these, the BIM module allows multi-model submissions and requires clear labelling of building components (existing vs. new). In the future, additional checks will be developed specifically for energy performance, heritage protection and partial retrofit scenarios.

infraBIM and utility networks
While the current scope focuses on vertical construction, the underlying system architecture is extendable to **infrastructure assets** — including roads, bridges and underground utilities. Estonia has already piloted IFC-based model integration for **utility mapping and digital twin visualisation** and future work may expand rule logic for:

- Clearance zones and corridor access
- Integration with 3D cadastral data
- Roadway and pedestrian accessibility compliance

The national Building Registry and Digital Twin are designed to accommodate spatial layering and multiple asset types, making infraBIM integration a logical next step — though not currently prioritised in the BIM permitting roadmap.

GIS and Digital Twin integration
One of the most forward-looking aspects of Estonia's system is its connection to the **national 3D digital twin**, maintained under the e-construction platform. Approved BIM models are geolocated and layered onto a city or national scale base map, enabling:

- Context-aware review during the permitting phase
- Spatial conflict detection with zoning plans or existing infrastructure
- Public communication and stakeholder engagement through 3D visualisations

This integration is particularly valuable for municipalities, urban planners and utility providers, enabling **real-time coordination** across domains that have historically operated in silos. The long-term vision is to achieve full synchronisation between permitting, planning and asset management workflows.

The next logical step in this evolution is the development of information model based urban planning, where detailed zoning plans and development regulations are encoded in machine-readable formats. This would allow key planning constraints, such as building height limits, floor area ratios, permitted functions and spatial buffers, to be extracted and compared automatically against submitted BIM models during the permitting process.

Such a capability would enable automated compliance checking against zoning requirements, bridging the current gap between planning and permitting. By aligning data structures and rules between the two phases, Estonia moves closer to a fully integrated, model-based regulatory environment that supports consistency, transparency and long-term sustainability objectives.

The long-term vision is a fully synchronised digital workflow that connects planning, permitting, construction and asset management — powered by interoperable models, geospatial integration and structured rule logic.

2.2.7 Impact and value

Time and cost savings
One of the most significant benefits observed in Estonia's BIM-based permitting rollout is the **reduction in administrative burden and processing time**. While the number of fully processed BIM-based permits is still limited, early feedback indicates:

- Pre-filling application metadata from the model reduces data entry time by **1.5 to 2 hours** per project.
- Common mistakes in area calculations, fire zone declarations and storey definitions are **automatically flagged**, decreasing the need for iterative communication.
- Reviewers issue **fewer clarification requests**, especially when using model-linked feedback.

This streamlining translates into **measurable cost savings** for municipalities and the state. According to the final PoC report[28], total **annual government savings** could exceed **€537,826.50**, based solely on reductions in permit processing time:

[28] https://eehitus.ee/wp-content/uploads/2019/12/Final-report.pdf

Table 1: Estimated Annual Government Savings from Reduced Permit Processing Time

Permit Type	Building Type	Time Saved	Avg € Saved/Permit	Annual Volume	Annual € Saved
Building Permit	Simple	1.1 hrs	€11.00	3,316	€36,375.10
Building Permit	Complex	8.0 hrs	€83.50	3,061	€255,690.90
Usage Permit	Simple	1.1 hrs	€11.20	3,107	€34,785.70
Usage Permit	Complex	8.8 hrs	€91.00	2,318	€210,974.80
Total					**€537,826.50**

These calculations are based on **55% time savings** per case and use baseline cost data from **Tallinn**, extrapolated to all 79 municipalities.
However, these figures should be interpreted with caution, for several reasons:

- The data is based on 2019 cost assumptions and hourly wage levels have increased significantly since then. Current savings would likely be even higher due to rising labour costs.
- The estimate assumes that all permits are processed using the BIM-based method, which is not yet the case. As of 2025, there is no regulatory mandate and only a limited number of permits have been issued using the BIM pathway in pilot projects. Realised savings remain proportionate to the actual uptake of the new process.
- The calculation only accounts for public sector administrative savings, while omitting the benefits on the applicant's side. These include reduced effort in data entry, faster feedback cycles through BCF-linked comments and greater certainty in regulatory interpretation. The combined effect likely results in substantially higher total efficiency gains across the ecosystem.
- There are significant indirect financial benefits to developers, especially for larger projects. Faster permitting enables earlier construction starts, which can reduce exposure to inflation, improve cost forecasting and shorten return-on-investment timelines.

Taken together, these direct and indirect effects demonstrate the strong economic case for scaling up BIM-based permitting. However, realising the full value depends on widespread adoption, regulatory clarity and consistent implementation across all municipalities.

Increased transparency and trust
The system enhances **procedural transparency** by making rule-check results, legal references and object-level feedback fully visible to all parties. This supports more consistent outcomes, reduces disputes and increases public trust.
All actions — uploads, checks, approvals, rejections — are logged within the EHR, creating a secure **audit trail** and supporting accountability.

Improved regulatory consistency
By applying the same logic and rule definitions nationally, the BIM-based pathway promotes **consistent enforcement of building codes**, regardless of local interpretation. This mitigates uneven quality and promotes fairness in how permits are granted.

Better data for public services
The structured data extracted from BIM models enables integration with planning, utility, statistics and cadastral systems. This reduces duplication and supports real-time coordination — a key enabler for national **digital twin infrastructure**.

Capacity building and readiness
The development process has improved **digital competence** among public officials, lawyers and system developers. Agile co-development and public-sector ownership ensure long-term governance continuity and extensibility.

Return on investment
The initial development of the system was achieved with a modest budget of approximately **€800,000**, covering PoC, platform development and integration, UI and the first 47 rule checks. With potential bi-annual savings already exceeding this figure, the initiative offers a clear return on investment — even before accounting for downstream productivity, housing delivery acceleration and regulatory clarity.

2.3. Finland

2.3.1 Overview

Finland's digital permitting landscape, BIM maturity and Evolution
In Finland there are 304 municipalities, and they can regulate themselves the platforms and registry data software for processing building permit applications. There are two SaaS-based software systems making up the ecosystem of the building permit process: 241 municipalities use Lupapiste (Cloudpermit) and another group of municipalities uses the Trimble building permitting platforms. So over 98% of municipalities have a platform software solution in use. There are only a few small municipalities in the countryside that use a manual process (still delivering the regulatory information in machine-readable form, but manually). Municipalities pay for the use of this software themselves and collect the building permit application fee to cover the cost and can thus regulate it themselves. In Finland, municipalities have moved from paper document applications to a digitalised process and workflow starting in 2015 after the national SADe project, which developed the first digital platform for the building permit process. Regulatory information data, which is mandatory to submit via applications, has been collected in a machine-readable data form since 2015. The transformation to digital building permit processes and a more interoperable data environment has required mutual adaptation of people, processes, technology, and legislation.
I
n Finland the process has been gradually developed. Finland's 14 different national development projects from year 2007 to 2025 for the development of a building permit process based on IFC have played a significant role to achieve the maturity and goals for digital and openBIM process adaption. Finnish Government have been funding these development projects via different Ministries and also municipalities have invested this in the development funding and human resources. Also, municipalities have invested on education of BIM-based building permit process. E.g city of Järvenpää and Hyvinkää have invested on their Key Persons education of use of IFC maturity. In the spring (January-May) 2025, the building BIM Coordinator trained the entire building control personnel of Hyvinkää and Järvenpää in information BIM-based permit processing every other week. The length of each training session was one hour. A total of 10 hours were spent on this. In addition, during the spring of 2025, the building control BIM Coordinator held seven national two-hour webinars, in which the building control permit processors and site inspectors of Hyvinkää and Järvenpää also participated. In the autumn of 2025, the BIM Coordinator also started training aimed at site inspectors. The total time for the in-depth training is approx. 5 hours. The length of one training session is approx. one hour. In addition to the above, the utilization of the information model is regularly discussed in building control permit and review meetings and in monthly meetings

aimed at the entire staff. Järvenpää has also publish free video education to all Key Stakeholders on youtube.[29] [30]

As one result of the latest national development project, RAVA3Pro (2021–2023), Finland enabled the capability to read regulatory information form data from IFC files (IFC 4.0 version) at the start of 2024 for both building permit process platforms. At the start of 2025, automatic code-compliance checking for the building permit process had already been implemented in some municipalities (use cases e.g. accessibility). The City of Helsinki was the leading municipality in the RAVA3Pro national development project for 23 municipalities, and this collaboration has continued beyond the project. The City of Helsinki, together with the cities of Vantaa, Järvenpää, Hyvinkää, and Tuusula, launched a joint development project to implement automatic code-compliance checks as part of the building permit approval process in Lupapiste (Cloudpermit). Municipalities Interviews are showing that Automation will simplify the application process, reduce waiting times, and increase transparency. [31]The code-compliance checks are based on building regulations and RAVA3Pro use cases. Additionally, designers can perform the same checks using their Solibri Desktop licences before submitting their IFC files to the building permit process. The implementation of automatic code-compliance checks is also part of the KympR3 project's roadmap in the City of Helsinki. These use cases were developed via RAVA3Pro and tested widely with different building permit process stakeholders. This final part of the automated process was also developed through the ACCORD EU project. The ACCORD demo case pilots in Finland were one part of the testing process. There was valuable software development through ACCORD for Cloudpermit, Solibri, and Future Insight to meet Finnish process needs. The interview videos from Finnish key stakeholders from the ACCORD Finnish demo cases are available[32].

The City of Helsinki is also developing and exploring the use of IFC models in digital twins. The IFC model of a new building is embedded into the 3D city model, allowing neighbours to visually see what the building would look like once constructed. It shows how the building fits into the cityscape and surrounding nature, and whether it casts shadows on other buildings. The model can be used to observe changes in lighting conditions at different times of the day. Many construction projects involve notifying and consulting neighbours. In this process, the neighbours are presented with the project's plans, including any deviations and their justifications. The neighbours need to sign a form to confirm they have been informed and allowed to express their views. During the consultation, neighbours can submit reasoned opinions about the project. The premise is that a visual neighbour consultation process would be easier and more understandable for neighbours.

Currently in Finland the next steps in the BIM-based process are being developed, which come from new legislation for a Decree that focuses on supporting IFC and machine-readable data. There will be more content added to the mandatory regulatory information via the Decree that will be added to the form and inside the IFC-file property sets. This information is collected using the national built environment information system RYHTI. The national RAVA3.5 project is developing the new IFC property sets and IDS rules for new regulatory information (new extra content from Decree and **IFC4.0 -> IFC 4.3.2.0)**[33] The definition of the minimum content of the architecture design model that is used in the building permit process is being developed at the RAVA 3.5. These content requirements come from legislation but are described at a general level and now need to be made specific for machine readability. There is also a project plan for a new national project, RAVA4, prepared for the next steps for national needs which come from the new Decree. There are also needs to develop the use of IFC files in city survey

[29] videos from city of Järvenpää BIM-Based building permit education series 1-7, Yordi Lara Ochoa, Architect, bIM Coordinator at city of Järvenpää building control department https://www.youtube.com/@JarvenpaanKaupunki/videos
[30] Interview from Jouni Vastamäki, Leading Building Control Inspector, City of Järvenpää
[31] Interviews of Jouni Vastamäki, Leading Building Control Inspector, City of Järvenpää and city of Hyvinkää and Paula Mäenpää, Development Manager, The Association of Finnish Cities and Municipalities
32 https://www.youtube.com/playlist?list=PLCcNB6pG4cabPjKLr3p4VdRouz5mN2oFS
[33] RAVA3.5 IFC Propertyset "core information" = Regulatory Information public hearing material https://kirahub.org/rava3-5-lausuntopyynto-suunnitelmamalliasetuksen-mukaisten-ydintietojen-ifc-maarityksista/

measuring. From City of Helsinki field piloting, the time used for getting coordination data to city surveying measuring machines from standardised IFC file content was tested. The time used to take the coordination information from a building IFC file is ~1 minute, compared with ~30 minutes to get this information calculated manually via 2D PDF files. The new Decree will also include requirements for correct coordination information for the building location itself and also for all entries (door coordinates are required to be given). Building location coordinates will ease the national process of combining building and building place IFC models (plot and zoning models) in the future, also enabling the next step to develop the checking of zoning requirements from building and building place IFC files (architecture models).

The average processing time for building permits varies by project type and location. For instance, **in Helsinki**, the average processing time for new single-family house permits was **110 days** in the period from July to September 2025. However, for apartment buildings, the average was **144 days**. These figures are subject to change based on workload and other factors[34]. Finland is introducing a regulation that will, from 2026 onwards, impose a legal time limit of three months for municipalities to decide on building permit applications. However, for certain complex projects, such as siting permits for green transition projects[35], the time limit may be extended to six months[36].

Municipalities also see a future with AI tools for BIM-based building permits. In June 2025 a group of municipalities also prepared the national RAVA AI1 project plan for taking the first steps to use AI in the building permit process. This RAVA AI1 project will be led by the City of Lappeenranta.

In accordance with the government program, a building supervision reform has been initiated. The goal is to ensure that building supervision operations across Finland have sufficient expertise and service levels, as well as the most uniform interpretations possible. The Association of Finnish Cities and Municipalities is conducting a study related to the reform. The study will be published at the beginning of 2026. As a basis for the study, a survey was prepared, which received responses from 253 municipalities. Preliminary data has already been reviewed, but the information will be further refined.
The survey reveals that the construction law, which came into force on January 1, 2025, has created challenges for about one third of municipalities. Of those municipalities experiencing challenges, more than half reported that building information models, which must be provided starting January 1, 2026, are particularly difficult. Excluding the largest cities, just over 40 percent of municipalities have considered cooperation with neighboring municipalities. About one third mentioned that differing IT systems pose a challenge to cooperation.[37]

In August 2025, Finnish industry players launched the **Apartment Building Consept 2000 project** (KT2000), aimed at developing **affordable apartment building** construction. The project's goal is to standardize and scale the processes of apartment building construction, as well as the design and implementation solutions, in collaboration with the Association of Finnish Local and Regional Authorities, municipal rental housing companies, and student housing foundations. The project consists of a joint development project and a program formed by the pilot projects of the funding parties, where the joint development work is carried out in practical projects.
The materials produced and the results of the project are intended to be made public for everyone's benefit. There will be also on part of project to make the design requirements (IFC) and include the national building permit requirements this concept. So, the building permit process will be more fluent for this concept. [38]

[34] Helsingin kaupunki
35 https://www.castren.fi/new-siting-permit-for-clean-energy-transition-projects-proposed-for-inclusion-in-the-building-act/
[35] Lieke
[36] Interview of Paula Mäenpää, Development Manager, The Association of Finnish Cities and Municipalities
[38] Interview of Jani Saarinen, Principal Consultant at Vison Oy, Vison is leading KT2000 Project

Upcoming permitting workflow starting year 2026
There will be two ways of applying for the building permit under the Building Act and Decree starting in 2026:

- *Machine-readable form = minimum requirements* are delivering the regulatory information part in machine-readable form via platform to the national built environment information system RYHTI. This will be collected via the Lupapiste (Cloudpermit) and Trimble platforms, which will deliver the data into RYHTI via openAPI data exchange. Mandatory delivery also includes the architecture design drawings in PDF form.
- *Delivery using an IFC 4.3.2.0 model* in which case regulatory information data will be machine-read from IFC files via the Lupapiste (Cloudpermit) and Trimble platforms, which will deliver the data into RYHTI via openAPI data exchange. Mandatory delivery also includes the architecture design drawings in PDF form. Municipalities can also carry out manual checks from IFC files if they have the maturity to do so. Some municipalities that use Lupapiste (Cloudpermit) already have the capability to use automatic code-compliance checking. The National Archives of Finland have accepted the IFC format as a legal form for archiving files. At the moment, 2D PDF files must be delivered for the archiving process.

The Decree's final version is now published to the EU notification process.[39] There is also a requirement from the Building Act for the application processing time. The application processing time for a normal average building is a maximum of 3 months and for a demanding building a maximum of 6 months.

Current BIM maturity in AEC industry and public sector
In Finland the first common BIM requirement documents were published already in 2012, and the industry is well matured in using openBIM processes via IFC files and machine-readable data. There is use of IFC in every lifecycle phase of buildings, infra, city models and digital twins, and also LCA calculation. Standardised information content in the openBIM process has been the national goal and will be even more important in the future. BIM-based building permit process development has been supporting the whole industry in the use of openBIM in more effective ways. Software providers are among the stakeholders that have been involved in the national development. Finland has a strong piloting PoC culture: if there are national-level requirements you need to prove that it's doable for the most commonly used native software to provide the required IFC-version files.

The Ministry of the Environment of Finland has in recent years supported municipalities to provide Building Controllers with openBIM Basic education that was organised at national level and reachable to municipalities of all sizes. The biggest municipalities have also been educating themselves more about the BIM-based process for years. The Finnish Association of Municipalities has started the needed national guideline project about the new BIM-based building permit process based on the Building Act and Decree. This will be finalised by the end of 2025.

All stakeholders need education, training, and national guidelines to achieve the next level of mandatory legislative process needs. Municipalities also need financial support from the Ministry and specialist support for organising and planning the education package. KIRAHUb's digital building permit ecosystem lately carried out a survey of municipalities about their support needs for implementing the new Building Act and the Decree[40]. The

[39] Decree on EU notification TRIS https://technical-regulation-information-system.ec.europa.eu/en/notification/27244
40 https://kirahub.org/wp-content/uploads/2025/10/RavaBIM-kuntakysely-2025_jakeluvapaa-tulosraportti.pdf?utm_campaign=KIRAHubin%20uutiskirje&utm_medium=email&_hsenc=p2ANqtz-

purpose of the market study was to understand the national status of implementing the use of Building Information Models (IFC) as part of applying for a building permit according to the new Building Act. The survey showed that the most important support need was education and guidelines followed by software licences and human resources. Over 56.2% of responding municipalities are ready to take IFC files into the process. [41] Both building permit platforms in use are already taking IFC files into the process and by the end of 2025 these are estimated to also have the capability to machine-read the new Decree's regulatory information part from IFC files (IFC 4.3.2.0).
In Finland there have been recession years for the building and construction industry for the last 4 years. It has to be seen in the future (when the industry has recovered from recession times) the true value of the new machine-readable BIM-based building permit process when there is again a high volume of permit applications. Statistics Finland publishes data about, e.g., the building stock and new production. The cubic volume of granted building permits decreased by 3 per cent in July 2025 from one year back in Finland.[42]

From paper-based permitting to BIM-integrated workflows
IFC files have been delivered to municipalities via SaaS-based building permit application platforms since 2015. But after the standardised IFC information content there are more possibilities that save time for Building Controllers to check them. There are expectations that the amount of IFC files will increase significantly after the new Building Act and Decree come into mandatory use starting in 2026. Industry and software are ready to deliver more standardised IFC information content than before, and that takes a little more time when it is the first building project—but after they learn the new content and set up the starting templates in software it will be easier next time for all. The architectural, engineering, and construction (AEC) industry in Finland, like in Estonia, demonstrates relatively high BIM maturity compared to its European peers[43].

Lessons learned from transitions
In Finland it has been learned that taking all stakeholders into the development process and testing phase is necessary for the success of development. The decisions were made in the 1990s and 2000s that Finland would build its national development based on the IFC standard and also use other international standards as a base in information technology. Also, tight collaborations with different leading openBIM countries and their specialists, research organisations, and buildingSMART networks have been valuable in achieving the goal to be one of the leading countries in the openBIM process.

2.3.2 Technical and organisational architecture

In Finland municipalities have two software platforms, Lupapiste (Cloudpermit) and Trimble, that are used for building permit applications. Both of these software platforms have the capability to read the regulatory information form data from IFC (IFC 4.0), and there are development projects to upgrade this to the latest requirements of the new Decree. Cloudpermit also has an automatic checking process based on RAVA3Pro use cases available to its municipal customers. In Finland the new Decree defines the use of the latest version of the IFC standard (4.3.2.0) that will be mandatory in the national BIM-

_8MGKCLi9fkCPvRlvut38xX37gGFRxOwMTMnaB1XR8-kXI_Yd5jtOUSUToCc2RfZO0oAx_j9Rr6HmyH7sJzftYX16yuQ&_hsmi=387591189&utm_content=387591189&utm_source=hs_email
[41] 2025 Survey to municipalities KIRAHub Digital Building Permit Ecosystem https://ravabim.fi/hubfs/RavaBIM%20kuntakysely%202025_jakeluvapaa%20tulosraportti.pdf?hsLang=fi
[42] Statistics Finland publishes data https://stat.fi/en/publication/cm3ra8vq260fy07ummvad77zd
[43] EU report https://build-up.ec.europa.eu/en/resources-and-tools/publications/analysis-adoption-bim-across-eu

based building permit process. There is also material that has used bsDD (MEP part), and there is development of materials at national level for IDS checking via the national RAVA3.5 Project.

2.3.3 Legal and regulatory framework

Role of national legislation: obstacle or enabler?
In Finland the new Building Act was adopted in 2025. The aim is to create a healthy, safe, and comfortable living environment that is socially functional and where the needs of various demographic groups are taken into account. The new Building Act and Decree will support the whole industry to use machine-readable data that comes from IFC-file standard information content—an important part of the national process concept. With out the new building act and decree in Finland the maturity and capabilities would not be at this level. Legislation is huge enabler for developing of openBIM process to also other phase at the life cycle than building permit.

How regulation supports (or fails to support) automation
The Building Act and Decree include mandatory requirements for machine-readable support for the use of IFC files because the industry already has the capability to produce this required standardised data via IFC files. IFC is already a common form to deliver the designs to the process. Mandatory use of IFC 4.3.2.0 for the BIM-based building permit process is also a long-term benefit to the industry.

2.3.4 Impact and value

The evaluations of interviews in Finland show clear added value of BIM-based building permits:

- Time savings: Automated checks (e.g. accessibility) reduce processing time. Estimation from city of Järvenpää that to average apartment house estimation on national RAVA3Pro use cases **automated checks are 1-5minutes**, estimation of doing the same checks from 2D pdf drawings **manually is 1-2 days**. Needs also notice that via manually checking human might not see all the mistakes. Also, designers cannot eighter use the automated pre-checking when using manually checking that there could via automated checking (Automated pre-checking is significantly raising the quality of application materials). Time estimation for total building permit application handle to average apartment house with manual **2D drawings and other material is 40 working days (8 weeks**), and estimated time for same process **using IFC models that are made as required data content is 10 workdays (2 weeks)**. In Finland it is mandatory to execute minimum 2 weeks neighbour hearing phase. [44]
- RAVA3Pro use cases for automated checking are national level and based on building act and decrees. These checking rules are same at whole Finland and transparently also the general IFC ruleset description is open. This gives openness and transparency to the process
- Machine-readable data: Provides a more useful national-level data source coming from IFC files; national archiving for IFC files will in the future provide more useful data on the built environment.
- Quality improvement: Preliminary IFC reviews and pre-checking help to identify incomplete or incorrect content at an early stage, starting with designers' own quality

[44] Interview of Jouni Vastamäki, Leading Building Control Inspector, City of Järvenpää and city of Hyvinkää

supervision for designing and IFC file data content. Also, the automatic data structure validation via IDS of the IFC file in the building permit process is an important part of ensuring national machine-readable data quality.

- Transparency: Using IFC in neighbourhood hearings improves understanding of planned projects and reduces conflicts.
- Knowledge transfer: Standardisation at national level also benefits smaller municipalities that do not have their own development resources.

2.4. Germany

2.4.1 Overview

In Germany, the building permitting process is highly decentralised and regulated individually by the country's sixteen federal states (Länder). Each state maintains its own building code (Landesbauordnung, LBO), which defines the rules, procedures and requirements for obtaining a building permit. Nationally, it is legally impossible to impose a single unified system, but to promote harmonisation, the states jointly maintain the Model Building Code (Musterbauordnung, MBO). The MBO functions as a national reference template, continuously updated through inter-state cooperation. Whenever states revise their own building codes, many now align more closely with this shared model.

Beyond the general building codes, specialised regulations apply in certain contexts — for example, specific guidelines for schools (Schulbaurichtlinie), high-rise buildings, industrial facilities or hostels. Consequently, the legal and procedural landscape is complex and multi-layered, with variations not only between states but often even between municipalities.

Despite this complexity, the permitting process generally follows a similar sequence of steps such as submission, formal check of submitted documents, technical review, consultations with further departments, feedback and requirements for corrections or additional input, second check and final approval with a building permit. The individual times and procedures vary significantly depending on the complexity of the project and the specific municipality. In some cases, the process can take several months or years. Germany does not have a nationwide maximum processing time for building permits. Pre-consultations can be useful for both applicants and authorities to clarify potential issues. In some cases, partial permits allow construction to begin before full approval, though at the applicant's own risk.

To standardise communication within this multi-step process, Germany developed a message format called XBau, which defines the structure of electronic exchanges between applicants, local authorities and external experts. XBau is a prerequisite for digital permit management and serves as the backbone for interoperable data exchange nationwide.

The administrative structure comprises approximately 16 upper building authorities (state level) and around 900 lower building authorities (municipal or district level). The upper authorities are responsible for legislation, supervision and control, while the lower authorities conduct the actual permitting procedures. For very large or strategic projects — such as airports, universities or major industrial plants — upper authorities may temporarily take over direct responsibility.

The average processing time for building permits can vary significantly depending on the complexity of the project and the specific municipality. In some cases, the process can take several months or years. Under the Net Zero Industry Act (NZIA), Germany has set fixed time limits for the permit process for the construction or expansion of net-zero technology

manufacturing projects. For projects with an annual manufacturing capacity of less than 1 GW, the time limit is 12 months; for those with 1 GW or more, it is 18 months. These time limits do not include the steps of an eventual environmental impact assessment (EIA)[45]. The time span modalities as a result of the new “Bau-Turbo law” are outlined in 2.4.3.

2.4.2 Evolution

Most building authorities are still transitioning from paper to fully digital procedures, and this step logically precedes BIM integration. Nonetheless, research and pilot projects have clearly outlined the next stages of development, showing how existing standards and prototypes can gradually evolve toward model-based workflows compatible with current regulations.

Unlike some neighbouring countries, Germany has no central national strategy or timeline for introducing BIM in building permitting; responsibility lies with the federal states. However, a series of publicly funded projects and collaborative initiatives mark a clear path of progress.

- **Hamburg Pilot** (2017–2020) – Funded by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), this was Germany’s first systematic attempt to integrate BIM into permitting. The project examined which information and communication steps could be supported digitally, and extended the XBau format to include BIM-related data such as IFC models and BCF annotations.
- **MBO2BIM** (DIBt Project) – Conducted by the German Institute for Building Technology (DIBt), this initiative focused on translating the Model Building Code (MBO) into machine-readable form. The results included a modelling guideline defining information requirements and a set of automated rule checks. The project also made recommendations for future revisions of building law to reduce ambiguity and improve BIM compatibility.
- **Bochum Municipal Pilot** – The City of Bochum, together with Vonovia SE, developed a BIM modelling guideline for residential buildings in North Rhine-Westphalia (NRW). Based on the MBO2BIM data structure, software firm VSK Software produced rule sets for automated checks of classification, fire protection, and accessibility requirements.
- **NRW Feasibility Study** (2023–2025) – Funded by the NRW Ministry, this ongoing project evaluates BIM-based checking in practice across eight municipalities, including Dortmund, Münster, Cologne and Herford. Reviewers receive BIM training and use model-checking software to compare manual and automated results, while architects test and refine the modelling guidelines.

These milestones illustrate a gradual but consistent shift from document-based digitalisation to data-driven permitting, supported by government funding and inter-municipal collaboration. Among all phases of the building lifecycle, the permitting phase remains the least digitised. Currently, almost all data is still converted into 2D drawings and PDF files for submission, even when BIM models are available.

The demand for BIM-based permitting is growing — both from public agencies exploring automation potential and from design offices eager to avoid redundant data preparation. Yet the supply side faces major hurdles: legal frameworks do not yet allow the formal approval of BIM models, and the technical infrastructure for secure digital submission is still maturing.
Because the system is decentralised, digital permitting platforms vary by state.

- Submission platforms: North Rhine-Westphalia was an early pioneer with Bauportal.NRW, launched in 2021. It enables online submission of applications, which are automatically forwarded to the relevant city. Other examples include Bauportal

[45] https://www.gtai.de/en/invest/accelerated-permit-process-1852344

Hessen, introduced in 2024. Meanwhile, the Einer-für-Alle (EfA) initiative provides a nationwide, reusable service framework led by Mecklenburg-Vorpommern and Baden-Württemberg.

- Permitting software: Local authorities use specialised systems such as Prosoz ProBauG, MS Impro or OTS.BAU to manage and document cases. These platforms handle digital archives, coordinate workflows and attach submitted files.
- BIM tools: Two main categories exist — viewers (for 3D navigation) and model checkers (for semi-automated validation). In practice, reviewers use various tools: from open-source IFC viewers to proprietary software such as Revit or Dalux. For automated rule-based validation, Solibri and BIM.permit have been applied in pilot projects. BIM.permit, developed by VSK Software, builds on the OpenBIM Rule Language derived from the MBO2BIM project and is currently used within the NRW feasibility study. Integration pilots with the EfA portal have demonstrated the technical feasibility of pre-checking BIM submissions.

The XBau interface ensures interoperability between all systems, defining how data and status messages are exchanged. All projects follow the openBIM principle: models must be software-independent, long-term maintainable and transparent. This openness extends to rule definitions, which must be accessible and verifiable to guarantee legal traceability.

2.4.3 Legal and regulatory framework

Germany's legislative framework remains both the main obstacle and the key enabler for digital transformation. On one hand, strict legal structures safeguard data integrity and procedural fairness; on the other, they slow innovation and automation.

Building regulations are still written in natural language and contain numerous exceptions, references and interpretive clauses. Such ambiguity makes them difficult to translate into machine-readable form. Moreover, building law has historically evolved reactively — adapting to incidents or new safety demands — rather than systematically for digitalisation.

Projects like MBO2BIM directly address this by formalising the wording and structure of legal provisions. The long-term vision is a model-based legal system, where the same digital rule sets used by architects to pre-check models are also applied by authorities, ensuring consistency and reducing iterative resubmissions.

For now, the Onlinezugangsgesetz and related e-government acts permit fully digital submission and communication, but the legal recognition of BIM models as authoritative documents is still pending future legislative reform.

The so called Bau-Turbo Law (Act to Accelerate Housing Construction) was approved by the Bundestag on 9.10.2025[46]. In order to provide extensive flexibility for housing construction, a new paragraph 246e will be inserted into the Building Code (BauGB). It is designed to accelerate residential projects by loosening certain planning regulations, while digital building permits provide the technical infrastructure for digital application and processing. The two measures operate on different levels: one modifies the legal requirements, while the other modernizes the bureaucratic procedure. This is a temporary measure designed to boost housing construction until the end of 2030. It creates a path for municipalities to approve certain residential projects more quickly by offering the following key exemptions and flexibilities:

- Loosening planning rules: Municipalities can greenlight housing developments by waiving specific zoning and planning regulations for a limited time. This avoids the

[46] https://www.bundestag.de/dokumente/textarchiv/2025/kw41-de-wohnungsbau-1111794

lengthy process of creating or changing a detailed land-use plan (Bebauungsplan), which can take years.

- Faster approvals: The law introduces a presumption of consent, which means a project is automatically approved after a three-month review period if the municipality does not object. This applies only if the municipality has opted into the "Bau-Turbo" framework.
- Densification measures: It makes it easier to add extra floors to existing buildings, build on top of commercial properties like supermarkets, or construct homes in areas previously restricted for other uses.
- Loosening noise protection: The law allows for more flexible application of noise protection regulations, enabling more housing to be built near commercial areas.47

2.4.4 Data Strategy

The long-term strategy foresees seamless data reuse — from submission to approval, statistics and later integration into digital twins. While PDF documents remain the legal standard today, the gradual shift toward data-centric workflows in ongoing BIM pilot projects has been reassuring. Digital building permit systems currently handle applications for new constructions, renovations, demolitions and change-of-use requests. They are expanding to integrate specialist reviews (fire safety, energy efficiency, statics) and connections to urban planning and GIS databases.

Research links BIM with broader sustainability and energy-performance goals, positioning digital permitting as a gateway to future digital-twin environments. The “BIM-ready municipality” programme in NRW exemplifies how local authorities are being equipped to use model-based data across departments, from planning to approval and facility management.

2.4.5 Impact and value

A Cost-Benefit-Analysis for implementing Digital Building Permits has not been procured so far as comprehensive quantitative data is still limited. The evaluation based on the latest studies shows that by moving from a mostly analogue service to a digital building-permit process, for a German authority it is realistic to aim for 30-50% faster processing in 1-2 years, and with full integration perhaps 50-80% faster. Applicant effort will drop even more (often 70-90% savings). The gains stem from fewer media breaks, fewer handoffs, better status transparency, and fewer missing-document cycles.

Table 2: Expected Efficiency Gains from Digitalisation[48]

Level of Digitalisation	Applicant Time Savings	Administrative Processing Time-Savings	Procedural Handoff Reduction	Calendar Time Savings*
Conservative / Early Adopter	~50 % (e.g., from 8 h → ~4 h)	~15-40 %	~20-30 %	If baseline ~100 days → ~60-85 days
Typical / Widely Implemented	~70-80 %	~30-50 %	~30-40 %	Baseline ~100 days → ~50-70 days

*Calendar time savings assume process changes, not just filing online; behaviour and workflow must be re-engineered.

[47] https://www.refire-online.com/investment/the-bau-turbo-speeding-up-planning-not-construction/
[48] Fauth, J.; Pötz, A.; Brenner, M.; Heitzhausen, H. (2025). Das Baugenehmigungsverfahren und dessen Digitalisierung: eine Bestandserhebung. Bautechnik. DOI:10.1002/bate.202500011;
AKDB (2024). Nie wieder Papierstau: 100 % digital zur Baugenehmigung. eREPORT 1/2024.
Behörden-Spiegel (2025). Frankfurt baut digital (07.03.2025).
Hessen Ministry (2025). Digitalisierung als Meilenstein für eine moderne und effiziente Verwaltung. Pressemitteilung 06.03.2025.
Federal Ministry (BMWSB) (2025). Digitaler Bauantrag – Wo stehen wir? Pressemitteilung 30.07.2025.

Most promising is the minimisation of correction loops: many authorities currently return applications multiple times for formal or content errors. Automated pre-checks, run with the same rule sets used by reviewers, could eliminate these repetitive steps, saving considerable time and ensuring consistent interpretation of regulations.
Legally binding qualified electronic seals (qeSiegel) already guarantee authenticity and traceability of all digital documents, enabling fully paperless communication. Over time, these foundations will allow rule-based automation, integration with AI-supported validation tools, and structured data reuse for planning statistics and sustainability monitoring.
Major bottlenecks include[49][50]:

- Legal and administrative hurdles: such as varying state-level regulations, legal uncertainty and human interpretation: Building regulations often require human interpretation and are not fully machine-readable, making complete automation of compliance checks difficult. This can lead to differing outcomes across building authorities.
- Technological and infrastructural issues: Fragmented IT landscape: The development of digital building permit processes is decentralized, resulting in a lack of standardized systems and interoperability between different software providers, Outdated infrastructure: Despite the push for digital applications, many documents are still converted back to paper, and some authorities have inadequate digital equipment, Limited availability of BIM data.
- Resistance and capacity: Hesitancy among public authorities: Some local building authorities are slow to participate in digital initiatives, even when supported by their respective state governments, Lack of skilled personnel: Both within the private and public sector.

Once an efficiency review has been accomplished the estimated benefits can be specified in numbers. A pilot project has been recently started in Erfurt, Thuringia, which will focus on using AI for DBP[51].

2.5. Netherlands

2.5.1. Overview

The Netherlands has long been a global leader in BIM adoption, a position earned through a national strategy that defines BIM as an information management tool rather than a 3D modeling tool. This approach has prioritized open standards and data exchange, leading to BIM's use in approximately 80% of all construction projects, despite it only being mandated for large-scale public works.

However, a recent survey from the Vereniging Bouw- and Woningtoezicht Nederland (VBWT)[52] reveals a significant gap between this national-level progress and local implementation. The survey shows that most municipalities are still in the very early stages of adoption, relying on traditional PDFs and CAD files for permit applications. The overall picture is one of high national-level vision, but limited tangible progress at the municipal level, a situation that is beginning to change with new, targeted initiatives.
The traditional "building permit" has been replaced by the Omgevingsvergunning (Environment and Planning Permit) under the 2024 Omgevingswet. This permit is now split into two parts[53]:

[49] https://live.handelsblatt.com/wp-content/uploads/2025/02/33769.pdf
[50] https://www.akbw.de/fileadmin/download/Freie_Dokumente/Berufspolitik/Stellungnahmen/DigitalerBauantraginBW1122.pdf
[51] https://digitalebaugenehmigung.de/aktuelles/baugenehmigung-und-ki
[52] https://c.spotler.com/ct/m1/k1/pz1YYgccPm_T-roeF044GYJNf4FqLxh0BSu73RP7bXUNz0xRstrmPjNxE_zaxPXE/qh7RWGmRTQwdcfJ
[53] [https://iplo.nl/regelgeving/overzicht-procedures/korte-uitgebreide-voorbereidingsprocedure/]

- Spatial Approval (Omgevingsvergunning): For zoning and environmental fit: Simple Projects (Regulier): Decision legally required within 8 weeks (extendable to 14 weeks); Complex Projects (Uitgebreid): Decision legally required within 6 months (extendable to 6.5 months).
- Technical Approval (Wkb): Technical compliance (safety, construction) for simple builds now uses a Construction Notification (Bouwmelding) which the municipality must process within 4 weeks, contingent on hiring a certified Kwaliteitsborger (quality assurance officer).

VNG monitoring[54] shows that only about 50% of all applications are processed within the initial statutory deadlines. Considering the decision time plus the mandatory 6-week objection period that must pass before construction starts, a realistic total timeline for a simple project is 14 to 20 weeks; for complex projects, it is 6.5 to 8 months.

2.5.2.Evolution

The journey towards BIM adoption in the Netherlands has been a continuous process of collaboration and learning. It has evolved from early policy and pilot projects to a new, practical initiative designed to deliver tangible benefits where they are needed most.
Timeline from paper to BIM-based permitting: The transition began with the creation of national roadmaps for infrastructure and standards for buildings in the mid-2010s. This was a top-down approach aimed at setting the stage for nationwide digitization. The later creation of **digiGO** as a central hub for standards was a key step toward streamlining this process.
Pilot Projects and Proof of Concepts (PoCs): Municipalities like Rotterdam and The Hague have been involved in pilot projects to test GeoBIM integration for building permits. These projects have aimed to automate technical and zoning checks by combining BIM with geoinformation systems (GIS) but have not yielded any production ready solutions so far.
A major policy milestone was the establishment of the **"Bestuursakkoord Digitale Gebouwde Omgeving '27"**, which formally set the goal of using BIM for permitting. However, a recent VBWT survey conducted in 2025 provided a crucial reality check, revealing that most municipalities are still at a basic "digital paper" level. A key recent development is the preparation of a new project “Pilot (NL): een op BIM-gebaseerde vergunningencontrole v1.0” (Dutch BIM-based permit checking package), aimed at bridging this gap by delivering the first practical BIM-based checks.

Lessons learned from transitions: The most significant lesson is the disconnect between national policy and local implementation. While the national framework is in place, municipalities lack the in-house expertise and face high costs, making it difficult to move beyond pilot phases.

A New Direction (ACCORD and Beyond): To address these issues, an educational workshop was held on June 16, 2025, during the Provero congress. The content for this workshop was derived from the ACCORD project. As a direct next step, a new project is being prepared to move from theory to practice.
The new project, titled "Dutch BIM-based permit checking package," marks a crucial shift from general exploration to delivering tangible, practical tools for municipalities. In a departure from previous efforts, this project will initially focus on **Omgevingsplan** checks—rules related to the building's context, such as urban planning and zoning—rather than the more complex technical building code. This targeted approach aims to provide quick, demonstrable value to municipalities. The project is a direct collaboration between **Future Insight**, **Neoprem**, **InterGarant**, **VBWT** and several Dutch municipalities.

[54] VNG Monitoring (Compliance): VNG Monitor Omgevingswet en Wkb (Q4 2024 report example) [https://vng.nl/nieuws/rapport-q4-monitoring-omgevingswet-en-wkb-beschikbaar]

2.5.3.Technical and organisational architecture

The technical architecture for BIM-based permitting is still largely in development. Most municipalities are still working with basic systems, but there is a clear roadmap for a more advanced, collaborative architecture.

- Platform(s) and infrastructure: The Omgevingsloket serves as the central platform for permit applications and notifications. The future vision, however, is the Digitaal Stelsel Gebouwde Omgeving (DSGO), a digital trust framework that facilitates secure data sharing. The VBWT survey indicates that most municipalities currently rely on their own specific, non-interoperable permit systems.
- BIM engine / model checking software stack: Automated compliance checking is a cornerstone of the future vision. The June 15, 2023 workshop demonstrated software solutions from companies like Solibri, BIMCollab, Pillr, Verifi3D and Future Insight, showcasing their capabilities for live model checking. The new project will build on this, aiming to deliver a practical package of these checks for municipalities.
- IT architecture and interoperability mechanisms: The Dutch approach is highly focused on achieving interoperability. The Dutch Information Exchanges Standards (VISI) and the COINS standard provide frameworks for digital information exchange.
- Use of openBIM vs closed BIM (pros and cons): The Netherlands heavily favors openBIM, with a strong national emphasis on IFC standards. The benefits include avoiding vendor lock-in, enabling broader collaboration across the supply chain and ensuring long-term data reusability. The downside is that a reliance on open standards can sometimes be more technically challenging for less-experienced users.

2.5.4.Legal and regulatory framework

The legal framework is a complex factor, acting as both an enabler and an obstacle to progress.

- Role of national legislation: obstacle or enabler?: The Omgevingswet is widely seen as a key enabler, as it is designed to simplify and unify regulations into a single framework that supports digital workflows. However, the lack of a national mandate for BIM was cited by municipalities in the VBWT survey as a reason for their slow adoption. This suggests that while a supportive legal environment exists, a lack of compulsory requirements can hinder widespread implementation.
- How regulation supports (or fails to support) automation: For automated checks to work, regulations must be machine-readable. The VBWT survey revealed a major failure in this area, with the majority of municipalities reporting that their regulations are either not or only partially machine-readable.
- Relationship to building code digitalisation: For automated checks to be effective, building codes must be digitized and made machine-readable. A major challenge identified is the difficulty of translating complex legal and regulatory texts into a machine-readable format. The new project to deliver a BIM-based permit checking package is a direct attempt to solve this problem. By focusing on environmental checks, it will provide a practical way to digitize a specific part of the regulatory framework and test its viability for broader application.

2.5.5.Scope and Domain Integration

BIM in the Netherlands is applied across a wide range of domains, but with varying levels of maturity.

- New buildings: This is a primary focus, with BIM being widely adopted by leading firms and mandated for large public projects. The new "BIM-based permit checking package" project will deliver tools specifically for building permit checks.
- Renovations (deep and light): The principles of BIM are also applied to renovation projects to manage complex existing conditions and plan interventions.
- infraBIM (roads, utilities, bridges): The Netherlands is a leader in this area, with organizations like Rijkswaterstaat and ProRail using BIM for large-scale infrastructure projects.
- Urban planning / GIS / energy/sustainability workflows: There is a strong drive to integrate BIM with GIS. The VBWT survey confirmed that municipalities recognize this as "essential" for permit checking. The new project's focus on environmental checks is a direct step toward enabling this integration for urban planning and zoning.

2.5.6.Impact and value

There is currently very little publicly available quantifiable evidence to measure the final cost-benefit impact of implementing digital (and especially BIM-based) permitting. The study, therefore, relies on contextualizing robust financial data and technical capabilities to demonstrate the potential for gradual, measurable improvement through automation.

- Tangible Cost and Time Savings (Quantified Potential): While realized data from operational systems is still emerging, the financial urgency is rooted in the known economic losses caused by process delays. National analysis on the Omgevingsrecht suggests that eliminating regulatory delay friction could unlock an annual cost avoidance potential of approximately €350 million for the industry in general (representing 1.5% of the project value base55). The greatest financial impact of DBP automation is the reduction of Interest Costs (Rentekosten), which account for 0.8% of total project value lost to delays56. The initial development of the Rotterdam pilot had an indicative cost of €600,00057.
- Targeted Value of Automation: The Rotterdam pilot aims to contribute directly to the national goal of at least a 10% productivity increase in the construction sector58. Automation targets the most valuable administrative component: the Spatial/Ruimtelijk component of the permit (e.g., 56.9% of total fees for many projects). Legislative restructuring has already caused municipal fee reduction for new residential projects (e.g., −43.5%)df59 through process elimination, illustrating the immense potential of automating the remaining municipal tasks.
- Bottlenecks and Unresolved Challenges: The most significant challenges remain the high costs of implementation, a lack of technical expertise at the municipal level, and the fact that regulations are often not machine-readable. The perception of low demand from the market is also a significant bottleneck.
- Key Enablers of Success: Success depends on a strong, collaborative ecosystem involving public bodies (like digiGO and VBWT), private companies (like Future Insight, Neoprem and InterGarant) and academia. A new project proposal, developed as a next step after the ACCORD project workshop, embodies this collaborative approach, aiming to translate national-level policy and educational efforts into practical tools that can finally deliver the long-awaited benefits of BIM to local governments.

[55] EIB, 2011
[56] EIB, 2011
[57] EC Toolkit, 2023
[58] Dutch Construction Transition Pathway
[59] COELO, 2024

2.6. Spain

2.6.1. Overview

In Spain, the processing of building permits follows a relatively homogeneous structure, with variations between municipalities. In general, the process follows the steps below:

1. Submission of the application by the developer, usually in paper format or 2D digital format (PDF/CAD), through the general or electronic registry.
2. Initial documentary review by municipal technical staff, verifying the required documentation and compliance with planning regulations, complemented, where necessary, by a request for additional documents.
3. Regulatory verification of applicable planning and sectoral parameters, carried out mainly manually, followed by a request for rectification in the event of errors or omissions.
4. Administrative decision, granting or refusing the permit, within a maximum period of three months from the start of the procedure, i.e. from the moment e documentation is complete, with negative tacit consent (silence).

There is a legal limit of 3 months for concluding a building permit process in most of the urban planning regional laws and municipal urban planning regulations.

The national survey of 67 municipalities of all sizes confirms that, while the structure of the process is common, resolution times vary significantly, according to a survey conducted by a representative of Madrid Municipality in April 2025. Approximately one third grant housing permits within one to six months (37 municipalities), another 15 resolve them within six to nine months and 12 municipalities take more than nine months, of which six acknowledge times exceeding one year. The analysis shows that smaller municipalities (<5,000 inhabitants) tend to resolve within shorter periods, whereas in larger cities, particularly those with more than 500,000 inhabitants, cases are concentrated with longer processing times.

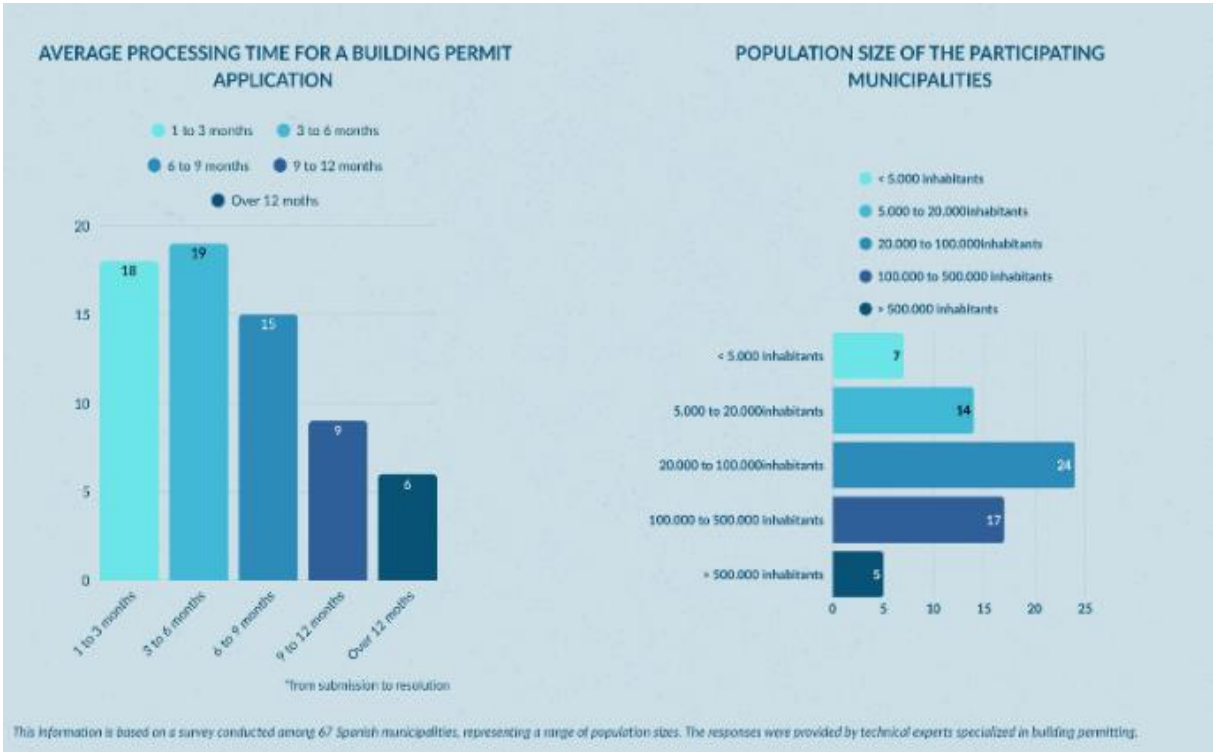

Figure 5: Average processing time for building permit applications in Spain

Current BIM maturity in AEC industry and public sector
The Spanish AEC industry shows a growing but uneven adoption of BIM. According to the *BIM Status Report 2024* [60]by buildingSMART Spanish Chapter (bSSCH):

- 32% of organisations have already implemented BIM in their regular processes.
- 26% are in the adoption phase.
- 34% have not yet started, although half of these plan to do so in the short or medium term.

In parallel, 86.8% of professionals state that they have worked with BIM and more than 50% report over three years of experience. Furthermore, more than 4,600 public procurement procedures with BIM requirements have been recorded, with Catalonia and the Madrid Region leading in territorial implementation.

Despite these advances, the report highlights structural barriers that hinder the full consolidation of BIM across the value chain. These include the cost of licences and specialised software, the shortage of qualified staff—particularly in small and medium-sized enterprises—as well as regulatory and standards fragmentation, which undermines interoperability and coordination among stakeholders.
In the Spanish municipal public sector, maturity remains at an early stage. According to the national survey carried out:

- 48% of municipalities have not implemented BIM but express an interest in doing so.
- 40% do not currently consider it necessary.
- 6% are in the planning phase.
- Only Madrid municipality is applying BIM in its building permit procedures, without it being mandatory and excluding the officially stamped documents.

The gap between the production of projects in BIM and the municipal capacity to process them is, therefore, one of the main challenges identified in the Spanish case.
Moreover, the data indicate that the lack of implementation does not necessarily reflect a lack of interest, but rather technical, training and regulatory limitations that constrain institutional maturity. Most municipalities acknowledge the need to assess the feasibility of BIM but still lack the resources and regulatory frameworks that would enable its deployment.

Demand vs. supply of BIM in permitting
The Spanish property development sector, represented by organisations such as the Spanish Association of Developers and Builders (APCE) or the Madrid Association of Property Developers (ASPRIMA), among others, has clearly expressed the need for the digitalisation of building permits, closely linked to the reduction of administrative timeframes.

The Building Cluster, an organisation bringing together numerous developers, construction companies, universities and research centres, has actively promoted collaborative initiatives with public administrations to explore the potential for automating building permits, as part of the wider digital transformation of the planning and permitting process.
In this context, digitalisation is perceived as a strategic tool to achieve this objective. This refers not only to the electronic processing of applications and the use of BIM models as a basis for automated compliance checking, but also to the simplification and harmonisation of municipal and regional planning regulations.
For a detailed insight into the point of view of the property development sector regarding the digitalisation of urban planning permits, the interview conducted with Jaime Fernandez, Managing Director of ASPRIMA, may be consulted in the Spanish section of Annex I.

[60] Estudio de adopción BIM 2024 - buildingSMART Spain

2.6.2. Evolution

Timeline from paper to BIM-based permitting
The City of Madrid has embarked on a progressive path towards the digitalisation of building permits, representing a pioneering case in Spain. This trajectory has evolved from a traditional system based on paper documentation and manual checks towards an innovative model of digital permits supported by the BIM methodology, through its Strategy for the Digital Transformation of the Planning Process.

- 2019: Implementation of the electronic case management system SIGSA-SLIM, which introduced digital documents in formats such as PDF and CAD.
- 2020–2021: First agreement between Madrid City Council and ASPRIMA to explore the use of BIM models in permit processing, through real projects incorporating digitalised planning parameters.
- 2022: Second BIM agreement with ASPRIMA, lasting six months, focused on converting essential planning requirements into machine-readable language and simplifying the reading of BIM models in real projects in the city.
- 2023–2024: Conduct of a Preliminary Market Consultation (PMC) with technology providers and AEC stakeholders, which confirmed that no comprehensive solution yet existed, but that technologies were sufficiently mature to cover parts of the process for building permit automation. The exercise confirmed the technical feasibility of the project and enabled the definition of requirements for the future MADRIDdbp platform.
- 2025: Publication of the public tender for the procurement of the MADRIDdbp digital platform, designed to validate compliance with planning regulations in a building project prior to the submission of its permit application. The aim is to provide developers with an automatic pre-validation before formal registration of the application, thus reducing subsequent amendments and clarifications.

In this way, Madrid has become the first Spanish city to address, in an integrated manner, the digitalisation of building permits based on BIM methodology and open standards.

Key milestones (PoC, MVP, full implementation)
Madrid's digitalisation process has been structured in successive phases, allowing the combination of practical experimentation with gradual deployment:

- PoC (Proof of Concept): During the second agreement, practical tests were carried out to check compliance with essential planning requirements using a 3D BIM model. A simulation was conducted comparing the traditional workflow — manual processing and checks on PDF drawings — with a digital verification through a tool provided by ASPRIMA. The results confirmed that part of the checks could be automated, achieving time savings of around 70% and a significant reduction in errors.

- MVP: The MADRIDdbp contract foresees the development of four MVPs initially focused on essential planning parameters (setbacks, plot occupancy, floor area ratio, building heights, etc.).
- The first MVP includes the download of the cartographic environment in 3D vector format, the submission and storage of IFC models, model visualisation, the formulation of a municipal IDS derived from planning rules expressed in natural language, its application to the model, the exchange of information in BCF format and the creation of a digital twin of the project's environment.

- The second MVP deploys the rules engine and automatically validates the planning parameters required for the Urban Viability Report (IVU) in a new development area, enabling the automated issue of the report.
- Subsequent MVPs will progressively extend validation to other urban development areas.
- Full implementation: The roadmap foresees extending the platform to cover all planning and sectoral requirements, consolidating a fully interoperable system of digital building permits.

Figure 6: MADRIDdbp evolution

In this context, the basic permit (*licencia básica*), created by Madrid City Council in 2020, constitutes a complementary instrument for administrative streamlining. It allows verification of the planning feasibility of a project and authorises the start of works while additional checks are completed. Once MADRIDdbp is operational, the basic permit will be able to be processed in future almost automatically, representing a decisive step in reducing housing delivery times.
The Basic Permit is an urban planning authorisation that enables construction works to begin once compliance with the Essential Urban Planning Requirements (REU), as defined in Annex VIII of OLDRUAM (Municipal Ordinance on Urban Planning Licences and Responsible Declarations of the Madrid City Council), has been verified.
This permit separates the validation of the essential planning parameters from the full review process, allowing projects to start earlier while the remaining urban planning and sectoral parameters continue to be assessed until the final Building Permit is granted. Applicants may choose to process the Basic Permit either directly with the Municipality or through an Urban Planning Collaborating Entity (ECU).
Compared to the three-month granting period of a Building Permit under the traditional procedure (OLDRUAM), the Basic Permit is resolved in one month and allows works to begin for all aspects covered by the Essential Urban Planning Requirements. The subsequent Building Permit resolution, required to complete the construction, has a one-month granting period, reducing the overall processing time from three months to two months, which represents a 33.3% time saving.
The Basic Permit is applicable to new construction, replacement works (demolition and new building), and general restructuring works. Once all required documentation is submitted, the

Basic Permit can be issued within one month. The final Building Permit resolution, integrated into the same procedure, is mandatory to complete the works.

The following data refer to the processing times of licence applications managed by the General Subdirectorate of Licences within the General Directorate of Building, from the approval of OLDRUAM (June 2022) to December 2024. The analysis covers both the Basic Permit and the Building Permit for residential projects.
Two types of timeframes are considered:

BASIC PERMIT + BUILDING PERMIT		
	(average) Net Time	(average) Gross Time
Basic Permit	17	68
Building Permit after Basic Permit	73	103

Figure 1: Basic Permit with Building Average Time of General Directorate of Buildings, Madrid City Council

- Net Time: The effective processing and review period handled by the technical and legal services of the General Subdirectorate of Licences. It measures the time elapsed from the start of the file, once the submitted documentation is complete and correct, until the granting (or denial) of the Building Permit, excluding the periods legally suspended (e.g. awaiting external reports or responses to correction requests submitted after the deadline).
- Gross Time: The total elapsed time from the start of the file—when the documentation is complete and correct—until the granting (or denial) of the Building Permit, including any legally established suspensions.

Lessons learned from transitions
The experience of Madrid City Council provides several valuable lessons for the European context:

- Public–private collaboration: The involvement of property developers and sector stakeholders (ASPRIMA and the Building Cluster) has been fundamental in aligning market demand with the administration's capacity.
- Early market consultation: The Preliminary Market Consultation (PMC) made it possible to identify the actual level of technological maturity and to adjust the tender specifications to viable solutions.
- Parametrisation of planning regulations: The transition from natural language to machine-readable language is indispensable. The City Council has created a group of experts to lead the parametrisation of its planning regulations.
- Housing policy orientation: The project is directly linked to the strategic objective of accelerating the delivery of new housing to the market, enabling faster construction while reinforcing legal certainty. The overarching objective is to move from timelines measured in months to those measured in weeks, depending on the legally required reports that must be processed once the building permit application has been submitted.

Taken together, Madrid's experience demonstrates how a traditional, complex and manual procedure can be transformed into a digital and scalable process, which can serve as a reference for other European cities in the transition towards Digital Building Permits.

2.6.3. Technical and organisational architecture

Platform(s) and infrastructure (e-construction equivalents)
The MADRIDdbp project is conceived as a digital platform for the automation of building permits, designed to integrate into the digital ecosystem of Madrid City Council. Its architecture is built upon the following core components:

- Developer portal: an access interface for applicants, enabling the submission of BIM models in IFC format, the pre-validation of essential planning requirements and the consultation of application status.
- Regulatory validation engine: the core of the solution, capable of automatically verifying planning parameters against the submitted BIM model.
- BIM model repository: a structured storage system for models and associated documentation, ensuring traceability, version control and secure archiving of permit records in interoperable formats.
- Municipal workspace: a dedicated environment for municipal staff, incorporating functionalities for review, change traceability, communication with applicants and the generation of automated reports.
- Integration with existing municipal systems: the platform will be connected to the electronic case management system, the corporate GIS, the city's digital twin and the municipal data lake, ensuring the uniqueness of data, avoiding duplication and facilitating its reuse across other areas of urban management.

This architecture reflects a model equivalent to the emerging e-construction platforms being developed in other Member States, with a clear orientation towards interoperability and alignment with smart city policies.

BIM engine / model checking software stack
The model checking engine is the essential component of the system. According to the technical specifications, it must provide the following capabilities:

- Reading and processing of models in open IFC format, with the ability to integrate updated versions of the standard.
- Automatic validation of essential planning parameters, through the application of rules derived from the parametrised municipal regulations.
- Generation of compliance reports integrated into the administrative file, enabling results to be verified in a transparent and traceable manner.
- Extensibility to additional sectoral regulations (accessibility, energy efficiency, fire safety, etc.), with the possibility of incorporating new validation rules in later phases.

This engine will be supported by the definition of a municipal BIM deliverable (IDS) specifying the mandatory parameters, attributes and minimum views required for verification.

IT architecture and interoperability mechanisms
The MADRIDdbp solution is based on the principles of interoperability, modularity and openness, which are reflected in the following mechanisms:

- Standardised integration APIs, enabling data exchange between the platform and other municipal systems, as well as connections with third-party external applications.
- Modular and scalable architecture, facilitating the incorporation of new modules through evolutionary maintenance.
- BIM–GIS interoperability, ensuring the georeferencing of models in their territorial context and the verification of essential planning requirements such as setbacks, alignments or plot occupancy in connection with official cartography.
- Integration with the urban digital twin, so that the information from each permit file is incorporated into Madrid's broader digital urban ecosystem, allowing its reuse in areas such as urban planning, mobility, sustainability and cultural heritage protection.

Use of openBIM vs closed BIM (pros and cons)
MADRIDdbp explicitly commits to the use of openBIM, in particular, the IFC format, as the principal deliverable in building permit procedures.

Advantages: Interoperability: enables designers to work with different modelling software, avoiding dependence on a specific vendor for applicants.
Technological neutrality: ensures the administration's independence and the long-term sustainability of the platform.
Transparency and traceability facilitates validation and storage in open and accessible formats.

Limitations: The heterogeneous quality of IFC exports can lead to loss of information or misclassification, as well as the potential absence of proper classification of all elements within their official IFC classes. The transition from proprietary environments to IFC requires additional normalisation efforts and prior validation on the part of architectural practices.

2.6.4. Legal and regulatory framework

Role of national legislation: obstacle or enabler?
The Spanish regulatory framework presents a complex and decentralised structure, stemming from the distribution of competences in urban planning and building across the three levels of public administration:

- National level: The State establishes certain basic principles on planning and regulates technical matters of mandatory application throughout the country via the Technical Building Code (CTE). This code governs essential aspects such as structural safety, fire protection, universal accessibility, energy efficiency and acoustic insulation. The CTE therefore serves as a common and homogeneous reference in critical areas of construction.
- Regional level: Spain is made up of 17 Autonomous Communities, each with exclusive legislative competence in urban planning, spatial planning and housing, resulting in 17 distinct planning laws. Each establishes specific criteria of application which all municipalities within its territory must comply with.
- Municipal level: Spain comprises 8,132 municipalities (INE 2025), each with its own planning regulations and, in some cases, specific ordinances governing the processing of building permits. While many of these rules address similar basic concepts (floor area ratio, plot occupancy, alignments, setbacks), they diverge in definitions, terminology and methods of application, generating a high degree of regulatory heterogeneity.

This fragmentation poses a structural challenge for designers, developers and administrations alike: projects must be designed to simultaneously comply with multiple regulatory layers, while urban planning parameters—although conceptually similar—are defined and structured in different ways, complicating their digitalisation.

How regulation supports (or fails to support) automation
Urban planning regulations in Spain are drafted in natural language, which represents a significant barrier to their translation into machine-readable form. Their wording is extensive, complex and includes multiple exceptions, often requiring technical and legal interpretation by municipal staff. This circumstance greatly complicates the parametrisation necessary for automated verification, as there is no national-level framework to standardise concepts and facilitate the digitalisation of planning ordinances.

The current situation highlights the need to promote a national strategy on BIM and digital building permits, going beyond the existing 2023 BIM Plan. A coordinated strategy at state level, involving municipalities and Autonomous Communities, would allow progress towards

the harmonisation of basic planning concepts, reducing fragmentation, increasing interoperability and supporting the development of digital platforms that can be replicated across different territories.

Relationship to building code digitalisation
The Technical Building Code (CTE), applicable nationwide, offers a framework with greater potential for automation. Its technical content is more easily parametrised and translated into digital rules than local planning texts.

Areas such as fire safety or universal accessibility are naturally suited to automated verification through BIM, as they include measurable parameters and are regulated at state level. The digitalisation of the CTE, in combination with BIM methodology, would make it possible to almost automatically check compliance with these requirements in any project across the country, providing a common foundation upon which each municipality could integrate its own planning regulations.

2.6.5. Data Strategy

The results of the survey conducted with 67 municipalities show that the data strategy linked to building permits in Spain remains at an early stage. Most municipalities continue to process applications in PDF or 2D CAD formats, which limits interoperability and data reuse.
The use of openBIM standards (IFC, IDS, MVD, bSDD) is very limited in local administrations, which rely mainly on document management systems (DMS) focused on archiving, rather than on CDEs. Integration with urban digital twins or with broader information systems is, as of today, residual.
This situation highlights the need for a coordinated effort across different levels of administration to establish a common data strategy for building permits, ensuring interoperability and facilitating the transition towards DBPs.

2.6.6. Scope and Domain Integration

BIM use for:
New buildings
In the Spanish context and specifically in the case of the City of Madrid, the application of BIM in building permits is mainly concentrated on new-build projects, particularly new residential developments, where there is greater availability of land and a consolidated use of BIM methodologies by developers.

The MADRIDdbp project has chosen to focus its first MVPs on this domain, responding to two strategic factors: the social and economic urgency of increasing the housing supply in the city and across the country and the high level of BIM adoption among developers and designers of new buildings, which facilitates the availability of high-quality models from the early design stages.

- *Renovations (deep and light)*

In renovations or small-scale refurbishment works, the use of BIM is still limited due to the lower return on investment. BIM is mainly being introduced in comprehensive or complex interventions, often combining models generated from point clouds. This approach enables precise documentation of the existing condition, traceable management of the works and the planning of building maintenance through updated 3D models.
The potential of BIM in this field is significant, given the growing importance of energy retrofitting and large-scale urban renewal, particularly focused on Spain's building stock from the 1940s to the 1980s, in line with European sustainability policies.

- *infraBIM (roads, utilities, bridges — optional)*

The use of BIM in infrastructure projects in Spain is at an early stage of consolidation. Administrations such as Adif (rail sector), the Government of Catalonia and major

municipalities have begun to include BIM requirements in tenders for roads, bridges and utility networks.
In the case of Madrid, the City Council is applying BIM in strategic projects such as the undergrounding of one of the city's main urban motorways, the South-West Green Corridor, which is currently under construction. The use of BIM in this project enables real-time management of modifications, control of material quantities and detection of clashes, generating tangible efficiencies in both costs and timelines.

- *Urban planning / GIS / energy/sustainability workflows*

The use of BIM for urban planning and GIS integration is less developed; nevertheless, the adoption of GIS for territorial analysis is steadily increasing and some metropolitan projects are moving forward with BIM + GIS integration, such as that of the Barcelona Metropolitan Area. In the case of MADRIDdbp, integration with GIS is indispensable for validating essential planning parameters. Requirements such as setbacks, plot occupancy or boundary separations depend directly on cartography and the correct georeferencing of the BIM model. For this reason, the technical specifications require full connection with the City Council's corporate GIS, ensuring more rigorous and traceable automatic verifications in the granting of permits.

2.6.7. Impact and value

Tangible cost and time savings
The second BIM agreement between Madrid City Council and ASPRIMA enabled regulatory checks to be tested on real projects, comparing the traditional review process with one based on digital models. The results showed that the partial automation of essential planning requirements could generate a time saving of around 70% compared with the manual procedure, significantly reducing administrative costs and the workload for technical teams.
This saving also translates into greater agility in the granting of permits, a factor of high relevance for the development sector and directly linked to the strategic objective of increasing the supply of housing in a shorter timeframe.

Regarding the implementation costs of a digital platform to automate urban planning permits, the public tender for MADRIDdbp has a duration of four years, with the possibility of a one-year extension. The contract budget amounts to €6,595,416.45 excluding taxes, representing a Total Tender Budget of €7,980,453.90 including taxes.

The contract is structured into four services: the first consists of the development of a digital platform for validating urban planning regulations through IFC models, delivered through four Minimum Viable Products (MVPs); the second includes operational support, maintenance, licence management and infrastructure provision; the third focuses on the evolutionary maintenance and updates of the platform; and the fourth covers overall assistance, including the national and international projection of the project, training, and management through the Project Management Office (PMO).

SERVICE	2025	2026	2027	2028	2029	TOTAL (no TAX)
Service 1	0	895.520	712.942	0	0	1.608.452
Service 2	100.075,79	422.643,14	611.174,72	673.125,24	451.218,930	2.258.237,82
Service 3	0	121.208	482.832	482.832	363.624	1.454.496
Service 4	97.985,75	290.997	300.999	320.407,50	263.831,38	1.278.220,63
Anually	198.061,54	1.730.368,14	2.109.947,72	1.478.364,74	1.078.364,74	6.595.416,45

Table 3: Breakdown of the contract budget by service and financial year (in Euros)

Bottlenecks and unresolved challenges
Despite the progress achieved, the transition towards digital building permits in Spain faces technical, organisational and regulatory challenges that must be addressed to ensure effective implementation:

- Quality and structuring of IFC models: it is essential to guarantee that the information contained in BIM models corresponds faithfully to the IFC schema, with all elements correctly classified and structured. The current heterogeneity of IFC exports remains a recurrent obstacle.
- Digitalisation of planning regulations: most ordinances are drafted in natural language, with semantic complexity and local variations, making their translation into machine-readable rules particularly challenging.
- Lack of terminological and regulatory standardisation: basic planning concepts such as floor area ratio, setbacks or plot occupancy are largely similar across municipalities, yet are defined and named differently, preventing the creation of replicable verification rules.
- Skills gap in public administrations: the results of the national survey show that only 19% of municipalities have technical staff trained in BIM, while more than 70% have not provided training in the last three years. This gap severely limits institutional capacity to effectively adopt new digital platforms.
- Insufficient funding for software and digital platforms, as well as for technical assistance in their implementation and maintenance, further constrains municipalities in the transition towards DBPs.

Key enablers of success
The experience of Madrid has made it possible to identify the following critical success factors for Digital Building Permits:

- Public–private collaboration, ensuring alignment of interests between developers, designers and administrations.
- Scalability of solutions, starting with pilots and MVPs focused on essential parameters and gradually broadening their scope.
- Adoption of open standards (openBIM), guaranteeing interoperability and technological independence.
- Parametrisation and regulatory harmonisation, a prerequisite for automatic verification and replicability at European level.
- Technical training of municipal staff, enabling the effective use of new digital tools and ensuring process quality.

In conclusion, the impact of Digital Building Permits in Spain is reflected in a clear potential for reducing administrative times and costs, which directly translates into the ability to bring new housing to the market more quickly. The case of Madrid City Council and MADRIDdbp shows that, although significant technical and regulatory challenges remain, the combination of public–private collaboration, open standards, regulatory harmonisation and staff training provides the foundation for consolidating a scalable and replicable reference model for other Spanish and European cities.

3. Synthesis and EU-wide perspective

3.1. Comparative overview

The comparative assessment of six frontrunner countries reveals that the transition toward Digital Building Permits (DBPs) follows a broadly similar trajectory across Europe. Despite differences in legislation, governance, and technical maturity, the underlying objectives and functional structures converge. Each national system aims to make permitting faster, more transparent, and more predictable, while maintaining legal certainty and technical rigour.
The table below summarises the state of BIM-based building permitting across six frontrunner Member States. It distils the detailed country analyses presented in Section 3 into a common structure that enables direct comparison. Each country profile is organised along three dimensions: maturity and system architecture, legal enablers and blockers, and the scope of use cases. A headline assessment is provided to capture the overall status in a concise statement.

Table 4: Comparative overview of BIM-based Building Permitting in 6 countries

Country	Overall Maturity and Technical & Organisational Architecture	Legal and Regulatory Framework (Enablers and Blockers)	Scope, Use Cases and Domain Integration	Overall Assessment/ Readiness Summary
Austria	Pilots (e.g. Vienna BRISE) use hybrid IFC+PDF; checks via Solibri; scaling limited outside Vienna.	Enabler: city-level data requirements; Blocker: IFC not yet legally binding, 2D plans still dominant.	New builds in Vienna; renovations/infra not covered; limited GIS integration.	City-led pilots, national uptake lagging.
Estonia	National Building Registry with BIM permit module live (2024); IFC as submission standard; 47 automated checks via BIM.works.	Enabler: ÜBN national BIM requirements, legal equivalence of digital; Blocker: ambiguity of legislation restricts automation.	Covers new builds and some level of renovations; multi-model handling; integration with digital twin in progress.	Most advanced national system, fully operational.
Finland	SaaS platforms (Lupapiste, Trimble) with IFC acceptance; first automatic checks running; decree mandates IFC 4.3.2.0 by 2026.	Enabler: new Building Act/Decree; Blocker: uneven municipal readiness, staffing gaps.	Focus on new builds; renovations to follow; infra/RYHTI links planned.	Strong legal push, roll-out capacity uneven.
Germany	State portals (NRW Bauportal etc.); pilots with Solibri, BIM.permit; fragmented uptake.	Enabler: XBau messaging, MBO2BIM pilots; Blocker: decentralised codes, legal ambiguity.	Case-specific BIM pilots for new builds; little on renovation/infra; no consistent GIS linkage.	Pilot-heavy, no systemic framework yet.
Netherlands	Strong governance (digiGO, DSGO); IDS focus; BIM permit checking project in progress.	Enabler: Omgevingswet and national IDS push; Blocker: municipal costs/capacity, rules not machine-readable.	New build checks in design; infra BIM mature; BIM–GIS integration under development.	Framework strong, implementation still localised.
Spain	Madrid's MADRIDdbp first integrated BIM permit platform; IFC official deliverable; IDS planned.	Enabler: CTE automatable domains; Blocker: fragmented local ordinances, limited BIM capacity.	MVP covers new housing; early use in retrofits; digital twin/GIS integration part of roadmap.	Madrid frontrunner, Malaga and Cataluña have started a DBP pilots.

Table 5: Summary Table, Average Processing Time

Country	Average Processing Time
Austria	1–3 months
Estonia	31 days
Finland	Varies (e.g., 110 days for single-family houses in Helsinki)
Germany	Varies (can be several months to years)
Netherlands	18 months
Spain	6-24 months

Table 6: Summary Table, Maximum Processing Time

Country	Maximum Processing Time
Austria	8–24 weeks (varies by state)
Estonia	30 days (legal limit)
Finland	3 months (general), 6 months (complex projects)
Germany	12–18 months (Net Zero Industry Act projects)
Netherlands	No nationwide limit
Spain	Varies by municipality

3.2 Benefits and risks of digital permitting

Digital Building Permits deliver measurable advantages for both authorities and applicants, improving efficiency, transparency and data quality throughout the permitting process. At the same time, the shift from document-based to data-driven systems introduces new dependencies on technology, standards and institutional capacity. The following table summarises the key benefits identified in national case studies alongside the main risks and limitations that may arise during large-scale implementation.

Table 7: Cross-cutting benefits and risks of Digital Permitting

Dimension	Benefits / Opportunities	Challenges / Risks / Barriers
Speed and Efficiency	- Faster submission, review, and approval cycles - Automated workflows reduce manual bottlenecks. - Real-time tracking and status updates for applicants.	- Transition and ramp-up periods may temporarily slow processes. - Legacy processes and paper-based culture resist change. - Bugs, system downtime, or incomplete automation can create new bottlenecks.
Cost and Resource Use	- Lower administrative overhead - Savings in time and travel for applicants and officials. - Avoid hiring extra staff if throughput improves.	- High upfront investment (software development/acquisition, infrastructure, integration). - Ongoing maintenance, upgrades, and technical support.
Accuracy, Compliance and Quality	- Automated validation and rule-checking reduce errors - More consistent application of regulations. - Integration with GIS, BIM, and spatial data enables smarter compliance checks.	- Encoding regulations, rules, and exceptions in software is complex - Interoperability issues with other systems (GIS, cadastral, planning, building models). - Ensuring the system stays updated with evolving codes.
Transparency and Accountability	- Audit trails, logging, version histories improve accountability, Reduces opaque decision making. - Stakeholders can see where an application is and what's needed.	- Risk of data misuse, privacy breaches, or exposing sensitive documents. - Ensuring appropriate access control among different user roles. - Legal frameworks may not yet accept fully digital signatures or submissions without reform.

Data and Analytics / Planning	- Rich data for urban planning, trend analysis, forecasting. - Performance monitoring, KPIs, bottleneck identification. - Integration with digital twins, sustainability indicators.	-Data standardization challenges (formats, schemas). -Data silos, fragmented legacy systems impede integration. -Ensuring data security, governance, quality, and correctness. -Ensuring long-term viability of the digital infrastructure
User Experience and Inclusion	- 24/7 access, remote submissions, less need for physical visits. - User-friendly interfaces, help wizards, status alerts. - More predictable process for builders, architects, citizens.	- Digital divide: users with low digital literacy or insufficient internet access may be excluded. - Need for training and support for both external and internal users. - Resistance to change by staff and stakeholders accustomed to analogue modes.
Regulatory / Legal / Institutional	- Digital permit systems can modernize governance, support e-government transformation. - Enabling risk-based inspections and dynamic compliance checks. - Harmonization across jurisdictions possible.	- Laws and regulations may need updating to accept digital documents, electronic signatures, and digital approvals. - Fragmented jurisdictions and overlapping authorities complicate harmonization. - Organizational inertia, siloed departments, lack of political will.

Overall, the balance of evidence from the analysed countries confirms that the benefits of digital permitting clearly outweigh the risks. Efficiency gains, process transparency and data consistency are already observable where model-based approaches are implemented. However, these benefits can only be sustained if supported by coherent information structures and shared procedural logic. The following subsection therefore outlines the common data requirements and process steps that form the foundation of all digital permitting systems examined in this study.

In particular, the analysis shows that countries with well-defined data standards, stable governance models and strong inter-agency coordination achieve more consistent and scalable results. Where such conditions are absent, progress tends to remain limited to pilot projects or single municipalities. Strengthening these structural enablers, especially interoperability frameworks and legal clarity, is therefore essential for sustaining the long-term value of digital permitting across Member States.

3.3 Common data requirements and process steps

Across the six analysed countries building-permit procedures differ in implementation but show a high degree of convergence in both the data collected and the sequence of procedural steps. Each system manages comparable information through five recurring stages: application, verification, consultation, decision and archiving.

All processes begin with administrative and spatial data identifying the applicant, property and project. Cadastral references, zoning information and intended building use are recorded at submission. The design and technical documentation forms the core of each application and typically includes architectural and structural information, fire-safety details and energy-performance data. Several countries also request additional statements or approvals from external authorities, such as fire, environmental or heritage experts.

During the verification phase, authorities check conformity with planning and building regulations, verifying plot ratio, height, fire and energy compliance, and completeness of documentation. Automation levels vary: Estonia and Finland already perform semi-automated rule checking, while Austria and Spain pilot similar functionalities; Germany and the

Netherlands still rely mainly on manual review. The consultation phase involves input from other agencies or neighbours when required. Following this, the decision is recorded digitally, with most countries issuing both a signed PDF and an electronic record. The archiving step ensures traceability, linking the permit to spatial registries or document repositories for future reference. Table 6 summarises the main information categories common to all studied systems.

Table 8: Shared set of functional data categories across all examined countries

Data category	Typical content
Administrative	Applicant, designer, project ID, property reference
Spatial	Parcel and zoning data, land-use constraints
Design and technical	Architectural and structural information, fire-safety, energy, accessibility
Regulatory approvals	Expert opinions and external clearances
Decision and record	Permit status, conditions, digital signature, archive link

Despite differences in tools and legal settings, the core data logic is consistent. Each system manages a comparable set of administrative, spatial, design and regulatory information, providing a clear foundation for interoperability and for developing harmonised European guidance on digital building-permit data structures.

Beyond procedural convergence, the analysed systems reveal a growing alignment in common data requirements—the specific information elements that must be provided and verified during the permitting process. These requirements determine what data is mandatory, how it is structured, and which parameters are checked against legal or technical rules. While details vary nationally, most systems rely on comparable legislative inputs such as zoning compliance, fire safety, structural integrity, accessibility, and energy performance. Defining these requirements consistently across Member States would allow automated validation and cross-border comparability. Another dimension concerns the type of building information to be submitted: whether limited to architectural models or extended to structural, MEP, and site data. Agreeing on the minimum dataset and its level of graphical detail is therefore essential for enabling automation, reducing manual review, and supporting interoperability in digital permitting.

4. Market readiness and regulatory context

Market readiness refers to the overall ability of national systems to support and scale Digital Building Permits (DBPs), combining administrative capacity, governance continuity, legal clarity and stakeholder engagement.

Estonia has already moved beyond readiness to implementation. Digital permitting operates nationwide through the Building Registry as part of routine public administration. The legal framework recognises digital submissions, municipalities use a shared platform, and automated rule checking is embedded in daily practice. The priority now lies in maintaining system quality and extending links with planning and asset-management environments rather than preparing for adoption.

Finland demonstrates a similarly high level of institutional maturity. The national approach, supported by the Building Act and coordinated through the Lupapiste and Ryhti

programmes, combines clear governance with predictable funding and public-private cooperation. Authorities and market actors work under a shared roadmap that ensures long-term continuity and incremental development.

Austria illustrates a strong technical and policy commitment, though progress is slowed by federal fragmentation. The BRISE-Vienna pilot and the national standardisation effort (ASI 273.12) have built a robust foundation, but the absence of a unified legal framework across Länder limits full deployment. Coordinated national guidance and harmonised procedures would be needed to move from pilot to system level.

In Germany the overall system remains fragmented. Building legislation is set at state level, leading to procedural variation and uneven IT capacity among municipalities. While awareness and industry demand are increasing, a consistent national framework and targeted financial support are required to turn pilots into lasting services

The Netherlands benefits from a clear legislative vision under the Omgevingswet and the digiGO strategy, which link spatial planning and environmental regulation. Implementation, however, remains gradual. Most municipalities are still adapting internal procedures, and readiness depends on how effectively national guidance can be translated into local practice.

Spain is emerging as a promising case of municipal innovation. The Madriddbp pilot demonstrates that digital permitting can be embedded within existing legal frameworks through cooperation between city authorities and technology partners. Its success has encouraged national dialogue on harmonisation, though wider replication will depend on coordinated governance and long-term funding at state level.

Table 9: Market readiness and regulatory context

Country	Governance and regulatory context	Institutional readiness	Overall status
Estonia	National system legally established; unified Building Registry	Digital permitting in daily use	Implemented
Finland	Building Act supports digital process; strong coordination	Stable long-term collaboration	High
Austria	Federal diversity; emerging national standards	Active pilots, limited scaling	Medium
Germany	Fragmented building law; regional initiatives	Limited municipal capacity	Low–Medium
Netherlands	Clear legal vision under Omgevingswet	Gradual local uptake	Medium
Spain	Municipal pilots within existing law	Expanding collaboration and interest	Medium–High

Across these countries, differences in progress stem less from technology than from governance continuity, legal coherence and administrative capacity. Frontrunners have achieved momentum by embedding digital permitting within existing institutional structures and ensuring predictable investment, while others remain dependent on project-based pilots. Overall, the European landscape ranges from full implementation (Estonia) to advanced readiness (Finland) and transitional development (Austria, Germany, Netherlands, Spain). These variations provide valuable lessons for designing EU-level

measures that respect national diversity while promoting convergence in standards, governance and capacity.

A key finding is that market readiness correlates strongly with the presence of a clear national mandate and stable long-term funding rather than the sophistication of local technologies. Countries with established legal frameworks and permanent governance bodies show higher resilience and scalability. Conversely, where digital permitting depends on temporary funding or fragmented jurisdiction, progress remains uneven and difficult to sustain. From a policy perspective, these insights point to the need for coordinated EU action to support regulatory harmonisation, shared infrastructures and capacity-building programmes that can reduce disparities and accelerate convergence across Member States.

5. Barriers and enablers

While frontrunner countries have achieved notable progress in developing DBPs, their experiences reveal a common set of barriers that still limit the speed and scale of implementation. These obstacles are not primarily technical but institutional and regulatory, reflecting the challenge of transforming long-established administrative systems. At the same time, several enabling factors have emerged that demonstrate how these barriers can be successfully overcome.

Regulatory and institutional barriers
The most significant barriers are linked to governance and legal fragmentation. In several Member States, building law is defined regionally, resulting in diverse procedures and inconsistent requirements. This limits the ability to create shared digital processes or scale successful pilots. In countries such as Austria and Germany, differing regional responsibilities lead to parallel developments that increase cost and reduce interoperability.
Another persistent issue is the lack of formal legal recognition of digital submissions. Even where model-based applications are accepted in practice, legal equivalence between digital and paper or PDF submissions is often missing. This creates uncertainty for applicants and restricts automation potential. Finally, fragmented responsibilities between ministries and local authorities hinder coordinated investment and the long-term management of digital systems.

Technical and data-related barriers
Although technology itself is not the main obstacle, several technical challenges persist. These include limited interoperability between platforms, insufficient connection to planning and land registries, and inconsistent data formats. Many municipalities still lack the IT infrastructure and staff resources needed to manage model-based data. Differences in information requirements also complicate cross-country and even inter-municipal comparison.

Non-technical barriers
A major challenge across all countries is the human and organisational side of digitalisation. Many local authorities face staff shortages, insufficient training, and limited understanding of the opportunities that data-driven processes bring. Public administrations are often risk-averse and reluctant to change established workflows. Furthermore, most initiatives have been funded as time-limited projects rather than permanent programmes, creating uncertainty about maintenance and continuity once pilots end.

Enablers and success factors
Despite these challenges, frontrunner experiences provide clear lessons for overcoming barriers. Strong national coordination bodies and clearly defined information requirements have proven critical in Estonia and Finland. Consistent funding and training have built administrative confidence and ensured long-term system operation. In Austria and Spain, public–private collaboration has accelerated technical development and increased market

acceptance. The Netherlands' integration of digital permitting within broader environmental and planning reform demonstrates the value of aligning digitalisation with regulatory modernisation.

Table 10: Barriers and enablers in Digital Building Permitting

Category	Typical barriers or enablers	Examples from countries
Regulatory	Fragmented governance, unclear legal status of digital submissions	Austria, Germany
Institutional	Limited coordination between national and local levels	Austria, Germany, Netherlands
Technical	Lack of interoperability, incomplete registries, inconsistent data	Germany, Netherlands
Organisational	Skills gaps, limited resources, short-term project funding	Austria, Germany, Spain
Enabling factors	National coordination, stable funding, training, private-sector collaboration	Estonia, Finland, Spain

Summary

Across all examined countries, the transition from document-based to digital permitting depends less on technology than on institutional leadership, stable regulation, and investment in human capacity. Frontrunners have demonstrated that sustained governance, shared data standards, and clear legal recognition are decisive enablers of progress. The persistence of regulatory fragmentation and short-term project cycles remains the main barrier to scaling digital permitting across Europe.

These barriers operate at multiple levels: systemic, where national legal frameworks and data policies remain misaligned; organisational, where public authorities lack resources or long-term mandates; and operational, where municipalities face skills shortages and dependence on vendor-specific tools. Overcoming them requires sustained policy coordination rather than isolated pilots. In particular, an EU-level framework could help promote common data specifications, legal interoperability, and shared infrastructures that reduce duplication of effort. Strengthening cross-border cooperation, pooled training initiatives, and stable investment mechanisms would create the conditions for lasting transformation beyond temporary projects.

6. Lessons learned

The experience of the frontrunner countries shows that successful digitalisation of building permitting is not the product of isolated pilots or technical demonstrations but the result of aligning legal frameworks, information standards, organisational practices, and digital infrastructures. When these elements reinforce one another, the outcome is a permitting process that is faster, more transparent, and more reliable, while also creating new forms of value for municipalities, industry actors, and citizens.

A decisive success factor is the establishment of a clear legal basis for digital submissions. Where jurisdictions have recognised that a digital model or dataset carries the same legal weight as a traditional drawing, uncertainty has been removed for applicants and administrations alike. In such cases, industry actors have the confidence to invest in digital processes, knowing that their efforts will be accepted by authorities. Equally, municipalities are able to reduce duplication and treat digital models as authoritative, rather than as optional

supplements. Legal clarity therefore acts as the foundation upon which all subsequent innovations are built.

Standardisation of information requirements is another central element. Where permitting bodies have articulated structured expectations regarding which attributes are needed, at which level of detail, and for which parts of the built asset, the process becomes both predictable and automatable. These requirements serve as the bridge between design outputs and regulatory checks, ensuring that data delivered by applicants can be processed consistently by digital platforms. This not only reduces errors and resubmissions but also makes it possible to automate specific compliance checks, saving time for both regulators and industry.

Closely related is the incremental codification of building regulations into machine-readable form. Successful jurisdictions have not attempted to automate the entirety of their codes at once. Instead, they have prioritised domains that are clearly defined, measurable, and high-impact, such as fire safety, accessibility, or energy efficiency. By demonstrating tangible results in these areas, administrations build trust among stakeholders and create momentum for broader reforms. This gradual approach avoids unrealistic expectations, while still delivering early benefits that justify continued investment.

Integration with wider digital government infrastructures has also proven to be transformative. When permitting systems are connected to national data exchanges, city digital twins, or GIS environments, they cease to be stand-alone administrative tools and instead become strategic sources of data for governance. Permitting then contributes not only to compliance control but also to planning, asset management, and sustainability monitoring. This integration ensures that the data generated through the permit process is not lost in isolated archives but becomes reusable intelligence that supports long-term urban and environmental policy objectives.
Another factor that supports effective implementation is the availability of shared solutions for municipalities. Smaller local authorities often lack the resources to develop and maintain their own platforms, but they can benefit significantly from centralised or joint systems. Experience with Estonian Building Registry shows that collaborative approaches reduce costs, ensure uniformity, and enable municipalities of different sizes to access the same quality of digital services. In some contexts, “one-for-all” solutions and scalable starter packages have been used to help smaller authorities enter the digital workflow. This demonstrates that centralisation, when appropriately designed, can enhance inclusiveness and accelerate uptake.

Finally, the most effective reforms have been implemented gradually through well-structured pilots. Authorities that tested digital permitting on real projects in controlled environments were able to identify bottlenecks, adjust requirements, and build user confidence before scaling up. This phased approach avoids the risks associated with national rollouts that have not been tested in practice. It also provides demonstrable evidence of efficiency gains, which can be used to justify further legal and financial commitments. Importantly, pilots have worked best when accompanied by structured stakeholder engagement, ensuring that municipalities, designers, engineers, and software vendors all feel ownership of the process.
In combination, these factors such as legal clarity, standardised information requirements, incremental rule codification, systemic integration, and structured piloting, form a blueprint for success. None of them alone is sufficient. Legal mandates without clear requirements create confusion. Platforms without codified rules become digital archives rather than engines of automation. Pilots without a legal basis remain experiments with no path to adoption. Where all of these elements are aligned, however, permitting becomes faster, more predictable, and more transparent, while at the same time feeding valuable data into broader digital ecosystems. This synthesis of legal, organisational, and technical reform is the hallmark of frontrunner countries and offers a path for others to follow.

7. Challenges observed

The frontrunner countries provide valuable insights into the challenges and bottlenecks that can undermine the digitalisation of building permitting. These issues do not arise from technology alone but from incomplete alignment between legal, organisational, and technical reforms. The evidence shows that when reforms are partial or fragmented, they risk reinforcing inefficiencies rather than eliminating them.

A first challenge concerns the reliance on hybrid submission formats. In several jurisdictions, digital models have been introduced but applicants are still required to provide drawings in PDF or other traditional formats. This dual system can be valuable in the early stages of implementation, since it allows staff to familiarise themselves with new tools while maintaining continuity of established workflows. It also provides a safeguard during the transition period by ensuring that decisions can still be based on familiar documentation if problems arise with digital models. However, the benefits of hybrid approaches diminish rapidly if they are maintained over the long term. Prolonged use of parallel formats leads to duplication, inconsistencies between models and drawings, and increased workloads for both applicants and reviewers. To avoid these issues, hybrid formats should be treated as a short-term onboarding mechanism rather than a permanent solution, with a clear roadmap for phasing out legacy formats and moving towards digital models as the sole authoritative source.

Fragmentation of legal and administrative structures represents another critical bottleneck. Where building regulations differ by region or municipality, the creation of standardised workflows or automated checks at national scale becomes highly complex. Variations in terminology, scope, and regulatory interpretation mean that rule sets must be redeveloped repeatedly, raising costs and slowing adoption. Fragmentation also produces unequal progress: larger cities with resources to develop digital systems advance rapidly, while smaller municipalities fall behind. The result is a patchwork landscape that undermines the broader digital transition.

A further bottleneck arises from insufficient municipal capacity. National strategies often set ambitious frameworks, yet implementation is ultimately carried out at the local level. Many municipalities lack the staff, training, or licences to manage BIM-based permitting effectively. In such cases, national mandates risk being perceived as unfunded obligations that erode trust between levels of government. Without structured programmes to strengthen local capacity, the pace and quality of implementation will remain uneven.

Another limitation is the misalignment between digital platforms and regulatory content. In several cases, permitting portals have been modernised to accept IFC submissions, but the underlying building codes remain in natural-language text that is not suitable for automated checking. As a result, platforms serve primarily as digital repositories rather than tools for automated compliance. This creates disillusionment among stakeholders who expect time savings and efficiency gains but encounter unchanged manual processes presented through new interfaces. Unless regulations are codified into structured, machine-readable form, the transformative potential of BIM cannot be realised.

The introduction of digital permitting also carries transitional risks that need to be carefully managed. Requiring BIM submissions may inadvertently exclude applicants and designers who lack the skills, tools, or resources to work in this way, particularly in smaller markets or for modest projects. Similarly, municipalities face significant investment costs for platforms, licences, and training during the initial phase. If these costs are not supported, the digital transition risks creating new barriers to participation, especially for small and medium-sized enterprises. Ensuring that early-stage burdens do not translate into long-term exclusion will be a critical condition for achieving equitable and sustainable adoption.

Finally, there is a significant challenge in the limited attention given to renovation and retrofit processes. Most digital permitting initiatives have focused on new construction, while existing

building stock has been largely overlooked. This imbalance is at odds with the objectives of the European Green Deal, the Renovation Wave, and housing affordability initiatives. Since the majority of Europe's 2050 building stock is already built today, neglecting renovation workflows risks disconnecting digital permitting reform from the Union's most pressing climate and housing priorities.

Taken together, these challenges can be summarised as duplication, fragmentation, capacity gaps, regulatory misalignment, and thematic imbalance. Each reflects the consequences of partial reform, where progress in one domain is not matched in others. Hybrid submissions persist when legal frameworks lag behind technical capability. Fragmentation results from weak national coordination. Capacity shortfalls reveal inadequate investment in municipal implementation. Misalignment arises when digitisation is mistaken for true digitalisation. Neglect of renovation demonstrates a lack of alignment with strategic policy goals.

The lesson is clear: digitalisation of building permitting must be pursued as an integrated programme that simultaneously addresses legal foundations, governance structures, municipal resources, and technical standards. Only when reforms are comprehensive and balanced will digital permitting deliver the efficiency, transparency, and sustainability benefits that Europe requires.

8. Roadmap for EU-wide adoption

The comparative analysis of frontrunner countries demonstrates that digital building permitting is achievable, but only when pursued as a coordinated reform that aligns law, governance, technology, and resources. An EU-wide roadmap should therefore combine harmonisation with flexibility, enabling Member States to advance at different speeds while ensuring convergence towards shared goals. The roadmap should provide legal certainty, promote interoperability, strengthen municipal capacity, and ensure that the benefits of digitalisation extend beyond efficiency to contribute to wider social and environmental objectives.

Harmonising Legal Foundations and Standards
The first step is to establish openBIM as a legally recognised submission format across all Member States. Several frontrunners have already adopted or planned IFC mandates, but without EU-wide alignment, fragmentation will persist. OpenBIM should be specified in the Public Procurement Directive as the default option for procuring BIM deliverables. This will help to avoid vendor lock-in and improve collaboration across the industry. In parallel, the EU should promote the development of common data requirements and shared rule libraries in machine-readable form, enabling local adaptation but ensuring compatibility across jurisdictions. This harmonisation would reduce duplication, create market certainty, and allow scalable digital solutions to emerge. As the key standard enabling openBIM, reinforcing IFC as the core submission format is not only a technical enabler but also a strategic measure for ensuring long-term efficiency. IFC provides the foundation for continuity across the building lifecycle, from planning and permitting to construction, renovation, and asset management. By mandating IFC in permitting processes, Member States can ensure that data captured at the application stage continues to deliver value throughout the lifecycle of the built environment, thereby maximising the return on investment in digitalisation.

Supporting Municipal Capacity and Shared Solutions
Given that permitting is delivered primarily at the local level, the roadmap must invest in municipal readiness. This includes training, staffing, and licensing support, but also the development of shared or centralised solutions that allow smaller municipalities to participate without creating financial barriers prohibitive costs. "One-for-all" platforms and starter packages can provide smaller authorities with an accessible entry point while maintaining consistency at national or regional scale. EU funding and knowledge-sharing mechanisms targeted at practical implementation should prioritise these collaborative models, recognising

that equitable adoption across municipalities is essential for ensuring fairness and inclusivity in the digital transition.

Housing and Prefabricated Solutions
Digital permitting should also be used to accelerate the delivery of affordable housing and industrialised construction. One promising approach is the introduction of type approvals, where prefabricated or standardised building designs can be granted general permission once and then replicated multiple times without undergoing full reviews. This significantly reduces permitting time for recurring housing typologies and aligns well with European objectives on housing affordability and the Renovation Wave.

In the context of the Affordable Housing Initiative, industrialised and modular construction is recognised as a key means to deliver quality housing at scale. By integrating type approvals into digital permitting environments, authorities can validate standardised housing designs once and re-use these approvals for subsequent projects. This approach shortens administrative lead times, reduces uncertainty for investors and contractors, and supports the production of affordable dwellings with predictable quality and performance. However, the full efficiency potential can only be realised if urban planning and permitting processes are digitalised together. Planning decisions, such as zoning compliance, density, and spatial coordination, often constitute the most time-consuming part of housing delivery. Digital planning tools, including 3D zoning maps and model-based development control, can enable automatic conformity checks and seamless data exchange with permitting systems. When integrated, these processes can cut overall project preparation times from months to weeks, reducing administrative costs that directly affect the price per square metre of new housing.

Beyond national implementations, shared digital catalogues of approved housing types could enable cross-regional replication within harmonised legal and technical frameworks. Such repositories would ensure transparency, encourage SME participation, and promote the uptake of circular, energy-efficient designs. By linking digital permitting with industrialised construction and coordinated urban planning, Member States can lower transaction costs, accelerate delivery, and contribute to the EU's wider objectives of affordable, sustainable, and socially inclusive housing.

Social and Environmental Dimensions
Finally, digital permitting reforms should be evaluated not only in terms of efficiency but also in terms of their social and environmental impacts. On the social side, digitalisation supports the development of a culture of innovation, promotes new skills, and fosters inclusion when training and support are widely accessible. Environmentally, BIM-based permitting enables more consistent application of sustainability rules, supports energy-efficiency targets, and provides data for monitoring the performance of the built environment in relation to climate objectives. Embedding these wider impacts into the evaluation of digital permitting will ensure that reforms contribute directly to Europe's broader policy goals.

Towards a European Framework
Taken together, these elements form a roadmap towards EU-wide adoption. Legal harmonisation provides the baseline, municipal capacity ensures delivery, type approvals and IFC reinforce efficiency, and social-environmental impacts guarantee alignment with broader Union objectives. The European Commission can play a catalytic role by supporting shared infrastructures, coordinating data and standards, and ensuring that reforms contribute not only to administrative efficiency but also to innovation, sustainability, and social inclusion.
A further step would be the establishment of targeted EU grants to support adoption. Initial investment costs for BIM-based permitting platforms are often high, as demonstrated in Estonia and Spain. Therefore, many authorities hesitate to act without external support. Moreover, current investments are typically fragmented at national or local level, which limits reusability and slows wider adoption. By designing a grant scheme with clear rules that

prioritise the creation of reusable, scalable solutions, the Commission could significantly reduce duplication of costs and accelerate convergence across Member States. Such funding would not only lower the entry barrier for smaller municipalities but also ensure that investments contribute to a common European foundation rather than isolated national silos.

9. Policy alignment and vision

The move toward BIM-based permitting is not a stand-alone reform; it is closely aligned with multiple high-level EU strategies and policies. Carefully linking digital permitting to these agendas strengthens the case for coordinated adoption and helps ensure that reforms contribute to the Union's broader goals. Below is a refined alignment grounded in existing EU initiatives and strategies.

Construction 2050 and the EU Construction Transition Pathway
The Construction 2050 vision, championed by the Construction 2050 Alliance, seeks to transform Europe's construction sector into a more sustainable, competitive, and digital industry. Its Manifesto emphasises digitalisation, climate action, circular economy, and skills development. [61]

Complementing that, the EU's Transition Pathway for Construction sets out enabling actions for a resilient, greener, and more digital construction ecosystem, listing six building blocks that include digital tools and innovation. [62]

BIM-based permitting fits directly as part of that digitalisation pillar. By embedding compliance checking into digital workflows, permitting becomes a mechanism for operationalising the Construction 2050 goals. Projects can proceed more predictably, with clearer regulatory feedback loops, helping reduce delays, cost overruns, and error-prone manual review. The alignment reinforces that BIM-based permitting is not just a regulatory reform but a sectoral transformation.

Green Deal, Renovation Wave and Sustainability Targets
The European Green Deal and its associated Renovation Wave place the decarbonisation and energy performance of the building stock among the Union's highest priorities. Buildings account for a substantial portion of energy use and emissions, and deep renovation is a central lever of climate targets. [63]
BIM-based permitting ensures that sustainability checks, such as energy performance, thermal efficiency, accessibility, or emissions constraints, are enforced at the design stage. The data collected can also feed into post-occupancy evaluation, monitoring, and further policy enforcement. In addition, digital permitting supports circular construction approaches by enabling tracking of materials, quantifying embodied emissions, and linking to digital twins. Through these pathways, BIM permitting contributes directly to delivering on the Green Deal's built environment ambitions.

New European Bauhaus
The New European Bauhaus initiative promotes the integration of sustainability, aesthetics, and inclusivity in the built environment. It aims for places that are "beautiful, sustainable, inclusive" and encourages participatory design processes anchored at local level. [64]
Digital permitting supports NEB goals in multiple ways: it can reduce administrative burden and processing time (thereby lowering cost barriers), embed accessibility and inclusive design rules within model-based checks, and enforce design quality while meeting compliance. Moreover, data-driven permitting enables transparency and citizen engagement—aligning with

[61] https://euconstruction2050.eu/
[62] https://single-market-economy.ec.europa.eu/sectors/construction/construction-transition-pathway_en
[63] https://institutdelors.eu/content/uploads/2025/06/PP312_Building_decarbonization_affordable_housing_Voita_EN_3.pdf
[64] https://new-european-bauhaus.europa.eu/index_en

NEB's participatory orientation. The NEB Facility (2025–2027) further supports scalable, innovative local demonstration projects that integrate sustainability, inclusion, and aesthetics.[65]

Affordable Housing: Quality, Speed, and Innovation
Affordable housing is an urgent priority for the Union. Many Member States face supply shortages, long processing times, and delays in quality assurance. BIM-based permitting can help address these by accelerating the regulatory step without sacrificing rigour. One strategic pathway is using type approvals or general permission for prefabricated or standardised housing typologies. Once compliance is validated for a design, it can be replicated with minimal review. This aligns with EU objectives under the Renovation Wave, housing strategies, and social inclusion goals.
Furthermore, BIM-based permitting encourages quality through embedded checks, continuous model validation, and integration with asset and life-cycle management. This ensures that affordable housing is not just fast but sustainable, durable, and aligned with climate goals.

Summary
When properly framed, BIM-based permitting becomes more than a permitting reform - it becomes an enabling instrument that delivers across multiple EU policies. It helps realise Construction 2050's digital ambitions, supports the Green Deal's climate goals in buildings, brings NEB's values of beauty and inclusion into the regulatory process, and accelerates high-quality affordable housing. The synergies are strong: digital permitting can anchor the intersection of technology, sustainability, and social policy.
The strength of this alignment also provides legitimacy and urgency to the roadmap in Section 4.4. It shows that investment in BIM permitting is not a niche technical endeavour but a strategic lever in Europe's future built environment.

10. Conclusion and Key Recommendations

The above analysis demonstrates that digital building permitting is no longer an experimental concept but a practical reality, delivering measurable benefits where legal clarity, structured data requirements, and shared infrastructures are in place. These experiences also reveal that success depends on more than technology alone. Legal frameworks, municipal capacity, common standards, and alignment with broader European objectives are equally decisive.

At the same time, challenges remain. Without harmonisation, investments risk being fragmented. Without adequate support, smaller municipalities risk being excluded. Without attention to housing, prefabrication, and renovation, digital permitting risks losing alignment with Europe's social and environmental priorities. And without EU-level coordination, valuable innovations will remain isolated rather than scaled.

The European Commission has a unique role to play in ensuring that the lessons of frontrunner countries are translated into a common European framework. This requires combining legal certainty with financial support, fostering both innovation and inclusiveness, and ensuring that digital permitting contributes directly to the Green Deal, the Renovation Wave, and the Affordable Housing Initiative.

Key Recommendations for EU Action:

- Establish a harmonised legal basis for BIM-based permitting, recognising openBIM as the core submission standard across Member States.
- Promote common data requirements and machine-readable rule libraries, ensuring compatibility and reusability across jurisdictions.

[65] https://www.housingeurope.eu/new-european-bauhaus-facility/

- Support municipal capacity-building through training, guidelines, shared platforms, and centralised solutions for smaller authorities.
- Provide EU-level funding, including grant schemes, to lower initial investment costs and ensure that new solutions are reusable by other Member States.
- Prioritise housing and prefabricated solutions through type approvals and general permissions for recurring building typologies.
- Expand the focus to include renovation workflows, aligning digital permitting reforms with climate and housing policy goals.
- Embed social and environmental evaluation criteria into digital permitting, ensuring that reforms foster inclusion, innovation, and sustainability.

11. Annexes

Annex I: Authors and Interview Sources Information

Austria

Harald Urban is Assistant Prof. at TU Wien and Deputy Head of the research unit Digital Building Process (TU Wien), a state-certified master builder and one of the first Certified Trainers (BIM) of buildingSMART Austria. He leads the Austrian Standard Istitut working group »openBIM Building Permit«, which he is developing further as an openBIM approval process in the EU-funded research project »BRISE- Vienna«. He supervises numerous research projects on digitalisation in the construction industry. He is co-author of the study »Potentials of Digitalisation in the Construction Industry« commissioned by the Austrian Federal Economic Chamber and the Austrian Federal Ministry of Transport, Innovation and Technology«.

Christian Schranz is Associate Prof. at TU Wien and Head of the research unit Digital Building Process (TU Wien). He started his research at the University of Illinois at Urbana-Champaign, USA, and continued at TU Wien. His research focuses on the modelling of building structures (incl. life cycle assessment) and digitalisation in construction, in particular, the use of openBIM and augmented reality (e.g. in the EU-funded research project »BRISE-Vienna«). As a board member of buildingSMART Austria, he is responsible for quality management and openBIM training. He is a member of the examination board for Certified Trainer (openBIM Expert). For buildingSMART International, he is a member of the »Professional Certification« steering committee.

Estonia

Christopher Raitviir is Head of Digital Construction in Tallinn, where he leads the digitalisation of the built environment lifecycle, from urban planning to facility management. He has played a central role in developing Tallinn's Digital Twin and previously designed Estonia's BIM-based building permitting process during his tenure at the Ministry of Climate. He holds a Master of Science degree in Civil Engineering and is pursuing a PhD on the "Synchronization of Information Flows of Digital Twins in Construction." Christopher is a strong advocate of international collaboration and serves as an active member of the European Network for Digital Building Permits as well as a steering committee member of the EU BIM Task Group.

Finland

Anna-Riitta Kallinen is a long-time openBIM and buildingSMART influencer from Finland. She is chair of Board and owner of ARK Consulting, ARKCON. She has over 20 years been actively involved in national BIM development projects, disseminating BIM know-how to the construction industry and industry operating models and guidelines. Was involved with project General BIM Requirements 2012 (COBIM). Project Coordinator COBIM2020 Planning project. Project Coordinator of Ministry of Environment of Finland development projects: RAVA2 BIM-based Building Permits and COBIM2020 part 14 and Ministry of Finance of Finland RAVA3Pro Project Manager, Were Part of VTT team in ACCORD EU Project. Project Manager of city of Helsinki KympR3 Project, Vice Chair of RAVA3.5 Advisory Boad,Chair of Finnish KIRAHub Digital Building Permit Ecosystem. Member of the EU BIM Task Group.

For the purposes of this survey feedback was collected through discussions and interviews with the following people:
Jouni Vastamäki, Leading Building Control Inspector, City of Järvenpää and city of Hyvinkää and **Paula Mäenpää**, Development Manager, The Association of Finnish Cities and Municipalities

Germany

Milena Feustel is the Chair of the EU BIM Task Group and as such responsible for developing and implementing both the Strategic and Operational Roadmaps of the Group and for fostering its strong network of members, stakeholders and partners on EU, national and regional levels in order to accelerate and harmonise the digitalisation of the EU construction industry, as a key lever for the EU Single Market, for achieving climate goals, improving energy efficiency and increasing affordable housing in the EU. She is an architect and an expert in the digital transformation of the construction industry, a leading voice in the implementation of BIM across the EU construction sector, particularly emphasising its adoption by public clients.

Contribution by André Vonthron, the Co-founder and Managing Director of VSK Software GmbH, a start-up founded in 2021 specialised in BIM-based permitting application and rule-based testing, which develops and implements software and processes for the digitalization of the building industry, such as the BIM.permit software (it played an important role at the Vonovia and City of Bochum pilot project).

Further sources:
Interview with Prof. Dr.-Ing. Joaquín Díaz: https://www.deutsches-ingenieurblatt.de/hand-aufs-herz-problemloeser-digitaler-bauantrag/

Ruhr-Universität Bochum, Lehrstuhl für Informatik im Bauwesen Prof. Markus König: https://bim-bauantrag.blogs.ruhr-uni-bochum.de/ und https://mbo2bim.de/

Chamber of Architects Baden-Württemberg:
https://www.akbw.de/fileadmin/download/Freie_Dokumente/Berufspolitik/Stellungnahmen/DigitalerBauantraginBW1122.pdf

Federals Ministry for Housing, Urban Planning and Construction:
https://www.bmwsb.bund.de/DE/bauen/innovation-klimaschutz/digitaler-bauantrag/digitaler-bauantrag_node.html

Netherlands

Jaan Saar is a leading voice in the digital transformation of the construction industry, with over 20 years of experience in both the public and private sectors. He is a passionate advocate for openBIM and international open standards, because they are essential for fostering better collaboration and interoperability throughout the building lifecycle. As the Chief Evangelist for the Dutch-based software development companyFuture Insight, Jaan helps clients unlock the full value of their BIM and GIS data. Before joining Future Insight, he served as the Head of Digital Construction for the Government of Estonia, where he led the development of the national digital twin and the e-construction platform. His commitment to advancing the industry is further demonstrated through his contributions to non-profit initiatives, including his previous roles as Chair of the EU BIM Task Group and Board Member and interim CEO of buildingSMART International.

Sources: For the purposes of this survey feedback was collected through discussions and interviews with the following people:[66]
Rolf Jonker - consultant and project leader at the Municipality of Rotterdam, responsible for the Rotterdam BIM-based permit checking pilot.

[66] Due to the limited scope and ad-hoc nature of this study the interviews with key stakeholders were not meticulously planned or recorded. Therefore there are no summaries and transcripts available but the discussions were used to collect the information provided in this study.

Wico Ankersmit - Director of the Dutch Association of Building and Housing Supervision (VBWT).

Jeroen De Ruig - Project Leader at VNG (Dutch Association of Municipalities), leading the DigiGO policy measure #13 Permitting Through BIM .
Pim van Meer Redert - Chair of the Digitalization Committee of Dutch Association of Real Estate Developers (NPROM), Director for Digitalization at VORM Holding.
Eric Houtman - General Manager of InterGaran Group, the leading organizations involved in providing quality assurance instruments and services under the Wkb framework in the Netherlands
Willeke Wijnen - Senior Permitting Advisor for the Municipality Veenendaal.
Petra Vermeulen - Functional Manager of Physical Living Environment for the municipality Nieuwkoop.
Paul Lutgens - Director of Environmental Permits for the municipality of Apeldoorn.

Spain

Rebeca Herrera is Head of Innovation for Urban Planning Licences in Madrid City Council, where she leads the digital transformation of permitting processes and the development of MADRIDdbp, the City's Digital Building Permit initiative. Enthusiast of openBIM and a committed advocate for a network of cities and countries embracing the digitalisation of building permits to enable smarter, more transparent urban development.
With over 12 years of international experience across the private and public sectors, she has a strong background in architecture, BIM strategy and digital delivery. She holds a Master's in Architecture (UPM) and a Master's in BIM Management (UNIR), and has previously worked in BIM consultancy and architectural practice. Rebeca represents Madrid City Council in the buildingSMART Spanish Chapter and contributes to European working groups on digital building permits.

Interview: To provide a comprehensive overview of the Spanish case, it was deemed appropriate to complement the municipal administrative perspective with insights from the property development sector, a key stakeholder in the urban ecosystem.
To this end, an interview was conducted with Jaime Fernandez, Managing Director of ASPRIMA (Madrid Association of Property Developers), an organisation representing the main actors in residential development across the region. Their contribution offers an expert assessment of the potential impact that the digitalisation of urban planning procedures may have on accelerating the launch of new housing projects.
This collaborative approach between public and private sectors enriches the analysis by identifying, with greater precision, the benefits, challenges, and opportunities associated with the automation of building permit processes, as well as its potential scalability at both national and European levels.
1. From the perspective of the development sector, how do you assess the initiative of Madrid City Council with MADRIDdbp and, in general, the commitment to tools based on BIM and self-validation of urban planning regulations as a means to modernise the licensing process?
From the Madrid Association of Property Developers (ASPRIMA), we regard it as a paradigm shift in the relationship between the sector and the Administration. Until now, the relationship with city councils has been based on digital formats – for the more fortunate ones – but there are councils – the majority – that still work with construction projects in paper format. The lack of application of already available technology (BIM) leads to clear inefficiency in public resources, lengthy licensing periods and, consequently, a higher cost of housing for the end consumer.
2. In your opinion, to what extent can the automation of urban and technical verification help shorten licensing times and provide greater legal certainty for developers?
To a great extent. Let us consider that, in the Community of Madrid, there are councils that take more than 15 months on average to grant a building licence – with the average timeframe

among councils ranging between 9 months and a year – a period that could be significantly reduced by applying automation and digitalisation to the process, also helping to improve its traceability.

Do you consider that there are other complementary measures that could also have a significant impact on streamlining procedures?

Generally speaking, the implementation of Urban Planning Collaborating Entities in all councils. Urban planning and construction is an area where public-private partnerships are clearly applicable and can help to unblock files in councils that suffer from an almost structural lack of dedicated personnel.

3. What impact do you think the implementation of this type of digital platform could have on the housing market, particularly in terms of product availability or cost reduction related to processing?

It is evident that faster licence granting would result, on the one hand, in greater capacity for developers to rotate capital and build a larger number of homes (the current average development period for a housing project is around 4 years) and, on the other hand, would lead to a reduction in financial costs. In the case of land acquisition – which can represent more than 50% of the total cost – there are associated costs of 10–12% annually, so if we reduce that average period (9–12 months) to zero, the cost reduction would be very significant – and would be passed on to the buyer.

4. From your experience, what challenges or resistance might both administrations and developers face in adopting tools based on BIM models and automatic self-validation?

On the part of the councils, lack of budget for implementation and resistance to change among civil servants, which tends to be greater the smaller the municipality. But developers are not exempt from certain prejudices, as it is a highly fragmented sector and sometimes reluctant to change. For both parties, it is important that success stories such as Madrid's are consolidated and their advantages communicated to other councils.

5. Looking ahead, what factors do you consider essential to consolidate this type of initiative and ensure its scalability, whether at national or European level?

It is a priority to disseminate its results, as local and regional administrations often do not know about the initiatives and success stories of others – even nearby ones. Once its benefits are disseminated and accepted, it is necessary to finance the digitalisation of councils in this area – the Next Gen funds have perhaps been a missed opportunity – since most of them do not have the capacity to develop initiatives of this scale on their own.

Annex II: Standards for Building Permits

Austria

Authorities in Austria must rely on open standards in order to avoid discrimination based on software when submissions are made. The following standards are used:

- IFC (ISO 16739) as the central exchange format for models.
- IDS for defining information requirements [67]
- MVD (Model View Definition) for different test scenarios.
- BCF for communication between stakeholders

Estonia

National BIM Requirements (ÜBN) as legal-technical interface

A major innovation in Estonia's legal-technical alignment is the introduction of the **ÜBN** — a set of **Common BIM Requirements** mandated for all BIM-based submissions. While not a formal law, the ÜBN serves as a technical annex to national guidance and is referenced in official documentation by the Ministry of Climate.

The ÜBN:

- Specifies required IFC entities and property sets (e.g. IfcSpace, IfcSlab, IfcBuildingStorey)
- Introduces domain-specific properties (e.g. evacuation route, storey status, load bearing)
- Defines attribute naming conventions and data population rules
- Ensures consistency across software platforms by standardising field expectations

By codifying these expectations, the ÜBN acts as a **regulatory schema** for BIM — providing a predictable, enforceable and machine-readable interface between legal requirements and digital models. Plans are underway to migrate parts of the ÜBN to international standard of Information Delivery Specifications (IDS), enabling harmonised validation and cross-border interoperability. During the initial development of Estonian BIM permitting service, IDS was not existing.

Open standards as the foundation for interoperability

Estonia's BIM-based permitting system is built on a foundation of open, internationally recognised standards. This choice reflects a long-term commitment to interoperability, data reusability and alignment with broader European digital infrastructure initiatives.

At the core of the system is the Industry Foundation Classes (IFC) schema — the ISO-standard data model developed by buildingSMART for representing building and construction information in a software-independent, machine-readable format. By requiring permit submissions in IFC format, Estonia ensures that:

- Models are consistent and readable across different authoring tools,
- Relevant data can be programmatically extracted for rule validation,
- Submissions remain accessible over time, independent of proprietary formats.
- In addition to IFC, the system uses:
- BIM Collaboration Format (BCF) to capture model-linked feedback and rule-check results,
- REST APIs to integrate with the national Building Registry (EHR) and other digital services

This standards-based approach provides a scalable and adaptable framework that supports both current operations and future developments, such as integration with digital twins, life cycle tracking and cross-border permitting systems.

Finland:

In Finland the following standards are used:

- IFC (ISO 16739-1) as the central exchange format for models. The new Decree is setting Mandatory of use IFC 4.3.2.0 to BIM-based building permit process

[67] https://ucm.buildingSMART.org/de/use-cases/3452/en

- IDS for defining information requirements68
- IDM ISO 29481-1
- Level of Information need ISO 7817-1
- MVD (Model View Definition) for different test scenarios.
- BCF for communication between stakeholders
- Common Data Environments (CDEs)
- bsDD (MEP)
- ISO 19650 (translated also to Finnish)

Finnish public material that has been used in this survey:
- National information system RYHTI data openAPI descriptions https://liityntakatalogi.test.suomi.fi/dataset/ryhti-syke-service/resource/8b52edc0-fb92-44b5-a53a-395c6ef8a550?inner_span=True
- Decree on EU notification TRIS https://technical-regulation-information-system.ec.europa.eu/en/notification/27244
- Annex of Decree´s notification version https://valtioneuvosto.fi/hanke?tunnus=YM052:00/2022 (e.g Regulatory Information requirements on Finnish, English version coming up couple of weeks to page)
- Building act implemented at 1.1.2025 https://www.finlex.fi/fi/lainsaadanto/saadoskokoelma/2023/751 English version coming up soon
- Public hearing material for Regulatory Information property set updated to Decrees new requirements https://kirahub.org/rava3-5-lausuntopyynto-suunnitelmamalliasetuksen-mukaisten-ydintietojen-ifc-maarityksista/ Final version and official of property sets is coming during week also national IDS for this material quality checks will be published by end of year 2025
- The Statistic Finland: Cubic volume of granted building permits decreased by 3 per cent in July 2025 from one year back in Finland https://stat.fi/en/publication/cm3ra8vq260fy07ummvad77zd
- 2025 Survey to municipalities KIRAHub Digital Building Permit Ecosystem https://ravabim.fi/hubfs/RavaBIM%20kuntakysely%202025_jakeluvapaa%20tulosraportti.pdf?hsLang=fi

Germany

Germany’s digital permitting ecosystem relies on internationally recognised open standards:
- IFC (ISO 16739): adopted as the neutral BIM exchange format for all pilot projects.
- IDS (Information Delivery Specification): replacing earlier MVDxml definitions to describe information requirements with less complexity and greater industry support.
- GML and INSPIRE: linking building data with geospatial systems and national cadastral registers.
- BCF (BIM Collaboration Format): standard for storing review comments and communicating issues linked to the 3D model.

Information requirements are maintained centrally through the national BIM-Portal, rather than published in the buildingSMART Data Dictionary (bSDD).

Netherlands

A robust data strategy is the foundation of BIM's effectiveness, but its implementation varies widely.

[68] https://ucm.buildingSMART.org/de/use-cases/3452/en

- **IFC, IDS, MVD, bSDD implementation**: The Dutch government relies on standards like **IFC** for data exchange and promotes **IDS** to define information requirements for permitting. The new project will build on this by creating these IDS files for specific Omgevingsplan checks, turning a theoretical standard into a functional tool.
- **Common Data Environments (CDEs)**: The **DSGO** is designed as a digital trust framework for data sharing, effectively functioning as a federated CDE. It aims to unify data from different sources and ensure reliable information flow.
- **Data extraction, reuse, archiving (incl. digital twin integration)**: The Dutch approach emphasizes BIM as a tool for information management, which inherently supports data extraction and reuse. The eventual goal is to integrate project models into a future digital twin of the city, enabling long-term asset management.
- **PDF vs BIM-based workflows (pros and cons)**: The VBWT survey highlighted that the majority of municipalities are still using PDF-based workflows. The main advantage is its simplicity. However, the disadvantages are significant: manual review, a high potential for human error and a complete lack of data reusability. A BIM-based workflow, while requiring higher initial investment, offers faster processing, more transparent workflow and a complete digital record of the asset. The BIM-based workflow allows for checks and reuse of data throughout the entire lifecycle of a building, including for a future digital twin.

Spain

With regard to MADRIDdbp, the procurement documents set out a robust framework for standards and data management, aligned with the principles of openBIM and international best practices:

- **IFC, IDS, MVD, bSDD implementation**

The technical specifications of MADRIDdbp clearly establish that the IFC format (openBIM) will be the official deliverable required from applicants in building permit procedures. In addition, the progressive definition of a municipal BIM deliverable is foreseen, including mandatory parameters and planning attributes aligned with local regulations.
The project also envisages the development of a Madrid-specific IDS, specifying what information must be provided and how it should be delivered within the 3D IFC model.
Furthermore, a set of predefined Model View Definitions (MVDs) will be established within the platform. To ensure semantic consistency, the use of the buildingSMART Data Dictionary (bSDD) will allow the normalisation of attributes and their linkage to the parametrised planning rules, although this is not explicitly included in the tender specifications.

- **Common Data Environments (CDEs)**

MADRIDdbp will operate as a centralised Common Data Environment (CDE), ensuring the custody of models, version traceability and interaction between applicants and municipal staff. This environment will be fully integrated with the City Council's corporate systems: the electronic case management system (SLIM/SIGSA), the corporate GIS, the urban digital twin and the municipal data lake.

- **Data extraction, reuse, archiving (incl. digital twin integration)**

One of the strategic pillars of MADRIDdbp is the reuse of information contained in BIM models beyond the processing of the administrative file.
Planning parameters will be extracted directly from the model, validated against the parametrised regulations and subsequently integrated into the urban digital twin and the municipal data lake.This information will support processes related to urban planning, mobility, sustainability and heritage conservation, adding value to the wider urban management ecosystem.

- **PDF vs BIM-based workflows (pros and cons)**

The project acknowledges the need for a temporary coexistence between traditional (PDF) workflows and digital (BIM) workflows. PDF-based workflows provide administrative continuity and legal certainty, as they are well-known and widely accepted formats. BIM-based workflows, on the other hand, enable automatic pre-validation prior to submission, reduce subsequent requirements, ensure consistency and traceability and shorten resolution times. However, they require more costly software licences and the availability of qualified personnel.

Annex III: Average and Maximum Processing Times for Building Permits

Austria

Austria's construction permitting process varies by state, with no nationwide maximum processing times. However, the European Commission's 2018 report indicates that the average processing time for building permits in Austria is approximately **1 to 3 months**, with additional time required for Environmental Impact Assessments (EIAs) if applicable[69].

Estonia

Estonia has streamlined its construction permitting process through digitalization. As of 2023, the average time to obtain a building permit is **31 days**, with a goal to reduce this to 30 days in line with the legal limit. Notably, 98% of all applications are processed online via an electronic building portal[70]. Estonia aims to reduce processing times to 30 days, aligning with the legal limit for handling construction permit applications[71].

Finland

In Finland, the average processing time for building permits varies by project type and location. For instance, in Helsinki, the average processing time for new single-family house permits was **110 days** in the period from July to September 2025. However, for apartment buildings, the average was **227 days**. These figures are subject to change based on workload and other factors[72].

Germany

Germany does not have a nationwide maximum processing time for construction permits. The average processing time can vary significantly depending on the complexity of the project and the specific municipality. In some cases, the process can take several months or years.

Netherlands

Average lead time from the permit to the completed new home is about 2 years[73], approximately 18 months.

Real-World Timeline: VNG monitoring[74] shows that only about 50% of all applications are processed within the initial statutory deadlines (see next section “Maximum Processing Times” for details)). Considering the decision time plus the mandatory 6-week objection period that must pass before construction starts, a realistic total timeline for a simple project is 14 to 20 weeks; for complex projects, it is 6.5 to 8 months.

[69] EUR-Lex
[70] Czech Daily
[71] Czech Daily
[72] Helsingin kaupunki
[73] Doorlooptijd gereedgemelde woningen: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksomschrijvingen/doorlooptijd-gereedgemelde-woningen
[74] VNG Monitoring (Compliance): VNG Monitor Omgevingswet en Wkb (Q4 2024 report example) [https://vng.nl/nieuws/rapport-q4-monitoring-omgevingswet-en-wkb-beschikbaar]

Spain

Average Time for Building Permits: Approximately 12 months, despite legislation stipulating a maximum of three months for major building works and one month for minor works.

Typical Project Duration: The complete process from land purchase to move-in typically spans 6 to 18 months, depending on project complexity, contractor availability, and municipal efficiency[75].

Table 6: Summary Table, Average Processing Time

Country	Average Processing Time
Austria	1–3 months
Estonia	31 days
Finland	Varies (e.g., 110 days for single-family houses in Helsinki)
Germany	Varies (can be several months to years)
Netherlands	18 months
Spain	6 -18 months

Maximum Processing Times

Overview of Maximum construction permit processing times in the six leading EU countries, based on available data:

Austria

Maximum Processing Times: Austria's building permit procedures vary by state. In some regions, maximum processing times range from 8 to 24 weeks. However, these times can differ based on the complexity of the project and the specific municipality[76].

Estonia

Maximum Processing Time: Estonia has set a legal limit of 30 days for handling construction permit applications. The Ministry of Climate oversees the building authority and aims to streamline the process further to meet this target[77].

Finland

Maximum Processing Time: Finland is introducing a regulation that will, from 2026 onwards, impose a legal time limit of three months for municipalities to decide on building permit applications. However, for certain complex projects, such as siting permits for green transition projects, the time limit may be extended to six months[78].

Germany

Maximum Processing Times: Under the Net Zero Industry Act (NZIA), Germany has set fixed time limits for the permit process for the construction or expansion of net-zero technology manufacturing projects. For projects with an annual manufacturing capacity of less than 1 GW, the time limit is 12 months; for those with 1 GW or more, it is 18

[75] https://investropa.com/blogs/news/spain-buy-land-build-home?utm_source
[76] ResearchGate
[77] National Building Code https://www.riigiteataja.ee/akt/105032015001?leiaKehtiv
[78] Lieke

months. These time limits do not include the steps of an eventual environmental impact assessment (EIA)[79].

Netherlands

Maximum Processing Times: The traditional "building permit" has been replaced by the Omgevingsvergunning (Environment and Planning Permit) under the 2024 Omgevingswet. This permit is now split into two parts[80]:

1. **Spatial Approval (Omgevingsvergunning):** For zoning and environmental fit.

- Simple Projects (Regulier): Decision legally required within 8 weeks (extendable to 14 weeks).
- Complex Projects (Uitgebreid): Decision legally required within 6 months (extendable to 6.5 months).

Technical Approval (Wkb): Technical compliance (safety, construction) for simple builds now uses a Construction Notification (Bouwmelding) which the municipality must process within 4 weeks, contingent on hiring a certified Kwaliteitsborger (quality assurance officer).

Spain

Maximum Processing Times: Spain has set a legal limit of 3 months for concluding a building permit process in most of their urban planning regional laws and municipal urban planning regulations.

It is important to provide context on how this timeframe is calculated, as the laws and ordinances regulating it often define these three months as a net period. That is:

The effective processing and review period handled by the technical and legal services of the municipality. It measures the time elapsed from the start of the file, once the submitted documentation is complete and correct, until the granting (or denial) of the Building Permit, excluding the periods legally suspended (e.g. awaiting external reports or responses to correction requests submitted after the deadline).

Therefore, the actual duration of the procedure, including the time taken for corrections, is significantly longer, and this is the real timeframe perceived by developers, architects, and citizens alike.

Table 7: Summary Table, Maximum Processing Time

Country	Maximum Processing Time
Austria	8–24 weeks (varies by state)
Estonia	30 days (legal limit)
Finland	3 months (general), 6 months (complex projects)
Germany	12–18 months (Net Zero Industry Act projects)
Netherlands	No nationwide limit
Spain	3 months (legal limit)

Please note that these figures are approximate averages and can vary based on specific circumstances and regional differences within each country.

[79]https://www.gtai.de/en/invest/accelerated-permit-process-1852344?

[80] Omgevingswet & Statutory Timelines: Informatiepunt Leefomgeving (IPLO) [https://iplo.nl/regelgeving/overzicht-procedures/korte-uitgebreide-voorbereidingsprocedure/]

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