

The use of BIM in FM: Legal aspects in the context of the BIM BR strategy

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Summary

The BIM BR Strategy, also known as the National Strategy for BIM Dissemination in Brazil, aims to promote an environment conducive to investment in BIM and its widespread adoption across the country. In its gradual implementation plan, the year 2028 has been set as the starting point for utilizing BIM in the management and maintenance of projects after their construction. This research seeks to provide Facility Management (FM) leaders, both in the public administration and private companies, with a comprehensive overview of the need, current status, and potential of using BIM in FM to achieve the 2028 goal of the BIM BR Strategy from the perspective of legal aspects involved.

Keywords: Sectorial policies. BIM BR Strategy. BIM. Facility Management. Internet of Things.

1 INTRODUCTION

In Brazil, over recent years, several legal measures have been enacted to foster the adoption of both Internet of Things (IoT)¹ and Building Information Modeling (BIM)². Regarding the spread of BIM, in May 2018, Decree No. 9.377 (BRAZIL, 2018a) established the BIM BR Strategy (BRAZIL, 2018b) with the purpose of fostering an environment conducive to the gradual implementation of BIM, consisting of three phases. The first phase focuses on projects, the second phase adds cost estimation and planning, and the third phase includes the use of BIM applied to the management and maintenance of projects after their construction. The objective is to encompass not only public works bidding processes but also the management of buildings and infrastructure, which will require significant institutional cultural readjustment for both the contracting party (public administration) and contractors (private sector companies), in terms of internal processes and the individuals involved (BARROS; MELO, 2020).

In this gradual implementation, the BIM BR Strategy (BRAZIL, 2018b) sets 2028 as the initial milestone for its third and final phase, which covers the use of BIM applied to the management and maintenance of projects after their construction. According to NBR ISO/TR 41013:2019 (ABNT, 2019b), it can be inferred that these management and maintenance activities are encompassed by the following facility services, relevant to the spectrum of processes in Facility Management (FM)³: management services for (i) real estate or shared space; (ii) infrastructure; (iii) equipment and systems; (iv) utilities; and (v) occupational health and safety. This final phase, as suggested by Arrotéia, Freitas, and Melhado (2021), can be related to the BIM BR Strategy (BRAZIL, 2018b).

Therefore, this study, derived from the first author's Master's thesis, aims to contribute to the dissemination of BIM in Brazil through the study of legal aspects related to its use in FM within the context of the BIM BR Strategy.

2 THE ONSET OF BIM ADOPTION IN BRAZIL

¹ Internet of Things (IoT) - infrastructure that integrates the provision of value-added services with the capabilities of physical or virtual connection of things to devices based on existing information and communication technologies and their evolutions, with interoperability (BRAZIL, 2019a).

² Building Information Modeling (BIM) - a set of integrated technologies and processes that enables the creation, utilization, and updating of digital models of a construction project in a collaborative manner, serving all stakeholders throughout its lifecycle (BRAZIL, 2018a).

³ The NBR ISO 41011:2019 (ABNT, 2019a) defines FM as "an organizational function that integrates people, property, and processes within the built environment with the aim of improving people's quality of life and the productivity of the core business."

In Brazil, by 2008, the Construction Industry Department (Deconcic) of the Federation of Industries of the State of São Paulo (Fiesp), with the support of various entities in the construction industry, first addressed BIM by presenting to the Brazilian government the publication of the document "Proposals for Industrial Policy for Civil Construction - Buildings." In this document, Deconcic initiated a prospecting effort to raise awareness about the importance of adopting BIM technology, proposing, among other things, the dissemination of BIM and management tools as a means to enhance sector productivity (FIESP, 2016).

The subsequent year, in 2009, the Brazilian Association of Technical Standards (ABNT) established a Study Committee to formulate Brazilian standards addressing the classification of construction standards and components. This culminated in the creation of the Special Study Committee CEE-134, specifically dedicated to developing a technical standard for BIM (FIESP, 2016).

In 2013, aiming to disseminate BIM, the federal government launched the Brazil Maior plan (ABDI, 2013), a strategy to support the productive sector, focusing on technological efforts for the country's development. The plan incorporated, within the strategic agenda for the construction industry, objectives such as intensifying the application of information technology to construction and implementing the construction information classification system. – BIM standards⁴.

One of the planned measures to realize these objectives involved implementing BIM technology within the construction system of the Brazilian Army (ABDI, 2013).

Moreover, there existed an initiative to adopt this methodology by some government agencies, including the National Department of Transportation Infrastructure (DNIT), the Ministry of Cities, through the Minha Casa Minha Vida program (later succeeded by the Casa Verde e Amarela program), Petrobras, the National Institute of Industrial Property (INPI), the Urban Development Company of the Port Region of Rio de Janeiro (Cedurp), and the Government of Santa Catarina. As early as 2013, the latter began crafting a "BIM Handbook," which inspired standardization in public tendering processes using this methodology (JUSTI, s.d.).

3 BRAZILIAN LEGISLATION RELATED TO BIM

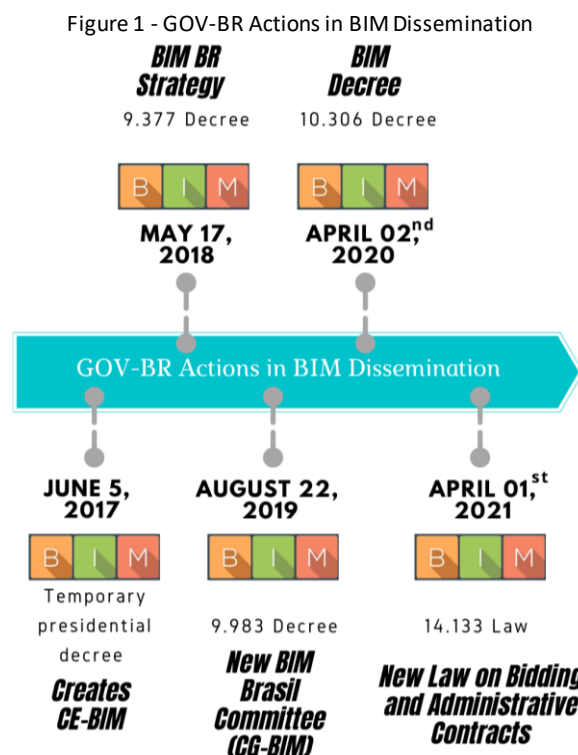
Despite the initiatives mentioned above, it wasn't until 2017 that the federal government of Brazil began publishing legislation concerning the usage of BIM. Below, in chronological order, are some laws and decrees issued to foster the dissemination of BIM in the country until the completion date of this study:

- June 5, 2017 - The temporary presidential decree (BRASIL, 2017) was published, establishing the Strategic Committee for BIM Implementation (CE-BIM), with the purpose of proposing the National Strategy for BIM Dissemination within the federal government scope;

⁴ In 2013, two of the seven planned parts of NBR 15965 - Construction Information Classification System had already been published: ABNT NBR 15965-1:2011 - Terminology and Structure (ABNT, 2011) and ABNT NBR 15965-2:2012 - Characteristics of Construction Objects (ABNT, 2012). After that, parts 3 - Construction Processes (ABNT, 2014), 7 - Construction Information (ABNT, 2015), 4 - Construction Resources (ABNT, 2021), 5 - Construction Results (ABNT, 2022), and 6 - Construction Units and Spaces (ABNT, 2022) were also published.

- May 17, 2018 - Decree No. 9.377 (BRASIL, 2018a) was published, instituting the National Strategy for BIM Dissemination in Brazil - BIM BR Strategy (BRASIL, 2018b), aiming to create a conducive environment for BIM investment and its diffusion throughout the country (revoking the temporary presidential decree of 2017);
- August 22, 2019 - Decree No. 9.983 (BRASIL, 2019b) was published, which, due to changes in the composition of the Ministries in the new government, repealed Decree No. 9.377 (BRASIL, 2018a), addressed the BIM BR Strategy (BRASIL, 2018b), and established a new BIM Strategy Management Committee (CG-BIM);
- April 2, 2020 - Decree No. 10.306 (BRASIL, 2020a), also known as the BIM Decree, was published, stipulating the use of BIM in the direct and indirect execution of engineering projects and services for specific federal public administration bodies and entities (FPA);
- April 1, 2021 - The new Law on Bidding and Administrative Contracts, Law No. 14.133 (BRASIL, 2021a), was published, establishing overarching regulations for procurement and contracting in direct, autonomous, and foundational public entities of the Union, States, Federal District, and Municipalities, replacing Law No. 8.666 (BRASIL, 1993).

Figure 1 provides a timeline summarizing the actions of the Brazilian federal government in the dissemination of BIM within the country.



Source: The authors (2021)

4 BIM BR STRATEGY

The BIM BR Strategy (BRASIL, 2018b), also known as the National Strategy for BIM Dissemination in Brazil, was initially established by Decree No. 9.377 (BRASIL, 2018a), which was later revoked and replaced by Decree No. 9.983 (BRASIL, 2019b). Its purpose is to foster an

environment conducive to investing in BIM and its widespread adoption within the country. To achieve this, it has a roadmap spanning from 2018 to 2028 for disseminating the BIM methodology, organized by purposes and actions, and comprising nine specific objectives (BRASIL, 2019b):

- I - Promote BIM and its benefits;
- II - Coordinate the structuring of the public sector for BIM adoption;
- III - Create favorable conditions for investment, both public and private, in BIM;
- IV - Stimulate capacity building in BIM;
- V - Propose normative acts that establish parameters for public procurement and contracting using BIM;
- VI - Develop specific technical standards, guides, and protocols for BIM adoption;
- VII - Develop the BIM National Platform and Library;
- VIII - Stimulate the development and application of new technologies related to BIM; and
- IX - Encourage market competition through neutral BIM interoperability standards.

The BIM BR Strategy (BRASIL, 2018b) also sets indicators and goals to guide the achievements by 2028:

- Increase companies' productivity by 10% (production per worker of companies adopting BIM);
- Reduce costs by 9.7% (production costs of companies adopting BIM);
- Increase BIM adoption tenfold (in 2018, 5% of the Construction Industry's GDP adopted BIM, and the goal is for 50% of the Construction Industry's GDP to adopt BIM);
- Increase the Construction Industry's GDP by 28.9% in 2028 compared to 2018 (with BIM adoption, it is expected to grow at a rate of 2.6% annually between 2018 and 2028, reaching an unprecedented production level).

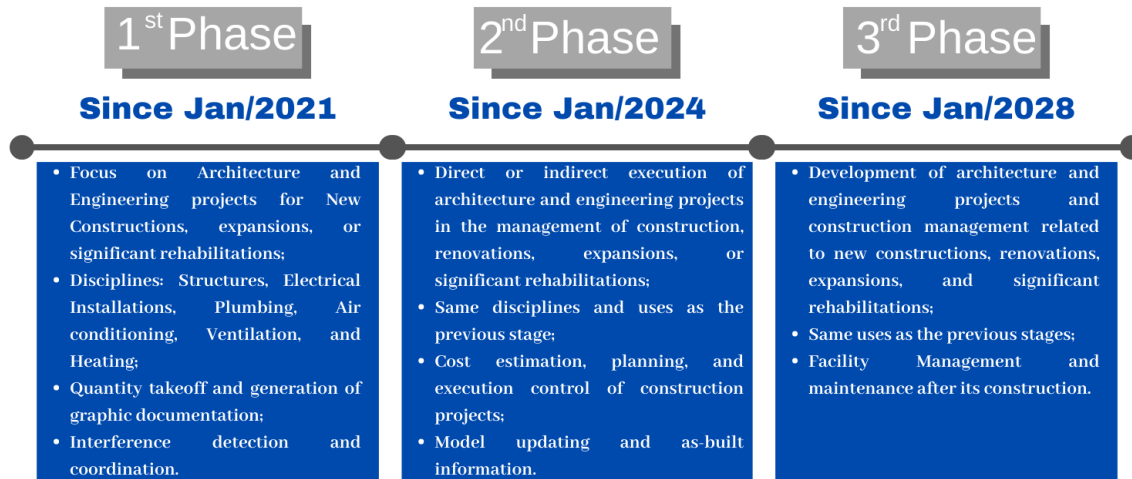
It is important to underscore objective VIII of the BIM BR Strategy (BRASIL, 2018b), which emphasizes that the BIM methodology is a digital transformation tool that aligns with other information and communication technologies for the building and infrastructure sector, including, presumably, IoT and Blockchain. This objective also aim to facilitate the integration of the BIM BR Strategy (BRASIL, 2018b) with related Government Programs, such as:

- The 2019-2022 Industry 4.0 Action Plan (BRASIL, 2019c), which considers, among other initiatives, the National IoT Plan established by Decree No. 9.854 (BRASIL, 2019a);
- Blockchain, which, as per the Brazilian Federal Court of Accounts (TCU) Report No. 1.613/2020-Plenary (BRASIL, 2020b), is considered a driver of innovation. According to this document, Blockchain holds disruptive potential for enhancing digital services in public administration, streamlining processes, combating corruption, and addressing internet scarcity, enabling a novel approach to information exchange and trust in real-world situations within the digital realm.

Moreover, the BIM BR Strategy (BRASIL, 2018b) guided the three phases of gradual implementation, as depicted in the schematic in Figure 2. The first phase, initiated in 2021, focuses on projects. The second phase, anticipated for 2024, adds cost estimation and planning

to the intended activities. The third and final phase, set for 2028, integrates the application of BIM in managing and maintaining the facility post-construction, essential aspects within facility management services.

Figure 2 – Phases of BIM Implementation in Brazil - Decree No. 10,306 (BRASIL, 2020a).



Source: Portobello Engenharia (2020) – adapted by the authors

In turn, the BIM Decree (BRASIL, 2020a) associates the actions of disseminating BIM with only two ministries⁵, mandating its application in one or more phases of the construction lifecycle, either through direct execution of architectural and engineering works and services or through indirect execution. In the latter case, the bidding documents and the contractual instrument must incorporate the obligation for the contractor to apply BIM in one or more phases of the construction cycle.

5 THE NEW LAW ON BIDDING AND ADMINISTRATIVE CONTRACTS IN THE BIM BR STRATEGY CONTEXT

The new Law on Bidding and Administrative Contracts - Law No. 14.133 (BRASIL, 2021a) has introduced a new framework for engineering and architecture works and services in the country, bringing various changes compared to its predecessor, Law No. 8,666 (BRASIL, 1993). Regarding the aim of this study, Article 19 of the new law has brought about legislative innovation and justification, albeit with a preference, for the use of the BIM methodology in these engineering and architecture works and services, whenever deemed suitable for the subject matter of the bidding, within the scope of the direct public administrations, autonomous agencies, and foundations of the Union, States, Federal District, and Municipalities, including the legislative and judicial entities of the Union, States, and Federal District, the legislative entities of the Municipalities when engaged in administrative functions, as well as special funds and other entities controlled directly or indirectly by the Public Administration (BRASIL, 2021a):

⁵ The dissemination actions of the methodology outlined in the BIM Decree were assigned to the Ministry of Defense (involving the three Armed Forces) and the Ministry of Infrastructure (involving only the National Civil Aviation Secretariat - SAC, for investments in regional airports, and the National Department of Transport Infrastructure - DNIT, for reinforcement and rehabilitation of special structures) (BRASIL, 2020a).

Art. 19. The administrative agencies with regulatory competences regarding material management, works and services, and procurement and contracts shall:

I - establish instruments that allow, preferably, the centralization of procurement and contracting procedures for goods and services;

II - create an electronic catalog for standardization of purchases, services, and works, allowing the adoption of the federal Executive's catalog by all federative entities;

III - establish a computerized system for monitoring works, including the use of image and video resources;

IV - establish, with the assistance of legal advisory and internal control bodies, models of bidding documents, terms of reference, standardized contracts, and other documents, allowing the adoption of the federal Executive's models by all federative entities;

V - promote the gradual adoption of integrated technologies and processes that enable the creation, use, and updating of digital models of works and engineering services.

§ 1. The catalog referred to in item II of this article may be used in procurements where the evaluation criterion is the lowest price or the highest discount, and it shall contain all the documentation and procedures specific to the internal phase of the procurement, as well as specifications of the respective objects, as provided for in regulations.

§ 2. The non-use of the electronic catalog for standardization referred to in item II of this article or the models of bidding documents referred to in item IV of this article shall be justified in writing and attached to the respective procurement process.

§ 3. In procurement processes for works and engineering services, whenever appropriate for the subject matter, Building Information Modeling (BIM) or similar integrated technologies and more advanced processes that may replace it shall be preferably adopted.

From the above, it can be inferred that Decrees No. 9.983 (BRASIL, 2019b) and 10.306 (BRASIL, 2020a), supported by Law No. 14.133 (BRASIL, 2021a) and in conjunction with Law No. 13.303 (BRASIL, 2016), provide the Brazilian public administration with the option to preferentially apply the BIM methodology. In accordance with the BIM BR Strategy (BRASIL, 2018b), the year 2028 marks the outset of the use of BIM applied to project management and maintenance of the construction project post-completion.

6 GOVERNMENT ACTION FOR THE DISSEMINATION OF IoT

Running parallel to the BIM BR Strategy (BRASIL, 2018b), the federal government has also been engaged in promoting the adoption of IoT technology in Brazil. The following laws and decrees have been published chronologically in this context:

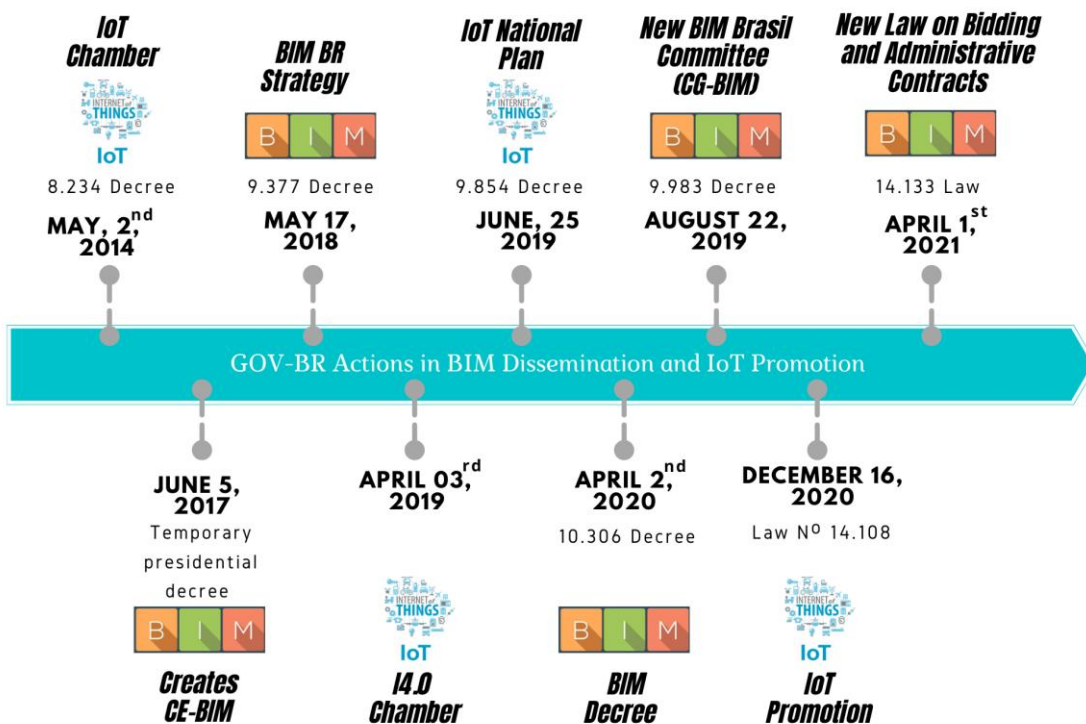
- May 2, 2014 - Decree No. 8.234 (BRASIL, 2014) was issued to regulate article 38 of Law No. 12.715, dated September 17, 2012 (BRASIL, 2012), which exempts the value of the Installation Supervision Fee and the Operation Supervision Fee for telecommunications stations that are part of machine-to-machine communication systems. Additionally, the decree established the Management and Monitoring Chamber for the Development of

Machine-to-Machine Communication Systems and Internet of Things (IoT Chamber). Decree No. 8.234, 2014, was revoked by Decree No. 9.854, 2019 (BRASIL, 2019a).

- April 3, 2019 - The Brazilian Industry 4.0 Chamber - I4.0 Chamber was officially formed. Its Action Plan 2019-2022 (BRASIL, 2019c) was introduced as a driver for the use of concepts and practices related to Industry 4.0 in the country. The plan aims to facilitate the introduction of technologies such as collaboration between IT and production sectors in Brazilian small and medium-sized enterprises.
- June 25, 2019 - Decree No. 9.854 (BRASIL, 2019a) was published, establishing the National IoT Plan and outlining the Management and Monitoring Chamber for the Development of Machine-to-Machine Communication Systems and IoT.
- December 16, 2020 - Law No. 14.108 (BRASIL, 2020c) was ratified, which completely exempts the installation supervision fees and operation supervision fees for machine-to-machine communication systems - a fundamental role for the growth of IoT technologies in the country, making it easier for companies to enter the Industry 4.0 ecosystem.

Figure 3 illustrates the timeline of government efforts in disseminating BIM and IoT technologies. This set of efforts strengthens the use of digital twins in FM due to the advantages and incentives perceived in the construction market, aligning with the 2028 goal of the BIM BR Strategy (BRASIL, 2018b) concerning the use of BIM in building operation and management.

Figure 3 - GOV-BR Actions in the Dissemination of BIM and IoT for Digital Twins



Source: The authors (2021)

7 METHODOLOGY

The chosen approach for developing this article was an integrative literature review (SOUZA; SILVA; CARVALHO, 2010), which allowed the researcher to incorporate their experience in FM management while conducting the mapping throughout the bibliographic study. During

the research, it became evident that this study is relevant for both the public administration and private companies. This is because, given the understanding of the current IoT and BIM dissemination landscape in Brazil, coupled with the 2028 target of the BIM BR Strategy (BRASIL, 2018b) geared towards the FM market, this research empowers FM managers with the knowledge of the present state of BIM usage in FM to achieve this target. This consideration encompasses the different aspects associated with relevant legislation.

8 RESULTS

From the analysis of the articles included in the literature review, it was possible to infer that, for a significant portion of the public administration, the adoption of BIM according to the BIM BR Strategy is a discretionary option for each organization.

The BIM Decree (BRASIL, 2020a) linked the application of BIM in one or more phases of the construction lifecycle to two ministries (Defense and Infrastructure), affording other entities within the Federal Public Administration the liberty to either adopt or disregard the BIM implementation measures as stipulated in the Decree. This is regardless of the purpose of BIM usage and across all its phases. In contrast, the new Law on Bidding and Administrative Contracts (BRASIL, 2021b) indicates the preferential adoption of the BIM methodology rather than enforcing its application across administrative bodies with regulatory competencies related to material management, construction, services, and tendering and contracts activities.

An analysis conducted by the Attorney General's Office (BRASIL, 2021b) indicates that the execution of the actions outlined in Article 19 of the new Law on Bidding and Administrative Contracts (BRASIL, 2021b), including models, is not a prerequisite for contracting under the new rules.

65. The discussion presented, which is now intended to be addressed, focuses on the possible need for some or all of the above acts to be elaborated in order to make their respective contracts possible. The debates usually focus on items II (standardized catalogs) and IV (document models for contracting), the latter being particularly relevant to this CNMLC [National Commission for Legal Advice and Legal Counseling], due to its institutional attributions within the AGU [Attorney General's Office]. However, the conclusion regarding one of the items tends to extend to the others, to a lesser or greater extent.

66. The point does not concern the possible obligation to use the measures provided for in Article 19, with the models being just an example. It is presumed that the act establishing each one will regulate its form of use, as is the case with Articles 29 and 35 of Normative Instruction SEGES/MP No. 5/2017. Only in the absence of such provision would any discussion be relevant, so it is premature to discuss this point specifically.

67. In any case, although Article 19 may bring governance instruments that potentially have high relevance for public contracting, it is materially a competence norm. That is to say, Article 19 is limited to giving competence to the "administration entities with regulatory competencies" to carry out the measures provided for in the provision (and, in the case of item IV, in coordinated action with the Legal Counsel and Internal Control). No legal effect can be solely inferred from this provision for the absence of such instruments - without prejudice to the fact that, in the understanding of the normative body or the contracting party itself, it may eventually be decided to wait for one or the other, using Law No. 8.666/93 in the meantime.

68. It is worth noting that, to the extent that paragraph 2 allows for the non-use of the electronic catalog and models, with justification, it opens the way to an interpretation

that allows for full contracting despite the absence of such instruments, since this circumstance may be, in itself, the justification in question. In other words, the non-use of models is justified by their non-existence, and the contracting process continues in accordance with Article 19, paragraph 2.

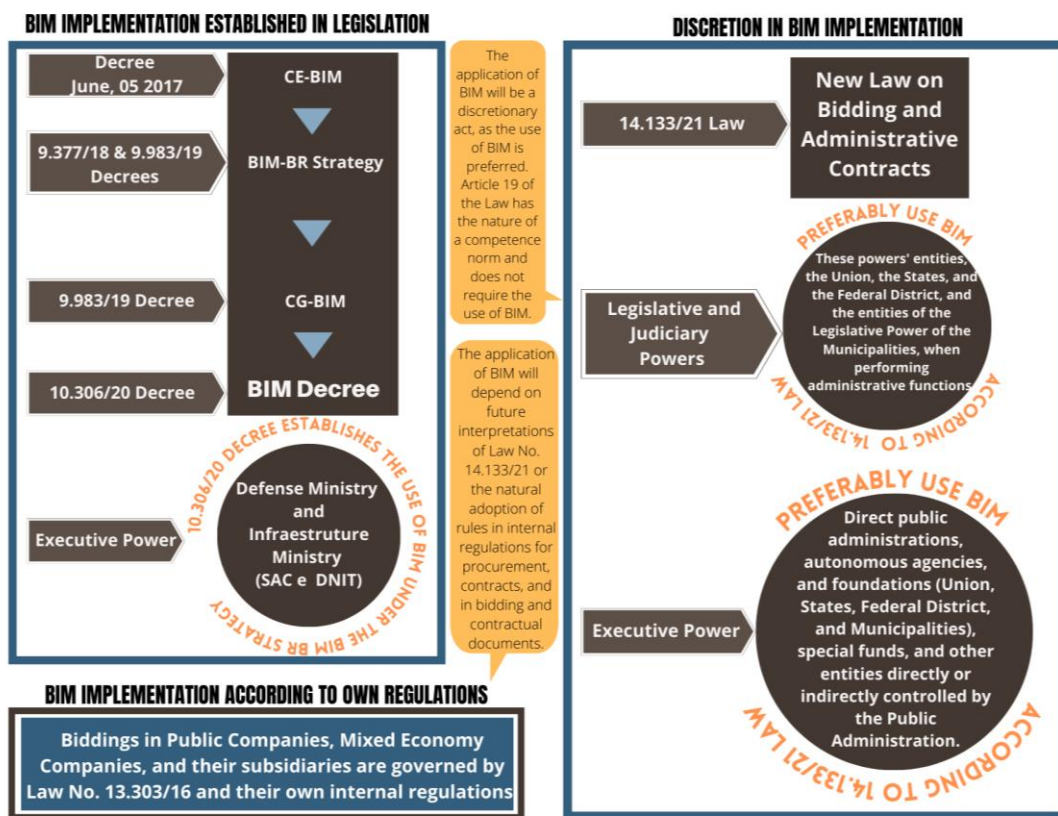
69. Therefore, the absence of any of the instruments provided for in Article 19, including document models or standardized catalogs, does not affect or hinder the realization of a contract, except for the possibility of determining that they await their elaboration, provided it is issued by a competent authority.

It can be inferred that this preferential usage, even for the direct administration covered by the Law, does not resolve the legal uncertainty stemming from the discretionary adoption of BIM by each entity of the Public Administration as experienced thus far: (i) due to the gaps in the BIM BR Strategy (BRASIL, 2018b) and the BIM Decree (BRASIL, 2020a), which confined mandatory BIM usage to certain inductive entities, rendering BIM's usage optional for the rest; and (ii) due to the new Law on Bidding and Administrative Contracts (BRASIL, 2021b), which introduced only the preferential use of BIM.

In terms of the legal guidance regarding the use of BIM as stipulated in the new Law, the exception applies to public companies, mixed economy companies, and their subsidiaries, which fall outside the scope of this Law due to their governance under Law No. 13.303 (BRASIL, 2016), commonly referred to as the Law of State-Owned Enterprises (PEREIRA JUNIOR; DOTTI, 2018). These institutions were excluded from the former due to the distinct provisions of the latter, including the obligation for each state-owned enterprise to formulate and uphold its individual internal regulations for bidding and contracts (COELHO, 2021). As a result, the legal rationale necessary for motivating the adoption of BIM in construction and engineering projects within these institutions will be contingent on varying scenarios. In a more reactive context, it may hinge from the interpretation of the Law of State-Owned Enterprises as influenced by future interpretations of the new Law on Bidding and Administrative Contracts (COELHO, 2021). Alternatively, in a proactive scenario, it may depend on the organic adoption of guidelines aligned with Law No. 13.303 (BRASIL, 2016), as outlined in their internal regulations for bidding and contracts, as well as their procurement and contractual documentation.

The scheme in Figure 4 summarizes these variances within the Brazilian Public Administration concerning the application of legislation for BIM implementation in construction and engineering procurement.

Figure 4 – Scheme illustrating legislation and BIM usage in Brazilian Public Administration



Source: The authors (2021)

9 DISCUSSION

The BIM Decree (BRAZIL, 2020a), in conjunction with Decree No. 9.983 (BRAZIL, 2019b), establishes a set of principles for the implementation and dissemination of BIM at the federal level. This framework also serves as a model for state and municipal decrees aiming at adopting the BIM methodology. Given that the Public Administration (including the Union, states, and municipalities) is the largest entity engaging in contracts for engineering works and services in the country, the delineation of BIM implementation phases in Decree No. 10.306 (BRAZIL, 2020a) and the new Law on Bids and Administrative Contracts (BRAZIL, 2021a), holds the potential to wield significant influence by harnessing the State's procurement power. This impact is reflected in the necessity for workforce adaptation and the cultivation of a construction industry culture, thereby fostering the proliferation of BIM across both the public and private sectors. The latter sector, with its interest in providing services to the former, becomes inherently intertwined with this dissemination effort.

However, concerning the public sector, the discretion to adopt the BIM methodology, as outlined by the mere preference stated in the new Law on Bids and Administrative Contracts (BRAZIL, 2021a), coupled with the absence of mandatory BIM usage mandated by the BIM Decree (BRAZIL, 2020a), could potentially lead more conservative public managers to delay the prompt adoption of the BIM methodology. This delay may occur as the rationale for costs and implementation efforts is specific to each agency and lacks a legal obligation. The Decree did not

stipulate the obligatory integration for other federal public agencies until phase three of the BIM BR Strategy, scheduled for 2028. Given that Law No. 14.133 (BRAZIL, 2021a) emphasizes the preferential nature of BIM usage, implying that these agencies can implement the methodology at their own discretion in terms of timing and appropriate BIM applications, there could be a technical imbalance among agencies within the Federal Public Administration (FPA).

Furthermore, restricting the use of BIM solely to the management and maintenance of projects and constructions that were initially designed or executed with BIM could potentially hinder the wider adoption of BIM for managing and maintaining existing buildings that were not originally developed using the BIM methodology. This includes a significant portion of the Public Administration costs. Consequently, the potential benefits of BIM in terms of lowering operational and maintenance expenses throughout this phase (which constitutes the longest period in a building's lifecycle) could be reduced.

Another noteworthy aspect is that the new Law on Bids and Contracts (BRAZIL, 2021a) establishes a two-year transition period between its publication in April 2021 and the repeal of its predecessor, Law No. 8.666 (BRAZIL, 1993). This condition allows the manager the option to choose between Laws No. 8.666 (BRAZIL, 1993) and No. 14.133 (BRAZIL, 2021a) during this transitional period, with the combination of provisions from both laws being prohibited (SÃO PAULO, 2021; SEPLAG, 2021). Due to this discretion, the guidelines issued by the competent authorities are still conflicting. In São Paulo (2021), the recommendation is for the immediate adoption of the rules of the new Law on Bids and Administrative Contracts. In Minas Gerais (SEPLAG, 2021), the recommendation to public managers is to refrain from conducting tenders according to Law No. 14.133 (BRAZIL, 2021a), considering the need for legal maturation of the legislation, regulation of various points, and training of public agents. With the prohibition of combining provisions from both laws, the authorities and entities at the state and municipal levels will need to assess the convenience and timing of immediately adopting the rules of Law No. 14.133 (BRAZIL, 2021a). This assessment can also have implications for the BIM BR Strategy.

The discretion granted by the legislation requires institutions and interested managers to conduct a comprehensive assessment of the impact on the business prior to its implementation. Therefore, the FM manager would play a crucial role in advocating for and deciding on the implementation of BIM. It's important to consider that the benefits of BIM usage in FM become evident during the O&M phase, which constitutes the longest period in the asset's lifecycle. However, the success of this manager relies on senior management providing resources and policies that promote the perspective that improved FM management significantly impacts productivity and the growth of businesses within which the facility operates.

10 CONCLUSION

The BIM BR Strategy includes, among its objectives, the application of new technologies related to BIM and advocates, in its third and final phase (2028 goal), for the use of BIM in the management and maintenance of the facility after its construction, activities that are inherent to the facility services integrated into FM. However, even though the legislation includes legal provisions for the dissemination of BIM and IoT, and analyses corroborate the efficiency of Blockchain in data storage and security, these provisions do not include explicit legal directives for the application of BIM, which is a fundamental and necessary part of implementing the

mentioned technologies within the entities of the Public Administration. Since the BIM Decree (BRAZIL, 2020a) restricts the mandatory use of BIM to a few agencies, other institutions that wish to apply the available laws and the methodology will face the challenge of defining, classifying, and justifying the use of BIM in a discretionary manner, regardless of the intended use or phase (pre-operational or not). While contained within the principle of legality, which requires that agents of the Public Administration act in accordance with the law, such discretion may hinder the dissemination of BIM in the public sector.

This study sought to contribute scientific knowledge about the dissemination of BIM in Brazil through the study of technological and legal aspects of its uses related to FM, within the context of the BIM BR Strategy.

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