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Miguel Bruno Alves Chaves

Luciana Rodrigues Rocha

Carlos de Salles Soares Neto

Li-Chang Shuen Sousa

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University Television in Brazil: Typology, Operational Challenges, and Prospects for TV 3.0

Miguel Bruno Alves Chaves (UFMA), Luciana Rodrigues Rocha (UFMA), Carlos de Salles Soares Neto (UFMA), Li-Chang Shuen Sousa (UFMA)

Abstract— This article examines the current operational and technological conditions of Brazilian university television stations (UTVs) in the context of the transition to the Application-Oriented TV model proposed by the TV 3.0 Project. Based on data from the Brazilian Association of University TVs (ABTU), the study presents a typology of distribution models and editorial profiles, highlighting the structural heterogeneity of the sector. In addition, a case study of three university broadcasters in São Luís, Maranhão, was conducted through questionnaires and content analysis. The results reveal critical gaps in infrastructure, human resources, and institutional articulation that hinder the adoption of core components of TV 3.0, such as interactive applications, broadband-backend integration, and content cataloging. Beyond diagnosis, the article introduces a strategic proposal grounded in a master's research project, outlining three non-exclusive scenarios for integrating UTVs into the connected television ecosystem. Centered on the Eduplay platform, these scenarios address varying levels of technical and structural readiness across stations.

Index Terms— University Television Stations, Application-oriented TV, TV 3.0, Public Communication

I. INTRODUCTION

The introduction of the Brazilian Digital Terrestrial Television System (SBTVD) in 2007 marked a significant milestone in the evolution of the national broadcasting ecosystem. Designed with technologies tailored to the Brazilian context, the system adopted the Ginga middleware as the cornerstone of its interactivity framework, thereby ensuring technological autonomy and alignment with the principles of inclusion, accessibility, and innovation [11], [12]. The standardization of Ginga under ABNT NBR 15606, followed by its formal recognition in ITU-T Recommendation H.761 and ITU-R Recommendation BT.2075-1 [7], [6], established Brazil as an international reference in the development of integrated broadcast-broadband television systems.¹

In the years following its deployment, the SBTVD faced the challenge of adapting to a rapidly evolving media landscape. The widespread adoption of internet-connected television sets, the growth of streaming services, and shifting media consumption habits heightened the demand for more immersive, personalized, and on-demand viewing experiences. This new context prompted the launch of the TV 3.0 Project, coordinated by the SBTVD Forum with the support of the Ministry of Communications, the National Education and Research Network (RNP), and several universities [4]. In its third phase, the project culminated in the proposal of a new architecture and, more importantly, a redefined concept for over-the-air digital television in Brazil. The brand name DTV+ was adopted to designate the next generation of the SBTVD.

¹ The regulatory framework of the SBTVD can be found in Portuguese at: <https://forumsbtvd.org.br/legislacao-e-normas-tecnicas/normas-tecnicas-da-tv-digital/portugues/> and in English at: <https://forumsbtvd.org.br/legislacao-e-normas-tecnicas/normas-tecnicas-da-tv-digital/english/>

The DTV+ initiative introduces both a structural and conceptual evolution in the broadcasting model, shifting the paradigm from linear channels to an application-oriented logic. The new architecture redefines the free-to-air television experience as a software-mediated journey, in which live and on-demand content are seamlessly integrated through a platform capable of managing user profiles, devices, and interaction modes. DTV+ is, therefore, an Application-Oriented Platform (AoP). Access to content takes place through applications presented in a curated catalog, exclusively dedicated to free-to-air television.

This new model presents both challenges and opportunities for public and university broadcasters. On the one hand, its software-based architecture creates opportunities for greater visibility and integration within a convergent digital ecosystem. On the other hand, it requires technical, operational, and editorial adjustments that must not be underestimated. The development of applications, the provision of on-demand catalogs, the management of viewer profiles, and compliance with the APIs defined by the ABNT NBR 25600:2025 standard series entail a transitional learning curve that demands capacity building, investment, and institutional coordination.

This article examines the operational models and editorial profiles of Brazilian university broadcasters, based on data collected within the scope of the Brazilian Association of University Television Stations (ABTU). It first aims to provide an overview of the current transmission methods and content typologies in use. Building on this typology, the study analyzes the case of three UTVs in the state of Maranhão to assess their technological readiness for the transition to TV 3.0. The analysis is grounded in the premise that, beyond physical infrastructure limitations, a structural gap persists in the coordination among the technical, administrative, and content production sectors. This lack of integration may hinder their incorporation into the new application-oriented television model. In response to this diagnosis, the study also advances a second objective: to propose an intervention centered on the Eduplay platform, aimed at enabling the gradual and inclusive integration of university broadcasters into the DTV+ ecosystem.

The structure of the work begins with an overview of the technical foundations of TV 3.0 and its implications for small-scale broadcasters, with emphasis on operational requirements, application coding standards, and the new architectural paradigm. It then presents the methodology, which is based on the application of questionnaires, typological categorization, and case study analysis. The following section discusses the results, drawing on the examination of operational and editorial profiles of the broadcasters under study, focusing on three university institutions in the state of Maranhão. Finally, this study also puts forward an Eduplay-based proposal for the integration

of university stations into the connected television environment.

II. MATERIALS E METHODS

This study presents a typology of the operational and distribution models adopted by the 190 UTVs registered in the database of the Brazilian Association of University Television Stations (ABTU) [13], as well as a classification of the types of content disseminated by the 29 broadcasters operating with a free-to-air signal. The methodology comprised four complementary stages, carried out in the following order: documentary analysis, content analysis of the subset of broadcasters transmitting over-the-air (OTA), administration of questionnaires, and unstructured interviews.

The first stage of the research consisted of a documentary analysis of data cataloged and made available on the ABTU² website. In this phase, variables were identified such as the operational model of the university television stations (broadcast, web TV, cable, internal circuit, and their combinations), geographical coverage, and institutional affiliation. This stage provided the basis for composing a national overview and for selecting the subset of stations operating with an OTA signal, which were then subjected to a more detailed analysis of the content they broadcast.

Next, once the university television stations operating via broadcast had been identified, an active search for their content was conducted through digital channels such as YouTube. The search and cataloging of content through these channels are justified by the fact that the stations' signals are limited to the cities where they are located, and it was not possible to mobilize local researchers to assist with this task. These data supported the construction of the typology of distributed content, considering parameters such as periodicity, editorial nature, and target audience.

Based on the ABTU database, two data collection instruments were distributed, designed specifically to gather information on both the institutional and technical profiles of the UTVs. The instruments were as follows:

- General questionnaire (Q1). Addressed to all UTVs, covering institutional aspects, staffing models, participation in networks such as the National Public Communication Network (RNP), presence on the Eduplay platform of the National Education and Research Network (RNP), and the types of content produced and distributed.

- Technical Questionnaire (Q2). To be completed only by UTVs operating via broadcast, focusing on the characterization of transmission, studio, and network infrastructure; interactive resources; content management systems; and production practices.

By the time this article was prepared and submitted, only four broadcasters had responded to the questionnaires, three of which were in São Luís. This circumstance required redirecting the research toward a case study involving three respondents: TV UFMA, TV IFMA, and TV UEMA.

After tabulating and analyzing the data collected through the questionnaires, unstructured interviews were conducted with the directors of the three stations. The purpose was

to contextualize the responses provided and to explore perceptions regarding barriers and opportunities associated with TV 3.0.

The data analysis followed a descriptive qualitative and quantitative approach, combining institutional and technical information to identify patterns, gaps, and levels of maturity in relation to the challenges posed by the evolution of Brazilian digital television.

III. TECHNICAL FOUNDATIONS OF TV 3.0 AND IMPLICATIONS FOR BROADCASTERS

TV 3.0, as proposed by the SBTVD Forum, is defined as a convergent platform that combines traditional broadcasting (over-the-air, OTA) with internet-based content distribution (over-the-top, OTT). Unlike previous generations, whose structure was based on linear transmission and geographical segmentation by frequency channel, the new architecture is guided by a model of interactive broadcasting services accessible via applications [4].

This platform integrates a set of software components that include an application catalog, data collection and processing systems, personalization mechanisms, audience measurement tools, privacy controls, and support for multiple devices. The Application Coding Layer, standardized as ABNT NBR 25608:2025, organizes these resources to enable continuous and personalized experiences, placing applications at the center of the viewer's journey. The architecture, reproduced in Figure 1 below, is presented in detail in [11].

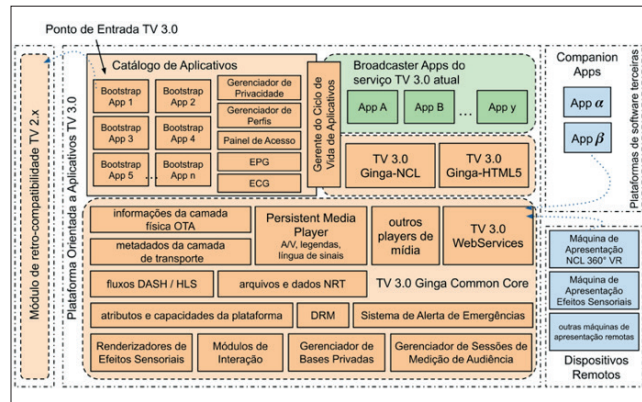


Figure 1: General system architecture

In TV 3.0, the application layer plays the role of orchestrating the execution of interactive services, bringing together linear and on-demand content in an application-centered environment. Its main components include:

- *Application Catalog*: an interface that aggregates and organizes access to interactive services, functioning as a single-entry point to broadcasting services (illustrated in Figure 2, which exemplifies how applications can be arranged in the DTV+ environment).
- *Persistent Media Player*: maintains continuous media playback even when switching between applications.
- *TV 3.0 WebServices*: a set of interfaces that enable

² <https://abtu.org.br/>

the integration of television with external devices and complementary systems.



Figure 2: Example of Catalog Application

Content production and distribution in TV 3.0 require the adoption of a set of technologies that go beyond the traditional domain of broadcasting. To deliver content and applications within the DTV+ environment, broadcasters will need to maintain a robust IP-based backend capable of hosting application repositories, media files, manifests, and metadata formatted according to regulatory requirements. These repositories must be continuously updated and accessible through servers compatible with HTTP protocols, ensuring interoperability with receivers from different manufacturers [11].

In the Application-Oriented Platform, the Bootstrap App serves as the entry point for the viewer’s media consumption journey. Traditional channels are now presented on the screen as standardized applications. Viewers can identify broadcasters through their icons, and channel numbers are no longer used.

For a television set to correctly recognize and instantiate Bootstrap Apps, there is an essential element that broadcasters must transmit: the Bootstrap Application Manifest (BAM). The BAM is an XML file that defines the initialization instructions for an application. It encapsulates information such as service identifiers, version, visual descriptors, initial URLs, and parameters for audience measurement. Its creation, updating, and correct signaling are the responsibility of the broadcaster, which must ensure consistency with the hosted application and compatibility with receivers.

Proper management of the BAM is a *sine qua non* condition for television sets to be able to identify and execute the initial applications associated with each broadcast service. With the BAM correctly signaled, the receiver should be capable of running an initial application such as the one shown in Figure 3 below:



Figure 3: Example of a Bootstrap Application

Broadcaster Applications, in turn, are secondary applications signaled by broadcasters, capable of expanding the basic functionalities offered by the Bootstrap Application. By enabling advanced interactive experiences, these applications represent a strategic opportunity for university broadcasters. Possible experiences include content personalization, integration with social networks, recommendations, targeted content and campaigns, and access to on-demand catalogs.

Given their experimental nature and their vocation for producing educational, cultural, and scientific content, university television stations can employ Broadcaster Applications to explore innovative formats for audience engagement, enabling tailored experiences for academic and regional communities. Moreover, the flexibility of the supported languages (NCL 4.0, NCLua, and HTML5) fosters collaborative development with research groups and technology programs, transforming each station into a living laboratory for the production and testing of interactive applications. Figure 4 shows an example of and Broadcaster Application.

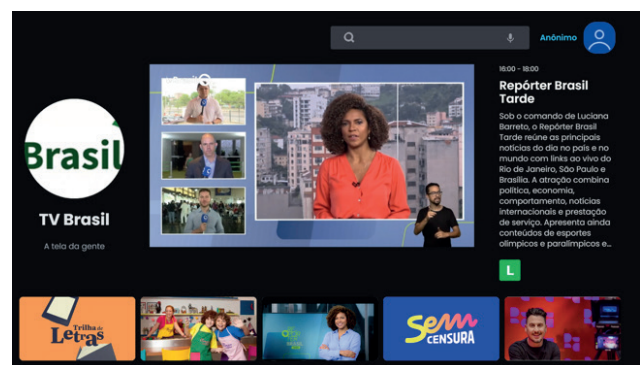


Figure 4: Example of Broadcaster Application

Another component, Persistent Media Player (PMP), is processed within the receiver but depends on resources provided by the broadcaster for its full operation. These resources include stable media streams, control metadata, and integration with web services, including session management, experience personalization, audience profiling, and the implementation of privacy policies.

Compliance with the Electronic Program Guide (EPG) and the Electronic Content Guide (ECG) requires broadcasters to maintain organized databases containing information on linear programming and on-demand archives. As further detailed in [11], these data must be made available

through standardized tables, enabling functionalities such as search, filtering, detailed descriptions, and access to past and future content when authorized for OTT distribution. Figure 5 provides a representation of the EPG.

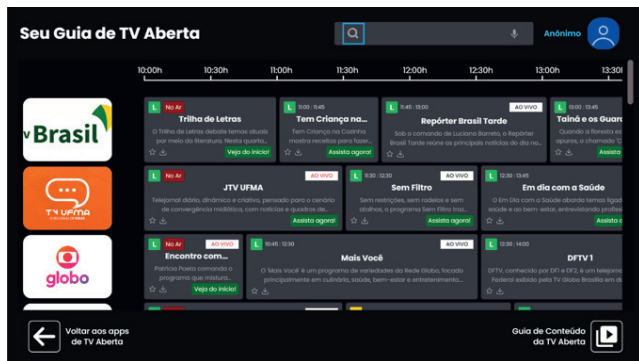


Figure 5: Example of EPG

The delivery of interactive and audiovisual content, in turn, requires infrastructure compatible with content delivery networks and adaptive streaming protocols, in order to ensure quality and continuity in the provision of services.

The lifecycle of an application in TV 3.0 includes activities such as versioning, compliance testing, automated validation, and update management. To support these stages, broadcasters must maintain development environments integrated with continuous publishing workflows, ensuring that applications remain in both technical and operational compliance. These requirements go beyond the traditional logic of linear production and substantially broaden the scope of the technical competencies needed to operate within the new model.

University and public broadcasters, which typically operate with limited budgets and outdated technical infrastructure, may face significant barriers in adapting to the new TV 3.0 ecosystem. The requirement for an IP-based backend, the use of declarative and procedurally complex languages, and the need to develop multiplatform applications present a steep learning curve for teams that have historically worked exclusively with linear production and without integration between content production and software development. The lack of accessible authoring tools for non-programmers further exacerbates this gap.

Moreover, many of these broadcasters lack institutional policies that promote integration among the technical, editorial, and administrative sectors. This hinders the implementation of convergent strategies and the development of sustainable solutions for interactive content production. The asymmetry between commercial broadcasters and university broadcasters may deepen if specific programs are not implemented to provide technical and operational support, training specialized personnel, and encourage experimental production aimed at the new application-oriented model.

IV. RESULTS AND DISCUSSION

4.1 Operational Typology of University Television Stations

The map prepared by ABTU records the different

distribution methods adopted by UTVs: free-to-air television, subscription television (cable), the web, and social networks, as well as various combinations of these platforms. These distribution models or configurations directly influence the types of challenges faced by each UTV, particularly in relation to their stage of editorial and technological maturity.

The data systematized by the association reveal a predominance of the exclusively online model. Known as WebUTVs, this model is adopted by 115 stations that operate through web platforms and social networks, without any presence in free-to-air broadcasting, subscription television, or internal circuits. This configuration highlights the consolidation of the internet as the primary operating medium for university television stations, particularly in institutions facing technical and budgetary constraints. It is worth noting that all 190 UTVs listed by ABTU maintain a presence on YouTube.

Of the 190 UTVs, only 29 broadcast over-the-air, and twenty of these are also available on cable. The cable distribution model includes 46 stations (66 when counting the 20 UTVs that simultaneously transmit via over-the-air broadcast). Although not indicated on the ABTU map, four university stations stream content through Eduplay: two of them are available both on the RNP service and on cable; one is available on free-to-air television and Eduplay; and one is present on free-to-air television, cable, and Eduplay. This last case refers to TV UFMA, the only station operating a complete content distribution model, integrating multiple delivery channels (free-to-air, cable, web and social networks, and Eduplay). Finally, the model based on an internal circuit combined with the web is observed in only five stations, indicating more restricted uses targeted at the internal audiences of the institutions.

4.2 Editorial Typology of Over-the-Air Stations

UTVs operating with an over-the-air signal display considerable heterogeneity in their institutional and editorial profiles, which presents an additional challenge for planning public broadcasting policies within the context of the SBTVD's evolution. One way to measure this heterogeneity is by examining the nature of the content broadcast. In this study, a typology based on [3], [4], [5], [10], [13], [15] was adopted.

The analysis of program content broadcast by the 29 university television stations operating over-the-air enabled the construction of a preliminary typology consisting of three editorial categories: generalist TVs, educational TVs, and institutional TVs. These categories emerged from the direct observation of the channels maintained by the stations on digital platforms, given the impossibility of tuning in to them outside their respective cities of origin, and they reflect distinct communicational approaches and varying levels of complexity in programming schedule organization.

Generalist TVs are those that offer a diversified schedule, covering multiple interests and formats. Their programming includes newscasts, talk shows, cultural features, content on health, music, cinema, among others. Although affiliated with higher education institutions, these stations show greater similarity to the commercial TV model by

structuring their schedules with regularity, periodicity, and strategic planning of broadcast times. Of the total analyzed, 13 stations fall into this category.

Educational TVs, in turn, are primarily dedicated to disseminating instructional and training content, such as televised classes, courses, lectures, and recordings of academic events. These stations operate as audiovisual platforms that extend the educational process, aimed at disseminating knowledge. Unlike generalist stations, they do not maintain a fixed schedule, and their audiovisual production is driven more by institutional demands than by a continuous programming logic. Six stations were classified in this group.

Institutional TVs function primarily as the communication sector of their respective universities, focusing on covering internal activities, publicizing initiatives from the rector's office, promoting institutional events, and placing content in external media outlets. Their production is closely tied to administrative agendas and directed by the university's communications office, rather than by a predefined schedule or consistent set of formats. As with the educational category, this editorial profile was observed in six stations.

It is worth noting that, even within this initial typology, significant conceptual gaps were identified. In some cases, the stations themselves use ambiguous self-descriptions on their digital channels, adopting labels such as "university," "educational," or "public" without clear criteria for differentiation. Four stations had no recent programming or active channels, making their classification unfeasible.

This scenario underscores a critical challenge: the lack of a well-defined editorial identity limits the ability of stations to position themselves strategically within the TV 3.0 ecosystem. Transitioning to an application-oriented model requires their integration into collective content platforms, such as VoD catalogs and institutional applications. However, the absence of clear editorial profiles undermines the interoperability of their productions, hinders the creation of synergies, and complicates the development of public policies aimed at ensuring the sector's sustainability.

4.3 Case Study: University Television Stations in Maranhão

In São Luís, three university television stations operate with distinct operational profiles: TV UFMA, affiliated with the Federal University of Maranhão; TV IFMA, run by the Federal Institute of Maranhão; and TV UEMA, operated by the State University of Maranhão. The first two broadcast over-the-air using a digital ISDB-Tb signal, while the third functions exclusively as a WebTV, distributing content through digital platforms such as YouTube and Instagram.

TV IFMA launched its digital over-the-air broadcasts on channel 2.3 on April 2, 2021, following a cooperation agreement between IFMA and the Brazilian Communications Company (EBC). The institute had taken over management of the station a year earlier, inheriting the facilities once used by TV Brasil in Maranhão, which itself had succeeded the former TVE Maranhão. The premises are shared with the Distance Education Center, IFMA Digital, and Radio IFMA, forming a multimedia hub that supports

both audiovisual production and academic activities.

TV IFMA's digital presence extends to YouTube, where its content is dominated by live streams of scientific and institutional events, promotion of research and courses, information on admissions processes, news, and other institutional activities. Taken together, these materials position the station closer to a communications office and a distance learning platform, rather than to a traditional television model with a regular, genre-based linear schedule.

TV UFMA began experimental broadcasts on August 5, 2015, on digital channel 54.1 and was officially launched two months later, on October 7. Today, it is carried on digital channel 16.1 over-the-air, on cable, and on Eduplay, where it offers both live streams and playlists of previously aired material. It also maintains a YouTube channel that hosts its programming, though without live transmission. By maintaining a presence on four distinct distribution platforms, it has become the most diversified university television outlet in terms of transmission media in Maranhão's capital.

Its programming schedule features a variety of formats, including journalistic, cultural, educational, and entertainment productions. While it provides occasional coverage of UFMA events, the station does not limit itself to serving as an institutional communications outlet, nor does it function primarily as a channel for classes or academic events. It operates as a fully structured university television station with a diverse, regular schedule and produces eight hours of original content each day.

TV UEMA is part of the UEMA Channel and does not maintain its own YouTube channel or presence on other distribution platforms. Its activity is limited to the university's video platform, where posting frequency is low.

The UEMA Channel functions primarily as an institutional communication outlet, documenting and publicizing academic events, interviews with faculty and students, information on the university's entrance examinations, and coverage of routine pedagogical activities. As such, TV UEMA does not operate as a television station in the strict sense. Rather, it serves as a digital space dedicated to publishing content related to the university and its academic community.

As outlined in the methodology, two questionnaires were sent to the stations listed in the ABTU database. With only four responses received, the decision was made to focus on the Maranhão stations and adapt the study to a case study format. The general questionnaire, designed to gather institutional and editorial information, was completed by all three stations. The technical questionnaire was answered only by TV UFMA and TV IFMA, the two stations that operate via broadcast.

Responses to the general questionnaire reveal a range of institutional barriers that limit the capacity for planning, production, and technological upgrading in response to the demands of TV 3.0.

All three UTVs analyzed are affiliated with public higher education institutions but operate with varying degrees of administrative autonomy. TV UFMA is managed under the

university's Communications Superintendency. TV IFMA reports to the Communications Department at the central campus³; TV UEMA falls under the Office of the Rector's Communications Advisory Unit. None of them operate within an independent technical or operational framework, which hinders resource allocation, the development of their own strategic plans, and the institutionalization of policies for technological transition.

In terms of staffing, all three reports point to fragile arrangements. TV IFMA has only one permanent employee, occasionally supported by scholarship students. TV UFMA works with a small technical team made up of outsourced staff and interns from the Social Communication undergraduate program. TV UEMA's team is entirely composed of staff from the university's communications office, none of them are public servants, who handle both institutional and operational duties. There are no public calls or competitive exams specifically for television professionals, which prevents the formation of stable teams.

Regarding content production, all three stations reported creating their own material, particularly in journalism, as well as educational, cultural, and institutional programming. Both TV UFMA and TV IFMA are part of the National Public Communication Network (RNCP). The federal university's station is also on the Eduplay platform, operating across multiple channels, including both broadcast and streaming. TV IFMA broadcasts exclusively over the air and has no presence on Eduplay. TV UEMA operates solely as a WebTV with a YouTube channel and explained that its absence from Eduplay is due to its small structure and the lack of a dedicated technical team.

Finally, when asked about the main challenges in transitioning to TV 3.0, all three stations pointed to the same issues: lack of infrastructure, budget constraints, absence of clear institutional policies, and staff having to juggle multiple roles.

The lack of references to internal policies, institutional goals, or projects aimed at adopting the technologies envisioned for TV 3.0 suggests that technological innovation has not yet been systematically integrated into the higher education institutions these stations belong to. This gap directly affects the stations' technical decisions, as shown in the responses to the technical questionnaire completed by those operating via broadcast. The following analysis reveals a scenario of technological stagnation, with infrastructure still anchored in the TV 2.0 model and no clear signs of transitioning to technologies compatible with the next generation of Brazilian digital television.

Transmission Infrastructure and Internal Network

TV UFMA and TV IFMA operate exclusively under the ISDB-Tb standard (TV 2.0) and have not implemented any of the features outlined in the DTV Play (TV 2.5) specification, such as the application layer or basic interactivity mechanisms.

TV IFMA reported operating with a 3 kW transmitter, while TV UFMA indicated a transmission power of 2.5 kW. No additional technical details were provided about their transmission facilities. Both stations have an

³ IFMA has 29 campi across the state.

estimated coverage radius of about 60 km, with signal distribution exclusively in digital format. TV IFMA operates in a multiprogramming setup: as part of the EBC network, it broadcasts TV Brasil, Canal Saúde, and its own programming.

Regarding network infrastructure, neither station has an IP backbone with bandwidth ≥ 10 Gbps, nor have they implemented IP-based production architecture in accordance with the SMPTE ST 2110 standard or 6G-SDI interfaces. Both reported not having internal networks capable of handling high-capacity media streams, which prevents convergence between production, automation, and distribution environments.

The stations also reported not having video switchers compatible with 4K production and editing. Combined with the lack of networks and Media Asset Management (MAM) systems, this limits their ability to create scalable and integrated production pipelines.

Production Equipment and Management Systems

The data analysis shows that both TV UFMA and TV IFMA face significant limitations in their production infrastructure and audiovisual archive management. As noted in the previous section, neither station has a MAM system, which undermines file organization, the automation of ingest and publishing workflows, and the reuse of content across different platforms.

Regarding Ultra High Definition (4K) production capabilities, TV IFMA reported having at least one camera capable of capturing in 4K. However, the station lacks a compatible switcher, which prevents maintaining a full 4K production workflow. TV UFMA, in contrast, stated that it has no cameras, switchers, or encoders supporting 4K and currently operates exclusively in HD.

A complete production chain from capture to editing and distribution that meets the technical requirements of TV 3.0 is not yet in place. Combined with the absence of media asset management systems, this gap limits the stations' ability to produce audiovisual content in formats compatible with an application-oriented platform. It also reduces their potential to integrate with VoD catalogs and other interactive services planned for the next generation of the SBTVD.

Dynamic Content Insertion

Both broadcast stations reported having SCTE-35 markers for dynamic content insertion, but with different scopes of application. TV UFMA indicated the presence of SCTE-35 markers for both streaming platforms and over-the-air transmission. TV IFMA, in contrast, reported using SCTE-35 markers only for over-the-air broadcasting. Neither station has established compliance testing routines, dynamic regional content targeting, or integration with personalization mechanisms.

V. DIAGNOSIS AND CHALLENGES FOR ENTRY INTO TV 3.0

The evidence collected indicates that the main obstacles

to the adoption of TV 3.0 by university television stations stem less from technical or editorial resistance and more from the absence of institutional planning by the universities and institutes to which they are linked. The broadcasters' accounts revealed no internal policies, formal guidelines, or defined goals for technological transition, suggesting that the TV 3.0 agenda has not yet been incorporated into the strategic outlook of these higher education institutions.

This gap hinders progress in overcoming interdependent challenges across four main dimensions:

- *Infrastructure Barriers.* The stations operate with studios and production systems designed for TV 2.0, lacking integration between recording, automation, and distribution environments. There is no internal IP architecture, and no modernization plans for networks compatible with SMPTE ST 2110. The absence of multi-format encoding, Media Asset Management systems, and application servers prevents full adoption of the interactivity layer envisioned for TV 3.0.
- *Shortage of specialized human resources.* Teams are small and combine responsibilities in production, operations, and institutional management. There are no hiring processes or calls specifically aimed at technical roles such as broadcast engineers, software developers, or specialists in multimodal audiovisual production. This lack of targeted recruitment limits the development of essential expertise needed to experiment with the features planned for the next generation of the SBTVD.
- *Weak coordination between technical, editorial, and administrative sectors.* The governance of the stations remains embedded within broader administrative structures, such as university communications offices or institutional departments, which makes it difficult to implement integrated strategic decision-making. The lack of alignment between technology, content, and planning teams limits their ability to design and execute foundational projects for the next phase of digital television.
- *Lack of public policies and technical-operational support programs.* Although progress is being made in defining the regulatory framework for TV 3.0 within the SBTVD Forum, there are no specific calls for proposals, funding lines, or federal programs aimed at the technical modernization of university broadcasters. If the gap between regulatory policy and the operational conditions of these broadcasters persists, it may hinder the democratization of access to the new generation of free-to-air television.

VI. SCENARIOS FOR EDUPLAY-BASED INTEGRATION

The analysis of the case studies reveals a clear technological asymmetry between university broadcasters and the technical demands posed by the DTV+ environment. To bridge this gap, a roadmap was structured into three implementation scenarios, which may coexist or be pursued progressively by using Eduplay, the national multimedia platform developed and maintained by the Brazilian National

Education and Research Network, which was designed to host and disseminate educational and institutional audiovisual content produced by public universities and research institutions. By offering a centralized infrastructure with high availability, Eduplay enables higher education institutions to distribute programming aligned with public communication goals. Although still underused by most UTVs, the platform is considered a strategic asset for broadening the visibility and accessibility of university television content in the digital environment.

Scenario 1: Eduplay as a standalone smart TV application. In this configuration, Eduplay is implemented as a native application for smart TVs, independent of the DTV+ environment. Similar to major streaming platforms, it would be distributed via app stores and compatible with the connected television interfaces of manufacturers. University broadcasters would benefit from increased visibility and discoverability through a shared platform that aggregates educational and institutional content. This scenario does not depend on over-the-air infrastructure and is suitable for UTVs currently limited to web-based operations.

Scenario 2: Eduplay integrated into DTV+ via the Public Communication and Services Platform. Based on Decree No. 12,595 of August 27, 2025, the Common Platform for Public Communication and Digital Government constitutes an institutional layer of applications for public services and socially relevant utilities within the DTV+ environment. In this scenario, Eduplay would be included as a public application within this platform. The RNP would maintain the technical infrastructure, while universities would be responsible for curating and uploading content.

Viewers would access Eduplay directly through the Common Platform, via the DTV+ catalog, without relying on Smart TV app stores. Within this architecture, Eduplay would be classified as a public-interest application, alongside other government or civic services. The strategy reinforces public service media and fosters national informational Sovereignty.

Scenario 3: Eduplay as a unified Broadcaster Application for OTA university stations. In this advanced scenario, Eduplay would operate as the default Broadcaster App for the 29 university stations that hold licenses for over-the-air transmission. The technical infrastructure, including backend and content hosting, would be centrally provided by the RNP. Universities would assume editorial responsibility, including program selection, uploads, descriptive metadata, categorization by institution, region, or topic, and, when necessary, content moderation. When accessing the OTA channel of any participating UTV, the receiver would load Eduplay as the associated application.

This would enable the delivery of a unified catalog (on-demand or linear where applicable) featuring regional and institutional diversity while maintaining operational and organizational consistency. Consequently, non-licensed broadcasters could have their on-demand content distributed within the DTV+ environment via recommendations made within the shared Broadcaster App.

To make Scenario 3 feasible, Eduplay must meet a set of technical and operational requirements compatible with the TV 3.0 architecture and applicable standards:

- Hosting of audiovisual content and metadata via an HTTP(S)-based backend, capable of serving multiple broadcasters with independent editorial curation.
- A coherent and organized metadata structure that allows DTV+ players to render catalogs, electronic programming guides (when applicable), navigate both on-demand and linear content, filter by institution/region/topic, and, when needed, integrate additional services such as subtitles, audio description, or accessibility features.
- Proper signaling of the application manifest, as defined by DTV+, ensuring that OTA receivers recognize and load Eduplay as the application associated with the broadcaster's license.
- An institutional framework for shared governance and curation, including moderation policies, content licensing, copyright management, content and metadata updates, and fallback procedures in case a participating broadcaster exits the consortium or becomes inoperative.
- Platform scalability and maintainability, considering the multiplicity of broadcasters and the diversity of programming, along with versioning support, compatibility testing, and technical compliance mechanisms.

The adoption of Decree No. 12,595 of August 27, 2025, formally legitimizes the operation of a Common Platform for Public Communication within the DTV+ environment. It provides a solid regulatory foundation for the legal and technical implementation of Scenario 2. The use of Eduplay as the technological backbone for this arrangement reinforces both its technical feasibility and institutional viability, especially considering its established role as a multimedia repository for higher education in Brazil. On the other hand, Scenario 3 demands a higher degree of cooperative governance among universities, along with technical coordination to ensure full interoperability.

VII. FINAL REMARKS

This study set out to examine the structural, technical, and editorial conditions of Brazilian university broadcasters in the context of the transition to the application-oriented television model proposed by the TV 3.0 Project. By systematizing data from ABTU and applying empirical instruments to three broadcasters in the state of Maranhão, it was possible to identify persistent weaknesses in production environments, network infrastructure, and governance. It was also possible to outline a proposal for integrating UTVs into the DTV+ environment based on Eduplay

The analysis shows that the barriers faced by university broadcasters go beyond simply acquiring equipment or upgrading systems. The challenge is more complex, involving the reconfiguration of production workflows, the training of staff, stronger coordination across sectors, and the development of public policies that recognize the strategic role these broadcasters play in public, scientific, and educational communication.

While this study focused on a small set of cases, the

results reflect a broader pattern of technological disparity between commercial broadcasters and smaller public institutions. Without structural measures to close this gap, university broadcasters risk being left out of the TV 3.0 technical ecosystem. This risk is especially evident in areas such as adopting interoperable standards, integrating with on-demand content catalogs, and developing applications compatible with the services outlined in the new regulatory framework.

By making these limitations and gaps visible, this study aims to inform public and technical discussions about the future of university television in Brazil. It underscores the need for clear institutional commitments from the universities and institutes to which these broadcasters are affiliated.

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Miguel Chaves is a Master's candidate in Communication at the Federal University of Maranhão (UFMA) and a researcher in the fields of public broadcasting and technological transition, with a focus on TV 3.0 and innovation in communication policy. He holds a bachelor's degree in Social Communication - Radio and Television from

UFMA and conducts research on the role of public university broadcasters in the implementation of TV 3.0 and in the development of public policies for the media ecosystem. He is an associate member of the Communication & Technology Collection Lab (CTCLab). Professionally, he works in Public and Commercial Communication, with experience in video editing and image direction at TV UFMA and TV Mirante, an affiliate of Rede Globo in Maranhão. He also has experience in audiovisual journalism, content management, and communication strategies for digital media. His interests include public broadcasting, technological innovation, audiovisual journalism, and digital transformation in the public sector.



Luciana Rodrigues Rocha is a Master's candidate in Communication at the Federal University of Maranhão (UFMA) through the PPGCOM/PRO-UFMA program. Her research focuses on public and university broadcasters, with emphasis on television content, communication policy, and TV 3.0. She holds bachelor's degrees in Social

Communication/Journalism and in Portuguese Language and Literature from the Federal University of Piauí (UFPI), and a postgraduate specialization in Educational Network Management – Educommunication, also from UFPI. She is an associate member of the Communication & Technology Collection Lab (CTCLab). Professionally, she serves at UFMA, working at TV UFMA. At the station, she works as a reporter and presenter, and also contributes to newsroom activities and television production. She has experience in media training, communication advisory, and press relations. For fifteen years, she taught Portuguese, Writing, and Literature in Youth and Adult Education (EJA). Her current interests include television production, public and university

broadcasting, public communication, and technologies shaping the evolution of audiovisual practices and Brazilian broadcasting.



Carlos Soares Neto is an associate professor at the Federal University of Maranhão (UFMA), holding a Bachelor's degree in Computer Science (UFMA, 2000) and a Master's and Ph.D. in Informatics from the Pontifical Catholic University of Rio de Janeiro (PUC-Rio, 2003 and 2010). He coordinates the

TeleMídia/MA and LAWS (Advanced Web Systems Laboratory) research groups at UFMA. His research interests include Hypermedia, Multimedia Applications, Multimedia Document Engineering, and Educational Data Analysis. He served as Chair of the Special Committee on Multimedia and the Web of the Brazilian Computer Society and is currently a member of its Steering Committee.



Li-Chang Shuen Sousa has been an Associate Professor in the Department of Social Communication at the Federal University of Maranhão since 2008. Permanent professor of the Post-Graduate Program in Communication - Professional Master's Degree at UFMA. She holds a degree in Social Communication -

Journalism from the Federal University of Maranhão (2002) and a master's degree in Communication from the Federal University of Pernambuco (2005). She holds PhD in Social Sciences from the Center for Research and Graduate Studies on the Americas of the University of Brasília (2013). PhD student in Computer Science at the Federal University of Maranhão. She has experience in the area of Communication, with emphasis on Journalism, Technology and Political Communication, working mainly on the following topics: television, journalism, politics, communication and technology, public opinion.

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