Design and Architecture of Data Governance for Broadcasting Media: Postprint

Authors: Rui Hao

Date: 2023-10-08T00:00:00+00:00

Abstract

This paper systematically reviews the significance and current status of data governance initiatives in radio and television stations within the context of media convergence, explores the objectives of implementing data governance, designs an organizational structure, institutional framework, and routine processes tailored for data governance in broadcast media, and introduces an architectural solution for technical implementation.

Full Text

Design and Architecture of Data Governance for Broadcasting Media

Author: Rui Hao (Beijing TV Station Information Network Management Department)

Introduction

Data constitutes a critical asset for broadcasting media organizations, forming the foundation for scientific decision-making and analytical management. In recent years, most radio and television stations have invested substantial resources to build various information systems that support business operations. These systems have become essential components of broadcasting media technology infrastructure, delivering the benefits of interconnectivity and resource sharing. However, the massive datasets generated by these systems contain valuable information that can be extracted and refined. The challenge of integrating these data resources and transforming them into actionable information and knowledge—what we term "data governance" for broadcasting media—has become crucial for enhancing program production, distribution capabilities, and management effectiveness.

Current State of Data Governance in Broadcasting Media

As broadcasting media organizations deepen their understanding of cloud computing, big data, and other emerging technologies, and as intensifying competition drives demand for smarter production and more refined management, the necessity and importance of data integration and governance have gained widespread recognition. Organizations need to process the diverse and voluminous data embedded across various information systems. However, from both business and technical perspectives, broadcasting media face significant challenges in data governance.

Business Challenges Current information systems offer only basic reporting capabilities that cannot satisfy complex analytical requirements. For instance, organizations cannot analyze which content assets in their media libraries resonate most with audiences and could be repurposed in future productions. Business analytics remain confined to individual systems, preventing leadership from conducting comprehensive, cross-functional analyses from a holistic perspective. Leaders cannot grasp overall program production efficiency, costs, or social impact. Compounding these issues, data inconsistency is severe, with the same business data existing in multiple versions across different systems, and inconsistent interpretations of data meanings across departments render analysis impossible.

Technical Challenges While organizations recognize the importance of data governance, it has not yet reached strategic priority status. Technical departments remain primarily focused on business system construction and maintenance. Existing analytical functions are typically sub-modules of business systems with strong coupling, lacking support for enterprise-wide analysis. Business systems generate massive volumes and diverse types of data, yet current technologies lack large-scale parallel processing or distributed processing capabilities, creating analytical bottlenecks. Furthermore, inconsistent standards for defining core data across systems result in poor data quality that cannot be directly reused. These issues impede sustainable business development and hinder progress in the big data era.

Data Governance Objectives

Broadcasting media data is inherently complex. Data sources include production and office systems (such as media asset management, editorial, and tape library systems), user behavior data collected through embedded codes and logs from proprietary new media platforms (online broadcast stations, IPTV platforms, mobile apps), internet data captured via web crawlers, and purchased network and viewership data. Storage requirements range from human resources datasets of only a few hundred megabytes to set-top box data growing by hundreds of terabytes annually with billions of records. Data formats include both

structured and semi-structured types. Given these characteristics, data governance must achieve the following objectives:

Data Standardization Establish data specifications with accurate definitions, complete records, sufficient precision, calculable costs and values, and reasonable retention periods.

Regularized Data Storage and Access Form a unified data architecture and storage model with multi-channel access pathways, ensuring data accessibility with robust security mechanisms.

Data Accountability Implement clear data ownership and quality requirements.

Data Governance Framework

Since broadcasting media organizations vary in their information technology maturity, data scale, and data quality, their data governance implementation paths will differ accordingly. Figure 1 illustrates a general framework applicable to most broadcasting media organizations. To implement data governance systematically, organizations should adopt a principle of planning first, then phased implementation: first, clarify strategic direction based on organizational goals; second, develop organizational structures, policies, and processes suited to their business characteristics; and finally, select appropriate technical tools and implementation solutions.

At the strategic level, data governance should aim to resolve practical issues of data being unknown, unavailable, uncontrollable, and weakly associated, while also incorporating holistic planning that accounts for rapid technological evolution in cloud computing, big data, and artificial intelligence, as well as media convergence trends.

At the mechanism level, data governance requires implementation through well-defined organization, policies, and processes. Only by strengthening institutional mechanisms can organizations ensure continuous improvement in governance effectiveness.

At the implementation level, data governance encompasses metadata management systems, data quality management systems, and data scheduling and processing systems. Through the construction of these information systems, paper-based plans, policies, and processes are internalized within technical platforms and tools to assist management personnel in development and maintenance, thereby enhancing governance efficiency.

Organizational Structure A sound organizational structure forms the foundation for data governance, ensuring effective cross-departmental collaboration. The structure should include three types of personnel: management, business,

and technical, corresponding to three roles: leadership group, business group, and technical group.

The **leadership group**, composed of station executives and technology and business department heads, is responsible for establishing a data governance culture, setting governance objectives, plans, policies, and processes, and allocating necessary resources.

The **business group**, comprising business experts and departmental system administrators, is responsible for defining data requirements, maintaining basic data operations (creation, deletion, modification, querying), and ensuring data correctness and timeliness at the source.

The **technical group**, consisting of IT department personnel including developers, database administrators, and system operators, handles platform and tool development/selection, data security, backup and auditing, and data quality monitoring and system maintenance.

Governance Policies Data governance policies should serve as mandatory organizational standards, clearly stating purpose, scope, responsibilities, and specific content. The policy framework should include management methods, technical specifications, and implementation details, covering all aspects of data usage: data standards, collection, auditing, analysis, publishing, transmission, storage, maintenance, security management, quality monitoring, and performance assessment. All policies should target practical effectiveness and service optimization, continuously improving data standardization, accuracy, completeness, and relevance. Effective control methods are essential for policy implementation, with performance assessment serving as the fundamental guarantee. Organizations must establish clear assessment systems with specific data governance metrics for regular evaluation and corrective action.

Governance Processes The primary business processes for data governance can be divided into four core phases—discovery, definition, application, and improvement—aligned with organizational policies and governance content.

The **discovery phase** identifies existing data inventories, current data status, data lifecycles, and current support and maintenance capabilities.

The **definition phase** documents data definitions, relationships, and the essential rules, standards, and key performance indicators required for governance implementation.

The **application phase** executes data governance through data exchange, storage, analysis, and processing to ensure alignment with all business rules, workflows, functional roles, and responsibilities identified in the discovery and definition phases.

The **improvement phase** drives governance effectiveness and value through data quality management and security assurance, monitoring compliance with

defined rules and standards.

These processes form a continuous cycle, as illustrated in Figure 2.

Implementation Architecture

The tools and platforms involved in data governance are inseparable from the overall data architecture of broadcasting media. Figure 3 presents a data framework for converged business environments, where data governance is primarily implemented through a data management platform that spans the entire data lifecycle. This platform comprises three key systems that provide technical guarantees for effective governance:

Data Asset Management System: Provides unified management of all-media data assets, including metadata, data standards, and data models. It covers data lifecycle management and offers visual data query and display functions for rapid, convenient data asset retrieval.

Data Quality Management System: Implements comprehensive data quality detection, enabling full closed-loop management of quality issue identification, tracking, resolution, and evaluation. This includes modules for quality rule management, data collection verification, quality issue detection, and quality issue analysis.

Data Scheduling and Processing System: Facilitates interconnection and interoperability among various systems, providing unified and diverse data services for data platforms and business applications. This system must also strengthen access control security to prevent data leakage and unauthorized access.

Conclusion

Data governance for broadcasting media is a continuous, iterative, and complex systems engineering project. For technology departments, it requires strategic recognition of data assets' importance and the substantial value of governance for future development. Through data governance, organizations can transform IT management into IT services and shift from cost centers to profit centers by monetizing data value. The governance process touches all business aspects, serving not only as a means to fully inventory and extract data value but also as an opportunity to optimize management functions, strengthen execution, and enhance core competitiveness to incubate innovative cross-boundary applications. Therefore, organizations must plan policies, regulations, and management structures early and establish a manageable, usable data governance technology platform to ensure subsequent governance efforts are effective and sustainable.

References

[1] Zhou Huining. Exploration of Enterprise Data Governance in the Information Age. *Information Technology*, 2018(17):18-19.

[2] Shi Kun, Wu Yue, Wu Yue. Enterprise Data Governance System and Practice. *Electronic World*, 2018(17):19-18.

[3] Lai Chun. The Impact of Data Governance on Data Quality Management. *Information Technology*, 2018(19):23-22.

[4] He Min. Research on Data Governance Work in Information Systems. *Information and Computer*, 2018(21):26-14.

Note: Figure translations are in progress. See original paper for figures.