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Reconfiguration of Descriptive Representation of Information in Digital Informational Ecosystems: Interoperability, Automation, and Artificial Intelligence

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Abstract. *The digital transformation of informational environments has promoted significant changes in descriptive representation, especially through semantic interoperability, metadata automation, and the growing use of artificial intelligence. In this context, models, standards, and practices associated with cataloging are undergoing transformations that affect technical processes, mediation, and information organization in digital ecosystems. The objective of this article is to discuss transformations in descriptive representation in contexts marked by automation, interoperability, and artificial intelligence, considering their effects on representation models, technical processes, and professional practices in the field. This is a theoretical-reflective and exploratory study, grounded in a narrative review of national and international literature on descriptive representation, contemporary cataloging, semantic interoperability, digital ecosystems, automation, and artificial intelligence. The analyses suggest that automation, interoperability, and artificial intelligence do not promote a rupture with the foundations of descriptive representation, but reconfigure the models, instruments, and practices through which these foundations are operationalized in digital environments. As a contribution, the article proposes understanding descriptive representation not as a field in decline in the face of emerging technologies, but*

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as a domain in transformation, whose relevance expands as the need grows for semantic structures, interoperable metadata, and mediation processes sustaining increasingly complex and connected informational environments.

1. Introduction

Descriptive representation and subject representation are central activities of Information Organization (IO), as they enable the identification, description, and individualization of information resources with a view to their retrieval and use in different documentary contexts. Over time, cataloging and indexing have developed principles, standards, and instruments aimed at promoting bibliographic control and facilitating access to information, becoming one of the technical and conceptual foundations of libraries and information systems (Svenonius, 2000; Mey; Silveira, 2009). More recently, technological development in both dimensions of information organization has affected the processes of information and knowledge representation.

As Lourenço (2020) argues, cataloging occupies a central position in information organization because it provides the basis for the construction of electronic catalogs, digital libraries, institutional repositories, and databases, being responsible for the structured representation of information resources and for ensuring their retrieval across different technological environments. The author further emphasizes that contemporary descriptive representation goes beyond simple bibliographic description, becoming part of increasingly interconnected informational ecosystems that depend on interoperable metadata standards capable of connecting information objects on the web.

However, the intensification of automation, interoperability, and Artificial Intelligence (AI) processes in digital informational environments raises a question for Information Science (IS): to understand how historically consolidated practices of descriptive representation have been challenged by technologies that automate metadata generation, expand the circulation of data across systems, and introduce new forms of information processing, sharing, and retrieval. These transformations affect not only the technical procedures related to cataloging, but also conceptual models, normative instruments, workflows, professional practices, metadata quality criteria, and forms of mediation in contemporary informational ecosystems.

In view of this reality, this article is guided by the following question: how have contemporary contexts of automation, interoperability, and AI been reconfiguring the models, instruments, and practices of descriptive representation of information in digital informational ecosystems?

The article starts with the argument that contemporary technological transformations associated with automation, interoperability, and AI do not entail a rupture with the foundations of descriptive representation, but rather reconfigure its models, instruments, and practices in digital informational ecosystems. In this process,

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classical principles of cataloging remain relevant, although they are now operationalized through semantic infrastructures, linked data, automated processes, and intelligent systems, thereby increasing the need for specialized mediation, quality control, and data governance.

The objective of this article is to discuss the transformations of descriptive representation of information in contexts marked by automation, interoperability, and AI, considering their effects on representation models, normative instruments, technical processes, and professional practices in the field.

Thus, the focus of the article is delimited to the analysis of transformations in descriptive representation in digital environments, understood as a process of reconfiguring the field's models and practices. The discussion developed in the following sections seeks to demonstrate how the foundations related to identification, individualization, standardization, contextualization, retrieval, and establishment of relationships among information resources remain conceptually relevant, even though they are mobilized within increasingly automated, interoperable digital infrastructures mediated by intelligent systems.

2. Methodological Procedures

This article is characterized as a theoretical-reflective study, grounded in a critical review of national and international literature on descriptive representation of information. The analysis was guided by the research question: how have contemporary contexts of automation, interoperability, and Artificial Intelligence been transforming the models and practices of descriptive representation of information? It was organized around four analytical axes: (i) foundations of descriptive representation; (ii) interoperability and the reconfiguration of models; (iii) automation and Artificial Intelligence; and (iv) an integrative discussion of the transformations observed. This organization made it possible to articulate the theoretical frameworks in order to understand contemporary changes in the models and practices of descriptive representation.

3. Descriptive Representation Of Information In Digital Environments

Descriptive representation of information can be understood as the set of procedures aimed at the formal description of information resources, enabling their identification, differentiation, and retrieval in information systems. Traditionally associated with cataloging, this activity occupies a central position in IO by enabling the construction of representations that make documents visible and accessible to different user communities (Svenonius, 2000).

Lourenço (2020) broadens this understanding by stating that descriptive representation is not restricted to the creation of bibliographic records but constitutes a fundamental process for the construction of electronic catalogs, digital libraries, institutional repositories, and databases. According to the author, cataloging brings together and organizes the physical and intellectual attributes of information resources

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through rules and standards that ensure consistency, retrieval, and information sharing in digital environments.

The author further argues that cataloging should be understood as a strategic activity of information organization, responsible for establishing relationships among documents, users, and information retrieval systems. For the author, its function goes beyond simple documentary description, becoming an essential element for interoperability and for the construction of more efficient digital informational environments (Lourenço, 2020).

The foundations of descriptive representation derive in part from Cutter's contributions, whose principles for the construction of catalogs significantly influenced the development of later cataloging codes. His conception of the catalog, oriented towards the location, identification, and selection of information resources, remains present in many of the objectives that guide contemporary IO systems (Cutter, 1904).

Throughout the twentieth century, the development of international standards for bibliographic description and data exchange formats contributed to increasing the consistency and sharing of records among institutions. In this process, cataloging came to be understood not merely as an operational activity, but as a mediating practice capable of establishing relationships among documents, systems, and users. As Svenonius (2000) argues, IO systems depend on the construction of intellectual representations that make it possible to describe resources and make their relationships explicit in increasingly complex documentary contexts.

The growing digitalization of informational environments has significantly expanded the challenges related to information representation. Digital libraries, institutional repositories, scientific portals, and research data environments have begun to demand models capable of representing heterogeneous resources, establishing connections among different information sources, and supporting retrieval processes in distributed contexts. As a result, descriptive representation has come to engage more intensely with concepts related to interoperability, semantic modeling, and data integration, aspects that have directly influenced the evolution of contemporary bibliographic models (Tillett, 2005; Riva; Le Boeuf; Žumer, 2024).

It can be observed that the evolution of digital environments has driven a paradigmatic shift in cataloging, characterized by the transition from a logic centered on the isolated bibliographic record to one based on entities, attributes, relationships, and semantically interoperable data. This transformation stems from the need to represent information resources not only as individually described documents, but also as elements belonging to networks of relationships that connect works, expressions, manifestations, items, authors, institutions, subjects, and other entities involved in the bibliographic universe. In this context, cataloging becomes aligned with Semantic Web and Linked Data (LD) technologies, facilitating connections among different informational ecosystems and expanding the possibilities for sharing, navigation, discovery, retrieval,

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and visibility of bibliographic information (Lourenço, 2020).

As Lourenço (2020, p. 165) notes, “cataloging takes place based on the entities of the Functional Requirements for Bibliographic Records (FRBR) model,” and the Resource Description and Access (RDA) standard “works with the representation of the different relationships among FRBR entities, enabling more dynamic user navigation through the catalog.” In addition, cataloging seeks to adapt “to the practices of the Semantic Web and LD,” becoming “a more dynamic model suited to current communication and information technologies” (Lourenço, 2020, p. 153).

Part of these transformations can be observed in the evolution of the conceptual models and standards used in information representation, which reveal a movement toward the reconfiguration of bibliographic representation aimed at semantic integration, data reuse, and the expansion of possibilities for information discovery in digital environments (IFLA, 2009; Hillmann et al., 2010; Riva; Le Boeuf; Žumer, 2024).

From this perspective, Lourenço (2020) interprets the adoption of the conceptual models of the FR family and of the RDA standard as part of a paradigmatic shift in cataloging, characterized by the replacement of a logic centered on the catalog card with a structure based on entities, attributes, and relationships. This transformation brings bibliographic representation closer to the data architecture used in the Semantic Web and supports interoperability among different information systems.

Transformations in cataloging are not restricted to the updating of rules and formats but involve a new way of conceiving bibliographic representation. Conceptual models begin to organize description on the basis of entities, such as work, expression, manifestation, item, person, family, and corporate body, as well as the relationships among them, providing greater contextualization of information. Thus, description shifts from being document-centered to being centered on entities and relationships.

In practical terms, this entails a transition from cataloging structured by carriers and bibliographic records to cataloging based on entities and relationships. For example, in the traditional model, each edition of a work was described in an independent bibliographic record, centered on the physical or digital document. Thus, different editions of the same work, such as Dom Casmurro, by Machado de Assis, are represented in separate records, often without making their connections explicit. In the new paradigm, later systematized by the International Federation of Library Associations and Institutions (IFLA) Library Reference Model (LRM), based on the harmonization of the FRBR, Functional Requirements for Authority Data (FRAD), and Functional Requirements for Subject Authority Data (FRSAD) models, the work, its expressions, manifestations, authors, translators, publishers, and subjects are treated as related entities. In this way, users can navigate among different editions, translations, adaptations, and works associated with the same author through explicit links among the data. Cataloging therefore ceases to emphasize only the description of isolated items and begins to represent a network of bibliographic relationships integrated into digital environments and the Semantic Web.

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Consequently, bibliographic records are converted into interconnected data which, previously stored in local catalogs, can be stored in digital environments with an LD structure, allowing authors, works, subjects, institutions, and other elements to be related within a broad semantic network. This is because, with the development of the Bibliographic Framework (BIBFRAME), developed by the Library of Congress, a linked-data-oriented structure is proposed and a pathway for transition from the MARC 21 format is offered, supporting the publication and reuse of bibliographic data on the Semantic Web.

The Library of Congress may be cited as an example, since, through the BIBFRAME project and the Linked Data Service id.loc.gov[4], it makes its bibliographic records available in LD format. In this environment, authors, works, subjects, institutions, and other entities are identified by persistent URIs and semantically related, enabling the integration of this information into the Web of Data and its reuse by different information systems. Thus, records no longer remain restricted to local catalogs, but become part of a network of interconnected data, supporting interoperability, sharing, and the expansion of possibilities for information retrieval.

Another example of the publication of bibliographic data as linked data is the Bibliothèque Nationale de France, which also makes its data available in LD through the data.bnf.fr[5] project, integrating bibliographic records, authority data, authors, and works into an RDF-based semantic structure.

Accordingly, catalogs can be designed to enable interoperability both locally and among institutions. Metadata can be produced to circulate across different systems, such as repositories, digital platforms, and search engines, supporting interoperability within the institution itself and with external institutions.

In this scenario, descriptive representation is no longer understood merely as a mechanism of documentary description restricted to the recording of elements such as title, authorship, edition, publication, carrier, and other bibliographic data used to identify information resources. The transformation brought about by digital environments consists in shifting descriptive representation from a function restricted to documentary description to its operation as part of broader informational infrastructures, in which bibliographic records, metadata, controlled vocabularies, and conceptual models work together to promote the discovery, sharing, reuse, and visibility of information in digital environments.

The transformations discussed in this section demonstrate the transition from models centered on the bibliographic record to structures oriented by entities, attributes, and relationships, consolidated by initiatives such as FRBR, IFLA LRM, RDA,

[4] ID.LOC.GOV - Linked Data Service provides interactive and machine access to commonly used ontologies, controlled vocabularies, and other lists for bibliographic description.

[5] data.bnf.fr, a project of the Bibliothèque nationale de France, aims to highlight the richness of its collections and connect its resources with those available as linked open data.

BIBFRAME, and LD. In addition to supporting interoperability and data reuse in digital environments, these models expand the possibilities for automation, entity linking, and semantic enrichment of information. In this context, the quality, consistency, and interoperability of metadata become essential conditions for the development of processes supported by Artificial Intelligence, the topic discussed in the next section.

4. Interoperability And the Reconfiguration of Representation Models

The transformations observed in digital informational environments, associated with the expansion of digital resources, the growth of information production on a global scale, and the need for data sharing, integration, and reuse, have increased the importance of interoperability in the processes of information organization and representation. In this scenario, interoperability has come to occupy a strategic position, since the production of records no longer serves exclusively local catalogs but has become part of broader and more distributed informational networks (Tillett, 2005; Riva; Le Boeuf; Žumer, 2024).

Interoperability can be understood as the ability of different systems, applications, and organizations to exchange information in a consistent and meaningful manner. In the context of information representation, this capacity involves not only technical aspects related to data exchange, but also semantic issues associated with the interpretation, meaning, and reuse of the information produced (Zeng; Qin, 2022). Thus, interoperability has become a central element in the development of digital environments capable of promoting discovery, sharing, and integration of information resources.

Part of this movement toward semantic interoperability is associated with the evolution of the conceptual models used to represent bibliographic entities and their relationships. The publication of FRBR represented an important milestone by proposing a conceptual structure based on entities, attributes, and relationships, shifting the focus of bibliographic representation from isolated records to networks of relationships among works, expressions, manifestations, and items (IFLA, 2009). Subsequently, the LRM broadened this perspective by harmonizing the FRBR, FRAD, and FRSAD models, offering a more consistent and comprehensive view of the bibliographic universe (Tillett, 2005; Riva; Le Boeuf; Žumer, 2024).

The adoption of RDA accompanied this shift in perspective. Unlike approaches centered exclusively on resource description, RDA was conceived to meet the demands of digital environments characterized by interoperability, data reuse, and the growing need to establish explicit relationships among informational entities. In this context, bibliographic description comes to be understood as part of an ecosystem of connected data, in which persons, works, institutions, concepts, and resources can be related in a structured and semantically meaningful way (Oliver, 2011; Riva; Le Boeuf; Žumer, 2024).

In parallel, the advancement of initiatives linked to the Semantic Web contributed to expanding the possibilities of integration among information systems. The proposal presented by Berners-Lee, Hendler, and Lassila (2001) established the foundations for an

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informational infrastructure capable of representing data in a way that is understandable to both humans and machines. From this perspective, technologies such as the Resource Description Framework (RDF), ontologies, and interoperable controlled vocabularies began to offer new mechanisms for describing, linking, and sharing information in distributed environments.

In this context, initiatives such as BIBFRAME represent a significant change in relation to bibliographic models traditionally grounded in records. Developed by the Library of Congress, BIBFRAME proposes a structure oriented toward entities and relationships, supporting the publication of bibliographic data in environments compatible with the Semantic Web and expanding the possibilities of integration with other information sources (Library of Congress, 2026).

These transformations indicate that the evolution of representation models is related not only to the adoption of new technologies, but also to the reformulation of the ways in which information resources are described, related, and shared. The growing incorporation of semantic structures, entity-oriented conceptual models, and interoperability mechanisms reveals a transition from a record-centered logic to approaches grounded in networks of interconnected data.

This shift creates conditions for new forms of information discovery and establishes part of the foundations that enable the incorporation of automated processes and AI applications into contemporary environments of information representation. It is precisely in this scenario that automation and AI begin to act as new agents in the transformation of representation practices.

5. Automation And Artificial Intelligence in Descriptive Representation Processes

Automation processes have been progressively incorporated into activities related to IO. Tools capable of performing automatic metadata extraction, entity identification, record linking, and semantic enrichment have become part of workflows that were previously carried out predominantly by manual means. From this perspective, recent advances in automation can be understood as an unfolding of the transformations initiated with the conceptual modeling of bibliographic data. According to Lourenço (2020), representation structured by entities and relationships expands the possibilities for automated information processing, supporting record linking, semantic enrichment, and metadata reuse in different informational contexts. More recently, advances in Artificial Intelligence (AI), particularly those associated with natural language processing and large language models, have broadened the debate on the possibilities and limits of automation in activities traditionally linked to information representation (Floridi, 2014; Bender et al., 2021; Chen; Li, 2024).

In this scenario, Roncaglia (2026) observes that Generative Artificial Intelligence systems depend heavily on the quality and consistency of metadata to produce reliable

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results. The author emphasizes that AI does not eliminate the need for specialized mediation by information professionals, nor does it reduce the relevance of cataloging; on the contrary, it increases the need for semantically structured bibliographic records capable of supporting processes of discovery, recommendation, and contextualized information retrieval.

These transformations raise issues that go beyond technological aspects. The incorporation of new semantic infrastructures, automated description mechanisms, and AI-supported systems prompts reflections related to the quality of the records produced, interoperability among informational environments, the reliability of automated processes, and the role played by information professionals in the construction and maintenance of knowledge representation systems. Rather than indicating a process of replacement of cataloging or descriptive representation, this scenario suggests a transformation of their instruments, methods, and practices, and reinforces the role of the professional responsible for these organization processes.

The incorporation of automated processes into IO systems is not a recent phenomenon. Since the adoption of the first machine-readable formats and bibliographic exchange mechanisms, different levels of automation have become part of activities related to the description, storage, and retrieval of information. What distinguishes the contemporary scenario is the increased capacity of these systems to process large volumes of data, identify patterns, and perform tasks that previously depended on more intensive human intervention (Zeng; Qin, 2022).

In current digital environments, automation is present at different stages of descriptive representation processes. Procedures related to metadata capture, record normalization, entity identification, authority linking, and semantic enrichment are frequently carried out with the support of computational mechanisms capable of reducing operational effort and expanding the scale of information processing (Alemu, 2022). In many cases, automation does not replace professional work but acts as a supporting element in the production and maintenance of records in environments characterized by increasing informational complexity.

The expansion of interoperable infrastructures and entity-oriented models has contributed to strengthening this movement. The availability of connected databases, interoperable controlled vocabularies, and structured datasets has supported the development of mechanisms capable of identifying relationships among information resources, suggesting semantic associations, and assisting activities related to bibliographic description. In this context, automation begins to operate not only on isolated textual elements, but also on data networks that represent entities, attributes, and relationships across multiple knowledge domains.

In recent years, the advancement of AI has significantly expanded the possibilities for applying these technologies to information representation processes. In particular, the development of natural language processing techniques, machine learning, and large

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language models has enabled computational systems to perform activities related to subject identification, entity extraction, abstract generation, document classification, and the assisted production of descriptions (Floridi, 2014; Chen; Li, 2024).

In the field of descriptive representation, these technologies have been used to support the automatic generation of metadata, the identification of names, places, institutions, and concepts present in documents, as well as to suggest descriptive elements capable of complementing existing bibliographic records. Recent studies indicate that cataloging and metadata professionals recognize opportunities in the use of AI to support workflows, but also highlight challenges related to data quality, the reliability of results, professional training, and the need for ethical criteria in the adoption of these tools (Chen; Li, 2024; Engel et al., 2025).

Recent literature also shows that the adoption of AI in cataloging and metadata cannot be treated as mere neutral automation. Issues such as bias, model opacity, hallucinations, inconsistency of results, and difficulty in making data provenance explicit directly affect the reliability of the representations produced. These elements are particularly sensitive in memory, research, and teaching environments, where metadata quality interferes with the discovery, interpretation, and use of information resources (Bender et al., 2021; Sussmeier; Henry, 2025).

In addition to technical issues, a discussion emerges concerning the very foundations of information representation. Documentary description involves processes of interpretation, contextualization, and attribution of meaning that have historically been associated with the work of specialized professionals. Although AI systems demonstrate a growing capacity to identify linguistic patterns and produce coherent textual representations, it remains a matter of debate to what extent these technologies can incorporate the conceptual, contextual, and cultural elements present in IO and KO processes (Hjørland, 2008).

In this sense, the adoption of AI technologies should not be understood exclusively as an operational advance. Their incorporation into descriptive representation processes raises reflections on the quality, consistency, transparency, and governance of the data produced, while also redefining part of the competencies required of information professionals. Rather than replacing activities traditionally associated with cataloging and indexing, these technologies transform the ways in which descriptive representation is produced and increase the need for supervision, validation, and curation of automated processes (Chou; Choi, 2025; Pinar; Cox, 2025).

It can therefore be observed that automation and AI have been contributing to transforming the ways in which descriptive representation is produced and maintained in digital environments. These transformations, however, do not eliminate the need for principles, conceptual models, human curation, and control mechanisms that have historically sustained IO. On the contrary, they make the discussion of the foundations

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that guide the construction of informational representations even more relevant in contexts marked by the growing presence of intelligent technologies.

6. Discussion

The transformations observed in the models and practices of descriptive representation reveal a movement of reconfiguration that goes beyond the simple adoption of new technologies. Although automation, interoperability, and AI play a relevant role in this process, their impacts cannot be understood solely from an instrumental perspective. The ongoing changes affect the very way in which information resources are described, represented, related, and made available in digital environments.

Historically, descriptive representation has been associated with the production of bibliographic records structured according to rules and standards defined by specialized communities. In this model, the record constituted the central unit of representation, concentrating on the information necessary for the identification, location, and retrieval of documentary resources. The evolution of conceptual models, particularly from FRBR and later LRM onward, contributed to shifting this logic toward structures grounded in entities and relationships, enabling more dynamic forms of information representation (IFLA, 2009; Riva; Le Boeuf; Žumer, 2024).

The expansion of interoperability intensified this movement by enabling records that were previously isolated to become part of broader informational ecosystems. In this context, descriptive representation is no longer restricted to the boundaries of library catalogs or specific systems but becomes part of interconnected data networks in which information produced by different institutions can be reused, enriched, and related. This transformation brings descriptive representation closer to principles traditionally discussed in KO, especially those related to the construction of meanings, the establishment of conceptual relationships, and the semantic organization of knowledge domains (Dahlberg, 1978; Hjørland, 2008).

From this perspective, interoperability should not be understood merely as a technical issue. The ability to share data across systems depends on the existence of compatible conceptual models, coherent semantic structures, and terminological agreements capable of sustaining the interpretation of data in different contexts. In other words, interoperability presupposes KO processes that precede and guide the technological solutions employed for information exchange.

The incorporation of AI further increases the complexity of this scenario. Unlike the technologies traditionally used to automate operational tasks, contemporary AI systems act on elements that come close to processes of documentary interpretation. Entity identification, concept extraction, the generation of textual descriptions, and metadata suggestion illustrate activities that, until recently, depended predominantly on analysis carried out by information professionals.

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However, the expansion of these capabilities does not eliminate the need for human mediation. Information representation processes involve decisions related to the selection of attributes, the establishment of relationships, the contextualization of resources, and the attribution of meanings. Such decisions do not depend exclusively on statistical patterns identified in datasets, but also on socially constructed knowledge, epistemological perspectives, and the specificities of the domains being represented (Hjørland, 2002; Svenonius, 2000).

This observation leads to a central question for contemporary Information Science: to what extent do technological advances alter the foundations of information representation, and to what extent do they transform only its operational procedures? The literature analyzed suggests that the fundamental principles of representation remain relevant. Aspects such as consistency, contextualization, terminological control, metadata quality, and semantic coherence continue to be indispensable elements for the construction of effective information systems. What changes are the mechanisms employed to produce, maintain, and connect these representations.

In this sense, a gradual transition can be observed in the role traditionally attributed to the cataloger. If, for much of the history of cataloging, the activity was associated with the manual creation of records, contemporary digital environments point to a shift toward functions related to the supervision, validation, curation, and governance of automated processes. Information professionals increasingly act in the definition of criteria, the monitoring of data quality, and the critical evaluation of the results produced by automated systems (Chen; Li, 2024; Pinar; Cox, 2025).

This change does not imply a reduction in professional relevance. On the contrary, the growing complexity of digital environments reinforces the need for knowledge related to information representation, KO, and semantic modeling. The greater the technological capacity to produce automated descriptions, the more important it becomes to have conceptual foundations capable of guiding and evaluating such processes.

Thus, automation, interoperability, and AI do not represent a rupture with descriptive representation of information. The contemporary scenario suggests a process of reconfiguration in which historically consolidated principles remain relevant, although they are applied within technological infrastructures substantially different from those that characterized traditional bibliographic systems. The transformation observed does not lie in the abandonment of the foundations of representation, but in the expansion of their possibilities of application in connected, distributed, and semantically structured digital ecosystems.

7. Final Considerations

This article sought to discuss how contemporary contexts of automation, interoperability, and AI have been transforming the models and practices of descriptive representation of information. Based on a theoretical-reflective review of the literature, it sought to understand how the transformations observed in digital environments affect the

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foundations, instruments, and processes historically associated with information representation.

The analyses carried out indicate that the evolution of bibliographic models, the consolidation of interoperable semantic infrastructures, and the growing incorporation of automated mechanisms have been promoting significant changes in the way information resources are described, related, and made available in information systems. In this context, initiatives such as FRBR, LRM, RDA, BIBFRAME, and LD have contributed to expanding the possibilities for integration, reuse, and sharing of information in digital environments.

It was also observed that the incorporation of AI introduces new possibilities for descriptive representation processes, especially in activities related to metadata generation, entity identification, semantic enrichment, and support for documentary description. Such advances may contribute to increasing the operational efficiency of information systems and support the processing of large volumes of data. However, the benefits associated with automation do not eliminate challenges related to the quality of representation, the transparency of automated processes, data governance, and the need for human supervision.

The results discussed throughout the article suggest that the ongoing transformations do not represent a replacement of the foundations of descriptive representation. On the contrary, they reveal the persistence of historically consolidated principles related to consistency, contextualization, metadata quality, and the construction of meanings in IO systems. What can be observed is a process of reconfiguring the instruments and practices through which these principles are operationalized in contemporary digital environments.

From the perspective of IO and KO, interoperability and AI reveal that current challenges are not restricted to the description of documentary resources but also involve the construction of semantic structures capable of supporting the interpretation, integration, and reuse of information in different contexts. This observation reinforces the importance of conceptual models, controlled vocabularies, ontologies, and other forms of knowledge representation as fundamental elements for the development of interoperable informational ecosystems.

At the professional level, the transformations analyzed indicate a gradual shift from activities traditionally associated with the manual creation of records to functions related to the curation, validation, supervision, and governance of automated processes. In this scenario, knowledge related to information representation, semantic modeling, and KO tend to assume an increasingly strategic role in the critical evaluation of results produced by intelligent systems.

As a limitation, it is acknowledged that this study is theoretical-reflective in nature and does not include empirical analyses of the adoption of AI technologies in specific contexts of libraries, archives, museums, or digital repositories. Future investigations may

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deepen this discussion through case studies, comparative performance evaluations, analyses of the quality of metadata produced by automated systems, and research focused on the interaction between information professionals and AI-based tools.

Finally, it is considered that the discussion of automation, interoperability, and AI should not be conducted as a debate on the replacement of human work in information representation processes. The results presented here suggest that the main contemporary challenge lies in the construction of models capable of integrating human competencies, semantic structures, and emerging technologies in a consistent and transparent manner, aligned with the principles that have historically guided IO and KO.

Technologies are transformed, processes are reorganized, and models are reconfigured; nevertheless, the foundations that give meaning to information representation remain.

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