RESOURCE DESCRIPTION AND ACCESS (RDA) AND MACHINE-READABLE CATALOGUING (MARC) FOR ORGANIZATION OF INFORMATION RESOURCES IN LIBRARIES IN NIGERIA

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Abstract
To achieve efficient and effective organization of information resources, libraries overtime have devised various tools, methods and systems, including cataloguing codes and standards. Prominent among these standards are the Anglo-American Cataloguing Rules, Second Edition (AACR2), Machine-Readable Cataloguing (MARC), and Resource Description and Access (RDA), among others. The purpose of the paper is to x-ray RDA and MARC standards for the cataloguing of information resources in Nigerian libraries. To achieve this, the paper gave an overview of RDA and MARC and further highlighted their key features. The necessity for the use of MARC format for cataloguing, different MARC formats, including MARC 21, and components of a MARC record were discussed. Also discussed in the paper are objectives, and features of RDA, as well as some benefits of RDA and MARC for cataloguing information resources in libraries. Comparisons between RDA and MARC as cataloguing standards were also made. The paper identified some challenges faced by libraries in the adoption and implementation of RDA and MARC, especially in Nigeria, and proffered suggestions for addressing the identified challenges, such as adequate resource allocation, training and education of library staff, access to RDA Toolkit, gradual implementation of MARC and RDA by libraries, among others.

Keywords: Cataloguing Codes, Information Resources, Libraries, MARC, RDA

Introduction

One of the established function of libraries irrespective of type and size is the organization of information resources. Although various definitions of a library exist, Kalu and Ndulaka (2018) aptly define a library as a collection of recorded knowledge (information sources) in any format or combination of formats, organized and made available for use in order to satisfy the information needs of library users. In the library parlance, information resources, otherwise referred to as information items represent the various information-bearing materials that are acquired, processed, and organized in a manner that library users can easily access, retrieve and utilize the content of such resources. They are the various materials, tools, and services that libraries provide to support the information needs of their users, or an information infrastructure that provides content and information services for the user (IGI-Global, 2023).

Information resources in the library are basically made available in two major formats namely print and non-print. Print resources include books, journals, newspapers, magazines, and proceedings, etc., while non-print resources include audios, audiovisuals such as CDs, and DVDs, electronic materials such as e-books, articles and databases; and streaming services; online resources like websites, digital archives, and repositories; databases and indexes for research and discovery; special collections like rare books, manuscripts and archives; government documents and publications; maps, atlases and geographic information systems (GIS) (Brown University Library, 2024).

A generally accepted philosophy of the library expressed in the five laws of Library Science, as propounded by the father of Indian librarianship, S. R. Ranganathan is that books, (and by extension every other information resource in the library) are for use. Therefore, the cardinal objective of any type of library is to acquire, process, prepare and make library resources easily available to users. For this reason, librarians and information-related discipline practitioners argue that it is the systematic organization of information resources in the library that distinguishes it from other institutions or places where books are kept, such as bookshops, and publishing houses. There is, therefore, no gainsaying that in contemporary librarianship, it is no longer acceptable to have an array of books and other information-bearing resources without proper organization. This implies that information resources held by the library must be properly organized for easy access, efficient retrieval, discovery, presentation, space management, cataloguing and metadata creation, improved resource visibility and search; collection

development, resource sharing, digital integration and user satisfaction (Olise, 2021); and libraries adopt standards for organizing information resources for compelling reasons such as consistency, interoperability, scalability, professional best practices and compliance with regulations (Ingrid & Elaine, 2010). To achieve efficient and effective organization of information, libraries overtime have devised various organizational methods and standards such as classification systems, subject headings and taxonomy, cataloguing and metadata standards, shelving and storage systems, digital resources management tools, discovery layers and search interfaces. Panchyshyn, Lambert & McCutcheon (2019) that some of the major cataloguing codes and standards adopted by libraries overtime for organization of information resources include:

- AACR2 (Anglo-American Cataloguing Rules, 2nd edition): A set of rules for descriptive cataloguing.
- MARC (Machine-Readable Cataloguing): A format for encoding bibliographic data in machine-readable form.
- Dublin Core Metadata Initiative: A set of metadata elements for describing digital resources.
- RDA (Resource Description and Access): A set of guidelines for descriptive cataloguing, replacing AACR2.
- ISBD (International Standard Bibliographic Description): A set of rules for descriptive cataloguing.

Among these cataloguing codes and standards, the Anglo-American Cataloguing Rules, second edition (AACR2) was the most commonly used cataloguing code in the English-speaking world for descriptive cataloguing. However, in 2013, a paradigm shift occurred in the cataloguing landscape resulting in the replacement of AACR2 by RDA. After extensive testing and review, RDA was finally adopted by the three US national libraries: the Library of Congress (LC), the National Library of Medicine (NLM), and the National Agricultural Library (NAL). Other major research libraries, both in the United States and internationally followed suit and finally replaced the AACR2 (Library of Congress, 2020).

Regrettably, the researchers observed that many years after the AACR2 was replaced by RDA and various cataloguing codes and standards adopted by libraries in advanced countries for cataloguing library resources, in Nigeria, most libraries still use AACR2 as the major

cataloguing standard. The continual use of AACR2 has resulted in difficulties in the cataloguing of digital resources in libraries. The focus of the paper, therefore, is to x-ray RDA and MARC standards for the cataloguing of information resources in libraries in Nigeria.

Overview of Resource Description and Access (RDA)

RDA is an acronym for Resource Description and Access. It is the new standard for descriptive cataloguing, providing data elements, instructions and guidelines on recording the contents and formulating bibliographic metadata for description and access to information resources covering all types of content and media held in libraries and related cultural organizations, such as museums and archives (Danesh and Afshar, 2021). RDA is designed to provide assistance to those who need to find, identify, select, obtain, use, manage and organize information. It is a multinational content description standard covering all media that is independent of technical communication formats. It can be used with MARC and DC (Dublin Core) and many other metadata storage and exchange formats (Dunsire, 2007).

RDA is purposely designed to take care of the new digital environment. It provides a set of guidelines and instructions on recording data to support resource discovery. It supports the compilation and arrangement of bibliographic records in order to establish relationships between intellectual works and their creators. The metadata created by following RDA instructions are designed to assist users in performing the following tasks: find a resource that corresponds to the user-stated search criteria, such as a resource by a certain author; identify that the resource described corresponds to the resource sought, or to distinguish between two or more resources with similar characteristics; select a resource that is appropriate to the users' needs; to acquire or access the resource described. The application of this new standard gives the user familiar metadata irrespective of the system used to store, retrieve and display information. RDA provides a comprehensive set of guidelines and instructions covering all types of content and media (RDA Toolkit, 2020).

A major philosophy of creating RDA, according to Haider (2019) is to succeed the Anglo-American Cataloguing Rules, second edition (AACR2). It is built on the foundations established by AACR2. This means that any cataloguer familiar with AACR2 will not find it difficult to use. RDA is organized based on international standards developed by the International Federation of Library Associations and Institutions (IFLA), such as Functional

Requirements for Bibliographic Records (FRBR) and Functional Requirements for Authority Data (FRAD). FRBR is a conceptual model of the bibliographic universe that assists in connecting user tasks of access and retrieval of resources to the elements and relationships of resource description. It is a document that illustrates a framework for accessing and retrieving records from bibliographic databases. FRAD on the other hand, is a conceptual model designed to describe the authority side of the library catalogue. It provides a clearly defined structuredframe reference for relating the data that are documented in the authority records to the needs of the users of those records. FRAD helps in assisting the potential for international sharing and use of authority records within and outside the library. Olive (2010) notes that in alignment with FRBR, RDA data elements for describing a resource generally reflect the attributes and relationships associated with the entity's work, expression, manifestation and item, as defined in FRBR. Those elements are defined in RDA as follows:

Work: A distinct intellectual or artistic creation, that is, the intellectual or artistic content.

Expression: An intellectual or artistic realization of a work in the form of alpha-numeric, musical or choreographic notation, sound, image, object, movement, etc., or any combination of such forms.

Manifestation: A physical embodiment of an expression of a work.

Item: A single exemplar or instance of a manifestation: RDA data elements for describing resources reflect the attributes (characteristics) of the FRBR Group 1 WEMI entities, as well as the relationships between WEMI entities.

Also alignment with FRAD, the RDA data elements for describing entities associated with a resource generally reflect the attributes and relationships associated with the entity's person, family, corporate body and place, as defined in FRAD. Those entities are defined in RDA as follows:

Person: An individual or an identity established by an individual, either alone or in collaboration with one or more other individuals.

Family: Two or more persons related by birth, marriage, adoption, civil union or similar legal status, or who otherwise present themselves as a family.

Corporate Body: An organization or group and/or organizations that is identified by a particular name and that acts, or may act, as a unit.

Place: A given text of space (RDA Toolkit, 2020).

The creation of RDA resulted from collaboration among representatives of the United States, Canada, Great Britain, Germany and Australia. Developed by the RDA Steering Committee (formerly the Joint Steering Committee for Development of RDA) as part of the strategic plan (2005-2009) to replace AACR2, RDA was initially published in June 2010 under the title RDA Toolkit as an online resource by the American Library Association (ALA) and the Chartered Institute of Library and Information Professionals (CILIP), and the Canadian Library Association. The text of RDA consists of 10 sections, divided into 37 chapters, with 13 appendices, a glossary and an index. In 2013, big national libraries such as the Library of Congress, the British Library and other major libraries adopted and implemented RDA as the new standard for descriptive cataloguing (Haider, 2019). Today, RDA is available as an online web-based product called the *RDA Toolkit.* Although most users prefer to access RDA online via the RDA Toolkit, print copies of the RDA instructions are also available for purchase (Librarianship and Information Technology, 2021).

Some of the major objectives of RDA are comprehensiveness, consistency, clarity, rationality, currency, compatibility, adaptability, ease and efficiency of use (Dunsire, 2007). RDA is guided by the principles of generalization, specificity, non-redundancy, terminology and reference structure, while the controlled vocabulary for describing content and carrier types is based on the RDA/ONIX framework for resource categorization (RDA/ONIX, 2006). Some of the major characteristics of RDA, according to Danesh and Afshar (2021) include:

Simplification: RDA is designed to simplify some of the complex rules inherent in AACR2 for its easy application to various resources with minimum specific instructions.

Structure: The manner in which AACR2 is structured posed a problem in itself, especially by the arrangement of the descriptive chapters by resource type. RDA aims to address this structural problem by placing identification of the resource type as the first step in the cataloguing process and therefore, at the beginning of the general instructions (Joint Steering Committee, 2006).

Consistency: The provision for general and specific rules in the AACR2 led to a situation where some resources were catalogued in slightly different ways thanother resources. RDA simplifies these rules so that they are more easily applied to a range of resources and limit alternative variations in treatment (Chapman, 2006) thereby making it consistent.

Content and Forms: The combination of AACR2 and ISBD resulted in the use of “general material designation” (GMD) and specific material designation (SMD) terms. To date, the use of

GMD and SMD has been limited, partly due to problems inherent in the list of terms. RDA replaced the GMDs and SMDs with a more flexible approach within which existing content and carrier terms can be defined without precluding the use of other terms that may be required in the future (Mederios, 2006).

Principle-based Rules: RDA has created a set of rules that arebased on clearly stated principles, with limited alternatives, that enable cataloguers to build their own judgment based on professionalism and expertise. This is against the general and specific rule structure and the provision of alternatives in AACR2, which led to situations where rule interpretations were developed to assist cataloguers.

Collocation: The information environment is changing by the day, to the effect that individual information resources may be available in diverse formats with various derivative works. RDA includes a chapter on relationships in addition to incorporating FRBR terminology throughout the text (Joint Steering Committee, 2005).

Internationalization: We may recall that AACR2 evolved from the English-speaking cultures of Britain and North America, making some aspects of the rules American biased. This singular deficiency has made some other countries develop their own set of rules resulting in some level of divergence and inconsistency. To address this particular problem, RDA abinitio is built on internationally agreed cataloguing principles with a view to removing elements of sectional and cultural bias.

Key Features of RDA

Some of the striking features of RDA as affirmed by RDA Steering Group (2017) include:

i. RDA is designed according to international models for user-focused linked data applications;
ii. RDA is based on the conceptual models of the FRBR, FRAD and Functional Requirements for Subject Authority Data (FRSAD) maintained by IFLA;
iii. RDA is compatible and compliant with the Library Reference Model, the IFLA standard that consolidates them.
iv. RDA is compatible with a range of encoding schemas such as MODS, Dublin Core, ONIX and MARC (Librarianship Studies & Technology, 2020).

v. RDA enables cataloguers to move between related instructions, using hyperlinks and to integrate their own institutional policies.

Machine-Readable Cataloguing (MARC): An Overview

The use of MARC as a cataloguing system has become so popular, having been adopted by major libraries and information agencies, especially in the advanced countries, but oftentimes questions continue to arise whether MARC is a cataloguing method or type of catalogue. MARC is an acronym standing for Machine-Readable Catalogue or Cataloguing. It is not a type of catalogue, nor a method of cataloguing. MARC is simply a system by which data elements within bibliographic records are uniquely labelled for computer handling. MARC is a standard set of digital formats for the machine-readable description of items catalogued by libraries such as books, DVDs, and digital resources (Library of Congress, 2006). MARC system for cataloguing was created in the 1960s and has been continuously revised to fit the metadata needs of a continuously changing world. Creating these computer-readable cataloguing records means that computer programs can be designed to search for and display specific pieces of the information stored in a cataloguing record. This type of cataloguing makes the computerized catalogues that exist in most libraries today possible and a basic understanding of how it works is essential for anyone to understand modern cataloguing and classification issues.

Why is MARC Necessary?

At this point, a question that will necessarily come to mind is, why can't a computer just read a catalogue card? The answer is simple. The information from a catalogue card cannot simply be typed into a computer to produce an automated catalogue. The computer needs a means of interpreting the information found on a catalogue record. The MARC record, therefore, contains a guide to its data, or title "signposts" before each piece of bibliographic information. The place provided by each of these pieces of bibliographic information (author, title, call number, etc.) is called a field. The records in simpler computer files sometimes have a fixed number of fields, and each field contains a fixed number of characters. However, to allow proper cataloguing of books and other library materials, the best file structure allows for records with an unlimited number of fields and unlimited field lengths. This flexibility is necessary because not all titles have the same length. Some books are parts of a series, requiring a field for that information, while others have no series statement. And audiovisual items have much longer physical descriptions, for example, (5 film strips sd; col.; 35mm + teaching manual).

The computer cannot expect a certain type of information to begin and end at the same position in every bibliographic record. The statement of responsibility will not always begin with the 145th character of the record and end at the 207th position, for example. Therefore, each MARC record contains a little "table of contents" to the record, according to a predetermined standard (Library of Congress, 2019).

Key Features of MARC

MARC as a cataloguing system has some features that make it a powerful tool for bibliographic description, discovery, and management, and widely adopted by libraries and information centres worldwide. Library Learning (2020) identifies some of the key features of MARC to include:

1. Standardized Format: MARC records follow a standardized format, making it easy to share and exchange bibliographic data between different libraries and systems.

2. Interoperability: MARC records can be easily shared and integrated with other systems, promoting resource sharing and collaboration.

3. Flexibility: MARC is highly customizable, allowing libraries to tailor the format to their specific needs.

4. Bibliographic Control: MARC provides a structured way to describe and control bibliographic information, ensuring consistency and accuracy.

5. Support for Various Material Types: MARC can be used to describe a wide range of materials, including books, journals, manuscripts, and digital resources.

6. Faceted Searching: MARC's structured formats enable faceted searching, making it easier for users to find specific information.

7. Support for Authority Control: MARC enables the use of authority records to control and standardize headings, ensuring consistency in cataloguing.

MARC Formats:

A MARC format is a standard data format used to represent bibliographic information such as books, articles, theses, audiovisual materials and digital resources. It is a set of codes and content designators designed for encoding machine-readable records. MARC format enables the exchange and sharing of bibliographic data between libraries, institutions, and systems. It

provides a structured way to describe and catalogue resources, thereby facilitating resource discovery, cataloguing, metadata management and data exchange (Paradis, 2010; Frank &Poluta, 2015; Yale University Library, 2020).

MARC have evolved over and are continuously evolving., with different variants such as MARC 21, (used in the United States and Canada); UNIMARC (used internationally); UKMARC (used in the United Kingdom), CANMARK (Canadian MARC – a variant of USMARC, used in Canada); MARCXML (an XML schema for representing MARC data); MARC-8 (an 8-bit character encoding scheme, used for MARC records); BIBFRAME (Bibliographic Framework – a new bibliographic model, being developed by the Library of Congress, to replace MARC 21). MARC formats are used in various applications, such as: Integrated Library Systems (ILS), Online Public Access Catalogue (OPAC), Metadata management systems, and digital repositories ((Tillet, 2011; Quintana, 2013).

What is a MARC Record?

A MARCrecord is a standardized digital format for describing and cataloguing bibliographic resources, such as books, articles, and digital objects. MARC records enable efficient and standardized resource description, discovery and management, supporting information discovery and access. A MARC contains metadata or descriptive information about the resource, such as:

1. Title and author information
2. Publication details (date, place, publisher).
3. Physical description (format, pages, size).
4. Subject headings and keywords.
5. Note and abstracts.
6. Identifiers (ISBN, ISSN, etc.), and
7. Links to related sources (Library of Congress, 2019).

MARC records are used in libraries, archives, and other information institutions to organize and manage collections, provide discovery and access to resources, facilitate resource sharing and collaboration, and support research and scholarship. MARC records are created and

edited using specialized software and are often shared among institutions through services like OCLC WorldCat.

There are three main sections of a MARC record, namely leader, directory and variable field.

Leader: This is the shortest section in a MARC record. It consists of 24 sequential symbols or characters. Individual symbols or groups of symbols show different types of data in the record. Leader is the first part of a MARC record and occupies positions 00-23. It provides metadata about the record itself, rather than the resource being described. The leader contains essential information for processing and interpreting the record.

Directory: The directory is the second part of a MARC record, following the leader. It occupies positions 24-29 and provides a list of fields and their locations within the record. This record states the location of each variable field in the MARC record. It also sets the length of the record. The directory entry for every variable is only 12 character positions. All directories end with the presence of RS, which signifies the end of the record. The directory is essential for parsing and interpreting the MARC record, as it allows software to: locate specific fields; determine field boundaries; and extract and process field data. The directory is like a table of contents for the MARC record and guides the processing software through the record's structure and content.

Variable Field: In a MARC record, a variable field is a field that contains descriptive metadata about the resource being described.It is the most important element of the MARC record and isidentified by a three-digit tag (e.g., 245, 100, 650), and can have varying lengths. These fields are essential for providing detailed metadata about the resource, enabling discovery, and supporting cataloguing and classification processes. MARC records consist of tags, indicators, subfields and data.

Tags: This is a three-digit code identifying the type of data (e.g. title, author, publication date). It is also called the field code. A tag is the broadest variable field and has only one tag per section of a MARC record. They are followed by indicators and subfield codes. Every three-digit number stands for a certain aspect of an item's metadata. For example, a field marked 600 would contain items related to a personal name related to the item, whereas the 610 field is reserved for corporate or entity names, as an item can have more than one subject or author. These tags are repeatable in an item.

Indicators: They are optional clarifiers that follow tags. Indicators are one or two-digit codes providing additional information about the data. Indicators have two spaces, which may cause some to assume that an indicator is two digits, but each digit stands for a different clarification. Some fields use only the first or second indicator, while others use both indicator fields. If an indicator field is not used, it is filled by the number sign (#).

Sub-fields: Subfields are also called "delimiters" occasionally. They follow immediately after indicators. Sub-fields provide more specific information within a tag. There are two symbols in the subfield code. The first is the subfield symbol which is often delimited by dollar signs ($). The second is a lowercase letter of the alphabet or a number. After the subfields or delimiter code, the data entry of the subfield is given. In theory, the first subfield would be signified by "$a". However, sometimes, this subfield indicator is often omitted. The other subfield indicators are always used.

Data: This is the actual content of the field (e.g. title text, author name).

MARC 21:

There are several types of MARC formats designed by countries and library institutions. Each type serves a specific purpose in the cataloguing and management of library resources. We shall look at MARC 21 as one of the popular MARC formats.

MARC 21 was developed by American computer scientist, Henriette Avram in the 1960s when he was working with the Library of Congress. The intention was to create records that could be read by computers and shared among libraries. MARC 21 was designed to redefine the original MARC for the 21st century and to make it more accessible to the international community. MARC 21 format for bibliographic data contains format specifications for encoding data elements needed to describe, retrieve and control various forms of bibliographic materials (Library of Congress, 1996). It is an implementation of the international standard "Information documentation – Format for information exchange" (ISO 2709-1996) (ibiblio.org, 2020). It is a computerized method for recording the information needed in a cataloguing record: the descriptive cataloguing, subject heading and other access points, classification numbers and other call number information.The current standard was introduced in 1999 and has formats for the following types of data: Bibliographic format, Authority Format, Holdings Format, Community Format, and Classification Data Format. Currently, the MARC 21 format has been implemented successfully by the British Library, the European Institutions and the major library institutions in the United States, and Canada. The current maintenance agency for MARC 2 is the Library of Congress. There are five data contents of MARC 21 format (Librarianship Studies & Information Technology, 2021). They are represented hereunder:

S/n	Name	Description
1	Authority Records	Provide information about individual names, subjects and uniform titles. an An authority record establishes an authorized form of each heading, with references as appropriate from other forms of the heading.
2	Bibliographic Records	Describe the intellectual and physical characteristics of bibliographic resources (books, sound recordings, video recordings, etc.).
3	Classification Records	MARC records containing classification data. For example, the Library of Congress Classification has been encoded using the MARC 21 classification format.
4	Community Information Records	MARC record describing a service-providing agency, such as a local homeless shelter or tax assistance provider.
5	Holdings Records	Provide copy-specific information on a library resource (call number, shelf location, volumes held, etc.

Relationship Between MARC and RDA Cataloguing Standards

Oftentimes, confusion arises among inexperienced librarians and cataloguers on the differences between RDA and MARC as cataloguing standards. This necessitates the need to explain the relationship between the two cataloguing standards. It is important however, to make it clear that RDA and MARC are two separate but complementary standards that can be used together to create and exchange bibliographic records (Linkedin Library Management, 2024). MARC provides the structure and syntax for encoding the data, while RDA provides the rules and vocabulary for defining the data elements. Cataloguers therefore, use RDA to create metadata, and then encode that metadata using MARC standards, resulting in a MARC record that can be stored in a library catalogue or shared with other institutions. The relationship between the two can therefore be likened to, writing a letter (RDA), and putting it in an envelope with a specific format (MARC) so that it can be delivered efficiently. We shall explain the differences between the two standards in a tabular form.

Differences Between RDA and MARC

S/n	RDA	MARC
1	RDA is a content standard for descriptive cataloguing.	MARC is a format standard for encoding data.
2	It provides guidelines for creating metadata about resources.	It provides a structure for representing RDA metadata in machine-readable format.
3	RDA focuses on the resource attributes, such as title, author, and publication details.	MARC enables efficient storage, retrieval, and exchange of bibliographic data.
4.	RDA tells one what metadata to create (content).	MARC tells you how to encode that metadata (format).
5	RDA, like AACR2, provides the rules for creating descriptive metadata.	MARC provides the framework for encoding metadata in a way that can be understood by computers.

Benefits of RDA and MRC in the Organization of Resources in Libraries

By adopting RDA in the organization of resources, libraries can improve the quality, consistency, and discoverability of their metadata, enhancing the user experience and supporting the evolving needs of their communities. However, Panchyshyn, Lambert, & McCutcheon (2019) identified some of the specific benefits of RDA to include:

1. Improved Search and Retrieval: RDA enables more precise and flexible searching, making it easier for users to find relevant resources.

2. Enhanced Metadata: RDA provides more detailed and standardized metadata, allowing for better resource description and discovery.

3. Increased Interoperability: RDA facilitates data exchange and sharing between libraries and institutions, promoting collaboration and resource sharing.

4. Better Support for Digital Resources: RDA is designed to handle digital materials and non-traditional resources, and ensure accurate description and access.

5. Better Support for Linked Data: RDA is designed to facilitate the transition to linked data and semantic web technologies, enabling libraries to participate in the global data ecosystem.

6. Increased Accessibility: RDA places much emphasis on accessibility and inclusivity, ensuring that library resources are more accessible to diverse user communities.

Though a newer standard, the Bibliographic Framework (BIBFRAME) is being developed by the Library of Congress, Librarianship Studies and Information Technology (2021) notes that MARC remains a standardized format for cataloguing and sharing bibliographic data and offers the following benefits.

1. Standardization: MARC provides a common language and structure for cataloguing, which brings about consistency across libraries and library systems.

2. Machine-readability: MARC enables computers to easily read and process bibliographic data, facilitating automation and efficiency.

3. Flexibility: MAR accommodates various material types, including books, serials, audio-visual resources, and digital content.

4. Compatibility: MARC is widely adopted and compatible with various integrated library systems (ILSs) and cataloguing software.

5. Facilitates Resource Sharing and Supports Cataloguing of Non-traditional Materials: Like RDA, MARC facilitates resource-sharing programmes, such as interlibrary loans and consortia agreements. MARC can be used to catalogue a wide range of materials, including archival, digital, and special collections.

6. Legacy Data Compatibility: MARC allows libraries to maintain and upgrade existing cataloguing data, ensuring continuity and minimizing data loss.

Challenges of Adoption of RDA and MARC by Libraries

Considering the digital transformation and advancements in the use of digital resources and their numerous benefits**,** most academic libraries in Nigeria are desirous of adopting and implementing RDA and MARC for the organization of their information resources. However, Monyela (2023) has identified major problems facing African libraries and cataloguers in the adoption of RDA for the cataloguing of resources. Understanding the challenges will enable libraries to plan and address the obstacles they may face during the adoption and implementation process. Some of the challenges include:

Challenges Associated with RDA

1. Rigours in Learning: RDA requires a significant change in cataloguing mindset and practices, which cataloguers have to go through the rigours before learning it.

2. Increased Complexity: RDA focuses on relationships and entities, which can lead to more complex cataloguing decisions.

3. Compatibility Issues: Integrating RDA with existing MARC-based systems can be challenging.

Challenges Associated with MARC:

1. Data Conversion Complexities: Converting existing MARC data to new formats can be time-consuming and error-prone.
2. Limited Flexibility: MARC's rigid structure can make it difficult to accommodate new types of resources or metadata.
3. Technical Expertise: Implementing and working with MARC requires specialized technical knowledge, which can be a barrier to some libraries.

Shared Challenges:

1. Planning and preparation for adoption: One of the shared challenges for adopting and implementing RDA and MARC is the planning and preparations**.** Libraries are normally faced with the challenge of providing training and education for cataloguers and librarians on RDA and MARC principles and guidelines. This training can come in the form of workshops, webinars and online courses to ensure staff understand and get acquainted with the new standards and formats.

2. Data Migration and Conversion Processes: After system configuration, the next step is to plan and execute a data migration strategy to convert existing bibliographic records to RDA. In migrating the existing data, it is important to ensure that the migration process maintains the integrity and accuracy of the data.

3. Training and Support: The training and support may be in the areas of cataloguing principles and concepts, RDA rules and guidelines, RDA Toolkit and online resources, introduction to MARC formats and structure, MARC tags, indicators and subfields, integrating RDA and MARC in cataloguing workflows, using RDA to create MARC records, troubleshooting common issues and errors, among others.

4. Interoperability: This refers to the ability of different systems, applications or components to communicate, understand, and cooperate. Interoperability enables different entities to work together seamlessly, sharing and using data services. The challenge normally manifests in a lack of standardization and harmonization, different interpretations, incompatible legacy, and technical limitations arising from outdated systems and lack of technical infrastructure, thereby impeding interoperability.

5. Quality Control and maintenance procedures: It is necessary to establish quality control processes to ensure that RDA records and the MARC standard meet the required standards. Regular audits and reviews need to be performed to identify areas for improvement.

6. Cost: Implementing RDA and migrating to new MARC formats can be costly**.**

How can Libraries Overcome the Challenges?

To overcome the challenges associated with the adoption and implementation of RDA and MARC, libraries should take into consideration the following strategies:

1. Training and Education of Library Staff: Jin and Sndberg (2014) observe that RDA rules cannot be implemented without adequate training. Training of staff for the adoption and implementation of RDA and MARC is therefore not a choice but a necessity. Libraries should therefore provide intensive and comprehensive training and workshops for cataloguers and staff on RDA and MARC formats and updates. The specific training needs may vary depending on the library, its size and the existing cataloguing practices. The target audience may include cataloguing librarians and staff, metadata specialists and any staff involved in bibliographic data creation and management.

2. Gradual Implementation: The implementation process should be taken in phases, starting with specific material types or collections**.**

3. Access to RDA Toolkit: The beginning point of implementation is the acquisition/ subscription of the RDA Toolkit (Monyela, 2020).Libraries must ensure access to the RDA Toolkit and other resources for ongoing support. The Toolkit is subscribed online, while the print version is imported.

4. Community Engagement: For effective adoption and implementation, libraries must engage in open communication among staff, libraries and other stakeholders and participate in discussion groups and forums to share experiences and best practices.

5. Data Migration Planning: It is important that libraries develop a thorough and effective plan for data migration and conversion.

6. Resource Allocation: Libraries must ensure that adequate resources: money, time and staff are allocated for the adoption and implementation of the standard and format.

7. Evaluation: Libraries must devise procedures to regularly assess and evaluate the adoption and implementation process with a view to identifying areas for improvement.

Conclusion

The cardinal objective of any type of library is to acquire, process, prepare and make library resources easily available to users. Libraries overtime have devised various organizational methods and standards such as classification systems, subject headings and taxonomy, cataloguing and metadata standards, shelving and storage systems, digital resources management tools, discovery layers and search interfaces. Some of the major cataloguing codes and standards adopted by libraries overtime for the organization of information resources include AACR2, MARC and RDA. While the RDA as a cataloguing standard replaced AACR2 in 2013 and has been extensively adopted and implemented in advanced countries such as the US, UK and Canada, it is still a far cry in most Nigerian libraries. The paper has x-rayed the two cataloguing codes, highlighting their features, and benefits and identified challenges of their adoption in Nigerian libraries. It is hoped that addressing the challenges through suggested strategies will change the tone for easy cataloguing of information resources in particular and general information organization in Nigerian libraries.

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