DESIGNING A DIGITAL REPOSITORY FOR THE INDIAN KNOWLEDGE SYSTEM USING OMEKA S

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Abstract :

The Indian Knowledge System (IKS), a vast intellectual achievement spanning millennia, faces significant challenges in accessibility and preservation. This paper proposes the development of a centralized digital repository as a solution. It argues that Omeka S, a next-generation open-source platform is uniquely suited for this task due to its semantic web capabilities, multi-site architecture and robust digital curation tools. The essay outlines a phased implementation plan, from content digitization to public exhibition and evaluates both the significant advantages and the practical challenges of using Omeka.

Keywords : Indian Knowledge System, IKS, Digital Library, Omeka S

Introduction :

Indian civilization has produced a vast amount of knowledge over thousands of years. This includes not just philosophy and religion but also advanced work in mathematics, astronomy, medicine, architecture and the arts. However, this treasure of knowledge is often difficult to access. It is scattered across ancient manuscripts in various libraries, held in oral traditions or published in specialized academic papers that are hard to find.

A practical solution to this problem is to build a centralized digital repository, essentially a well-organized online library. This essay explains how a platform Omeka S would be an ideal tool for designing and developing such a repository for the Indian Knowledge System (IKS).

Historical foundations and evolution of indian knowledge system (IKS) :

The Indian Knowledge System (IKS) represents a vast and holistic framework of intellectual traditions. It has evolved over millennia in the Indian subcontinent. Its foundations are characterized by ancient origins, a rich interdisciplinary nature and a complex historical trajectory.

The Indian Knowledge System represents a profound and extensive collection of

knowledge, practices, and innovations that have been cultivated over millennia within India, encompassing diverse fields such as mathematics, astronomy, medicine, philosophy, and ecology (Kumar, 2024). This holistic system is deeply embedded in ancient texts like the Vedas, Upanishads, and Puranas, emphasizing an interconnectedness between all facets of existence and the universe (Sharma & Makhijani, 2023) (Mandavkar, 2023). The contemporary relevance of the Indian Knowledge System is underscored by its potential to address modern societal challenges, with efforts now focused on integrating these traditional insights into digital learning platforms (Khan & Sharma, 2024) (Maheshkumar & Soundarapandian, 2023). Table 1 describes the development in IKS on historical trimline;

Table 1: Historical Timeline of the Indian Knowledge System

Time Period	Key Developments	Major Contributions
Vedic and Post-Vedic Eras (c. 1500 BCE onwards)	Emergence of foundational philosophical and scientific thought recorded in Vedic literature.	Composition of the Vedas and Upanishads; early developments in metaphysics, astronomy, and mathematics.
Classical Period	Systematization of knowledge into distinct schools (Shastras) and disciplines.	Contributions by figures like **Aryabhata** (astronomy), **Panini** (linguistics), **Charaka** and **Sushruta** (medicine). Establishment of the **Gurukula** system of education.
Medieval to Pre-Colonial Era	Continuation and development of knowledge traditions through scholarly commentaries and institutions.	Influential texts like Kautilya's *Arthashastra* (statecraft) continued to be studied and applied.
Colonial Period (c. 19th Century)	Introduction of a Eurocentric educational model through policies like Macaulay's Minute (1835), leading to the marginalization of IKS.	Indigenous knowledge was devalued, creating a rupture in transmission and fostering an inferiority complex regarding traditional systems.
Post-Independence Revival (21st Century)	Rekindled academic interest and policy-driven efforts to reintegrate IKS, culminating in the **National Education Policy (NEP) 2020**.	

Need for Digital Preservation and Need of Digital Repository :

Given its immense historical depth, the digital preservation of the Indian Knowledge System is critical for ensuring its accessibility, preventing epistemic erasures, and facilitating future research and education (Dutta, 2019).

The main goal of Omeka S is to make knowledge accessible. Currently, if someone wants to study an ancient text like the *Arthashastra* or a medical treatise like the *Sushruta Samhita*, they face many hurdles. The original manuscripts might be fragile and stored in a restricted archive. Translations might be out of print or expensive. A digital repository solves this by:

- **Preserving** delicate materials through high-quality digital copies.
- **Organizing** scattered resources into a single, searchable website.
- **Connecting** related ideas. For example, a user could easily see how mathematical concepts from the Vedas influenced architectural designs for temples.

About the omeka project :

The Omeka project is a suite of open-source software tools designed to help cultural institutions, scholars, students and enthusiasts publish their digital collections and create rich online exhibitions. Its name comes from the Swahili word "omeka," meaning "to display or lay out wares," which perfectly captures its purpose: to showcase items of cultural or historical significance.

The project is led by the **Roy Rosenzweig Center for History and New Media (RRCHNM)** at George Mason University, with a strong commitment to making professional-quality digital archiving accessible to people without advanced technical skills. A key point about the Omeka project is that it offers two distinct platforms, each serving different needs:

- **Omeka Classic (The Original) :** This is the first version of Omeka. Think of it as a powerful, user-friendly tool for building a **single, focused digital collection or exhibition website. This is best for** Individual scholars, teachers, small museums, or specific projects that need one website.
- **Omeka S (The Scalable, Semantic Version): This** is the newer, more advanced version. The "S" stands for **Semantic** and **Scalable**. It's designed for institutions that need to manage **multiple websites and complex, interconnected data. This is best for** universities, large libraries, archives, and consortia that need to share resources across different departments or projects.

Omeka S, an open-source web publication platform, offers a robust framework for managing and disseminating complex digital cultural heritage collections, making it an ideal choice for this endeavour (Singh & Sharma, 2009). This platform's flexibility in handling diverse media types and its adherence to established metadata standards further enhance its suitability for curating the multifaceted resources of the Indian Knowledge System ("Can't Touch This: Digital Approaches to Materiality in Cultural Heritage," 2023). This platform, coupled with a robust digital preservation strategy, can address the critical need for a centralized, accessible, and sustainable framework for Indian cultural heritage, thereby mitigating the risks of loss and promoting wider engagement (Abdullah et al., 2024).

Features and capabilities of Omeka S :

Following are the feature and capabilities of Omeka S ;

1. **Core Architecture:**
- Multi-site management capability allowing one installation to power multiple independent websites
- Centralized shared item pool accessible across all sites while maintaining separate site identities
- RESTful API-driven architecture supporting seamless integration with external applications
- Modular extensibility through dedicated plugins for customized functionality

2. **Content Management:**
- Advanced item management system supporting diverse media types (images, documents, audio, video)
- Flexible item sets for logical grouping of related resources
- Custom resource templates enabling tailored metadata structures
- Batch processing capabilities for efficient bulk operations

3. **Metadata Framework:**
- Semantic web compatibility with Linked Open Data (LOD) support using RDF and JSON-LD
- Vocabulary management system supporting standard metadata schemas like Dublin Core
- URI management for persistent resource identification

4. **User Management:**
- Role-based permission system with granular access controls (Admin, Editor, Author, Reviewer, Researcher)
- Workflow management supporting collaborative content creation
- Group-based access restrictions for sensitive materials
- Comprehensive audit trails tracking all system activities

5. **Technical Capabilities:**
- Internationalization support for multi-language implementations
- Advanced search engine with faceted browsing and filtering
- IIIF (International Image Interoperability Framework) integration

6. **Interoperability:**
- JSON-LD output for machine-readable data exchange
- OAI-PMH provider support for metadata harvesting
- Standardized data export formats ensuring system compatibility
- Cross-platform integration capabilities with research tools

This comprehensive feature set establishes Omeka S as an enterprise-grade solution for managing complex digital collections while maintaining academic rigor and technical sophistication.

Omeka S modules and plugins :

Omeka S extends its core functionality through a modular system of plugins, which are add-ons that provide specialized features. These modules are essential for adapting the platform to specific project needs, particularly for complex domains like the Indian Knowledge System (IKS). Key modules include:

1. **CSV Import:** Allows bulk uploading of items and their metadata from spreadsheet files, crucial for populating a large IKS repository efficiently.
2. **Mapping:** Integrates interactive maps (like OpenStreetMap or Google Maps) to geolocate items, enabling users to visualize the geographical origins of manuscripts, artifacts, or historical sites.
3. **IIIF (International Image Interoperability Framework):** Supports the viewing of high-resolution images in a standardized way, ideal for displaying detailed manuscript pages or artwork with zooming and panning capabilities.
4. **Custom Vocabularies:** Enables the creation of controlled, predefined lists of terms (e.g., a list of IKS disciplines like *Jyotisha*, *Ayurveda*, *Vastu Shastra*), ensuring consistency in metadata tagging.

Implementation of Omeka S: a step-by-step plan for development :

Building this repository would involve a clear process, following phases describes the implantation for digital repository using Omeka S;

Phase 1: Planning and Scoping :

The initial phase involves strategic planning where domain experts, digital archivists and technical specialists collaborate to define the repository's scope. This includes selecting priority knowledge domains (e.g., beginning with Mathematics and Astronomy) for developing a customized metadata schema aligned with IKS terminology and establishing content acquisition guidelines. Key deliverables include a detailed project charter, metadata standards document and a phased content strategy outlining which texts, artifacts and resources will be digitized first.

Phase 2: Installation and Setup of Omeka S :

The implementation begins with technical installation, which requires a LAMP/LEMP stack (Linux, Apache/Nginx, MySQL, PHP). Omeka S can be installed on a physical server or cloud infrastructure. Key steps include:

- Downloading the latest version from the official website
- Configuring the web server (virtual host setup, permissions)
- Creating and configuring the MySQL database
- Setting up environment variables and file permissions
- Running the installation wizard for basic configuration

Post-installation, administrators configure :

- Site information and global settings
- SSL certificate implementation
- Backup and recovery procedures
- Performance optimization (caching, CDN integration)

Customization of Themes :

Omeka S supports extensive theme customization to align with institutional branding:

- Selection from official and community-developed themes
- CSS customization for colours, fonts, and layout modifications

Phase 3: Content Digitization and Population :

This implementation phase focuses on the systematic digitization and metadata enrichment of IKS materials. The workflow involves:

Digitization Process :

- High-resolution scanning of manuscripts and texts
- Photography of artifacts and historical objects
- Audio-visual recording of oral traditions and performances
- Quality assurance checks for all digital assets

Metadata Application :

- Uploading digitized content as Omeka S items
- Applying standardized metadata using predefined templates
- Adding IKS-specific descriptors and taxonomic classifications
- Implementing quality control through peer-review mechanisms

Content Organization :

- Creating logical item sets and collections
- Establishing relationships between interconnected knowledge elements
- Implementing version control for scholarly editions
- Ensuring cross-referential integrity across the knowledge system

This phase transforms physical and knowledge resources into semantically rich digital objects, creating the foundational content layer of the repository.

Phase 4: Curatorial Exhibitions and Public Engagement :

This final implementation phase focuses on transforming archived content into engaging educational experiences using Omeka S's exhibition tools:

Exhibit Development :

- Create narrative-driven virtual exhibitions like "Surgical Tools in Ancient India"
- Combine items with contextual explanations, scholarly commentary, and multimedia
- Design thematic pathways exploring specific IKS concepts chronologically or conceptually

Presentation Features :

- Utilize Omeka S's built-in exhibit builder with layout options
- Incorporate interactive timelines and geographical mappings
- Implement multilingual support for broader accessibility

This phase ensures the repository evolves from a digital archive into an active educational platform, making IKS accessible and meaningful to diverse audiences through curated storytelling and scholarly interpretation.

Advantages of a digital repository using Omeka S :

1. **Structured and Meaningful Organization :** Unlike a simple website or cloud storage, Omeka S uses rich, standardized metadata (Dublin Core) and allows for custom fields. This means each item (manuscript, image, video) is described in a detailed, consistent way, making the collection professionally searchable and manageable.

2. **Interconnected Knowledge :** A major advantage is the ability to create meaningful links between items. You can show how a philosophical concept from one text relates to a medical practice or an architectural principle in another. This reveals the deep connections within IKS, which are often lost when knowledge is siloed.

3. **Scalability and Centralized Management :** Omeka S can run multiple, distinct websites from a single installation. An institution could have one site for Ayurveda, another for Sanskrit literature, and a third for students, all sharing the same central pool of digital items. This is efficient and ensures consistency.

4. **Enhanced Discovery and Accessibility :** The repository makes fragile and rare materials accessible to a global audience 24/7. Powerful search and filtering tools help users find exactly what they need, while curated online "exhibits" can guide them through complex topics with narrative context.

5. **Collaborative and Sustainable :** The built-in user roles (Admin, Editor, Author) allow scholars, librarians, and domain experts to collaborate on content creation and curation securely. Being open-source software, it avoids vendor lock-in and can be maintained cost-effectively over the long term.

Omeka S doesn't just store files; it builds a dynamic, interconnected web of knowledge that preserves context, enhances research, and makes heritage accessible to all.

Technological infrasture for Omeka S :

Building a digital repository with Omeka S requires a specific technological stack. Table 2 providing the technological requirement for deployment of Omeka S based digital repository.

Table 2. Summary of the core system requirements for an Omeka S installation

Component	**Minimum Requirement**
Operating System	Linux
Web Server	Apache (with mod_rewrite enabled)
Database	MySQL 5.7.9+ or MariaDB 10.2.6+
Programming Language	PHP 7.4+ (PHP 8.4 is not yet supported)
Image Processing	ImageMagick (v6.7.5+) or PHP's GD library

Challenges in implementing a digital repository with Omeka S :

While a digital repository using Omeka S offers significant benefits for preserving the Indian Knowledge System (IKS), its implementation faces several challenges. The project is technically complex which requiring specialized expertise for setup and maintenance and the process of digitizing physical materials and creating detailed metadata is highly resource-intensive. Significant hurdles also exist in standardizing the diverse concepts of IKS into structured digital formats without losing their original context. Furthermore, navigating intellectual property rights for ancient texts and their modern interpretations along with ethical considerations regarding culturally sensitive knowledge, presents legal and ethical complexities. Finally, ensuring the long-term sustainability of the repository, including ongoing funding, technical updates and continuous community engagement, is a critical challenge that must be addressed for the digital repository project's lasting success.

Conclusion :

In summary, the Indian Knowledge System is a priceless heritage that deserves a modern home. Using Omeka S to build a digital repository is a practical and powerful way to achieve this. It would transform scattered information into an interconnected, accessible, and lasting resource. This would not only preserve the past but also inspire students, researchers, and the general public to explore and appreciate the depth of Indian knowledge for generations to come.

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