Article

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Development of Customized Project Management Methodology for the Implementation of Online Archives Exhibitions: Insights and Evaluation from a Research and Development Organization

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Abstract: This study explores the development of a customized project management methodology tailored for the implementation of online archives exhibitions, offering insights and evaluation derived from a research and development organization. Recognizing the distinctive requirements of such projects, the research investigates the design and application of a specialized project management approach. Through a comprehensive analysis, this study presents key insights into the methodology's efficacy and evaluates its impact within the unique context of a research and development setting. The findings contribute valuable perspectives to the evolving field of project management, particularly in the realm of digital exhibition development within innovative organizational environments.

Keywords: project management methodology; online archives exhibition; archives; astronomy and astrophysics; cultural heritage preservation

1 Introduction

The promotion of archives is a comprehensive effort directed towards increasing awareness and utilization of archival services and content. This involves strategic marketing initiatives, educational outreach, and advocacy campaigns to underscore the intrinsic value of preserved records. By highlighting the wealth of historical, cultural, and informational resources housed within archives, promotion endeavors aim to attract diverse audiences, including researchers, students, and the general public. The goal is to foster a deep appreciation for the importance of preserving and accessing archival materials, positioning archives as vital repositories of collective memory and cultural heritage. Through effective promotion, archives can engage a broader audience, ensuring their continued significance and contribution to knowledge and understanding (McBride 2019). Archival exhibitions represent one method employed to promote archival records and services. The primary objective of these exhibitions is to offer the general public or researcher an opportunity to explore and discover the unique and historically significant items on display. Physical exhibits of historical records in archives, museums, and libraries are constrained by their limited geographic accessibility, often only open during set hours. To access these materials, visitors must physically journey to specific locations in particular cities or countries.

The integration of digital technology has greatly expanded the inherent value of archives, heritage institutions, and diverse content by transcending the constraints of physical space and time. Online archival exhibitions are digital presentations of historical materials such as documents, photographs, artwork, and multimedia, providing a virtual platform for global interaction and accessibility. Online exhibitions provide a valuable and streamlined alternative, overcoming the limitations of offline displays while also facilitating high levels of user engagement (Roberts et al. 2018). Presently, archivists and museum professionals are harnessing the advantages of online exhibitions for educational purposes. Mobile technology and the broad availability of mobile devices that can handle multimedia content online as well as offline make online exhibitions more feasible. Many professionals

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engaged in creating online archival exhibitions often lack structured approaches while executing the project. A considerable body of prior research has extensively examined the design and technical dimensions of online exhibitions (Chee Khoon, Ramaiah, and Foo 2003; Foo 2010). Surprisingly, there exists a significant gap in the literature regarding the procedural aspects of implementing online archives exhibitions. The absence of studies addressing the implementation process highlights the need for focused research in this area to better understand and guide the successful execution of online archival displays. In the framework of a commemorative effort, this paper offers the author's experiences in a methodical manner, describing the creation of customized project management methodologies and the design of an exhibition portal.

2 Review of Literature

Archives preserve an organization's history, documenting its activities and progress, and are found in institutions such as universities, government bodies, corporations, and cultural heritage organizations (Tansey 2016). They range from single drawers in small libraries to entire departments in larger institutions or independent repositories (Welsh and Wright 2010). Archival materials, including organizational records, personal correspondence, news clippings, public records, and visual representations, convey significant societal events, historical moments, anniversaries, influential individuals, and institutions (Allyn, Aubitz, and Stern 1987). Archives serve two essential functions: safeguarding information for future use, managing the increasing volume of data, and carefully selecting records to preserve long-term while discarding those that cannot be stored permanently (Čtvrtník 2023). The primary objective of archival processing is to facilitate the use of archives, with other functions supporting this goal (Greene and Meissner 2005). Information professionals must understand their role beyond sorting, storage, and retrieval; they should identify and engage with users' needs and requirements (Jain et al. 1999).

Organizing exhibitions with photographs, documents, and maps can ignite interest in record preservation and highlight its educational value. These exhibitions aim to make collections more accessible, educate them about cultural heritage, and complement traditional textbooks and scientific publications (Allyn, Aubitz, and Stern 1987). They offer dynamic interpretations of collections, combining leisure and education, attracting new visitors, and serving as promotional events. Exhibitions optimize events, engage audiences, enable interactive contact, and achieve communication goals (Dudley 1990). Museums and archives have long curated temporary exhibitions, evolving with the advent of the Internet (Mateos-Rusillo and Gifreu-Castells 2016). Technological advancements enable archives to use exhibitions to reinterpret history, bridge gaps between scientists, research, and institutions, and showcase scientific archives and research-based collections (Gül Durukan and Akmehmet 2020). Online exhibitions offer a cost-effective alternative to traditional displays, overcoming time, space, and location constraints. They provide 24/7 access, eliminate travel needs, reduce maintenance costs, and simplify content updates (Ramaiah 2007). Online exhibitions include notable events, anniversaries, themes, treasures, and special collections (Kalfatovic 2002). They engage learners, enhance motivation, provide global access, foster interactive learning, and promote collaboration (Hackenbroich, Taylor, and Williams 2023; Myers 2000; Roberts et al. 2018; Shaura et al. 2022). Virtual exhibitions transcend physical limitations, allowing multiple visitors to access the same item concurrently and ensuring broader public outreach (Noor and Grataridarga 2019). Libraries, archives, and museums increasingly use online exhibitions to boost accessibility and engagement, requiring ongoing maintenance, staff knowledge retention, and regular updates to stay relevant (Hackbart-Dean, Barcelona, and Hamilton-Brehm 2023).

A substantial body of literature explores the use of various technologies, including HTML, DHTML, CSS, XML, and RDF, in the context of archive exhibitions. To effectively utilize these tools, archivists need a robust skill set in coding to navigate and manipulate these technologies for creating engaging and user-friendly archive exhibitions (Martini et al. 2016). However, because online exhibitions function as multimedia websites, content management tools can be used to build these platforms without coding from scratch. Content Management Systems (CMS) like Drupal, WordPress, Joomla, and Django CMS streamline the process of editing, publishing, modifying, and managing web content, saving time and eliminating the need for advanced coding skills (Singh and Kumar 2020). Among these, Drupal stands out for its adaptability and modularity, which, supported by a large community of developers, enhances its ability to efficiently manage text, images, and multimedia (Mohorovi, Tijan, and Cisic 2010). Open-source CMS platforms, such as Drupal, allow code modification and benefit from a supportive community, contributing to their reliability and usability (Saha and Poray 2020).

Archivists encounter various challenges, including skill, knowledge, and resource disparities in the archival enterprise (Hickerson 2001). The ongoing evolution of digital technologies prompts discussions on the evolving skills and knowledge needed by archival professionals (Anderson 2007; Cox 2006; Turner 2008; Yakel 2004).

Also, exhibition work faces a recurring challenge as certain administrators underestimate the effort invested. Archivists and faculty-status librarians often lack recognition in merit and promotion for their exhibition contributions. Novara and Novara assert that exhibits continue to be undervalued in scholarly communication for academic librarians, archivists, and curators (Novara and Novara 2017). Recently during the COVID-19 pandemic, "digital humanism" gained widespread acceptance, impacting the cultural sector. Innovations like online exhibits proved beneficial for accessing, marketing, and appraising cultural assets, particularly during global closures (Kraner 2020). Museums and archives globally, forced to temporarily shut down, prompted a reassessment of visitor experiences. Exhibition officers and curators had to create technologically mediated exhibits and new web-based content. The pandemic accelerated the allocation of funds for digital transformation in archives and libraries, as experts note (Ciurea and Oprea 2022; Frederick and Wolff-Eisenberg 2020; McGrath 2020). Faced with these challenges, archivists seek to minimize project costs and efforts. In response to the complexities and resource constraints, archivists are compelled to find efficient strategies and methodologies that streamline processes, ensuring optimal use of resources while achieving any project goals. Archivist domains face numerous challenges, prompting the need to consider adopting initiatives or projects that require minimal cost and effort. This necessitates the utilization of existing reusable components such as processes, methodologies, templates, and frameworks, rather than starting from scratch. By sidestepping the need to reinvent established approaches, information professionals can gain advantages from utilizing project management methodologies to effectively execute projects (Arumugam and Padma 2017).

Several scholars emphasize the importance of integrating project management practices into information portals, such as online exhibitions, to ensure project success (Campbell-Meier 2008; Greene 2010). Drawing on past experiences helps select appropriate methodologies, design implementation plans, and assign tasks efficiently. Prioritizing team well-being creates a supportive environment that enhances commitment and increases the likelihood of project success (Klaus-Rosińska and Pliński 2023). Serving as project managers, archivists need a methodology to guide and track projects. They can either adopt existing methodologies for a fee or develop a custom approach. However, no universal project management methodology fits all projects across different sectors, and existing standards often have limitations (Charvat 2003; Cockburn 2000). Customizing a methodology is essential for maximizing efficiency and enhancing project success. Failure to use a project management methodology (PMM) can jeopardize an organization's knowledge management, repeatability, comparability, quality standards, and overall effectiveness (Whitaker 2014). Since a custom project management methodology for online archive exhibitions does not exist, the authors propose their six-step process, validated through a case study at a research and development organization in India, to help archivists effectively manage online archive implementation projects.

3 Research Methodology

This research unfolded in three successive stages: (1) creating a customized project management methodology for online archive exhibitions; (2) executing the proposed methodology through the implementation of an online archive exhibition portal in an organization; and (3) evaluating the effectiveness of the proposed methodology.

In the initial phase, the authors devised a customized project management methodology for online archive exhibitions through collaborative brainstorming sessions. To stimulate idea generation and gather input from experts in related fields, the Crawford Slip Method, introduced by C. C. Crawford (Ballard and Trent 1989), was employed. This straightforward yet effective brainstorming approach facilitates the spontaneous generation of ideas, concepts, and expressions relevant to the research (Arumugam and Padma 2017). It involves gathering ideas from diverse participants and quickly organizing them into categories using pieces of paper, typically sticky notes. This method not only yields multiple solutions but also actively engages participants, making them feel that their contributions are valued. The focus of the study was exclusively on the online archives exhibition of the Indian Institute of Astrophysics. During the brainstorming session, 13 experts with backgrounds in website development, content curation, archives, and exhibition management contributed to the establishment of customized project management methodology to implement the online archive exhibition. User responses were documented and utilized to formulate this methodology in a Word document. The efficacy of this methodology was subsequently put to the test in the next phase, where it was applied to construct the IIA Online Archives Exhibition. Other institutions can also adopt and adapt this project methodology by following a similar procedure.

In the second phase, an extensive catalogue of archived materials was initially compiled. Subsequently, a thorough review was conducted in collaboration with the archival management team to assess and refine the aforementioned list. The team then meticulously gathered and organized

photographs from the IIA archives and conducted a comprehensive reevaluation of the archival materials in partnership with library staff. Metadata was subsequently generated for each archival item. High-quality scanning techniques were employed to digitize images, newspaper clippings, and other documents, with each item marked with a watermark denoting its source as the "©IIA Archives." Following the completion of these tasks, the IIA online archives exhibition portal was developed using Drupal, in conjunction with the IIA50 events portal. Numerous iterations and testing phases were carried out during the website's development. The official launch of this portal took place as part of the IIA50 Golden Jubilee year celebration.

In the third phase, the authors utilized a survey method to evaluate the effectiveness of the tailored project management methodology. Feedback was gathered from the team involved in implementing the online archives exhibition portal, using a thoughtfully crafted survey created on Google Forms. The collected data underwent quantitative analysis in Excel to extract meaningful insights and draw conclusions.

4 Results and Discussion

The research outcomes were categorized into three key segments:

(1) Development of customized project management methodology for online archives exhibition:
In this phase, the study focused on constructing a tailored project management methodology specifically designed for orchestrating online archives exhibitions. The objective was to create a framework that seamlessly integrates with the unique requirements and intricacies of curating and presenting archival content in a digital format.

(2) Execution of customized PM methodology through the development and launch of the online archives exhibition portal:
This part of the study delved into the practical implementation of the customized project management methodology. It involved the actualization of the developed framework in the creation and deployment of an online portal dedicated to archives exhibitions. The emphasis was on applying the methodology to navigate the challenges inherent in the digital presentation of archival materials.

(3) Evaluation of the proposed online archives exhibition project management methodology:
The study also included an evaluative component, where the efficacy and efficiency of the tailored project management methodology were scrutinized. This phase sought to assess the methodology's performance in achieving the goals of the online archives exhibition project. The evaluation encompassed aspects such as adaptability, resource optimization, and overall success in meeting the intended objectives.

4.1 Development of Customized Project Management Methodology for Online Archives Exhibition

As a result of this study, we developed a customised project management methodology for an online archive exhibition. This includes activities and deliverables of each phase. During the brainstorming session, participants employed the Crawford Slip Method (Ballard and Trent 1989) to generate a plethora of sticky notes, as illustrated in Figure 1. This method facilitated the collection of numerous ideas and inputs, enabling participants to efficiently capture their thoughts and suggestions. The sticky notes were then meticulously arranged based on their relevance and importance. Through a consensus-driven approach, the participants finalized the user-generated ideas during this session.

Figure 2 provides a detailed view of the inputs gathered during the brainstorming session aimed at developing custom project management methodologies for an Online Archives Exhibition. Out of a total of 162 slips generated from brainstorming, 71 were selected as required activities and deliverables, while the remaining slips were identified as duplicates or outside the project's scope. The selected 71 slips were further categorized into 43 activities and 28 deliverables, essential for the successful implementation of the Online Archive Exhibition portal. This selection process was a collaborative effort, with all participants agreeing on the significance of these activities and deliverables (Bryson et al. 2004). Consequently, the resulting custom project management methodology was tailored to address the specific needs of the Online Archive Exhibition portal implementation, ensuring a structured and effective approach to the project. These inputs were documented and synthesized into a cohesive methodology to streamline project management processes for online archive exhibitions. By formalizing these insights into a structured framework, the methodology facilitates apparent oversight, systematic planning, and efficient resource allocation throughout the project lifecycle (PMI 2017). This approach enhances organizational efficiency and supports the preservation and accessibility of archival materials in digital formats, catering to diverse audiences and scholarly communities.

Figure 1: Sticky notes generated during the brainstorming (Crawford Slip method).

Steps	Activities			Deliverables		
	Selected	Rejected	Total	Selected	Rejected	Total
Requirements gathering and analysis	**9**	11	20	**5**	7	12
Prepare project plan	**4**	7	11	**4**	6	10
Define content, metadata and identify software	**10**	9	19	**5**	6	11
Design and build	**8**	8	16	**4**	8	12
Testing	**5**	7	12	**3**	3	6
Launch	**7**	8	15	**7**	11	18
Total	43	50	93	28	41	69

Figure 2: Activities and deliverables slips collected during CSM brainstorming session.

The collaborative brainstorming session yielded a comprehensive and structured approach to managing the Online Archives Exhibition project, as depicted in Figure 3. The activities and deliverables identified were meticulously documented and organized within a Word document, forming the foundation of the project's methodology. This methodology, developed through consensus-driven discussions and collaborative efforts, provides a step-by-step guide to project management, ensuring that all critical aspects are thoroughly addressed (Kerzner 2017). The approach outlined in Figure 3 is designed to guide project managers through the various stages of the Online Archives Exhibition project, from initiation to closure, thereby ensuring a systematic and efficient project management process. The methodology consists of several key stages: project initiation, planning, execution, monitoring and control, and closure. Each stage is further divided into specific tasks and activities essential for successfully managing the Online Archives Exhibition project. Project managers (librarians or archivists) can ensure effective planning, streamlined execution, continuous monitoring and control, and smooth project closure (PMI 2017). The results of the brainstorming session and the subsequent development of the project management methodology demonstrate the effectiveness of collaborative and consensus-driven approaches in project management. The methodology provides a roadmap for project managers to navigate the complex process of managing an Online Archives Exhibition project, ensuring that all critical aspects are covered and the project is delivered on time, within budget, and to the required quality standards.

The requirements gathering and analysis phase begins with requirement gathering sessions to identify the exhibition's topics, objectives, involved subjects, target audience, feasibility assessment, timeline, and potential challenges. It includes a needs assessment, feasibility study, stakeholder identification, and requirements analysis. Deliverables from this phase include detailed specifications, a requirements document, a user acceptance plan with test cases, a use case email, and an approval note, ensuring project clarity and approval. These steps establish a thorough understanding of project needs and feasibility, providing a solid foundation. Critical tasks such as identifying users, preparing an event charter, developing a testing plan, and securing necessary

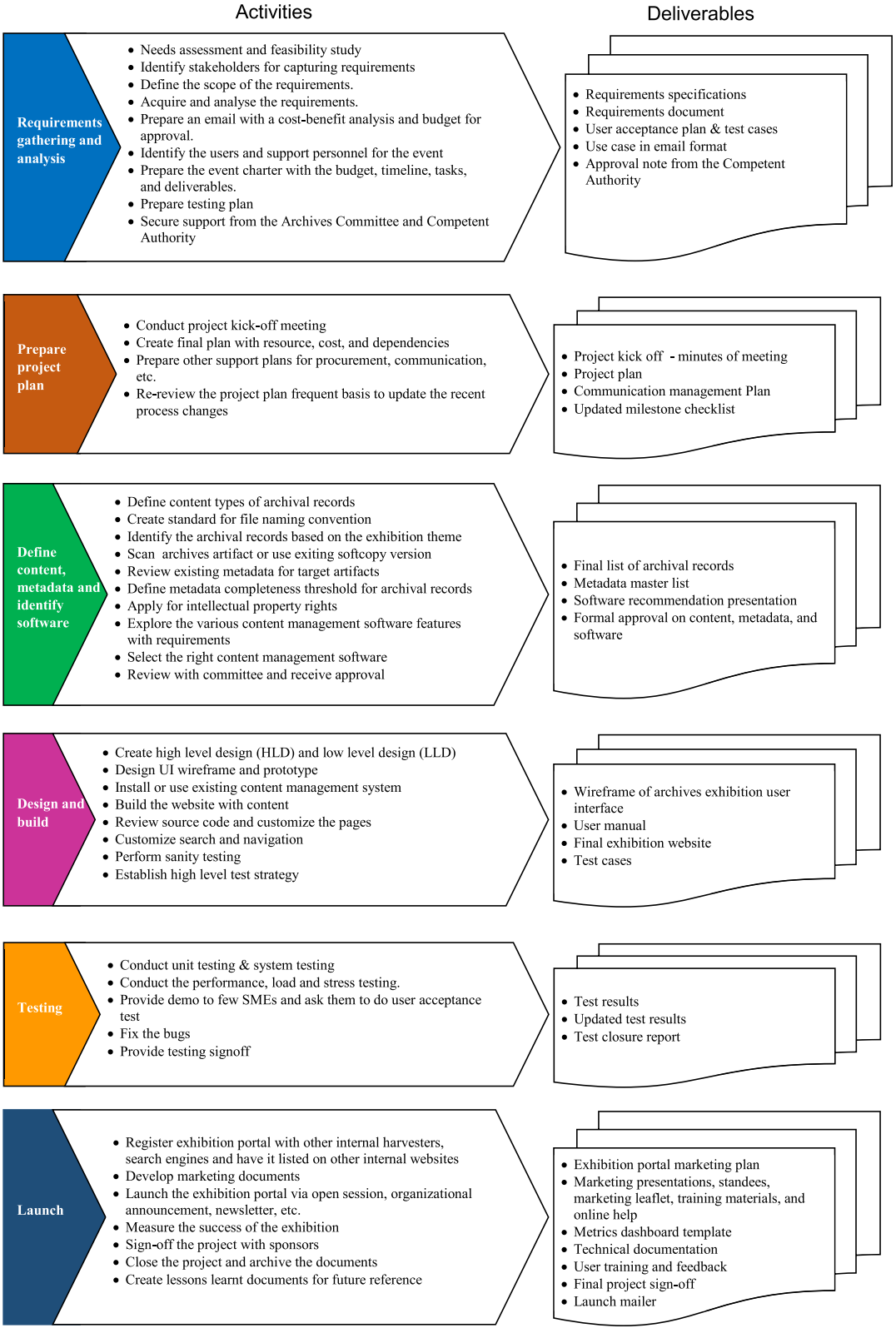


Figure 3: Customized project management methodology developed for online archives exhibition.

support are essential for successful project execution and closure (Pinto 2019).

Ensuring the refinement of the concept and rigorous feasibility assessment during project planning is pivotal for the success of the Online Archives Exhibition. Initiating a comprehensive project kick-off meeting and detailed planning establishes a robust execution framework. This is complemented by effective procurement and communication strategies, enhancing operational efficiency and stakeholder engagement. Continuous reviews of the project plan ensure adaptation to evolving needs, with critical outputs including meeting minutes, the finalized project plan, a communication strategy, and updated milestones. This systematic project management approach amplifies the exhibition's impact and ensures alignment with strategic goals, meticulously detailing all implementation steps required in this phase.

In the subsequent phase of the methodology, the focus shifts towards defining and preparing archival records and metadata, crucial for laying the groundwork for the portal's successful development (Pacheco, Da Silva, and De Freitas 2023). Activities include delineating content types of archival records, establishing a standard file naming convention, identifying records aligned with the exhibition theme, digitizing archives or utilizing existing digital copies, reviewing metadata, setting completeness thresholds for metadata, securing intellectual property rights, assessing features and requirements of content management software, selecting appropriate software, and seeking committee approval. Key deliverables from this phase encompass a finalized list of archival records, a comprehensive metadata master list, a presentation recommending suitable software, and formal approval of content, metadata, and software choices. This phase is pivotal in ensuring precise definition, preparation, and management of archival records and metadata, establishing a robust foundation for subsequent portal development and implementation.

The design and build phase of the methodology is pivotal for translating the project plan into actionable steps. This phase commences with the creation of high-level design (HLD) and low-level design (LLD), which serve as foundational blueprints guiding the development of the exhibition's architecture and functionality. The design team meticulously crafts UI wireframes and prototypes to refine the user interface (UI), prioritizing usability and aesthetic appeal (Pressman and Maxim 2020). Central to this phase is the deployment or configuration of a content management system (CMS) to streamline content organization and management, crucial for efficient project execution. During website construction, content creation aligns closely with the exhibition's strategic goals and anticipated visitor experience. Source code undergoes rigorous review and customization to ensure it meets project specifications, optimizing both functionality and performance. Customization of search and navigation features enhances user engagement and accessibility, supported by thorough sanity testing to identify and resolve initial defects. A structured high-level test strategy is established to validate the website's functionality against predefined criteria, ensuring robustness and reliability in user interactions. Deliverables from this phase include a detailed wireframe of the archives exhibition UI, a comprehensive user manual for content management and website operation, the final exhibition website presenting curated content, and a suite of exhaustive test cases for ongoing quality assurance and maintenance. This phase not only focuses on achieving tangible outcomes but also underscores the iterative nature of development. Continuous monitoring and adjustment of activities ensure alignment with project objectives and stakeholder expectations, reinforcing a solid foundation for subsequent phases. By adhering to a structured approach in design and build, the Online Archives Exhibition is poised to achieve its intended goals effectively.

During the testing phase of the online archives exhibition methodology, all aspects of the web application's functionality undergo rigorous evaluation to ensure optimal performance in usability, compatibility, security, and overall user experience. This phase is crucial for verifying and validating project deliverables according to the approved test plan document. Activities include thorough unit and system testing to validate both individual components and integrated system functionality. Additionally, performance, load, and stress testing assess the application's resilience under various conditions, ensuring it can handle expected user traffic and data loads effectively. User acceptance testing with subject matter experts (SMEs) provides essential feedback for refining usability and functionality, with identified issues and bugs systematically addressed through iterative processes. Formal testing signoff signifies readiness for deployment and operational use. Deliverables include detailed test results, updated findings from bug fixes and improvements, and a comprehensive test closure report, ensuring technical robustness and reliability while setting a clear path for maintenance and future enhancements.

In the final phase of the methodology, the focus is on preparing for and successfully launching the online archives exhibition portal. Activities include registering the portal with internal harvesters and search engines to maximize visibility, while developing comprehensive marketing materials such as presentations, standees, leaflets, and training resources to promote the exhibition. The portal launch is orchestrated through open sessions, announcements, and

newsletters to engage stakeholders. Post-launch, success metrics are used to evaluate visitor traffic, engagement, and satisfaction, informing ongoing improvements. Formal sign-off from sponsors signifies alignment with project objectives, followed by systematic archiving of documents and documentation of lessons learned for future projects. This phase underscores meticulous planning, strategic marketing, rigorous evaluation, and structured closure to ensure the exhibition achieves its goals effectively, enhancing its impact and legacy through continuous improvement aligned with industry standards in digital content management and exhibition development.

4.2 Implementation of Customised Project Management Methodology by Development and Launch of Online Archives Exhibition Portal

The archival records selection and digitization process underwent a comprehensive five-phase approach (Figure 4), ensuring a meticulously organized and engaging user experience centred around our archives and the theme. In the Conceptualization Phase, the theme "Memories of IIA" was carefully selected to showcase pivotal moments and achievements from the Indian Institute of Astrophysics' history. This thematic foundation guided the subsequent phases, influencing the selection and presentation of archival content. Moving to the Identification Phase, extensive efforts were devoted to pinpointing specific records that best aligned with the chosen theme, offering valuable insights into the institution's evolution and contributions. During the Segregation Phase, the identified records underwent systematic categorization based on their types, including photographs, manuscripts, letters, and research papers. This categorization streamlined the content organization, facilitating intuitive navigation and exploration for users. The Digitization Phase involved a meticulous process of converting selected records into high-quality digital formats to ensure their preservation and accessibility online. Each digitized record was marked with copyright information, denoted as "© IIA archives," to uphold intellectual property rights and provide proper attribution. In the Enrichment Phase, comprehensive metadata such as titles, descriptions, dates, and keywords were meticulously added to enrich each record. This metadata not only enhanced the discoverability and accessibility of the archives but also facilitated a coherent and structured presentation within the online archive exhibition portal. This structured Content Curation Framework significantly contributed to the systematic organization and accessibility of our archival content, culminating in a rich, engaging, and user-friendly online exhibition experience. By following these phased approaches, the Online Archive Exhibition portal serves as a valuable repository for users to delve into the profound historical and scientific legacy of the Indian Institute of Astrophysics, fostering a deeper understanding and appreciation of its contributions to astronomy and beyond.v

The creation of the Online Archives portal served as a pivotal component within the comprehensive IIA50 platform, specifically crafted to celebrate the Institute's golden jubilee. Utilizing Drupal as our robust content management system, we meticulously curated a diverse and extensive collection of digital archival records (Daradimos, Vassilakis, and Katifori 2008). Each record was thoughtfully presented using custom HTML and CSS coding, ensuring a visually appealing and user-friendly interface. The utilization of Drupal, combined with a WYSIWYG (What You See Is What You Get) HTML editor, greatly simplified webpage creation and updates for library and archives staff with minimal coding knowledge. This user-friendly tool allowed staff to manage website content efficiently, ensuring accurate and visually appealing presentations (Bascones and Carreras 2012). The technology enabled independent updates, adding

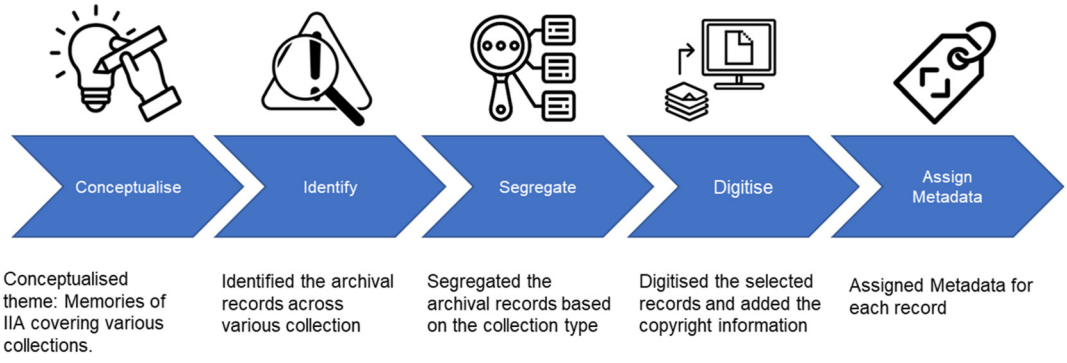


Figure 4: Content curation framework for online archive exhibition.

new records, and prompt adjustments, keeping the archive current and relevant. By democratizing content management, archivists and librarians could apply their expertise directly, enhancing digital presentation. Our team prioritized enhancing user experience and ensuring seamless functionality throughout the iterative design and rigorous testing phases. This iterative process involved continuous adjustments to optimize navigation pathways, improve accessibility features, and enhance overall usability. A critical strategic decision was to treat the development of the Online Archives Exhibition as a separate project distinct from the broader IIA50 event website. This approach enabled us to focus explicitly on meeting the exhibition's unique requirements and designing a tailored user interface that effectively showcased the historical significance embedded within the Institute's archives. User testing played a crucial role in shaping the portal's development. Insights gathered from diverse users provided valuable feedback that informed iterative improvements, enhancing the portal's intuitiveness and engagement levels. This user-centered approach validated our design decisions and ensured that the Online Archives portal seamlessly complemented and enriched the commemorative efforts of IIA50. By serving as a comprehensive digital repository, the Online Archives portal is a valuable resource for visitors to explore and appreciate the Indian Institute of Astrophysics' rich historical legacy. Through curated exhibits, interactive features, and accessible navigation, the portal continues to preserve and promote the Institute's profound contributions to astronomy and scientific research.

The online exhibition (Figure 5), accessible via the IIA website under "Past Events" and integrated with the IIA50 website, is organized into two main components: "About the Exhibition" and "Browse by Theme." It includes several themes: "IIA through the Years," "Visits," "Astronomers," "Instruments," "Newspaper Clippings," "Correspondence," "Total Solar Eclipse," and "Videos." The "IIA through the Years" theme features 24 historical photographs, handmade paintings, and sketches illustrating various IIA structures from 1792 to 2008 in both colour and

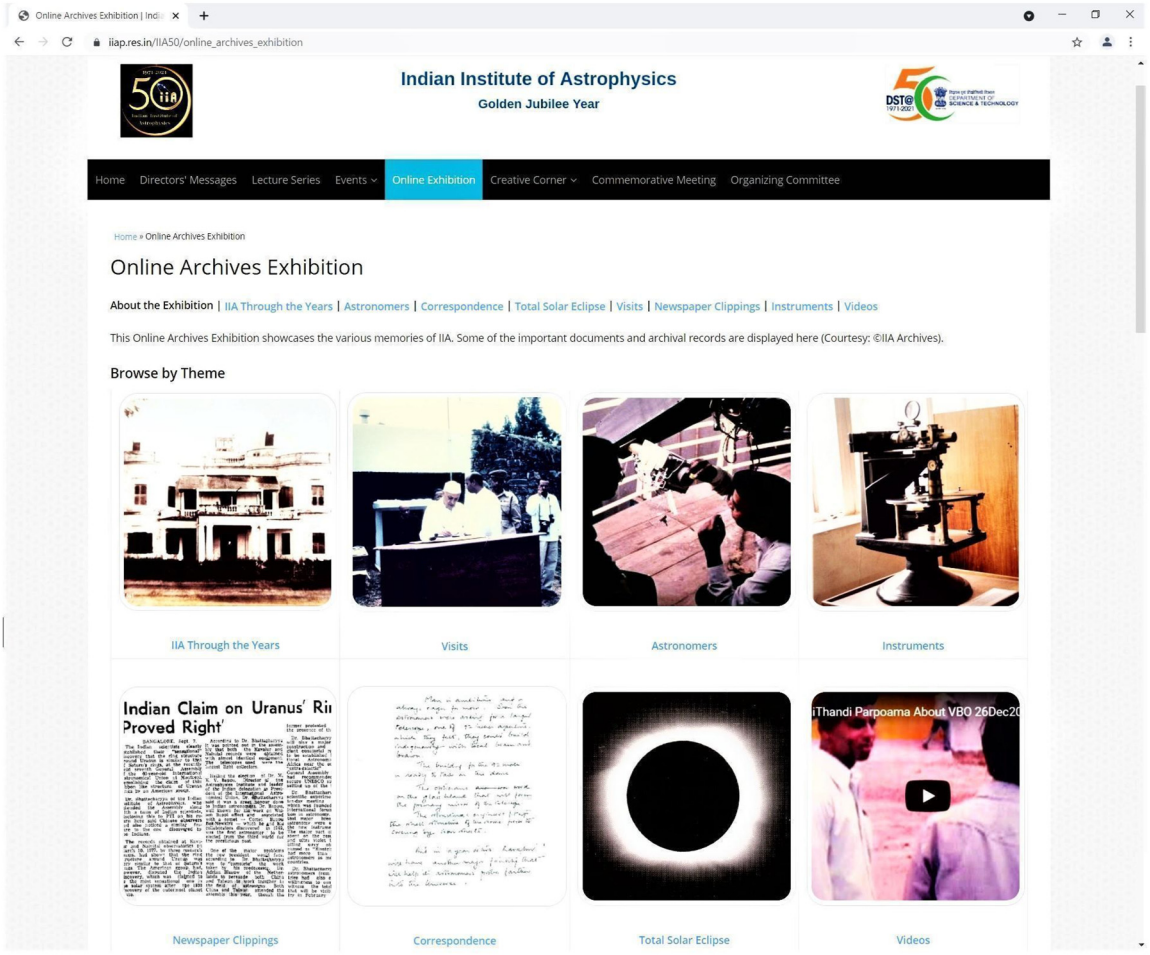


Figure 5: IIA Online Archives Exhibition portal – homepage.

black and white. The "Visits" theme highlights 12 pictures documenting notable visits by distinguished individuals to the Indian Institute of Astrophysics from 1961 to 2000. The historical astronomical instruments utilized for observations and technical endeavors, acquired and locally crafted by the observatory since the eighteenth century, constitute significant collections housed within the library and archives facilities at Kodaikanal and Bangalore. Among these archives at IIA, Bangalore, are preserved antique instruments like the photometer. These instruments have played a pivotal role in recording numerous important discoveries and findings originating from both the Madras and Kodaikanal observatories (Birdie 2014). The online exhibition showcases various instruments belonging to the IIA, with a predominant focus on displaying a diverse array of telescopes utilized for observations. Newspaper clippings have been used for decades as an important source of information as well as a way to keep track of important events. This exhibition also displays 23 newspaper clippings of various events and achievements of the Indian Institute of Astrophysics. The online exhibition, the "correspondence" section, deals with various letters by the different astronomers of Indian Institute of Astrophysics. It also includes a handwritten letter by Prof. M. K. Vainu Bappu. A total of 12 letters are displayed in the online exhibition. The photos of nine total solar eclipses from 1868 to 2010 are available in this exhibition, and links to six YouTube videos are displayed in the online archive exhibition's final segment.

4.2.1 Sample Templates and Deliverables

By applying this methodology, we successfully created a comprehensive set of 32 templates and deliverables to support various aspects of the online archives exhibition process. This set includes resources such as wireframes, project plans, metadata lists, and more (Figures 6, 7, 8, and 9). These templates and deliverables provide practical frameworks and tools that can be adapted and utilized by other institutions undertaking similar projects. They are designed to streamline the process, improve project management, reduce the time required from project teams, prevent duplication of effort, and offer valuable insights into the effectiveness of online exhibitions.

4.3 Evaluation of Proposed Online Archives Exhibition Project Management Methodology

To evaluate the effectiveness of the proposed methodology, a survey was conducted with the team that utilized it to develop

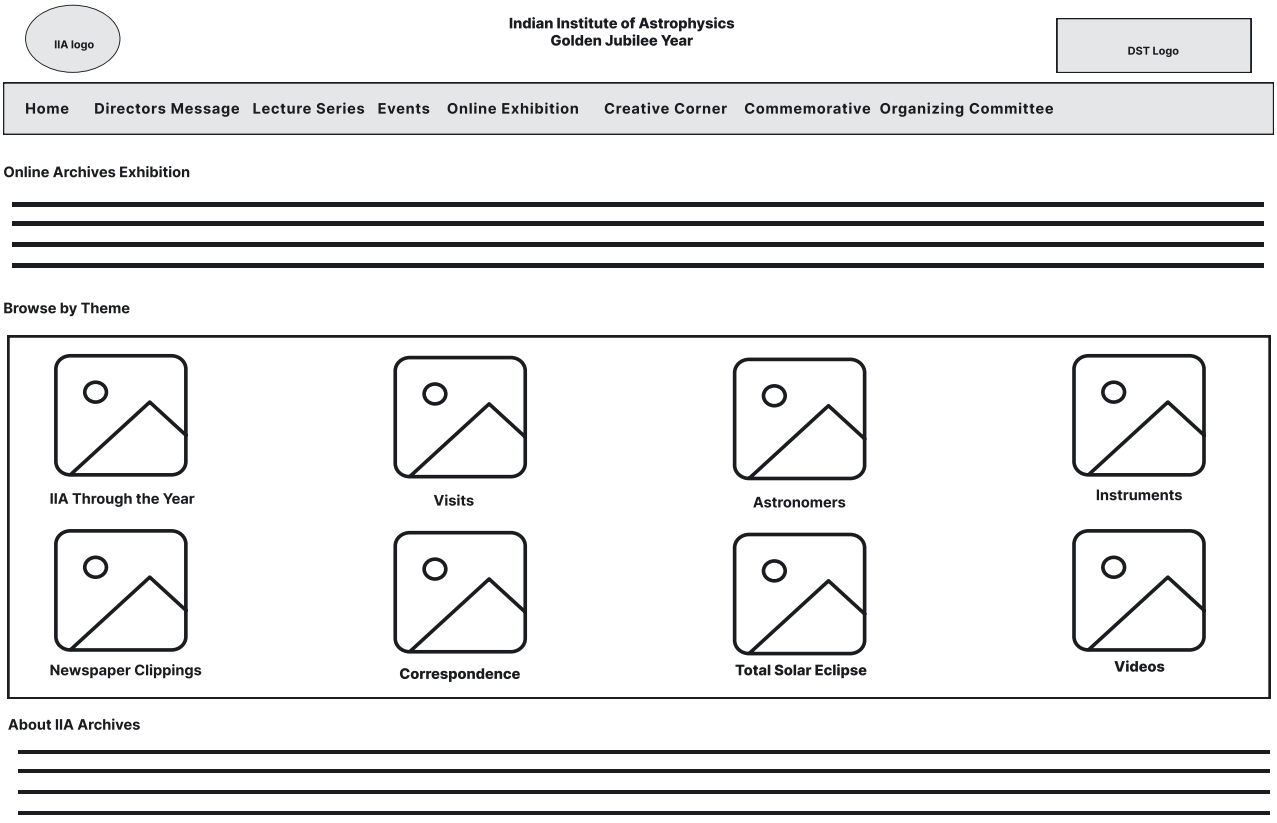


Figure 6: AOE portal wireframe in desktop view.

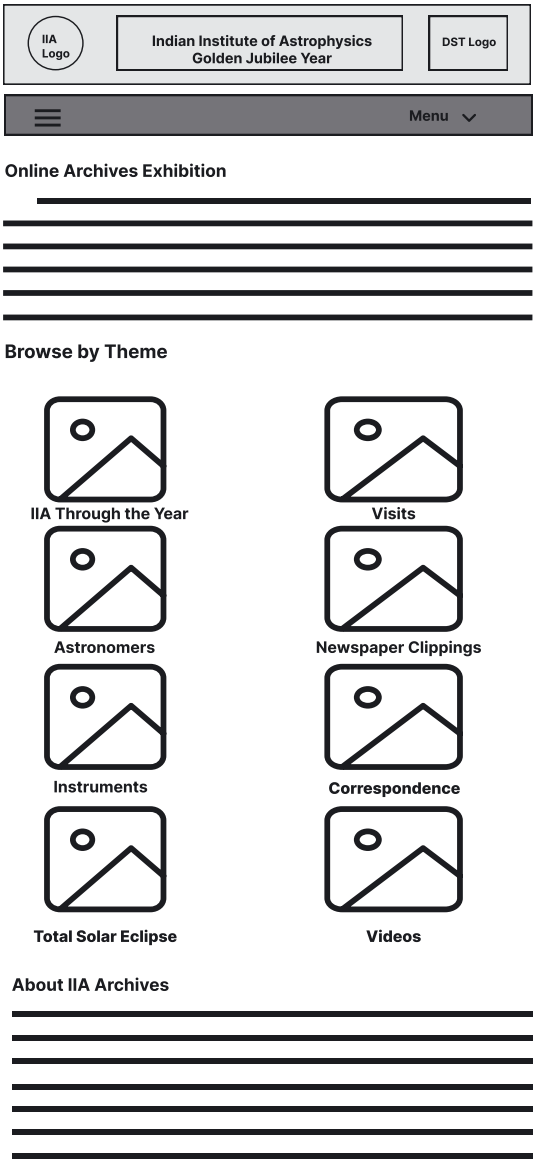
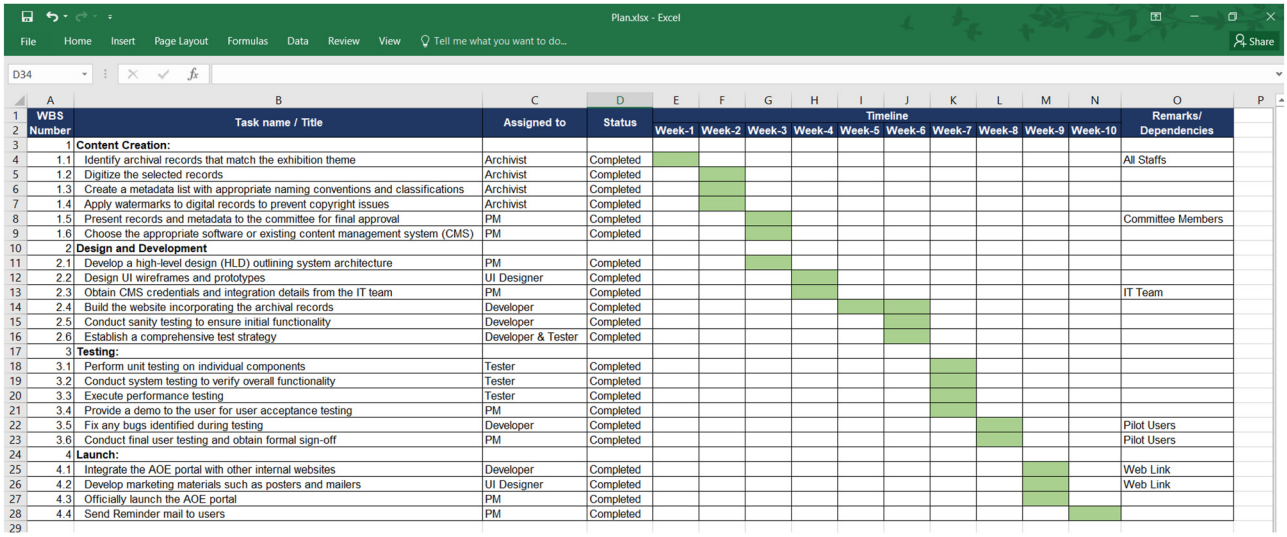


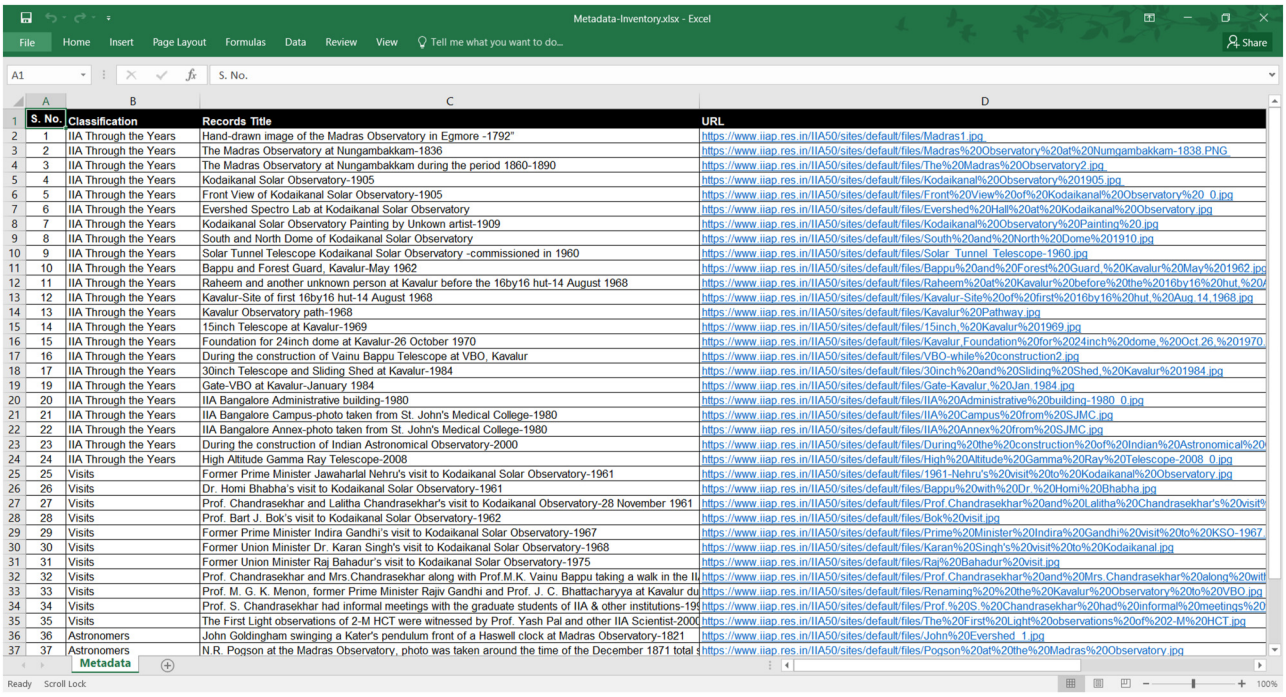
Figure 7: AOE portal wireframe in mobile view.

the Online Archives Exhibition for the Indian Institute of Astrophysics as part of the IIA50 golden jubilee celebrations. This team included 13 experts from library sciences, archives, web development, UI design, testing, and project management. Their feedback was crucial in assessing the methodology's impact on the project's execution and outcomes. The results of the survey were overwhelmingly positive (Figure 10). Of the participants, 87 % reported that the methodology fostered a happier and more motivated team, indicating a significant improvement in team morale. This is essential in any project, as a motivated team is often more productive and collaborative. Additionally, 93 % of the experts indicated that this approach saved time and money, highlighting its efficiency and cost-effectiveness. These savings can be attributed to streamlined processes and better resource management. Furthermore, 80 % of the experts believed the methodology significantly improved decision-making processes. This enhancement in decision-making aided in better design and project outcomes, leading to a more polished and practical online archives exhibition. The positive feedback suggests that the structured approach provided clear guidelines and frameworks, facilitating better planning and execution. The broad consensus among the experts suggests that this approach is a valuable tool for managing complex projects like online archives exhibitions. The methodology's ability to improve team morale, save resources, and enhance decision-making processes demonstrates its potential as a best practice in project management for similar initiatives. The survey results align with scholars' emphasis on integrating project management practices into information portal development projects, such as online exhibitions, to ensure project success (Campbell-Meier 2008; Greene 2010). Future implementations across diverse institutions are recommended to validate and refine the methodology further. This would ensure its broader applicability and reliability,



WBS Number	Task name / Title	Assigned to	Status	Timeline										Remarks/ Dependencies
				Week-1	Week-2	Week-3	Week-4	Week-5	Week-6	Week-7	Week-8	Week-9	Week-10	
1	**Content Creation:**													
1.1	Identify archival records that match the exhibition theme	Archivist	Completed											All Staffs
1.2	Digitize the selected records	Archivist	Completed											
1.3	Create a metadata list with appropriate naming conventions and classifications	Archivist	Completed											
1.4	Apply watermarks to digital records to prevent copyright issues	Archivist	Completed											
1.5	Present records and metadata to the committee for final approval	PM	Completed											Committee Members
1.6	Choose the appropriate software or existing content management system (CMS)	PM	Completed											
2	**Design and Development**													
2.1	Develop a high-level design (HLD) outlining system architecture	PM	Completed											
2.2	Design UI wireframes and prototypes	UI Designer	Completed											
2.3	Obtain CMS credentials and integration details from the IT team	PM	Completed											IT Team
2.4	Build the website incorporating the archival records	Developer	Completed											
2.5	Conduct sanity testing to ensure initial functionality	Developer	Completed											
2.6	Establish a comprehensive test strategy	Developer & Tester	Completed											
3	**Testing:**													
3.1	Perform unit testing on individual components	Tester	Completed											
3.2	Conduct system testing to verify overall functionality	Tester	Completed											
3.3	Execute performance testing	Tester	Completed											
3.4	Provide a demo to the user for user acceptance testing	PM	Completed											
3.5	Fix any bugs identified during testing	Developer	Completed											Pilot Users
3.6	Conduct final user testing and obtain formal sign-off	PM	Completed											Pilot Users
4	**Launch:**													
4.1	Integrate the AOE portal with other internal websites	Developer	Completed											Web Link
4.2	Develop marketing materials such as posters and mailers	UI Designer	Completed											Web Link
4.3	Officially launch the AOE portal	PM	Completed											
4.4	Send Reminder mail to users	PM	Completed											

Figure 8: Project plan used for IIA Online Archives Exhibition project.



Metadata-Inventory.xlsx - Excel

S. No.	Classification	Records Title	URL
1	IIA Through the Years	Hand-drawn image of the Madras Observatory in Egmore -1792"	https://www.iiap.res.in/IIA50/sites/default/files/Madras1.jpg
2	IIA Through the Years	The Madras Observatory at Nungambakkam-1836	https://www.iiap.res.in/IIA50/sites/default/files/Madras%20Observatory%20at%20Numgambakkam-1838.PNG
3	IIA Through the Years	The Madras Observatory at Nungambakkam during the period 1860-1890	https://www.iiap.res.in/IIA50/sites/default/files/The%20Madras%20Observatory2.jpg
4	IIA Through the Years	Kodaikanal Solar Observatory-1905	https://www.iiap.res.in/IIA50/sites/default/files/Kodaikanal%20Observatory%201905.jpg
5	IIA Through the Years	Front View of Kodaikanal Solar Observatory-1905	https://www.iiap.res.in/IIA50/sites/default/files/Front%20View%20of%20Kodaikanal%20Observatory%20_0.jpg
6	IIA Through the Years	Evershed Spectro Lab at Kodaikanal Solar Observatory	https://www.iiap.res.in/IIA50/sites/default/files/Evershed%20Hall%20at%20Kodaikanal%20Observatory.jpg
7	IIA Through the Years	Kodaikanal Solar Observatory Painting by Unkown artist-1909	https://www.iiap.res.in/IIA50/sites/default/files/Kodaikanal%20Observatory%20Painting%20.jpg
8	IIA Through the Years	South and North Dome of Kodaikanal Solar Observatory	https://www.iiap.res.in/IIA50/sites/default/files/South%20and%20North%20Dome%201910.jpg
9	IIA Through the Years	Solar Tunnel Telescope Kodaikanal Solar Observatory -commissioned in 1960	https://www.iiap.res.in/IIA50/sites/default/files/Solar_Tunnel_Telescope-1960.jpg
10	IIA Through the Years	Bappu and Forest Guard, Kavalur-May 1962	https://www.iiap.res.in/IIA50/sites/default/files/Bappu%20and%20Forest%20Guard.%20Kavalur%20May%201962.jpg
11	IIA Through the Years	Raheem and another unknown person at Kavalur before the 16by16 hut-14 August 1968	https://www.iiap.res.in/IIA50/sites/default/files/Raheem%20at%20Kavalur%20before%20the%2016by16%20hut,%20A
12	IIA Through the Years	Kavalur-Site of first 16by16 hut-14 August 1968	https://www.iiap.res.in/IIA50/sites/default/files/Kavalur-Site%20of%20first%2016by16%20hut,%20Aug.14,1968.jpg
13	IIA Through the Years	Kavalur Observatory path-1968	https://www.iiap.res.in/IIA50/sites/default/files/Kavalur%20Pathway.jpg
14	IIA Through the Years	15inch Telescope at Kavalur-1969	https://www.iiap.res.in/IIA50/sites/default/files/15inch,%20Kavalur%201969.jpg
15	IIA Through the Years	Foundation for 24inch dome at Kavalur-26 October 1970	https://www.iiap.res.in/IIA50/sites/default/files/Kavalur_Foundation%20for%2024inch%20dome,%20Oct.26,%201970
16	IIA Through the Years	During the construction of Vainu Bappu Telescope at VBO, Kavalur	https://www.iiap.res.in/IIA50/sites/default/files/VBO-while%20construction2.jpg
17	IIA Through the Years	30inch Telescope and Sliding Shed at Kavalur-1984	https://www.iiap.res.in/IIA50/sites/default/files/30inch%20and%20Sliding%20Shed,%20Kavalur%201984.jpg
18	IIA Through the Years	Gate-VBO at Kavalur-January 1984	https://www.iiap.res.in/IIA50/sites/default/files/Gate-Kavalur,%20Jan.1984.jpg
19	IIA Through the Years	IIA Bangalore Administrative building-1980	https://www.iiap.res.in/IIA50/sites/default/files/IIA%20Administrative%20building-1980_0.jpg
20	IIA Through the Years	IIA Bangalore Campus-photo taken from St. John's Medical College-1980	https://www.iiap.res.in/IIA50/sites/default/files/IIA%20Campus%20from%20SJMC.jpg
21	IIA Through the Years	IIA Bangalore Annex-photo taken from St. John's Medical College-1980	https://www.iiap.res.in/IIA50/sites/default/files/IIA%20Annex%20from%20SJMC.jpg
22	IIA Through the Years	During the construction of Indian Astronomical Observatory-2000	https://www.iiap.res.in/IIA50/sites/default/files/During%20the%20construction%20of%20Indian%20Astronomical%20
23	IIA Through the Years	High Altitude Gamma Ray Telescope-2008	https://www.iiap.res.in/IIA50/sites/default/files/High%20Altitude%20Gamma%20Ray%20Telescope-2008_0.jpg
24	Visits	Former Prime Minister Jawaharlal Nehru's visit to Kodaikanal Solar Observatory-1961	https://www.iiap.res.in/IIA50/sites/default/files/1961-Nehru's%20visit%20to%20Kodaikanal%20Observatory.jpg
25	Visits	Dr. Homi Bhabha's visit to Kodaikanal Solar Observatory-1961	https://www.iiap.res.in/IIA50/sites/default/files/Bappu%20with%20Dr.%20Homi%20Bhabha.jpg
26	Visits	Prof. Chandrasekhar and Lalitha Chandrasekhar's visit to Kodaikanal Observatory-28 November 1961	https://www.iiap.res.in/IIA50/sites/default/files/Prof.Chandrasekhar%20and%20Lalitha%20Chandrasekhar's%20visit%
27	Visits	Prof. Bart J. Bok's visit to Kodaikanal Solar Observatory-1962	https://www.iiap.res.in/IIA50/sites/default/files/Bok%20visit.jpg
28	Visits	Former Prime Minister Indira Gandhi's visit to Kodaikanal Solar Observatory-1967	https://www.iiap.res.in/IIA50/sites/default/files/Prime%20Minister%20Indira%20Gandhi%20visit%20to%20KSO-1967
29	Visits	Former Union Minister Dr. Karan Singh's visit to Kodaikanal Solar Observatory-1968	https://www.iiap.res.in/IIA50/sites/default/files/Karan%20Singh's%20visit%20to%20Kodaikanal.jpg
30	Visits	Former Union Minister Raj Bahadur's visit to Kodaikanal Solar Observatory-1975	https://www.iiap.res.in/IIA50/sites/default/files/Raj%20Bahadur%20visit.jpg
31	Visits	Prof. Chandrasekhar and Mrs.Chandrasekhar along with Prof.M.K. Vainu Bappu taking a walk in the II	https://www.iiap.res.in/IIA50/sites/default/files/Prof.Chandrasekhar%20and%20Mrs.Chandrasekhar%20along%20with
32	Visits	Prof. M. G. K. Menon, former Prime Minister Rajiv Gandhi and Prof. J. C. Bhattacharyya at Kavalur du	https://www.iiap.res.in/IIA50/sites/default/files/Renaming%20%20the%20Kavalur%20Observatory%20to%20VBO.jpg
33	Visits	Prof. S. Chandrasekhar had informal meetings with the graduate students of IIA & other institutions-19	https://www.iiap.res.in/IIA50/sites/default/files/Prof.%20S.%20Chandrasekhar%20had%20informal%20meetings%20
34	Visits	The First Light observations of 2-M HCT were witnessed by Prof. Yash Pal and other IIA Scientist-2000	https://www.iiap.res.in/IIA50/sites/default/files/The%20First%20Light%20observations%20of%202-M%20HCT.jpg
35	Astronomers	John Goldingham swinging a Kater's pendulum front of a Haswell clock at Madras Observatory-1821	https://www.iiap.res.in/IIA50/sites/default/files/John%20Evershed_1.jpg
36	Astronomers	N.R. Pogson at the Madras Observatory, photo was taken around the time of the December 1871 total s	https://www.iiap.res.in/IIA50/sites/default/files/Pogson%20at%20the%20Madras%20Observatory.jpg

Figure 9: Metadata inventory used for IIA Online Archives Exhibition portal.

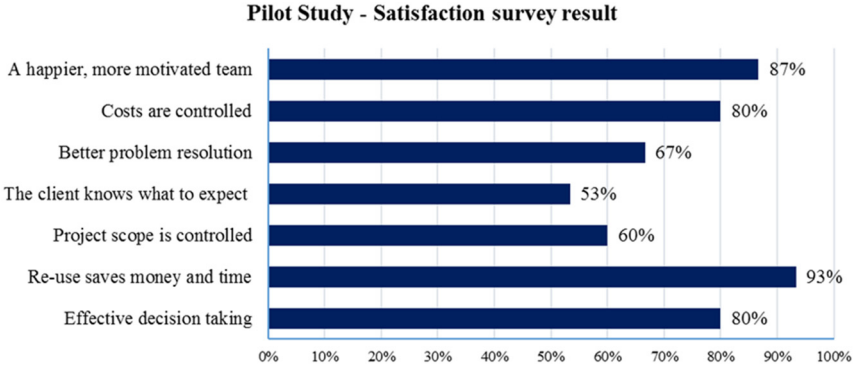


Figure 10: Survey result from the team that utilized customised Online Archives Exhibition Project methodology.

allowing more organizations to benefit from its structured and efficient approach. By continuing to test and adapt the methodology in various settings, it can be optimized to meet the specific needs of different projects and teams, ultimately contributing to the success of future online archives exhibitions and similar endeavors.

5 Conclusions

Meticulous planning and collaborative teamwork are essential for developing an effective project management methodology for online archive exhibitions. Brainstorming sessions significantly shaped this methodology, helping save time during the planning and design of the online archive website (Arumugam and Padma 2017). The IIA library staff played a crucial role, particularly in the initial stages, by creating metadata for archival records and scanning documents, tasks that required substantial time. The assistance of the institute's experienced faculty members was vital for selecting and finalizing the exhibition content. This online archival exhibition portal, developed using Drupal with minimal customization, utilized a WYSIWYG HTML editor, reducing the time spent on technical work, especially coding (Bascones and Carreras 2012). Online exhibitions can engage a broader audience than physical exhibitions, making them a highly effective tool for marketing archives and showcasing their global significance (Ramaiah 2007). They are adept at captivating diverse age groups, especially the younger population, and are becoming crucial for educational and outreach purposes (Abdulrahaman et al. 2020). Addressing the challenges of preserving and accessing digital collections in the digital

age requires a multifaceted strategy. This strategy should emphasize the development of user-friendly interfaces, promoting collaboration among archives, and implementing outreach initiatives, such as online archive exhibitions, to engage new user groups (Friedewald, Székély, and Karaboga 2024). The COVID-19 pandemic has increased the use of digital technologies in IIA archives, facilitated by social distancing and restrictions on physical archives (Frederick and Wolff-Eisenberg 2020). In an increasingly digital world, online archive exhibitions have become essential for preserving and disseminating institutional legacies, enabling organizations to reach a global audience and provide access to their valuable collections (Ciurea and Filip 2016).

Institutions should adopt the project management methodology outlined in this article to facilitate the effective development and management of these online exhibitions. Structured project management methodologies are crucial for ensuring the success of online exhibitions (Campbell-Meier 2008; Greene 2010). They provide archivists with the tools and frameworks to manage complex projects efficiently, adapt to evolving technological demands, and effectively meet project goals. Customizing project management approaches to fit the specific needs of online archive exhibitions is crucial for optimizing project outcomes. The absence of a well-defined project management methodology (PMM) can jeopardize various aspects of an organization's operations, including its knowledge management practices, quality standards, and overall effectiveness (Whitaker 2014). Implementing a robust PMM helps safeguard these elements, ensuring that online exhibitions are impactful and sustainable. Our literature review revealed a gap in structured project management methodologies for online archives exhibitions, highlighting the originality of our research and its potential to contribute valuable insights to the field of collection-based virtual learning in art and design. Additionally, libraries, archives, and museums must regularly evaluate their online exhibitions to ensure they align with institutional goals and stay relevant amid evolving technology. Ongoing assessments are crucial for maintaining high content, design, and functionality standards and adapting to new advancements and user expectations (Hackbart-Dean, Barcelona, and Hamilton-Brehm 2023). This study suggests that to establish effective digital preservation programs within memory institutions, librarians and archives professionals must thoroughly understand core concepts, strategies, tools, and best practices (Ahmad and Rafiq 2023).

5.1 Limitations and Future Studies

Having tested the methodology in a single organization, it is recommended that this online archive exhibition approach be evaluated across a diverse range of institutions. Broader testing will provide critical feedback and insights, enabling us to refine and enhance the methodology. Evaluating the approach in various settings will also reveal institution-specific challenges and opportunities, contributing to a more versatile and robust framework. Widespread testing and adaptation will ensure the methodology's effectiveness and benefits for a broad array of archives and museums, fostering innovation and excellence in the field of online exhibitions. Future studies should focus on developing a comprehensive portal to upload this methodology, along with related sample templates and deliverables. This resource would serve as a valuable tool for anyone conducting similar online exhibitions, providing access to proven methods and materials without the need to recreate them from scratch. By making these resources readily accessible, we can facilitate the creation of high-quality online exhibitions and promote best practices across the field. Additionally, this portal would support knowledge sharing and collaboration, ultimately enhancing the overall quality and impact of online exhibitions.

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