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THE TRANSFORMATIVE EVOLUTION OF CONFERENCE MANAGEMENT SYSTEMS

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ABSTRACT

Once reliant on manual processes and paper-based submissions, academic conferences have evolved into dynamic platforms for knowledge sharing, collaboration, and innovation through Conference Management Systems (CMS). CMS has become a key driver of change and progress in conference organisations. These centralised hubs connect authors, reviewers, organisers, and attendees. To date, various CMS models have been developed with different features. Understanding these features is crucial to ensure that conference organisers receive the best support. A previous study has reviewed various CMS platforms, highlighting their distinct features and strengths. However, this research needed to address CMS technology's evolution and future advancements. Through a literature review and comparative analysis of CMS features, this paper outlines the typical features of CMS that can be useful for organisers. Further, this paper explores the transformative evolution of CMS and looks ahead to the promising future. This evolution reflects a dedication to continuous innovation, adapting to changing needs, and embracing advanced technologies to enhance user experiences while ensuring security and privacy. The future of CMS is marked by innovation, adaptability, and a solid commitment to providing improved experiences for all conference stakeholders.

Keywords: Conference Management Systems (CMS), Academic Conferences, Digital Innovation, Conference Planning, Transformative Evolution

INTRODUCTION

In academia, where knowledge sharing and collaboration are essential, academic conferences are critical platforms for scholars, researchers, and experts to present their insights and discoveries (Yanqing & Itodo, 2021). These events promote intellectual growth, nurture ideas, foster partnerships, and drive innovation. However, in the digital age, the complexity of organising academic conferences has increased significantly (Daimi & Li, 2011; Ahmad et al., 2012). Traditional methods of managing these conferences, such as paper submissions and manual reviews, are no longer efficient or effective in addressing the diverse needs of participants, including authors, reviewers, organisers, and attendees. Advanced management tools are therefore required to organise conferences (Gupta et al., 2013) effectively. This study addresses these challenges by examining the role and impact of Conference Management Systems (CMS) in streamlining conference administration and enhancing the overall experience for all stakeholders involved.

A CMS is a specialised software designed to meet the unique needs of academic conference coordination (Ahmad et al., 2012). It is a central hub for all conference activities, supporting diverse participants such as authors, reviewers, organisers, and attendees. By offering a seamless framework for collaboration, a CMS fundamentally changes the dynamics of conference administration, ensuring that every conference stage is well-organised, efficient, and practical (Yanqing & Itodo, 2021; Gupta et al., 2013; Kalmukov, 2011; Daimi & Li, 2011).

Many CMS platforms have been developed as open-source or commercially available through subscriptions. Conference organisers explicitly develop some CMS platforms to handle their conference organisation and management needs. These systems are equipped with various features to fulfil specific requirements. A previous Ishak et al. (2023) study reviewed several CMS platforms with unique features and strengths. However, their study needs to focus on CMS technology's evolution and future advancements. Knowing about CMS's evolution and future can provide valuable guidance for further enhancing these systems to meet emerging trends and requirements in the academic and professional conference landscape. Furthermore, understanding these features is crucial for conference organisers as they must decide which CMS is best suited for their conference.

This article is organised as follows: The next section discusses related work on CMS and the methodology. The results section presents the CMS models and typical issues in CMS implementation. A discussion on future work in CMS and the conclusion follows this.

RELATED WORKS

A CMS is a platform designed to organise and manage academic conferences efficiently. It offers various features and functionalities tailored to the specific needs of conference planning and execution. While the features may vary depending on the CMS platform, the following paragraphs describe some standard and essential features found in these systems (Kanav et al., 2014; Gupta et al., 2013; Ahmad et al., 2012; Daimi & Li, 2011; Kalmukov, 2011; Ishak & Zaibon, 2008).

- **User Management:** One of the foundational aspects of a CMS is user management. This component allows for the registration and profile management of conference participants. Users are granted specific permissions for access based on their roles. This role-based access control ensures that administrators, organisers, authors, reviewers, and attendees have appropriate privileges within the system.
- **Paper Submission and Management:** The CMS streamlines the paper submission and management process. It lets authors submit their research papers, abstracts, and proposals online. Documents can be uploaded and managed within the system, where automated plagiarism detection tools may be employed. The CMS also records submission statuses and histories, making it easier to track submission progress.
- **Review Management:** Reviewing papers is critical to the conference organisation. The CMS facilitates this by automating the assignment of papers to reviewers. Reviewers can provide scores and feedback through the system, and the CMS tracks the review process, helping organisers make decisions on paper acceptance, rejection, revision, and more.
- **Scheduling and Agenda:** The CMS allows for creating and managing conference schedules, including sessions and tracks. It provides a platform to showcase information about presenters and speakers. Real-time updates to the schedule ensure attendees have access to the most current information, enhancing their conference experience.
- **Communication and Collaboration:** Effective communication is critical in conference management. The CMS includes tools for email notifications and reminders, messaging, and discussion forums to foster participant collaboration. Announcements and news updates can be disseminated, and authors can interact with reviewers and organisers within the system.
- **Registration and Payment:** For attendees, the CMS offers online registration, fee collection, and payment processing. It generates registration invoices and keeps track of attendance, simplifying the logistical aspects of the conference.
- **Data Analytics and Reporting:** Data analytics and reporting tools provide valuable insights into conference activities. The CMS often includes an analytics dashboard and allows for customising reports and statistics. Data can be exported for in-depth analysis, and submission and review analytics offer a deeper understanding of the conference's dynamics.
- **Publication and Proceedings:** The CMS supports the online publication of accepted papers and facilitates the creation of digital proceedings. It may assign Digital Object Identifiers (DOIs) to conference materials and offer indexing and archiving capabilities for long-term accessibility.
- **Customisation and Branding:** Many CMSs allow customisation to align with the conference's branding and theme. This includes customisable themes, logo and banner integration, and the creation of tailored landing pages that reflect the conference's identity.
- **Mobile Accessibility:** Recognising the importance of mobile devices, CMSs often feature responsive designs that ensure accessibility on various screens. Some may even offer dedicated mobile apps to give attendees easy access to conference information.
- **Security and Privacy:** Security is a paramount concern. CMSs incorporate robust user authentication and authorisation systems, employ data encryption for sensitive information, and adhere to data protection regulations to safeguard user data and conference content.
- **Scalability and Performance:** As conferences can vary significantly, CMSs are designed to be scalable and can accommodate many participants, submissions, and activities. High-performance infrastructure ensures that the system can handle heavy traffic without degradation.
- **Feedback and Evaluation:** Gathering feedback is crucial for improving future conferences. The CMS may include features for conducting attendee and participant surveys and evaluation

forms for sessions and presentations. Post-conference feedback collection mechanisms enable organisers to refine future events.

- **Technical Support and Documentation:** Comprehensive user manuals, documentation, responsive customer support, and helpdesk services assist users in navigating and maximising the CMS's use.
- **Archiving and Record Keeping:** CMSs often include features for storing and retrieving historical conference data, enabling organisers to maintain a record of past events for reference and analysis.

A CMS significantly enhances efficiency and streamlines conference processes (Gupta et al., 2013; Sultan et al., 2009). It allows authors to submit papers swiftly, reduces paperwork, and saves time (Ishak et al., 2023). Automating peer review assignments and managing reviews ensure a smooth and organised evaluation process (Kalmukov, 2011). CMS platforms also foster better collaboration among conference participants (Zheng et al., 2008; Papagelis & Plexousakis, 2006) through real-time communication tools like messaging systems and discussion forums, thereby enhancing the efficiency of the review process.

Centralising all conference-related data within a CMS simplifies access and management for organisers and participants, ensuring critical information is readily available (Ling, 2023). This consolidation leads to significant time and cost savings. Automating administrative tasks reduces the workload on organisers, thereby minimising administrative overhead (Ling, 2023). Going paperless further reduces printing and material costs, making the process more cost-effective. Additionally, CMS platforms assist organisers in making informed decisions (Yadav & Desai, 2023; Zaibon et al., 2003) by providing analytics tools that offer insights into submission trends, reviewer performance, and participant demographics, facilitating effective scheduling, session planning, and logistics.

The CMS enhances the experience for authors and reviewers with user-friendly interfaces that simplify navigation and interaction (Ishak & Zaibon, 2008). Authors can track their submissions and receive prompt feedback, improving their overall experience. CMS platforms also facilitate the publication and distribution of conference materials (Schulzrinne, 2023), ensuring broader accessibility to accepted papers by publishing them online and archiving them for future reference, thus preserving valuable research.

Security and privacy are prioritised in CMSs, with stringent measures to protect user data and comply with data protection regulations (Kanav et al., 2014). Moreover, CMSs are designed to be scalable, effectively accommodating conferences of varying sizes and complexities.

METHODOLOGY

This study was conducted in two main phases: data collection and analysis. The data collection phase involved a comprehensive literature review on Content Management Systems (CMS). Sources included peer-reviewed articles from academic journals and conference proceedings. Key aspects identified were various CMS models' features, benefits, challenges, and advancements. Features refer to the core functionalities and capabilities of different CMS models. Benefits encompass the advantages and positive impacts of using CMS, such as improved efficiency and user experience. Challenges highlight common issues and limitations, including technical difficulties and user adoption hurdles. Advancements cover recent developments and innovations in CMS technologies and methodologies.

The analysis phase involved a comparative study of different CMS models. Parameters for comparison included a detailed examination of the functionalities provided by each CMS model (features), an evaluation of the positive outcomes and advantages offered by each CMS (benefits), and an assessment of the difficulties and obstacles associated with each CMS model (challenges).

RESULT

CMS Models

CMS models can be categorised into several types:

- **Commercial CMS:** Software companies typically develop and sell commercial CMS solutions as licensed products. These systems offer a wide range of features and are often customisable to meet the specific requirements of individual conferences. Organisers pay licensing fees for the software and may receive technical support and updates from the vendor—examples: Cvent (<https://www.cvent.com/>), Eventbrite (<https://www.eventbrite.com/>) and Whova (<https://whova.com/>).
- **Open Source CMS:** Open source CMS platforms are developed collaboratively by a community of developers and are freely available to the public. They provide a cost-effective solution for conference organisers, as there are no licensing fees. Open-source CMSs can be highly customisable and are often supported by active user communities. Examples: Indico (<https://getindico.io/>), ConfTool (<https://www.conftool.net/>) and Open Conference Systems (OCS) (<https://pkp.sfu.ca/ocs/>)
- **Custom-Built CMS:** Some organisations develop custom CMS solutions tailored to their unique needs. This approach allows maximum flexibility and control over the system's features and functionality. However, it can take time and effort to develop and maintain. Example: KMICeEx (Ishak & Zaibon, 2008).
- **Cloud-Based CMS:** Cloud-based CMS platforms are hosted on remote servers and accessed via the Internet. Conference organisers do not need to install or maintain software locally. This model offers scalability and accessibility from anywhere with an internet connection. Examples are Cvent (<https://www.cvent.com/>) and Eventbrite (<https://www.eventbrite.com/>).
- **Hybrid CMS:** Hybrid CMS solutions combine features of both commercial and open-source models. They may offer a core set of features through open-source components while providing additional proprietary features or support for a fee. This approach allows for flexibility while offering professional support when needed. Examples: Drupal (<https://www.drupal.org/>), Joomla (<https://www.joomla.org/>), and WordPress (<https://wordpress.org/>)
- **Mobile App CMS:** With the increasing use of mobile devices, some CMS solutions focus on creating dedicated mobile apps for conference management. These apps offer features for conference scheduling, attendee engagement, and real-time updates.
- **Subscription-Based CMS:** Subscription-based CMS models charge organisers regularly for the use of the system. This approach may include hosting, support, and updates as part of the subscription package. It offers a predictable cost structure for ongoing conference management—examples: EDAS (<https://edas.info/>), EasyChair (<https://easychair.org/>) and OpenConf (<https://www.openconf.com/>).

Typical Issues in CMS

Issues related to CMS cover various challenges that organisers, participants, and users may face during the planning and execution of academic conferences. These challenges can significantly impact the overall experience and efficiency of the conference management process.

One notable issue concerns usability and user experience (Lubis et al., 2022). Some CMS platforms feature complex interfaces that can pose difficulties for users, particularly authors and reviewers, who may need to become more familiar with the system's intricacies (Ming et al., 2021). This can lead to reduced utilisation of the CMS's features. Additionally, adequate mobile optimisation or the absence of dedicated mobile apps can help the user experience, as many participants rely on mobile devices for accessing conference-related information and tasks (Su et al., 2023).

Performance and scalability issues can also be problematic (Zheng et al., 2008; Iyer et al., 2005). Slow response times during peak usage can frustrate users, affecting their ability to interact with the system effectively. Furthermore, specific CMS platforms may need help to handle large conferences with a high volume of submissions and participants, jeopardising the system's efficiency and reliability. Technical issues, such as compatibility problems with web browsers or operating systems, can impede users' ability to fully access and utilise the CMS (Manhas, 2015). System downtime or scheduled disruptions can disrupt conference activities and inconvenience participants (Pun et al., 2012).

Data security and privacy are paramount concerns (Avci & Koca, 2023). Security vulnerabilities within the CMS can potentially result in data breaches, exposing sensitive user information and research papers.

Integration challenges can complicate matters further (Silva & Loureiro, 2011). The difficulty of integrating the CMS with external systems, such as payment gateways or content management systems, can hinder seamless conference management and impede the flow of critical information.

User support is another critical issue (Sharma et al., 2023). Inadequate user support, including a lack of comprehensive documentation or unresponsive customer support channels, can leave users without timely assistance when encountering issues, leading to frustration and inefficiencies (Sharma et al., 2023; Gök et al., 2019).

Customisation limitations (Romero et al., 2020) can affect the branding and uniqueness of the conference. Some CMS platforms may offer limited customisation flexibility, making it challenging for organisers to create a distinct conference identity.

Budgeting concerns can arise when dealing with application subscriptions and related expenses (Shu et al., 2023). Unexpected costs, such as licensing fees, hosting fees, or the need for additional features, can strain the conference budget if not adequately anticipated and planned for.

Lastly, practical training and onboarding resources ensure that users can maximise the CMS's features and capabilities (Abdulraheem-Sal, 2016). Inadequate training can result in users needing to be more utilised in the system, hindering the conference's overall success. Proactive planning, regular system monitoring, user feedback collection, and ongoing system updates and improvements are essential to mitigate these issues. Equally critical to a smoother conference management experience is selecting a CMS platform that aligns with the conference's specific needs, technical capabilities, and user base.

ADVANCING CMS

The future of CMS is set for a transformative evolution driven by a forward-looking approach aimed at enhancing user experiences, streamlining conference operations, and adapting to the dynamic landscape of academic and professional gatherings. A pivotal aspect of this evolution is a steadfast commitment to enhancing the user experience. CMS platforms will continue to prioritise the development of intuitive and user-friendly interfaces, ensuring that authors, reviewers, organisers, and attendees can seamlessly navigate and interact with the system. Moreover, the enduring relevance of mobile devices (Zein et al., 2023) in conference-related tasks will be acknowledged, with a continued focus on mobile optimisation and the creation of dedicated mobile apps (Jonsson, 2015).

A.I. and automation technologies will play a central role in the future of CMS (Ling, 2023; Patil et al., 2022), automating administrative tasks such as paper assignment, review coordination, and scheduling (Yadav & Desai, 2023). The infusion of automation is poised to significantly enhance efficiency while freeing valuable time for organisers and participants. Scalability and performance will remain pivotal, with CMS platforms designed to scale and accommodate larger conferences gracefully. The goal is to ensure optimal performance even during peak usage periods, guaranteeing users a reliable and responsive experience (Hasnain, 2021). Security and data privacy will maintain their prominence in CMS development efforts, strongly emphasising robust security measures, encryption, and strict adherence to data protection regulations (Kanav et al., 2014). The seamless integration of CMS with external systems, including payment gateways, content management systems, and academic databases, will be further refined. The comprehensive integration approach aims to provide a unified and connected conference management ecosystem, simplifying various aspects of conference organisation.

Customisation and branding options will continue to expand, granting organisers greater flexibility to tailor CMS platforms to reflect their respective conferences' unique identity and branding. AI-driven analytics and reporting tools will empower organisers with deeper insights into conference data, facilitating informed decision-making and enhancing the effectiveness of conference planning (Schmitt, 2023). Community and collaboration features, such as integrated messaging, discussion forums, and virtual networking opportunities, will foster interaction and engagement among conference participants. The priority of accessibility compliance will ensure that CMS platforms are fully accessible to individuals with disabilities, aligning with stringent accessibility standards (Bruno et al., 2005). Sustainability initiatives, encompassing options for paperless conferences, virtual participation, and sustainable event management, will align CMS platforms with environmentally conscious practices, reducing ecological footprints. A.I.-powered review assistance tools will revolutionise the review process, aiding reviewers in assessing paper quality, detecting plagiarism, and providing feedback with increased efficiency and accuracy (Patil et al., 2022).

Furthermore, CMS platforms will emphasise their adaptability to hybrid and virtual conference formats, recognising the growing popularity of these formats, especially in response to global events (Baumann et al., 2023). A continuous feedback loop will be established to gather user input and suggestions, enabling ongoing system improvements that closely align with user needs and expectations. Multilingual support and internationalisation features will broaden the reach of conferences and foster global collaboration and knowledge exchange. The future of CMS is characterised by innovation, adaptability, and an unwavering commitment to delivering enhanced experiences to all stakeholders participating in the dynamic world of academic and professional conferences. The ongoing transformation promises to redefine the landscape of conference management, aligning it with the evolving needs and preferences of a diverse and global community.

CONCLUSION

In conclusion, CMS has become indispensable in academic and professional conferences. As we look to the future, the trajectory of CMS development is clear: a relentless commitment to enhancing user experiences, optimising operational efficiency, and adapting to the changing landscape of conferences. The future of CMS hinges on improving the user experience, with user-friendly interfaces and mobile accessibility at the forefront. A.I. and automation technologies will transform conference management by automating tasks and improving efficiency. Scalability, data security, and privacy will remain paramount, ensuring that CMS platforms can handle larger conferences and protect sensitive information.

Integration and interoperability will connect CMS platforms with external systems, fostering a more comprehensive conference ecosystem. Customisation, analytics, and collaboration tools will empower organisers and participants, while accessibility and sustainability initiatives will align CMS platforms with global trends. The future of CMS is marked by innovation and adaptability, reflecting the dynamic nature of academic and professional conferences. By embracing emerging technologies and trends while remaining user-centric, CMS platforms will continue to play an integral role in the successful organisation and management of conferences, fostering knowledge sharing, collaboration, and academic growth on a global scale.

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