Improving User experience in enterprise meeting Rooms with next gen technology: Part I

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Abstract
In the modern corporate ecosystem, seamless meeting experiences are essential for productivity, as organizations increasingly rely on digital collaboration tools, optimizing meeting workflows becomes crucial. However, authentication challenges and fragmented user experiences often hinder the company's efficiency. To address this, C2-Meet, a home-grown web application, was developed to simplify meeting room interactions for employees, streamlining the encryption and access process. By leveraging the Teams' built-in architecture, the solution eliminates redundant logins while maintaining the organization's grade security. This research highlights how this custom Teams' App can align organizational meeting setups by reducing authentication overhead while ensuring security and usability.

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Keywords: Microsoft teams, custom app development, enterprise collaboration, adaptive cards, two-factor authentication (2FA), Workflow integration, meeting room automation, secure access, enterprise productivity

1. Introduction

According to recent industry reports, over 80% of enterprise employees use Microsoft Teams as their primary collaboration platform, with a significant percentage accessing it through mobile devices. With organizations increasingly adopting hybrid work models, the demand for effortless and secure meeting room experiences has grown more impact fully.

Recognizing this need, Company-2 developed C2-Meet, a custom web application designed to simplify meeting room scheduling for internal users. While security remains a key element of enterprise applications, rigorous authentication measures can sometimes hinder user experience. C2-Meet, designed to simplify meeting room access, required two-factor authentication (2FA) to ensure that only authorized employees could join meetings. However, this additional security layer disrupted the convenience, forcing users into a time-consuming login process before every session. To overcome this, the development team leveraged Microsoft Teams' built-in authentication mechanism, which securely verifies users without requiring repeated logins. By embedding C2-Meet within a custom Teams app which provided smooth access while keeping security strong, allowing employees to join meetings easily without risking data safety.

This research paper has its following objectives:

- **Enhanced meeting accessibility**: Simplification in the process of joining meetings while ensuring uninterrupted user experience.
- **Ensure Secure Authentication**: Implementation of a secured login mechanism without adding unnecessary steps.
- **Enable Cross-Platform Access and maintenance of data integrity**: Ensure compatibility across desktop and mobile devices however still protecting the confidential information by coherent user authentication.

Fig 1: Basic Floor Map

Significant Characteristics

- Interactive Room Finder Map: A **50" interactive display** on each floor near common areas provides a **real-time floor plan view** with meeting room availability.
- Rooms appear **green** if available and **red** if reserved.
- **VC occupancy sensors** display an **amber** status if a room is occupied, enhancing visibility for users.

Fig 2: Interactive Floor Map

- **Enterprise Security Compliance:** The platform adheres to strict security protocols, safeguarding meeting data and ensuring controlled access.
- **Improved Booking Efficiency:** The system prevents double booking, helps users verify room availability before scheduling, and reduces unattended reservations.
- **Cross-Platform Accessibility:** NV-Meet is accessible across multiple devices, including desktops, laptops, and mobile platforms, ensuring flexibility for users.

Problem Statement

In the modern corporate ecosystem, efficient and hassle free meeting access is crucial for productivity. Company 2 relies on C2-Meet, a homegrown web application designed to simplify the meeting room experience for internal employees. However, several challenges emerged, causing confusion and inefficiencies in the meeting workflow.

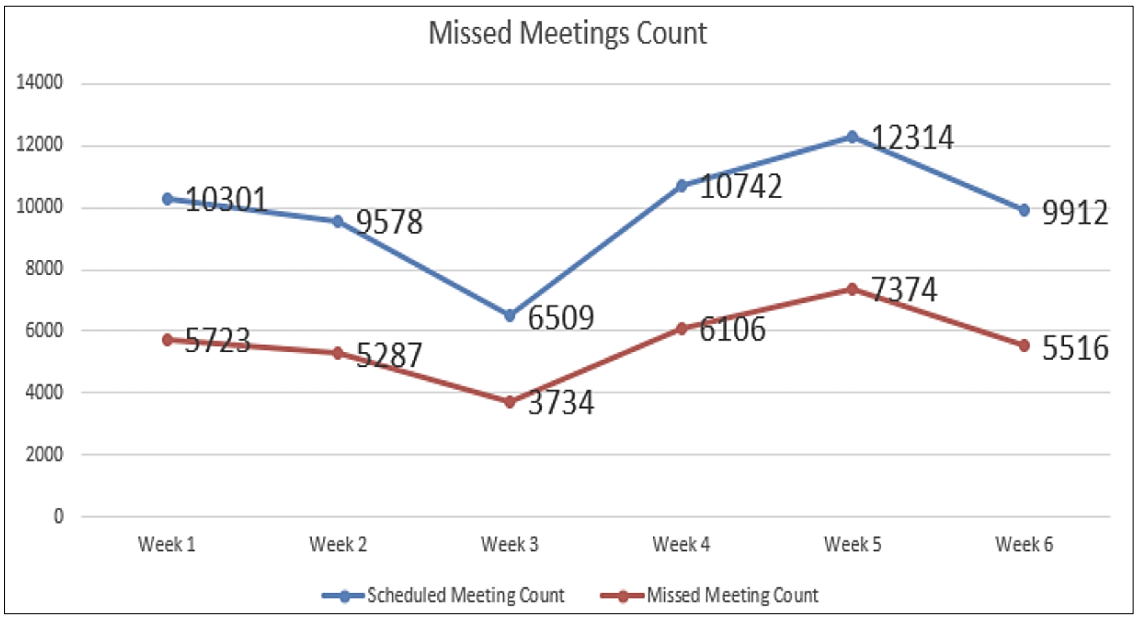

Fig 2: Interactive Floor Map

- **Complex Meeting Join Process** – Over the past three months, 7.15% (4,985) of calls were incorrectly dialed out of 69,721 calls from meeting rooms, leading to delays and disruptions.
- **Booking Challenges** – The primary mode of booking meeting rooms is through Outlook. Users often see an available room but experience booking declines, leading to the misconception of double booking, especially with recurring meetings. Additionally, restricted rooms still appear as booking options, adding to the confusion.
- **Booking Uncertainty in a Hybrid Work Model** – In the hybrid work environment, users are often uncertain about whether to add meeting rooms during scheduling. Data shows that nearly 50% of bookings go unattended, with no proper system for accountability.
- **Platform Overload** – With multiple platforms like Teams, Zoom, and Webex, users struggle to remember the correct process for joining meetings, further complicating the experience.

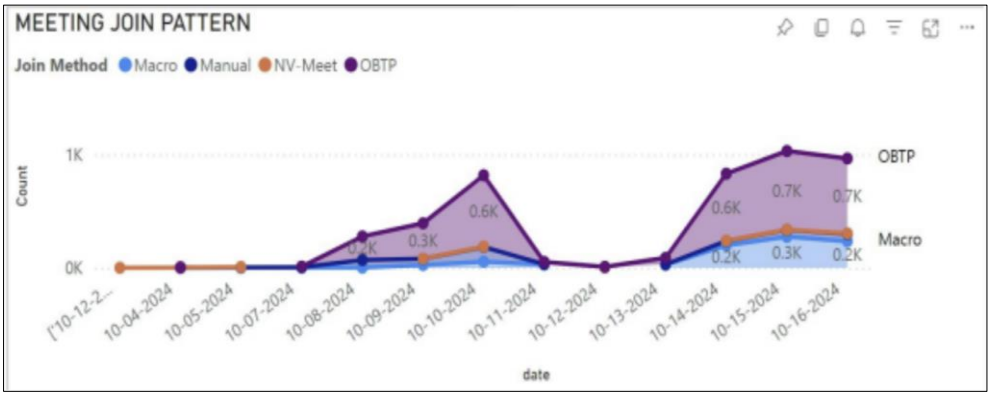

Fig 3

Meeting Join Pattern

While C2-Meet was designed to align meeting room accessibility, ensuring secure yet smooth authentication became an additional challenge. Since Company 2 uses Microsoft Teams as its primary collaboration platform, an opportunity emerged to integrate C2-Meet within Teams. Microsoft Teams inherently authenticates users through a token-based security mechanism, which eliminates redundant logins. However, directly leading Teams authentication for C2-Meet required a custom-built solution.

Furthermore, this research paper will discuss the development, deployment and the implementation of the custom Web Application that facilitates the smooth functioning of the Meetings in a corporate world.

3. Literature review

The literature has been reviewed to explore existing authentication methods, Microsoft Teams integrations, and meeting room technologies to understand the challenges and advancements in seamless meeting experiences.

Microsoft Teams has been widely recognized as an enterprise collaboration platform with built-in authentication mechanisms that simplify secure access. Literature suggests that leveraging Teams' authentication capabilities can eliminate redundant login steps while maintaining security compliance. Adaptive Cards have also been studied for their ability to embed web applications within Teams, providing real-time data exchange and improving user experience without requiring platform switching.

Existing research further discusses the trade-off between security and usability in enterprise solutions. While comprehensive security measures are essential for data protection, they often lead to workflow disruptions. Literature suggests that integrating proxy authentication models and custom applications within Microsoft Teams can streamline user access while maintaining robust security. These findings provide a foundation for the proposed custom Teams app, demonstrating how it improves meeting room accessibility by optimizing authentication processes.

4. Methodology

The research follows a structured approach to designing and implementing a custom Microsoft Teams application including requirement analysis, platform selection, authentication integration, development, and testing.

The process began by identifying the primary challenge that was enhancing the meeting room experience by eliminating redundant authentication steps without compromising security. A potential study was conducted to explore Microsoft Teams' capabilities, focusing on built-in authentication mechanisms and integration possibilities. Existing authentication models, including two-factor authentication (2FA), were analyzed to assess their impact on user experience.

The next phase involved designing a custom Microsoft Teams application to act as a bridge between C2-Meet and Teams' authentication system. Adaptive Cards were utilized to embed the C2-Meet platform directly within the Teams interface, ensuring effortless user interaction. The application was developed using Microsoft Teams SDK, incorporating token-based authentication to enable smooth access for authorized users.

Rigorous iterative and usability tests were conducted, to validate the effectiveness of the effectiveness and productivity of the solution and for smooth user login experience respectively.

The methodology employed a combination of software development best practices and user driven-feedbacks refinements to create an optimized meeting room solution. The iterative approach ensured that the final product met both security standards and user expectations, providing a seamless meeting experience within Microsoft Teams.

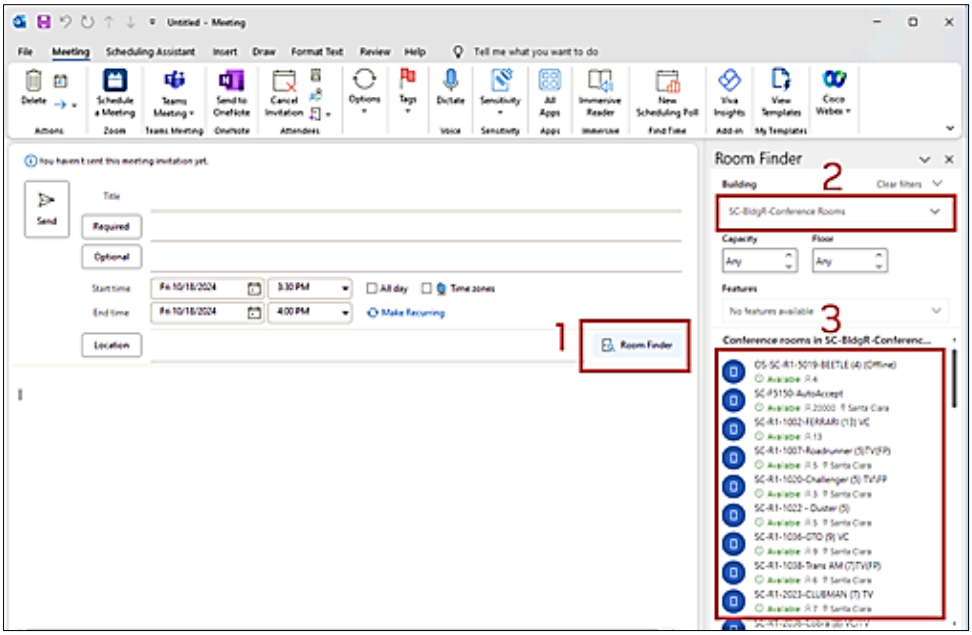

Fig 4

1. Manual Room Finder

The Web Application made use of the following components:

Hardware Description

The development and deployment of the custom Web application required minimal hardware resources, as the solution was designed to operate within cloud-based environments. The primary Infrastructure/Architecture included enterprise grade servers for hosting the C2-Meet web application and managing authentication requests. Secure network configurations ensured seamless communication between Microsoft Teams and the custom application. End-user devices, such as laptops, desktops, and mobile phones, played a crucial role in accessing the solution, leveraging Microsoft Teams' cross-platform compatibility. Additionally, encryption protocols and security gateways were implemented to safeguard authentication tokens and user data, ensuring a secure.

Software Description:

- The custom Teams Web Application was developed using **Microsoft Teams SDK, JavaScript, and cloud-based authentication services**.
- **The Adaptive Cards framework** was utilized to embed the C2-Meet web application within Teams, ensuring a seamless user experience.
- **Token-based security mechanisms** were implemented for authentication, allowing users to access meeting rooms without repeated logins.
- The **backend** relied on cloud services like **Microsoft Azure or AWS** for hosting and data management.
- The solution was designed to comply with **enterprise security policies**, maintaining data integrity and access control.

Working of the Web Application

The custom web application acts as a seamless integration

layer between C2-Meet and Microsoft Teams, designed to enhance meeting accessibility, security, and overall efficiency. A major challenge in corporate environments is ensuring that users can join meetings effortlessly without compromising security. To address this, the application leverages authentication & security through Teams' built-in token-based authentication, eliminating the need for redundant logins. Once a user initiates a meeting request, their identity is automatically verified, ensuring that only authorized participants can access the meeting room. This not only simplifies the authentication process but also enhances security by preventing unauthorized access.

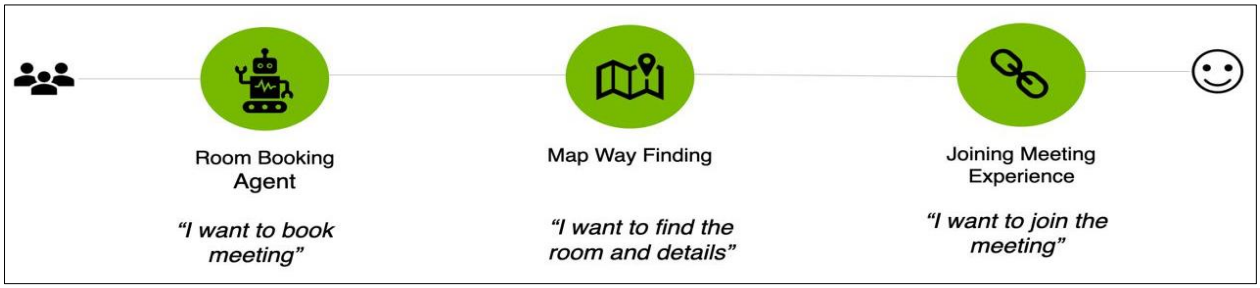

Fig 5

Solution - Meeting Experience

To further improve **user-friendly integration & accessibility**, the application utilizes the Adaptive Cards framework, embedding C2-Meet's functionalities directly within the Microsoft Teams interface. This allows users to schedule meetings. This allows users to schedule meetings, check room availability, and join calls with minimal friction, eliminating the confusion associated with multiple platforms and login credentials. By presenting an intuitive and interactive interface, employees can manage their meetings effortlessly within their existing workflow, reducing disruptions and enhancing productivity.

Additionally, Real time synchronization and control plays a crucial role in maintaining meeting efficiency. The application continuously updates meeting room availability, synchronizing with teams to reflect the latest changes in booking status. This reduces scheduling conflicts, prevents double bookings, and ensures that users have accurate information when reserving rooms. Furthermore, integration with room occupancy sensors and status indicators enhances real-time control, providing visibility into meeting room usage and availability.

Future aspects

The future scope of the custom Microsoft Teams application extends beyond its current implementation, offering possibilities for further enhancements and scalability in enterprise environments. Key areas for future development include:

- **Scalability for Larger organizations**: The Web Application has been designed to support larger organizations with complex meeting room infrastructure, integrating with multiple office locations and customized scheduling preferences.
- **Cross-Platform Compatibility**: While designed for Microsoft Teams, the application can be adapted for other collaboration platforms used in hybrid work environments.
- **Enhanced Security Measures**: As enterprise security policies evolve, additional security layers such as biometric authentication, zero-trust security models, and AI-based anomaly detection could be integrated.

6. Conclusion

In the Era where efficient collaboration defines corporate success, the integration of an intelligent meeting room management system becomes imperative. The custom Web Application design for C2-Meet transforms the way the meetings are scheduled, accessed and managed, eliminating the inefficiencies associated with traditional booking and authentication process. By leading Microsoft Teams' built-in security framework, real-time synchronization, and an intuitive user interface, the solution ensures effortless accessibility without compromising security.

This research paper highlights the significance of enhancing the user experience by removing the booking challenges, reducing uncertainty and aligning meeting access across platforms. With adaptive technology and automated authentication, employees can now focus on productivity rather than logistics. The integration of real-time occupancy sensors, dynamic room availability displays, and a centralized meeting dashboard exemplifies the future of workplace collaboration.

7. References

1. Tran L, Stojcevski A, Pham T, Souza-Daw T, Nguyen N, Nguyễn V, *et al*. A smart meeting room scheduling and management system with utilization control and ad-hoc support based on real-time occupancy detection. In: Proceedings of the 2016 IEEE Conference on Computer Communications Workshops (CCE); 2016. p. 186-91. doi: 10.1109/CCE.2016.7562634.
2. Korte E, Kuijt-Evers L, van der Kleij R. Effects of meeting room interior design on team performance in a creativity task. In: Ergonomics and Health Aspects of Work with Computers. Lecture Notes in Computer Science, vol 6779. Berlin: Springer; 2011. p. 59-67. doi: 10.1007/978-3-642-21716-6_7.
3. Trivedi U. Overcoming meeting room challenges. WorkInSync - A MoveInSync Product. 2025 Jan 24 [cited 2025 Apr 02]. Available from: https://workinsync.io/blog/overcoming-meeting-room-challenges-in-the-workplace/
4. Saralegui U, Antón M, Arbelaitz O, Muguerza J. Smart meeting room usage information and prediction by modelling occupancy profiles. Sensors. 2019;19(2):353. doi: 10.3390/s19020353.