

Implementing Mobile Solutions for Warehouse Management with SAP EWM

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ABSTRACT

Warehouse management is a critical aspect of supply chain operations, and the adoption of mobile solutions has revolutionized how warehouses operate. This paper explores the implementation of mobile solutions for warehouse management using SAP Extended Warehouse Management (EWM) software. It discusses the benefits, challenges, and best practices associated with integrating mobile technology into warehouse operations. Additionally, the paper provides insights into how SAP EWM facilitates mobile solutions for various warehouse processes, enhancing efficiency, accuracy, and agility in the supply chain.

Keywords: SAP EWM, Mobile solutions, ITS Mobile, SAP FIORI

1. Introduction

Efficient warehouse management is crucial for ensuring smooth supply chain operations and meeting customer demands in today's dynamic business environment. Traditional warehouse management methods often rely on manual processes and paper-based systems, which can be error-prone, time-consuming, and lack real-time visibility into inventory movements. As businesses strive to improve efficiency, accuracy, and agility in their warehouse operations, the adoption of mobile solutions has emerged as a game-changer.

Mobile solutions leverage the power of smartphones, tablets, barcode scanners, and other handheld devices to digitize and streamline warehouse processes. These solutions enable warehouse staff to access real-time data, perform tasks on the go, and communicate seamlessly with other team members and systems. Among the various warehouse management systems available, SAP Extended Warehouse Management (EWM) stands out as a robust solution that integrates seamlessly with mobile technologies, offering advanced functionalities for optimizing warehouse operations.

In this paper, we delve into the realm of implementing mobile

solutions for warehouse management with a focus on leveraging SAP EWM. We explore the benefits that mobile technology brings to warehouse operations, the challenges organizations may face during implementation, and the best practices to ensure successful adoption. Additionally, we examine how SAP EWM facilitates the integration of mobile solutions into key warehouse processes, such as inbound and outbound operations, inventory management, order picking, and cycle counting.

By understanding the significance of mobile solutions in warehouse management and the capabilities of SAP EWM in enabling their implementation, organizations can unlock new levels of efficiency, accuracy, and responsiveness in their supply chain operations. This paper serves as a guide for businesses looking to harness the power of mobile technology to optimize their warehouse management processes and stay competitive in today's fast-paced market landscape.

2. Literature

SAP Extended Warehouse Management (EWM) stands out as a top-tier solution adept at overseeing warehouse operations of medium to high complexity. It caters to various types of warehouses, including those within manufacturing

sites for raw materials and finished goods, as well as standalone distribution centers for finished goods. EWM boasts an extensive set of features, empowering organizations to tackle the challenges posed by rapidly evolving customer service expectations and the persistent need to enhance warehouse productivity.

Choosing EWM marks a crucial decision point, with the subsequent choice of a mobile solution being equally vital. The mobile solution acts as the interface through which users access the robust functionality offered by EWM. SAP presents two options for furnishing the mobile front-end to EWM: ITS Mobile and Fiori Apps. While ITS Mobile has been around for longer, SAP has shifted its focus to Fiori apps since 2013 as the preferred method for integrating mobile devices with EWM. Both ITS Mobile and Fiori apps share certain characteristics; they are browser-based solutions leveraging HTML to deliver SAP information to mobile devices.

2.1 ITS (Internet Transaction Server) mobile:

ITS (Internet Transaction Server) mobile is a SAP technology designed to establish a connection between mobile devices and SAP systems. Its purpose is to enable the execution of applications built upon the popular Dynpro programming model within the SAP ecosystem.

ITS, integrated within the SAP NetWeaver Application Server, doesn't necessitate a standalone installation. If your SAP system is built on SAP NetWeaver, ITS functionality is readily available. It extends support to all hardware and operating system platforms compatible with SAP NetWeaver. Employing template technology, ITS enables comprehensive customization of the HTML representation of each screen, including function key mapping, color schemes, and fonts. Templates are generated using a dedicated generator within the ABAP development workbench (SE80), ensuring compatibility with various mobile devices equipped with web browsers, without SAP's explicit device support.

Given ITS's integration into the SAP NetWeaver Application Server, established SAP system management tools like CCMS can be utilized for ITS administration and monitoring.

Furthermore, ITS's integration into the SAP NetWeaver Application Server obviates the need for a separate security infrastructure. Features such as Single Sign-On (SSO2), connection encryption (SSL, SNC), and external authentication (JAS) are provided by the application server.

As an integral component of the SAP NetWeaver Application Server ABAP, ITS enjoys long-term support and continuous enhancement with each new SAP NetWeaver release.

ITS Architecture: The Internet Transaction Server (ITS) serves as a bridge, extending the client/server architecture of SAP systems to the Internet.

Functioning as a gateway between one or more Web servers and SAP application servers, ITS manages all requests and responses exchanged between a Web browser client and an SAP server. It comprises two primary gateway components: the Web server gateway (WGate) and the Application server gateway (AGate).

WGate: WGate, residing on the same machine as the Web server, facilitates the connection between the ITS and the Web server. It receives requests from Web browsers through the Web

server and forwards them to AGate via TCP/IP connections. WGate acts as a Web server extension, harmonizing differences in various Web server APIs.

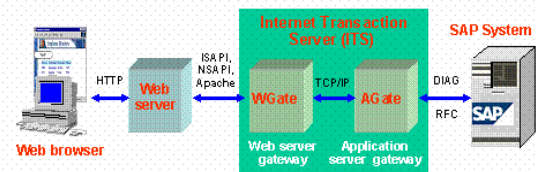


Image Source¹

It supports multiple Web servers, including Microsoft Internet Information Server (IIS), Netscape Enterprise Server (NES), and Apache Web Server.

WGate bridges the gap between the 'stateless' nature of Web servers, operating on single request/response cycles, and the 'stateful' SAP system, where business transactions rely on internal status. It ensures that server processes remain active throughout user sessions to maintain context in the SAP system¹.

AGate: AGate, the core processing component of ITS, connects the ITS to the SAP application server. It receives Web browser requests from WGate and communicates with the SAP application server via the DIAG protocol or RFC protocol. AGate manages sessions, services, and users, generating HTML documents sent back to Web browser clients.

Upon establishing a connection, AGate processes requests, transmitting relevant details to the SAP system. The SAP system then initiates the appropriate transaction or dialog step. After completing a dialog step, AGate retrieves results from the SAP system, processes them, and sends responses back to WGate¹.

ITS mobile leverages the ITS framework, which is integrated into the SAP Kernel. This eliminates the need for maintaining additional server infrastructure, as is necessary with Web SAP Console. ITS mobile is particularly suited for high-volume business scenarios with a significant number of users².

ITS Mobile has evolved to support a wide range of applications, including ITS, Web Dynpro, web server pages, and portals. It operates as a browser-based technology compatible with various mobile devices, including those equipped with barcode scanners (RF devices) for data capture, RFID technology, and devices with voice-controlled applications.

Supported browsers include Pocket Browser, Wavelink Industrial Browser, and Internet Explorer. ITS Mobile finds applications in several SAP modules such as SAP ECC (Enterprise Core Components) for functions like Warehouse Management, Inventory Management, Yard Management, Task and Logistics Execution, among others, utilizing standard SAP transactions. It's also integral to SAP EWM (Extended Warehouse Management), SAP AII (Auto ID - RFID), and non-SAP applications supporting browser-based devices.

Moreover, ITS Mobile extends its utility to applications requiring features like signature capture, approval workflows,

mobile printing, GPS functionality, and camera support, as long as they are compatible with web browsers.

ITS Mobile, being an ABAP-based application for mobile devices, offers several

advantages³:

- 1) Entire application development can be done using the ABAP workbench.
- 2) SAP GUI for Windows facilitates ABAP debugging without complexity in the system landscape.
- 3) Templates and generated HTML can be customized to align with specific business requirements.
- 4) Flexibility in utilizing HTML or JavaScript based on device types within the application.
- 5) Support for data input via 1D and 2D barcode scanning adds versatility to data capture capabilities.

4.2. Sap Fiori

SAP Fiori represents a design framework empowering the creation of business applications featuring a user experience akin to consumer-grade applications. This transformation enables users, regardless of expertise level, to navigate SAP systems effortlessly through intuitive interfaces accessible on any device. Leveraging SAP Fiori design principles and tools, users can seamlessly develop and personalize applications consistent with SAP S/4HANA and other enterprise software solutions. Key benefits of SAP Fiori include:

Enhanced user satisfaction and heightened productivity, leading to improved data quality.

Accessible work environments from any location, facilitated by optimized native mobile applications and responsive web applications.

Agile development and scalability, achieved through UI flexibility and accelerated development processes, enabling swift adaptation and expansion of application functionalities⁴.

SAP Fiori offers over 300 role-based applications covering various functions such as HR, Manufacturing, Supply Chain, Finance, and more. When accessing the SAP Fiori homepage, users are greeted with an image of flowers, as “Fiori” translates to “flowers” in Italian.



SAP Fiori delivers real-time business roles accessible on compatible handheld devices, providing intuitive functions with unparalleled responsiveness across desktops, smartphones, and tablets. It facilitates multiple device applications, enabling users to initiate processes on desktops or laptops and seamlessly continue them on smartphones or tablets. These Fiori Apps are developed based on the User Interface UI5.



Integration of SAP Fiori with SAP HANA enhances application response times and query execution, resulting in unmatched performance. Leveraging SAP Fiori’s user experience (UX) capabilities, businesses can offer personalized, role-based experiences tailored to engage users across various lines of business throughout the enterprise.

4.2.1 SAP Fiori encompasses several components and functionalities:

SAP Fiori Launchpad: This serves as a centralized access point for all SAP modules, applications, and services, ensuring users experience a consistent interface across all SAP solutions.

Fiori Studio: A design tool enabling rapid creation of both simple and complex UI designs.

Fiori App Developer Kit (ADK): A toolkit aiding developers in building new applications based on the SAP Fiori UX platform.

SAP Fiori is not merely a standalone product; it functions as a platform for app development, redesigning existing apps, and integration with other systems. Originally known as “SAP UI5,” it was introduced around 2012 to replace the traditional GUI of SAP ERP 6.0 with a modern, mobile-responsive interface. Over time, it evolved into SAP Fiori, encompassing a broader range of UX offerings from various divisions within SAP SE. In 2013, SAP announced plans to release SAPUI5 as an open-source project under the name “Mobile First Open-Source Project” (MOS). In May 2014, MOS became known as SAPUI5; it was rebranded again in November 2015 as “SAP Fiori 2” when it was merged with other UX offerings from other divisions within SAP SE into one unified offering called “SAP Fiori 2”. Fiori is based on SAP’s technology platform. Fiori provides users with instant access to SAP’s core business applications and helps to drive digital transformation across the enterprise.

The architecture of SAP Fiori is structured around three main components:

Front-End Server: This component manages user interface access and the UI5 libraries used for app UI creation.

Back-End Server: Responsible for providing business logic, data access, and OData services for accessing backend data.

Database: Stores business data, which can be located either on-premises or in the cloud. Additional components such as SAP NetWeaver Gateway and SAP HANA support the architecture by providing supplementary services.

In addition to these three components, there are also some other components which are used to support the architecture such as SAP NetWeaver Gateway and SAP HANA, which provide additional services.

Key architectural principles supporting SAP Fiori include⁵:

- 1) Role-based authentication and authorization, supplemented by single sign-on (SSO) for enhanced security.

- 2) Exit Data Protocol for secure provisioning and data consumption.
- 3) Centralized access to applications, along with personalization, navigation, and configuration features through the launch panel.
- 4) No dependency on specific devices, sessions, or users, ensuring flexibility and scalability.

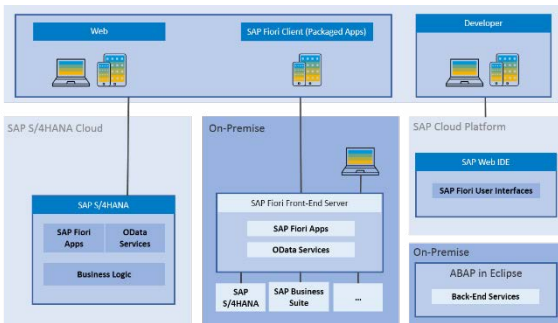


Image source⁶

SAP Fiori offers a multitude of benefits⁵:

Increased Productivity: Fiori streamlines processes, leading to enhanced productivity across tasks and functions.

Time Savings: Studies indicate that task completion time is reduced by 64% compared to traditional SAP UI, resulting in significant time savings.

Ease of Learning: Fiori’s simplified design makes it easier to learn and adapt, shortening the training period for users.

Reduced User Frustration: By providing a more intuitive and user-friendly interface, Fiori lowers the likelihood of user frustration and disappointment.

Accessibility: Fiori facilitates seamless navigation within the organization, allowing employees to move more efficiently across different functions and processes.

Mobility: Fiori-based applications can be accessed by mobile workers on various devices, enabling flexibility in work practices compared to the traditional mouse-keyboard interaction of SAP GUI.

SAP/Apple Partnership: Collaboration between SAP and Apple results in optimized applications tailored for Apple devices, providing users with a range of finely tuned options for improved functionality and user experience.

4.3 Benefits of these Mobile solutions into warehouse management

Implementing mobile solutions in warehouse management brings numerous benefits:

More Accurate Inventory Control and Tracking: Mobile solutions enable real-time tracking and accurate management of inventory, reducing discrepancies and ensuring inventory levels are always up to date.

Fewer Transaction Processing Errors: With mobile devices capturing data directly at the point of activity, the likelihood of errors in transaction processing is significantly reduced.

Higher-Value Inventory Data: Access to real-time data through mobile solutions allows for better analysis and decision-making, leading to improved inventory management practices.

Shorter Throughput and Cycle Times: Mobile solutions streamline processes and enable faster movement of goods through the warehouse, resulting in shorter throughput and cycle times.

Less Inventory Carrying Costs: Improved inventory control and faster throughput times contribute to reduced inventory carrying costs, freeing up capital and resources.

Other notable benefits include:

Reduced Chance of Human Error: Automated data capture and workflows minimize the risk of human errors in warehouse operations.

Streamlined Workflows: Mobile solutions optimize workflows, simplifying tasks and improving efficiency.

Real-Time Notifications: Instant notifications delivered to frontline workers and supervisors enable timely responses to changes or issues in the warehouse environment.

Increased Time on Warehouse Floor: With mobile devices providing access to necessary information and functionalities on the warehouse floor, workers spend less time traveling to and from the back office.

Efficient Warehouse and Order Fulfillment: Overall, implementing mobile solutions results in a more efficient warehouse and order fulfillment process, leading to greater customer satisfaction and stronger client relationships.

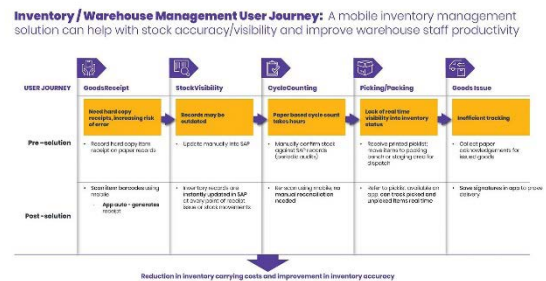


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4.4. Challenges of Implementing mobile inventory solutions

Implementing mobile solutions in warehouse management brings numerous benefits, but it also comes with its own set of challenges. Addressing these challenges is crucial to ensure the successful deployment and adoption of mobile technology in warehouse operations. Let’s explore some of the key challenges:

4.4.1. Integration with Existing Systems: One of the primary challenges is integrating mobile solutions with existing warehouse management systems (WMS), enterprise resource planning (ERP) systems, and other legacy software. Compatibility issues, data synchronization, and ensuring seamless communication between mobile devices and backend systems can pose significant hurdles.

4.4.2. Data Security and Privacy Concerns: Mobile devices accessing sensitive warehouse data raise concerns regarding data security and privacy. Protecting sensitive information from unauthorized access, data breaches, and cyber threats requires robust security measures, including encryption, user authentication, and mobile device management (MDM) policies.

4.4.3. User Training and Adoption: Introducing new mobile technologies requires training warehouse staff on how to use the applications effectively. Resistance to change, lack of technical proficiency, and reluctance to adopt new processes may hinder user acceptance. Providing comprehensive training programs and ongoing support is essential to ensure smooth adoption and maximize the benefits of mobile solutions.

4.4.4. Device Compatibility and Performance: Warehouse environments can be harsh, with factors like dust, moisture, and temperature variations potentially affecting the performance and durability of mobile devices. Selecting ruggedized devices capable of withstanding these conditions is crucial. Additionally, ensuring compatibility across different device platforms, operating systems, and screen sizes adds complexity to the implementation process.

4.4.5. Network Connectivity and Reliability: Warehouse operations depend heavily on reliable network connectivity to access real-time data and communicate with backend systems. However, warehouse environments may have limited or unreliable Wi-Fi coverage, leading to connectivity issues and disruptions in data transmission. Implementing backup solutions, such as offline data storage or cellular connectivity, can mitigate these challenges.

4.4.6. Cost Considerations: Deploying mobile solutions involves significant upfront costs, including device procurement, software licensing, and infrastructure upgrades. Additionally, ongoing maintenance, support, and software updates incur recurring expenses. Balancing the upfront investment with the expected return on investment (ROI) and long-term benefits is essential for project viability.

4.4.7. Regulatory Compliance: Warehouses operating in regulated industries must adhere to various compliance requirements, such as data privacy regulations (e.g., GDPR), industry standards (e.g., FDA regulations for pharmaceutical warehouses), and occupational health and safety regulations. Ensuring that mobile solutions comply with these regulations and standards is critical to avoiding legal and financial repercussions.

Addressing these challenges requires careful planning, collaboration between IT and operational teams, and a comprehensive implementation strategy. By proactively identifying and mitigating potential obstacles, organizations can successfully harness the transformative power of mobile technology in warehouse management.

5. Conclusion

In conclusion, the implementation of mobile solutions for warehouse management, particularly in conjunction with SAP Extended Warehouse Management (EWM), offers significant advantages in enhancing operational efficiency, accuracy, and overall productivity. By integrating mobile technologies such as ITS Mobile and SAP Fiori into warehouse management processes, organizations can unlock additional benefits and drive further improvements in their operations.

ITS Mobile provides a robust framework for connecting mobile devices to SAP systems, enabling real-time data capture, and streamlining warehouse workflows. Its seamless integration with SAP EWM facilitates efficient inventory control, tracking, and transaction processing, contributing to improved inventory management practices and reduced operational errors.

Similarly, SAP Fiori offers a modern and intuitive user interface, providing users with easy access to SAP applications and functionalities across devices. By leveraging SAP Fiori alongside mobile solutions, organizations can enhance user experience, streamline workflows, and empower warehouse personnel to perform tasks more efficiently, regardless of their location or device.

Furthermore, the combination of mobile solutions, ITS Mobile, SAP Fiori, and SAP EWM enables organizations to achieve greater visibility into warehouse operations, optimize inventory management practices, and respond swiftly to changing business requirements. Through thorough planning, comprehensive training, and robust security measures, businesses can maximize the value of their investment in mobile technologies and drive digital transformation in their warehouse operations.

In summary, the integration of mobile solutions, ITS Mobile, SAP Fiori, and SAP EWM offers a comprehensive framework for modernizing warehouse management processes, improving operational efficiency, and achieving competitive advantage in today's dynamic business environment. By embracing mobile technologies, organizations can adapt to evolving customer demands, enhance employee productivity, and deliver exceptional service levels, thereby positioning themselves for success in the digital age.

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