

Microsoft Power Platform - Management Solution for the Production Department

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Abstract. In the current context of digital transition, companies face the constant challenge of modernising their internal processes, increasing their operational efficiency and responding quickly to market demands. Digital transformation has become an essential factor for the competitiveness and sustainability of organisations, requiring the adoption of new tools and methodologies.

It is against this backdrop that VoltEdge emerges, an organisation in the electric mobility sector seeking to evolve its working methods, promoting more effective management of its operations.

This paper details the entire process of developing a solution to the problem presented by the company. This process involves identifying and analysing the requirements, designing the solution, implementing it and testing it.

Finally, the results obtained are presented and a reflection is made on the work carried out, in which the limitations to its realisation are presented and possible improvements are suggested.

Keywords: Operations Management, Power Platform, Low-code.

1 Introduction

In the current era of digital transformation, organizations increasingly rely on innovative technological solutions to optimize processes, enhance productivity, and support data-driven decision-making. Within this context, Microsoft's Power Platform has emerged as a key ecosystem, enabling the rapid development of business applications, process automation, and data integration through low-code tools.

The project presented in this paper was developed under the Learning and Development (L&D) programme of Hitachi Solutions, a global consultancy specializing in digital transformation across industries such as manufacturing, retail, financial services, and healthcare. The initiative aimed to provide trainees and recent graduates with practical experience in applying both technical and business knowledge to a real-world-inspired scenario.

The proposed solution was based on a fictitious company, VoltEdge, operating in the electric mobility sector and focused on the design and implementation of a digital system to improve operational management within its production department. The project enabled the exploration of Power Platform technologies, particularly Power Apps,

Power Automate, and Dataverse, while reinforcing concepts of software engineering, system integration, and user experience design.

1.1 The Problem

VoltEdge is a fictional electric mobility company focused on charging solutions for electric vehicles. The company aims to transition from Excel-based processes to more integrated digital solutions. The main challenge was to develop an application to support critical activities—customer management, projects, and sales, warehousing, and production operations—automating processes, improving interdepartmental communication, enhancing efficiency, and supporting decision-making.

1.2 Objectives

The main objectives are:

- Creating and structuring Dataverse entities (Case Reports, Tests, Devices, Assembly Lines, Packages, etc.);
- Implementing automated logic using Power Automate Flows and C# plug-ins (e.g., automatic code generation, status updates, performance indicators);
- Developing customized interfaces for operational data recording and visualization;
- Creating Power Pages and a Canvas App for web and mobile access;
- Applying security via personalized profiles and column-level restrictions;
- Simulating maintenance, testing, and equipment replacement scenarios;
- Digitally representing the full production cycle with quality and traceability validations.

1.3 Approach

The project followed an agile-inspired methodology adapted for the educational context, allowing progressive learning through practical application. Weekly thematic modules covered specific competences, starting with theory presented by company professionals and followed by hands-on. Continuous documentation through reports facilitated reflection and assessment. The 17-week internship (February–June 2025) was structured to progress from fundamental to advanced topics. Key activities included introductory sessions, Dataverse learning and development, automation and plug-ins, security, web resources, Power Pages, Canvas App development, presentations, and final report preparation.

2 State of the art

This section reviews work related to the project, documenting current practices, similar systems, and the technologies used, justifying contributions to the field.

2.1 Related Works

ERP (Enterprise Resource Planning) in Rolls-Royce: The company integrated over 1,500 previously independent systems using an ERP solution to improve efficiency, reduce costs, and provide faster access to information, despite challenges such as cultural resistance and technical migration issues [1].

Mesfine Industrial Engineering (MIE): MIE replaced multiple outdated systems with Microsoft Dynamics SL, implementing ERP to unify processes across departments. Benefits included improved data flow, reduced production delays, and better deadline compliance, achieved through phased planning and specialized teams [2..4].

Alternatives to ERP:

- CRM (Customer Relationship Management): Focused on sales, marketing, and customer service, improving communication and loyalty [5];
- FSM (Field Service Management): Optimizes field operations such as maintenance and installations, managing work orders, teams, and inventory [6].

Comparison: ERP integrates all company areas, while CRM and FSM are specialized tools. Choice depends on integration needs, cost, implementation complexity, and organizational priorities.

2.2 Existing Technologies

Low-Code Platforms: These platforms simplify application development using visual interfaces, reducing programming complexity and enabling rapid deployment. This makes work faster and applications can be created in less time than with the traditional method, which also helps to cut costs [7]. They also support advanced features like artificial intelligence (AI), business intelligence (BI), and robotic process automation (RPA). The most relevant and well-known low-code platforms are the following:

- Microsoft Power Platform: Includes Power Apps (custom apps), Power Automate (workflow automation), Power Pages (websites), Canvas Apps (drag-and-drop app design), Dataverse (data storage), Dynamics 365 (integrated business management), and Copilot Studio (intelligent virtual assistants) [8].
- OutSystems: A Lisbon-based low-code platform for rapid development, using AI for optimisation and supporting diverse sectors[9][10].
- Mendix: Offers no-code (Mendix Studio) and low-code (Mendix Studio Pro) environments, integrating AI assistance and promoting collaboration between technical and non-technical teams [11].

Platform Comparison: According to Forrester Wave 2025, Microsoft leads in both capabilities and strategy, OutSystems follows closely with strong features, and Mendix balances functionality and collaboration, i.e., Microsoft Power Platform leads with its deep ecosystem and advanced AI/RPA features, while OutSystems focuses on high-performance, scalable enterprise solutions. Mendix stands out for its collaborative no-code/low-code environment suited to diverse development teams. The choice depends on project requirements and organizational context.

3 Analysis

This section details the analysis, requirements of a Microsoft Power Platform-based solution for a company providing sustainable electric vehicle charging solutions, focusing on the Production Department.

3.1 Problem Domain

The company relied heavily on Excel spreadsheets, causing communication issues between Production, Storage, and Sales Departments. The solution digitizes Production processes, responsible for manufacturing, maintaining, and delivering chargers and batteries. Main concepts include:

- **Assembly Line / Process / Supervisor** – manages production stages and staff.
- **Device / Item / Package** – tracks machinery, products, and packaging.
- **Case Report / Revision / Test / Testing Goal Indicator** – monitors faults, checks, and performance indicators.
- **Service / Replacement Requests** – handles maintenance needs.

The Production Department has two key roles:

- **Assembly Supervisor** – oversees production and maintenance.
- **Quality Standards Supervisor** – ensures compliance with quality standards and manages incidents.

Functional Requirements

The system's functional requirements define the essential capabilities to support production management, including entity creation, modification, automation, and real-time monitoring. These are organized into several Use Cases (UCs) that describe the main interactions between users and system components.

- **UC01 – Create Entities:** The Assembly Supervisor manages entities such as Assembly Line, Assembly Process, Device, and Package, while the Quality Standards Supervisor oversees Case Reports, Replacement Requests, Revisions, Tests, and Testing Goal Indicators.
- **UC02 – Edit Entities:** Enables update and maintenance of records across all entities.
- **UC03 – Complete Assembly Process:** Covers all production stages, from identification to storage, with automatic item status updates.
- **UC04 – Generate Low Productivity Alerts:** A Power Automate flow detects devices with productivity below 85% and sends email alerts to the supervisor.
- **UC05 – Trigger Replacement Request:** A custom button allows the Quality Standards Supervisor to create a replacement request and update device status automatically.
- **UC06 – Generate Unique Code:** A C# plugin generates unique alphanumeric identifiers for Case Reports, ensuring traceability.

- **UC07 – Scan QR Code:** The mobile Canvas App enables the Assembly Supervisor to access device information on-site via QR code scanning.

Non-Functional Requirements, Based on FURPS+ model

- **Functionality:** Access control and permission mechanisms were implemented through role-based profiles, ensuring data confidentiality and compliance. Evaluation considered correct role assignment and successful enforcement of user restrictions.
- **Usability:** The solution achieved multi-device compatibility (mobile, tablet, desktop). Usability was measured by interface responsiveness and error-free task execution across devices.
- **Reliability:** Stability was assessed through continuous operation and consistent response times under normal workloads.
- **Performance:** Automated workflows and plugins were optimized for execution time and system load.
- **Supportability:** All functionalities were fully tested and documented, ensuring maintainability and adaptability to future updates.
- **Other:** The system was entirely developed using Microsoft Power Platform and Dynamics 365, supporting scalability, integration, and low-code extensibility.

4 Solution Design

The design illustrates how the system components interact using a low-code approach.

Fig. 1 illustrates the system architecture which includes the following components:

- Model-Driven App – main interface for supervisors;
- Canvas App – mobile access for field operations;
- Power Pages – external portal with Copilot chatbot;
- Power Automate – automates workflows like alerts and record creation;
- Dataverse – unified database for all data;
- Copilot Studio – chatbot support;
- External Service API – integration with Teams and Outlook.

Activity Flows for Key Use Cases:

- Register/Update Entity – users fill in forms in Power Apps; data validated and stored in Dataverse;
- Complete Assembly Process – five phases from Identification → Production → Final Item → Case Report → End Item, guided by Business Process Flow;
- Generate Productivity Alerts – automated flow checks device productivity and sends email alerts;
- Create Replacement Request – button triggers JavaScript flow to create request and update status;

- Generate Unique Code – plugin automatically generates unique alphanumeric code for Case Reports;
- Scan QR Code – mobile app validates QR code and retrieves device info from Dataverse.

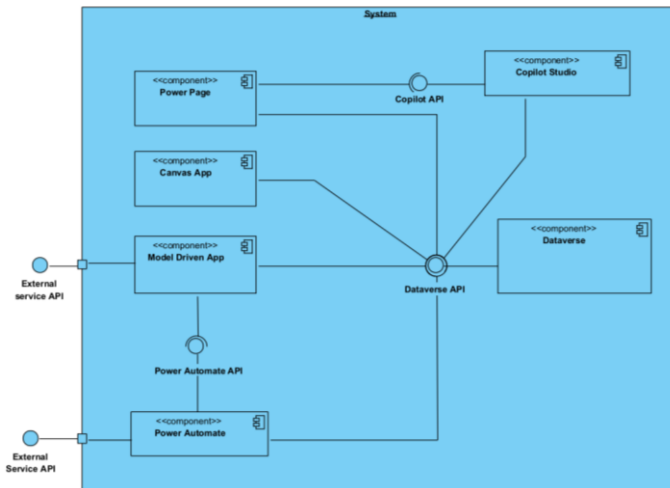


Fig. 1. – Component Diagram

5 Implementing the solution

The implementation phase followed a use case–driven approach, ensuring each functionality was developed, validated, and integrated within the Microsoft Power Platform. Using Dataverse, Power Apps, Power Automate, and C# plugins, the system ensured cohesive management of business logic and user interactions. UC01 and UC02 served as foundational models for subsequent implementations.

5.1 Implementation

The development process was organized around specific Use Cases (UCs), each corresponding to a key operational requirement within the production management workflow.

- **UC01-Create Entities**

The first stage focused on structuring the database in Microsoft Dataverse. Custom entities were created to represent key business objects—such as devices, industrial plants, and case reports—accessible through the Power Apps Main Page. Columns were defined with mandatory and optional attributes, while Choice and Lookup fields ensured data integrity and logical relationships. Custom forms were developed as user interfaces, allowing intuitive and controlled record creation and editing

- **UC02 – Edit Entities**

This stage enabled users to manage and modify existing records directly through the configured forms. Customized views were developed to display only the information relevant to each user's role, filtering records according to business unit and operational context. The system's security configuration relied on role-based access control, defining permissions at a granular level—Create, Read, Write, Delete, Append, Assign, and Share—thus ensuring both usability and compliance with access policies.

- **UC03 – Complete an Assembly Process**

The assembly process was modeled as a Business Process Flow with stages: Identification → Production → Final Item → Case Report → Closure. Workflows and business rules automated status updates, tracking items from In Use to Produced and In Testing, concluding with the assembly automatically set to Inactive.

- **UC04 – Generate Productivity Alerts**

Operational efficiency was further enhanced through a Power Automate flow designed to monitor device productivity. Executed every two days, the flow queried Dataverse to identify devices with performance levels below 85%. When such cases were detected, automated email notifications were sent to the Quality Standards Supervisor, enabling proactive intervention and maintenance scheduling.

- **UC05 – Create New Replacement Request**

To streamline maintenance operations, a custom button was integrated into the Device form using the XRM Toolbox and Ribbon Workbench. When triggered, a JavaScript Web Resource initiated a Power Automate flow that automatically generated a new Service Request and updated the device's status to Awaits Replacement Request Approval. The system provided immediate feedback through an on-screen pop-up, confirming successful submission and improving the user experience.

- **UC06 – Generate Unique Code for Case Report**

Data uniqueness and traceability were ensured through a C# plugin registered via XrmToolBox. Executed in the pre-operation stage of Case Report creation, the plugin—implemented in the class CaseReportHelper—generated a unique alphanumeric identifier following the format [IndustrialPlant]-[ItemCode]-[RandomCode] or [ItemCode]-[RandomCode].

This process guaranteed the generation of non-redundant codes, combining structured and random elements (four to five alphanumeric characters) before record insertion into Dataverse.

- **UC07 – Visualize Device Information On-Site**

Finally, a mobile Canvas App was developed to facilitate on-site access to device information. Using QR code scanning, supervisors could instantly retrieve key data fields,

such as device code, operational status, and timestamp of the scan. This feature significantly improved real-time monitoring and decision-making efficiency, providing a fast and intuitive interface for field operations.

5.2 Power Pages Interactive Website

A customer-oriented website was developed, featuring key sections such as Home, FAQ, Privacy Policy, and Contact pages to provide users with clear and accessible information. The solution also includes a Production Department Dashboard, which enables supervisors to easily create, edit, and manage records directly through the web interface.

Accessibility was a core consideration during development, with the ARC Toolkit employed to ensure compliance with inclusive browsing standards. In terms of security, the platform incorporates robust authentication mechanisms and access control to protect user data and maintain system integrity.

Additionally, a Copilot-powered chatbot was integrated into the website to enhance user experience. The chatbot assists visitors by answering frequently asked questions, guiding them through the site, and offering personalized support based on available data.

5.3 Tests

Several tests were conducted to validate the correct functioning of the implemented requirements.

Power Automate Flows:

Both manual and automated tests were performed using Power Automate's built-in tools. Manual testing allowed real-time observation of the logic and data flow, while automated testing reused previous run data to validate fixes and improvements. During development, various flows—such as productivity alerts and automatic creation of Replacement Requests—were tested to confirm that they behaved correctly in different scenarios.

Plugins:

Plugin tests were implemented using the FakeXrmEasy framework, which simulates the Dataverse environment and allows isolated unit testing of plugin logic. Following the AAA pattern (Arrange, Act, Assert), simulated entities were created and initialized, the plugin execution context was configured, and the results were validated—ensuring, for example, that unique codes were generated correctly for case reports.

Acceptance Tests:

Acceptance testing was carried out on the model-driven application, the canvas app, and the company website. Supervisors and mentors participated through weekly meetings, reviewing implemented features, providing feedback, and suggesting improvements. This continuous validation ensured that the solution met the defined requirements and

5.4 Solution Evaluation

The evaluation process focused on verifying that all functional and non-functional requirements identified earlier were fulfilled. Tests on Power Automate flows, plugins, and applications confirmed that the implemented logic correctly addressed all use cases, enabling VoltEdge's production staff to perform their tasks efficiently.

The solution was continuously assessed in weekly review meetings, where progress was demonstrated and feedback was collected. The final presentation to company staff and management received highly positive feedback, emphasizing the system's robustness, usability, and alignment with business objectives.

In summary, all requirements were successfully achieved, and the overall evaluation of the solution was very positive, both technically and functionally.

6 Conclusions

All project objectives were achieved. Dataverse entities were structured with proper relationships, and automation was implemented via Power Automate flows and C# plugins for code generation, device status updates, and performance calculations. Customized interfaces, a Power Pages website, and a mobile Canvas App facilitated user interaction and field management. Security was ensured through role-based access and column-level restrictions. Operational scenarios validated system robustness, while the solution provided a full digital representation of the production cycle with quality assurance and traceability, delivering a comprehensive, business-aligned system for VoltEdge.

6.1 Limitations and future work

The main limitation encountered was the time required to acquire proficiency in Microsoft Power Platform tools. As a result, part of the internship period was dedicated to learning Dataverse, Power Automate, Power Apps, and Power Pages before implementation could advance.

Future developments could extend the Canvas App to additional operational areas, such as test management, revisions, and performance monitoring. Increased automation, particularly in reporting, quality validation, and proactive notifications would further reduce manual effort. Moreover, implementing analytical dashboards with real-time metrics could enhance monitoring and decision-making at the managerial level. These improvements highlight the system's scalability and flexibility, confirming its potential for continuous evolution within the organization.

6.2 Final assessment

The overall outcome of the project is highly positive. Despite initial challenges, all goals were accomplished, demonstrating consistent progress and practical learning. The

internship provided valuable experience in applying low-code technologies and developing integrated business solutions using Microsoft Power Platform and C#.

Beyond technical growth, the experience at Hitachi Solutions Portugal fostered collaboration, autonomy, and professional maturity, contributing significantly to both technical competence and soft skill development. This project therefore represents not only a successful technological implementation but also a meaningful step in academic and professional advancement.

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