**Return of Investment:**

**Machine Learning System**

Portfolio

DIJI. CORPORATION

CIS601: Systems Analysis & Design

Final Course Project

Park University

|  |  |  |  |
| --- | --- | --- | --- |
| **VERSION HISTORY** | | | |
| **VERSION** | NAME | DESCRIPTION OF CHANGE |
| 3/19/23 | Milan, Cathy | Initial Creation |
| 3/26/23 | Milan, Cathy | Software Development Methodology |
| 4/02/23 | Milan, Cathy | Business Analysis and Process Design |
| 4/09/23 | Milan, Cathy | Use Case and Sequence Diagram |
| 4/16/23 | Milan, Cathy | Class Diagram |
| 4/23/23 | Milan, Cathy | Data Model and Data Flow Diagram |
| 4/30/23 | Milan, Cathy | Project Evaluation |
| 5/07/23 | Milan, Cathy | Final Submission |

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# EXECUTIVE SUMMARY SNAPSHOT

Diji Corporation Is newly startup online job shop that is presented on the internet today. Diji Corporation specialize in the sale and distribution of a vast array of printing services that include customer customization. With recent high sales, the corporation has difficulties in measuring productivity for future assessments. This has led management to questionable positive effects, challenges with the delay of production, and the lack of today’s modern technology. The failure in determining the overall result of return In investment is obsolete. Currently, all tests are completed manually generating an unnecessary large amount of paperwork distributed throughout the entire facility. Most often, paperwork is not properly documented or filed, so historical data poses huge inconsistencies for future assessment and planning.

As a company dedicated to providing high-quality products and services to its customer base, Diji. Co. plans to invest in a machine learning project to reach a larger audience and generate more leads. With this project, the company can be aware to a customer's experience with certain products and services quickly and easily.

# PURPOSE OF THIS DOCUMENT

The proposed project is essentially creating an overall display unit that shows the OEE of all equipment (monthly, semiannually, and annually rationale), annually favored trends, and predicative maintenance for OEE failures. The system will pose the integration and data storing of all manufacturing item ID, descriptions, effectiveness score, and customer favored purchases. Once computed, the information is transferred directly to the manager who will oversee the web development project of the company. This will assist in the planning and execution of deliverables for future assessment.

# BUSINESS OBJECTIVES

[1] Populate a historic record of all previous sales data within the past year to develop past, present, and future trends.

[2] With the populated analysis, hired developers will build a machine learning system that will provide models to assist in the transportation of bi-weekly statistics for planning.

[3] Project managers will be able to distinguish product analysis, warehouse associates will track the inventory for productivity, and users will be able to input information digitally for enhanced tracking.



# PROJECT OBJECTIVES

Diji Corporation is currently utilizing an outdated system that tracks trend analysis for project

managers. The current system is paper based, required a large amount of time and resources, and does not aid managers for analysis. This provided project is to invest into a developmental company that will build a system in which historic information will populate past, present, and future analysis for project managers, users, and warehouse associates. This is aid in faster decisions to be made, planning for future success, and inventory maintainability.



# POTENTIAL CHALLENGES

[1] The overall cost.

[2] The adaption from paper utilization to digital means for staff members.

[3] The length of time this project could take before the return of rate is favored.

[4] Historical data is inconsistent and not present.

# PROJECT TEAMS

The project table below summarize the department and the positions in

which are required to complete the project.

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# SOFTWARE DEVELOPMENT METHODOLOGY

## Diji. Corporation will adapt the Waterfall methodology that is fragmented into linear

## requirements in which each phase is a prerequisite of the one before. Phases will not

## continue until the approval of stakeholders is completed.

WATERFALL CORE PRINCIPLES

## [1] Low customer involvement

## All users, associates, and managers who are involved will be trained at the very

## minimal to avoid interrupting the daily rhythm amongst the employees. Hired developers will assess priorities for system build while working one on one with project management officers and the gathered information they would present. Once systems were generated and approved, the finalized project would be implemented on pilot program. If the pilot program was successful, the full deployment of the new system would be ready for distribution.

## [2] Strong documentation

## Due to the nature of the MLS build, all steps, processes, and requirements will be recorded and placed into a procedures catalog for future purposes. The finalized book of procedures will be approved through stakeholders and managers for publications.

## [3] Sequential structure

## The project will follow a sequential structure due to the waterfall methodology in which the project will abide by.

# BUSINESS REQUIREMENTS

## The investment of new MLS for Diji. Corporation will pose the functions and non-functional

## requirements below by developers.

|  |  |  |
| --- | --- | --- |
| **REQ. ID #** | **FUNCTIONAL REQUIREMENTS** |  |
| **1.1** | This refers to authenticating access requests for information in cloud computing. | Secure Communication |
| **1.2** | Each physical module should have an embedded computer to enable autonomous decisions and retrieve required information from cloud computing via CPS. | Embedded computer |
| **1.3** | This provides a virtual system with online data from shop-floor sensors. | Virtual reader |
| **1.4** | A generated report of consolidated data | Improve Work coordination with digital workflows |
| **1.5** | Standardized processes must be put in place so that accurate data can be gathered. | Required for Digital Lean to work |
| **REQ. ID #** | **NON-FUNCTIONAL REQUIREMENTS** |  |
| **2.1** | An engine that powers the virtual system and serves as a virtual repository to enable efficient parallels | Virtual system builder |
| **2.2** | The system should be able to recover from interruptions in real time | Recovery |
| **2.3** | The system can offer its core functions to external factories or other internal factories | Services for core processing |
| **2.4** | This refers to transferring customer requirements to products and investigating manufacturability using existing resource or outsourcing services | Online data analysis |
| **2.5** | Employees should be trained on the advantages, prerequisites, and perks of digital lean and the value it brings to their specific jobs | Adaptability to new business models |
| **2.6** | System needs to protect company data from unauthorized access and assure its integrity through core network services (LPWA) | Security |
| **2.7** | The system needs to have the ability to connect to a vast array of IoT devices | Network Requirement |
| **2.8** | Routing of data transported through wireless devices and connections to a cloud-based system is required for IoT applications | Reliability and availability |
| **2.9** | new industrial enterprises with accurate diagnostics and comprehensive logging features. This enables employees to have easy accessibility to tasks, logs, and sensors | Applicability/Useability |
| **2.10** | Employee, data information and app managed services with reliable monitoring | Scalability |

# BUSINESS PROCESS DIAGRAM

The provided process that will be strictly followed describes how developers will go about the implementation. Diji Co. Will renovate their old systems of analogue to full digital capabilities. The business process below will be the initial phase of the project and will continue once approved by proper authorities.

A diagram of a business process

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# PROJECT TIMELINE

## A picture containing text, screenshot, design Description automatically generated

# SEQUENCE DIAGRAMS

## *Title:* Diji Co. Online Purchase

## *Description:* Sequence diagrams, commonly known as the Unified Modelling Language, are

## utilized to display the chain of correspondence amongst objects within an interaction in a system

## database. The diagram presented depicts Diji. Co's stature of the precedence in which the IT

## system is collaborating the company to their customers.

## *Explanation:* The sequence diagram found below starts with the customer is on the webpage interface in which they can began to browse and add the desired products to their cart. Once completed, the system will be allotted to order the added items. The added items will then reach back to the warehouse where the item code is checked for availability. The results will be. Displayed in the checkout webpage. Once completed, the items will be available for payment type confirmed through the customer. As payments are processed through the POS system, reach back to the customers financial institution is notified. Approval or denial of funds is returned. If approved, the confirmation page is generated, and a confirmation email is sent to the customers email on file.

Diagram, engineering drawing

Description automatically generated

# USE CASE DIAGRAMS

*Title:* Machine Learning Technology Use Case Diagram

*Description:* The use case diagram illustrates the process beginning of registration on the web face interface, up until the report of return of investment report is generated for management to access future potential and/or improvements. The illustration depicts required functionalities that need to be carried out by the system and the associated actors involved.

*Explanation:* Actors – User, Administrator, Primary Data App System, newly integrated application system. The primary application system generated all auto configured information pertaining to the viewing times each product is receiving. There, the filtered data is analysed, and objectives are generated by administrators. Once the business proposal is generated, the overall report is processed through the newly integrated application in which the only person to access it is the manager.

*A picture containing text, diagram, drawing, sketch

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# CLASS DIAGRAMS

The provided diagram below narrates the process of which the user and customer interact

in which how and where the information is notated through the machine learning system.

A picture containing text, diagram, plan, font

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# DATA FLOW DIAGRAM

The data flow chart below annotates the process of information within the developed

machine learning system.

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# PROJECT EVALUATION

*MAINTAINABILITY*

A key characteristic of software is maintainability, which is determined by how easily the documented code is inserted, out-of-date data is moved, and how the bad ones can be fixed. It is essential to ensure the upkeeping of the software and systems operational and receptive at all costs. The capacity of a machine to be maintained in or returned to a specific operational condition under physical deterioration is referred to as maintainability. (Pierskalla & Voelker, 1976).

Assessment: Since ML models are co-dependent on the informational data provided, these associated systems are prone to degrade over time. The logical aspect of software applications is far more complex and will cause system errors over an extended period. The more significant challenge lies when software is unified with ML models as we continue to augment receiving factors. Since continuous maintenance is required, handling vast sets of data, complicated algorithms, and custom code can be complex. In addition, well-updated procedures are essential, given that any changes to the system can substantially impact model performance.

Solution: Developmental teams should invest more staff capabilities focused on simple maintenance tasks. Not only would this require a more extensive staff, but the installation and creation of more maintenance tasks should be emphasized. They are building a powerful model for managers to aggregate and add interchangeable and easy-to-update tasks to reduce system errors. This allows managers to establish precise control procedures and documentation standards, with an outlook to ensuring that changes can be observed and checked effectively. If permitted, the investment in IS health assessment software could provide a visual understanding and continuous integration tools that can assist in identifying system errors and solving these faults faster than considered.

*SCALABILITY*

Scalability is a system's way of coping with increasing obligations and demands as users and datasets upsurge and multiply.

Assessment: ML models' significant capability and compatibility demands can require large amounts of computer processing and storage space to function correctly. This makes it much harder for MLS to upgrade, and assisted assets will need to be allocated to aid the increasing or decreasing demands of the business.

Solution: The investment in Software-Defined Storage could alleviate overwhelming systems by dividing storage resources from their associated hardware platforms. This makes storage assets easier to process and formulate.

*VULNERABILITY*

Vulnerabilities are the inclination and holes in a system that allows inside and outside threats to be feasible and menace some casts to capitalize on them. Vulnerabilities in MLS include server misconfigurations, transporting classified information not formatted to the correct encryption, and even negligent user error.

Assessment: MLS are targeted through specific attacks to try and embezzle and abuse businesses. These systems are more prone to attack where complete access to all business model parameters is stored in the adversarial machine. MLS are complexly created around using and storing sensitive information to produce adequate results. The potential cost of damage is at a higher stake.

Solutions: Developers should instill propriety to encrypt sensitive data, validate user inputs, and stay on top of updates. The investment in a reliable vulnerability scanning tool that also controls access to protect classified data while preventing the potential threat of unauthorized access to their systems.

*SECURITY*

Security is a leading concern in today’s modern world. Therefore, the capacity to safeguard data from unauthorized personnel is a priority. Regarding MLS, security is crucial due to the protection of sensitive data stored so the model will generate accurate and worthy results.

Assessment: MLS usually depends on datasets with extensive private information. With big personal data, any data breach could pose a considerable detriment within organizations.

Solution: Developers should invest in strategic encryption protocols, mitigating access, adopting strict rules for storage and data management, and investing in a powerful security tool (monitoring, detection, and response processes).

*LEGAL ISSUES*

The scope and application of MLS have continued to grow in the modern day. As the growth of MLS increases, the amount of sensitive data being processed is utilized to deliver results that sometimes could be harmful and not helpful. These issues cause legality concerns today.

Assessment: With MLS and the integration of AI, the results of partial/discriminatory data, lack of contestability, product liability, and accountability have posed concerns. MLS processes large amounts of sensitive data that generates decisions and results. Therefore, they must abide by all pipelines' current data privacy laws.

Solution: Developers should ensure the laws and regulations are updated and implemented in their MLS. The generated results of MLS could sometimes look bad at first-hand contact. However, developers should reinforce periodic training to enable the user's understanding to articulate their findings' algorithms.

*ETHICAL CONCERNS*

As MLS Continues to grow in technology, the lack of transparency, unbiased decisions, and discriminatory outcomes have only sometimes been evident, posing substantiated ethical concerns.

Assessment: MLS today executes sophisticated processes that deliver fast results that significantly impact people. The processed data should always be precise so the user can understand the results.

Solution: To mitigate ethical challenges with MLS, developers should implement educating and training users on the system's left and right limits to alleviate deception. Also, ensure that the data reflects the unaversive by ensuring the data is not biased and is currently inclusive to represent diversity.

# DATA DICTIONARY

Below is the data dictionary annotated for the developed machine learning system.

A close-up of a document

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