

# eco-friendly furniture co.



**Samiksha Khare**  
Scrum Master



**Chen Chen**  
Software Developer



**Dhvanil Sanjay Shah**  
Support Engineer



**Ashley (Jia) Yan**  
Software Tester



**Emily Su**  
Product Owner



# About Eco-Friendly Furniture Co.

**Company Overview:** Eco-Friendly Furniture Co. is a forward-thinking furniture manufacturing company dedicated to producing sustainable and environmentally friendly furniture solutions.

**Mission Statement:** To minimize our environmental footprint while providing high-quality, stylish, and functional furniture for homes and businesses.

- **Headquarters:** San Francisco, CA
- **Company Size:** 100-150 employees
- **Founded:** 2013





# Business Problem

Environmental impact data has been managed inefficiently, and this problem has become more apparent as our operations and volume of data increase.

Eco-Friendly Furniture Co. currently uses Excel files stored in SeedDMS document management system to store environmental impact and other company files. The decentralization of data specifically pertaining to environmental impact and reliance on manual processes to analyze environmental performance poses obstacles to making informed decisions, heightens compliance risks, restricts transparency, and hampers efforts to save costs.



# Reporting Environmental Impact



## 01 Energy Consumption Data

Electricity usage, renewable energy usage, and fuel consumption.

## 02 Material Sourcing Data

Types, quantities, and sourcing of raw materials and goods used in manufacturing and production.

## 03 Logistics Data

Emissions associated with the transportation of raw materials and goods.

## 04 Waste Generation Data

Types and quantities of waste generated in manufacturing and production.



# Our Proposal

## *Environmental Management System*

To improve the management of environmental impact data, we propose the development of an Environmental Management System (EMS) web app. The EMS will be implemented with a MySQL backend database management system, compatible with SeedDMS<sup>1</sup>, and enable Eco-Friendly Furniture Co. to centralize environmental impact data for efficient storage and management.

- User authentication and access controls will be implemented to ensure data security and privacy
- EMS modules will enable employees to view, monitor, and analyze environmental impact data, thus streamlining decision-making capabilities, ensure regulatory compliance, and improve environmental transparency.
- Python as an analytics engine will facilitate data processing, analysis, and automation allowing for more effective decision-making and insights into our environmental impact.

[1] SeedDMS. (2024). About. Retrieved from <https://www.seeddms.org/about/>

# Business Objectives

**S**pecific      **M**easurable      **A**chievable      **R**elevant      **T**ime-bound

Centralize Data	Consolidate all environmental impact data into a single database system.	Ensure 100% of data is accessible through the new system.	Implement a MySQL backend to manage and centralize data storage.	Centralized data management enhances decision-making and operational efficiency.	Complete data centralization within the first two months of the project.
Enhance Data Integrity	Ensure the accuracy, consistency, and security of all environmental data.	Achieve 99.9% data accuracy and zero data loss incidents.	Implement regular database backups and stringent access controls.	Maintaining data integrity is crucial for compliance and trustworthiness.	Establish data integrity protocols by the end of the third month.
Improve Efficiency	Streamline data entry, analysis, and reporting processes.	Reduce data processing time by 50% and report generation time by 30%.	Develop automated data entry and reporting tools.	Increased efficiency reduces costs and improves productivity.	Achieve streamlined processes within the first four months of the project.
Facilitate Growth	Lay a foundation for future scalability to integrate with existing and new systems.	Ensure the system can handle a 100% increase in data volume without performance degradation.	Design the system architecture with scalability in mind.	Scalability is essential for long-term sustainability and adaptability.	Ensure scalability features are in place by the end of the project (six months).



# DBMS Decision Criteria

As an environmentally conscious company, Eco-Friendly Furniture Co. requires a DBMS that not only supports our operational needs but also aligns with our sustainability ethos and data management requirements.

## Criteria Definition & Weight Assignment

- **Cost Efficiency (Weight 20%):** Reflects our commitment to cost-effectiveness and resource optimization. A rating of 5 indicates no unnecessary financial expenditure.
- **Operational Performance (Weight 25%):** Critical for managing large datasets of environmental impact. A DBMS that perfectly meets our performance expectations scores a 5.
- **Usability & Management (Weight 15%):** Our system should be user-friendly, reflecting our collaborative and inclusive work culture. A score of 5 suggests the system is exceptionally easy to use.
- **System Flexibility (Weight 10%):** Represents the need for our DBMS to adapt to evolving environmental data types and sources. A score of 5 means the system is highly adaptable.
- **Data Security (Weight 20%):** Security is paramount due to the sensitivity of environmental data. A rating of 5 indicates robust security features in line with best practices.
- **Community Support (Weight 10%):** An active OSS community offers long-term sustainability for our EMS, with a score of 5 indicating excellent support and community engagement.

## Rating Scale

- Each OSS is evaluated against these criteria on a 1-5 scale.
- A score of 5 signifies perfect alignment with the business objective related to that criterion.



[1] Andrea,O. (2018 Jan 29). 8 Key Considerations When Choosing a DBMS. Retrieved from <https://blog.paessler.com/key-considerations-when-choosing-a-dbms>

[2] Dallas TX.(2023, Sep 6). Choosing the Right Database Management System for Your Application. Retrieved from <https://axissoftwaredynamics.com/choosing-the-right-database-management-system-for-your-application/>

# DBMS Competitive Analysis

Criteria	MySQL <sup>1</sup>		PostgreSQL <sup>1, 2</sup>		SQLite <sup>1</sup>	
	Description	Score	Description	Score	Description	Score
Cost Efficiency	Free, open-source	4	Free, open-source	3	Free, open-source	5
Operational Performance	High performance, especially for read-heavy workloads	5	Excellent performance, particularly for complex queries and write-intensive workloads	4	Good performance for small-scale and embedded applications	3
Usability & Management	Easy to install, configure, and manage	4	Slightly more complex setup, but offers extensive features and control	3	Very easy to use and manage, particularly for small-scale projects	4
System Flexibility	Supports various storage engines and replication methods	5	Advanced features (i.e., complex data types, full-text search)	5	Lightweight and suitable for embedded use cases, but lacks some advanced features	3
Data Security	Provides robust security features (i.e., access controls, encryption options)	5	Strong security features, including role-based access control and SSL support	4	Limited security features compared to server-based databases	3
Community Support	Large and active community	4	Large and active community	5	Active community, particularly for embedded use cases	4
Total Score	27		24		22	

[1] Devathon Team. (2021, Jan 15). MySQL vs PostgreSQL vs SQLite. (n.d.). Devathon. Retrieved from <https://devathon.com/blog/mysql-vs-postgresql-vs-sqlite/>  
[2] Drake, M & ostezer. (2022, Mar 9). "SQLite vs MySQL vs PostgreSQL: A Comparison of Relational Database Management Systems." (n.d.). DigitalOcean. Retrieved from <https://www.digitalocean.com/community/tutorials/sqlite-vs-mysql-vs-postgresql-a-comparison-of-relational-database-management-systems>





# MySQL SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"><li>• Global community and widespread usage as the world's most popular open source database<sup>1, 2</sup></li><li>• Compatibility and integration with SeedDMS<sup>5</sup></li><li>• Cost-effectiveness</li><li>• Reliable performance with structured data is suitable for environmental metrics</li></ul>	<ul style="list-style-type: none"><li>• Complexity in large scale implementations</li><li>• Limited built-in analytics</li><li>• Complex transactions may encounter difficulties (i.e., deadlock, lock contention)<sup>3</sup></li></ul>
Opportunities	Threats
<ul style="list-style-type: none"><li>• Integration with IoT technologies</li><li>• Cloud-based Solutions</li><li>• Customization for sustainability reporting</li></ul>	<ul style="list-style-type: none"><li>• Competing database technologies</li><li>• Security vulnerabilities</li><li>• Potential regulatory compliance risks (i.e., GDPR) leading to legal repercussions<sup>4</sup></li></ul>

[1] Statista. (2023 Sep). Worldwide popularity ranking of database management systems. Retrieved from <https://www.statista.com/statistics/809750/worldwide-popularity-ranking-database-management-systems/>  
[2] MySQL. (n.d.). About MySQL. Retrieved from <https://www.mysql.com/about/>  
[3] Kwong, L. G. (2021, Oct 31). Understand the Basics of Locks and Deadlocks in MySQL - Part I. Medium. Retrieved from <https://lynn-kwong.medium.com/understand-the-basics-of-locks-and-deadlocks-in-mysql-part-i-92f229db0a>  
[4] Min-Hank Ho, VP Product Management (2023, Sep 13). Data Security in MySQL is an evolving compliance and threat landscape. Retrieved from <https://baffle.io/blog/data-security-in-mysql-is-an-evolving-compliance-and-threat-landscape/>  
[5] SeedDMS. (2024). About. Retrieved from <https://www.seeddms.org/about/>

# MySQL Overview

MySQL is the world's most popular<sup>1</sup> open-source client/server relational database management system developed and maintained by Oracle's MySQL team. As an open-source software, it is available for use under the version two GNU General Public License<sup>2</sup>.

## Sponsors

MySQL has 8,000+ sponsors<sup>3</sup>, with the most sponsors at Hewlett Packard Enterprise, Amazon Web Services, Microsoft, and VMware.

## Critical Users

MySQL is used by major companies including Facebook, Twitter, eBay, Pinterest, Tumblr, Wikipedia, and many more<sup>4</sup>.

## Key Benefits<sup>5</sup>

- Ease of use
- Reliability
- Scalability
- Performance
- High Availability
- Security

[1] MySQL. (n.d.). About MySQL. Retrieved from <https://www.mysql.com/about/>

[2] MySQL. (2010, Jul). Commercial License for OEMs, ISVs and VARs. Retrieved from <https://www.mysql.com/about/legal/licensing/oem/>

[3] PartnerBase. (n.d.). MySQL. Retrieved from <https://www.partnerbase.com/mysql>

[4] Oracle. (n.d.). MySQL. Retrieved from <https://www.oracle.com/webfolder/college-recruiting/projects/mysql.html>

[5] Oracle. (n.d.). What is MySQL?. MySQL. Retrieved from <https://www.oracle.com/mysql/what-is-mysql/>

# MySQL Upstream & Downstream

## Upstream<sup>2</sup>

The official MySQL **codebase** maintained by the MySQL development team at **Oracle Corporation**.



## Distribution<sup>3</sup>

MySQL has several distributions for various use cases and deployment scenarios:

- MySQL Community Edition
- MySQL Enterprise Edition
- MySQL Cluster
- MySQL Database Service
- MySQL HeatWave

## Downstream<sup>1</sup>

MySQL's downstream versions are derived versions or branches based on the upstream MySQL versions, with modifications, optimizations, or extensions:

- MariaDB
- Percona Server for MySQL
- Amazon RDS MySQL

[1] DB-Engines GmbH. (n.d.). System Properties Comparison Amazon Aurora vs. MariaDB vs. Percona Server for MySQL. Retrieved from <https://db-engines.com/en/system/Amazon+Aurora%3BMariaDB%3BPercona+Server+for+MySQL>  
[2] Oracle Corporation. (2024 Apr 8). MySQL logo. Retrieved from <https://1000logos.net/mysql-logo/>  
[3] MySQL. (n.d.). Retrieved from <https://www.mysql.com/>

# MySQL User Success Stories



"MySQL is the engine that drives our business, handles computationally intensive queries, and performs all the testing in terms of executing tasks and producing valuable results for users. It's the engine that drives QuerySurge."<sup>1</sup>

**Joe Brandsdorfer**

Director of Operations, Real-Time Tech Solutions



"The decision to use MySQL's built-in replication to migrate the data for us meant that we no longer had to build the most challenging pieces to guarantee data consistency ourselves as replication was a proven quantity."<sup>2</sup>

**Willie Yao**

Head of Developer Infrastructure

[1] MySQL. (n.d.). RTTS Uses MySQL Embedded for QA and Testing Platform. Retrieved from <https://www.mysql.com/why-mysql/case-studies/rtts-queriesurge-mysql-embedded.html>

[2] Yao, W. (2015, Oct 6). How We Partitioned Airbnb's Main Database in Two Weeks. Retrieved from <https://medium.com/airbnb-engineering/how-we-partitioned-airbnb-s-main-database-in-two-weeks-55f7e006ff21>

# OSS Guiding Principles<sup>1</sup>



- **License Compliance**  
We must understand and adhere to the open-source license terms.
- **Community Engagement**  
We should actively participate and contribute to the open-source community.
- **Transparency and Collaboration**  
We need to be transparent about our software use and collaborate openly.
- **Security and Quality Assurance**  
We must prioritize security and conduct thorough testing.
- **Long-Term Maintenance**  
We should consider sustainability and community support for long-term use.



[1] Open Source Software. (2024, Jan 6). Free and Open Source Software (FOSS) Core Principles. Retrieved from <https://osssoftware.org/blog/free-and-open-source-software-foss-core-principles/>



# SDLC Model

## Scrum + Incremental Model

### Benefits of Scrum<sup>1</sup>

- **Flexibility and Adaptivity:** Scrum is highly adaptive to changes, which is crucial in projects dealing with environmental data. In such area, requirements can evolve frequently because of new regulations or changes in company policy. Based on ongoing feedback, priorities and functionalities could be adjusted on account of Scrum's iterative process.
- **Stakeholder Engagement:** Stakeholders are involved throughout the development process by means of regular reviews and sprints in Scrum. This continuous engagement is crucial for our EMS, because it aligns with user needs and compliance requirements.
- **Team Dynamics and Productivity:** Scrum enhance collaboration and self-organizing within the team, which can facilitate problem-solving and innovation. Regular sprints and stand-up meetings keep teams focused and productive.

### Benefits of Incremental Model<sup>2</sup>

- **Progressive Development:** The Incremental model provides manageable, functional or increments modules in the development of our EMS. This method breaks down the development process into smaller parts, each adding functionality to the previously delivered parts, and it is ideal for complex projects.
- **Early and Predictable Deliveries:** By delivering the system incrementally, we'll able to provide functional improvements at each stage, which enables early testing and feedback. This is essential for an EMS, where early bug detection and adaptation to user feedback can significantly enhance the final product.
- **Risk Management:** This model reduces risks, because each increment is smaller and more manageable. Problems can be detected early and are typically associated with a specific increment. This will make them easy to address without affecting the entire system.

[1] Sean, P. (2023, Dec 30). What Is Agile Scrum Methodology? Retrieved from <https://www.businessnewsdaily.com/4987-what-is-agile-scrum-methodology.html>

[2] Martin, M. (2023, Dec 30). What is Incremental Model in SDLC? Advantages & Disadvantages. Retrieved from <https://www.guru99.com/what-is-incremental-model-in-sdlc-advantages-disadvantages.html>



## Why a Blend of Scrum and Incremental Model?<sup>1, 2</sup>

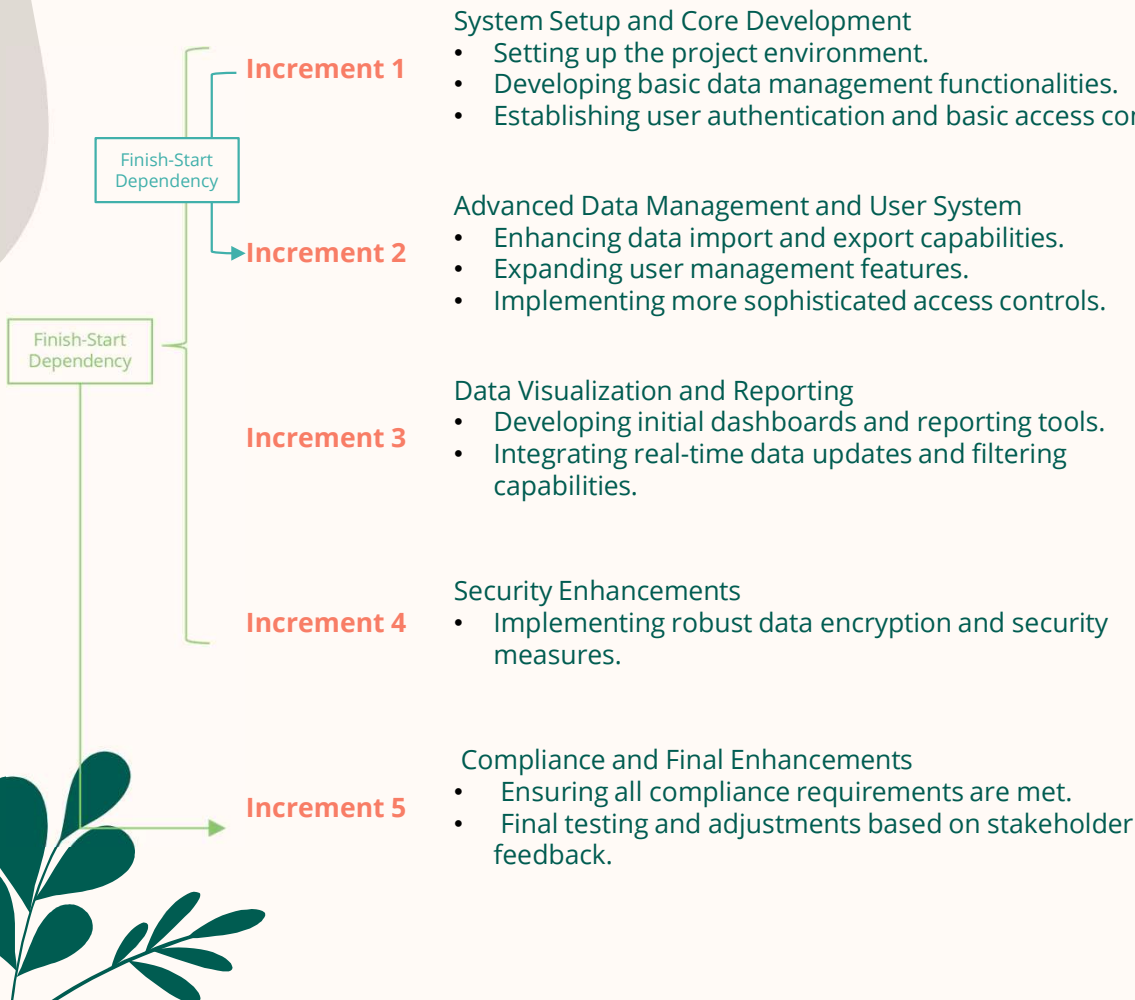
- **Combining Predictability with Flexibility:** Blending the Incremental Model with Scrum provides the structured delivery of increments. In the meanwhile, it will still maintain the flexibility based on real-time feedback and changing needs. This is particularly useful for an EMS, where different modules might require rapid adjustments due to technological, regulatory, or operational changes.
- **Enhanced Focus on Deliverables:** Incremental Model's focus on delivering working components at each stage. While combined with Scrum's sprint-based approach, each component will be fully functional and meet quality standards before moving on to the next. This method reduces the accumulated complexity, especially during the final stages of the project.
- **Risk Reduction:** The regular review and adaptation processes in Scrum, associated with the Incremental Model's approach to modular development, will effectively spread the risk. Each increment can be adjusted or improved without significantly disturbing the entire project, which is crucial in managing risks while developing an EMS.
- **Continuous Improvement and Integration:** With each increment, the team can integrate lessons learned into the next phase. This continuous loop of feedback and improvement will provide robustness, user-friendliness, and compliance with environmental standards in our EMS.

[1] Sean, P. (2023, Dec 30). What Is Agile Scrum Methodology? Retrieved from <https://www.businessnewsdaily.com/4987-what-is-agile-scrum-methodology.html>

[2] Martin, M. (2023, Dec 30). What is Incremental Model in SDLC? Advantages & Disadvantages. Retrieved from <https://www.guru99.com/what-is-incremental-model-in-sdlc-advantages-disadvantages.html>



# Scrum-Incremental: Sequential Increments



**Result** Users can input and access environmental data through a secure system, establishing the groundwork for data-driven decision-making.

**Result** Enhanced UI for data import/export functions and more robust user management, leading to increased engagement and productivity.

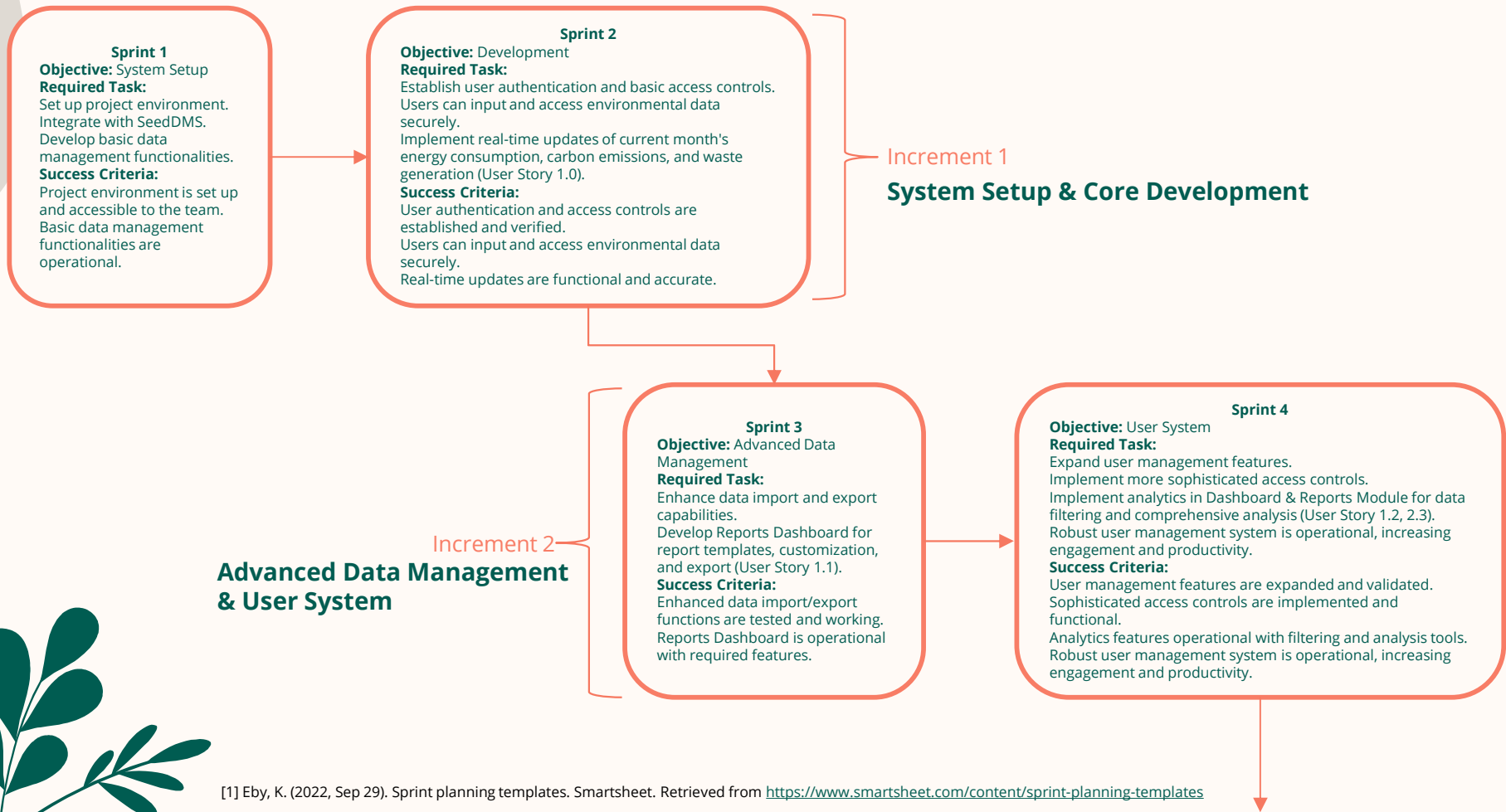
**Result** Stakeholders gain immediate visual insights from dashboards, facilitating proactive environmental management actions.

**Result** Ensures data integrity and confidentiality, protecting sensitive information and strengthening system security.

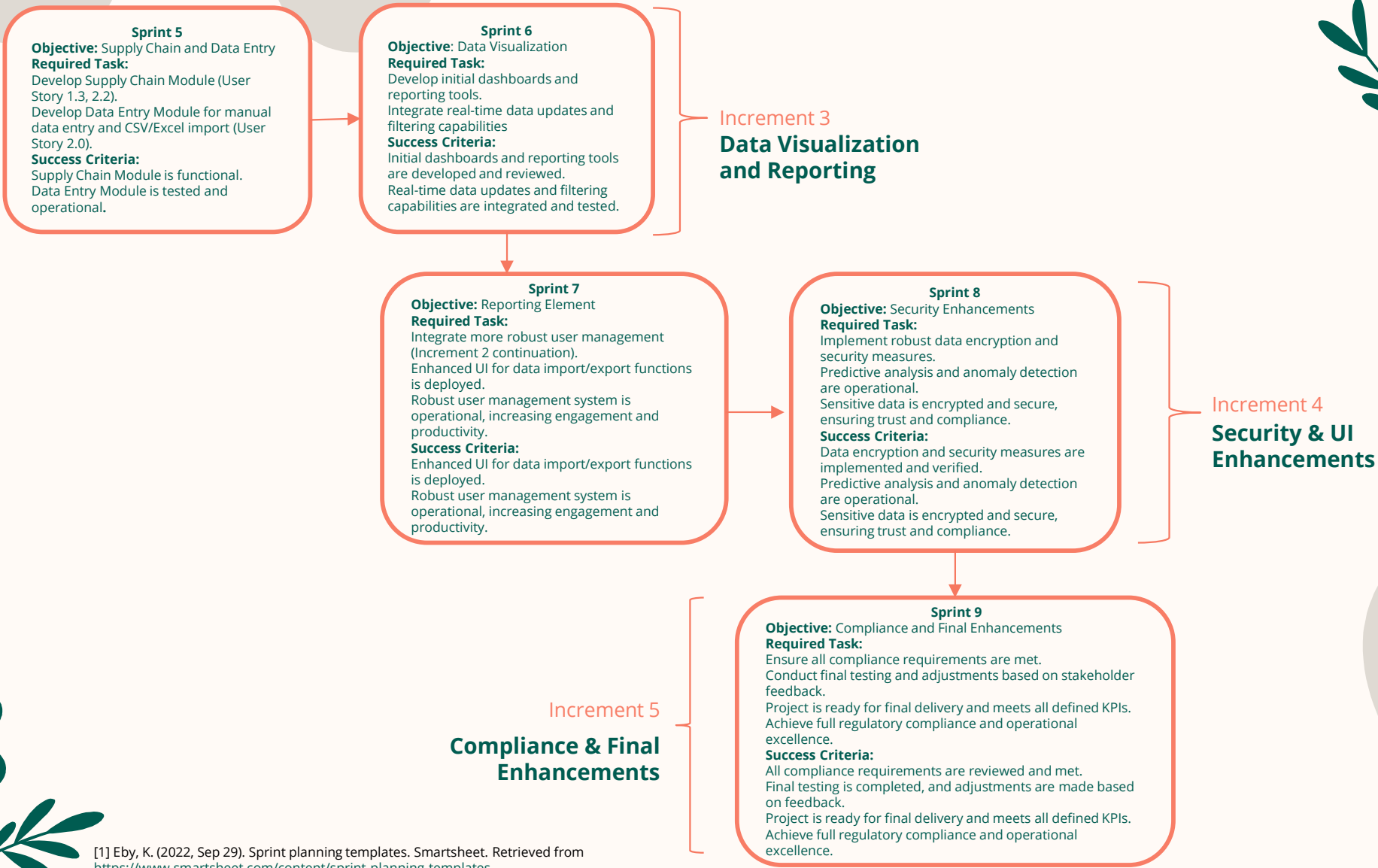
**Result** Achieve full regulatory compliance and operational excellence, ensuring all environmental KPIs are met effectively.



# Sprint Plan



[1] Eby, K. (2022, Sep 29). Sprint planning templates. Smartsheet. Retrieved from <https://www.smartsheet.com/content/sprint-planning-templates>



[1] Eby, K. (2022, Sep 29). Sprint planning templates. Smartsheet. Retrieved from <https://www.smartsheet.com/content/sprint-planning-templates>

# Personas



**Pam**  
*Environmental Director*



**Jim**  
*Supply Chain Ops Manager*



**Oscar**  
*Database Administrator*

[1] svstudioart. (n.d.). Banner with diverse happy people group standing together on white [Image]. Freepik. Retrieved from [https://www.freepik.com/free-vector/banner-with-diverse-happy-people-group-standing-together-white\\_12873006.htm#fromView=search&page=1&position=27&uuid=f789654e-d293-4c2f-adc9-d60109001927](https://www.freepik.com/free-vector/banner-with-diverse-happy-people-group-standing-together-white_12873006.htm#fromView=search&page=1&position=27&uuid=f789654e-d293-4c2f-adc9-d60109001927)

# Pam: Environmental Director

**Characteristics:** results-oriented, expertise in environmental best practices, deeply engaged in the local environmental community, strategic visionary, goal-oriented planner

**Responsibilities**

- Develops, implements, and communicates the company's environmental sustainability strategy and goals to stakeholders.
- Oversees environmental impact data collection, analysis, and reporting.
- Manages relationships with San Francisco regulatory agencies and certification bodies and collects feedback to drive improvement.
- Collaborates with Supply Chain Ops Manager to ensure supply chain operations are conducted in an environmentally-responsible manner in alignment with the company mission.

**Pain Points**

- Difficulty locating, aggregating, and analyzing environmental data from SeedDMS due to lack of filtering and search functionalities which results in lack of visibility into environmental performance across the company.
- Time-consuming manual data entry and manipulation in Excel.
- As environmental impact reporting is being fed up the chain, there are version control issues where files become corrupted and data integrity is diminished due to multiple users modifying one file.
- Repeated requests and long wait times to receive environmental performance reports from teams.

**Requirements**

- Centralized system for collecting, storing, and analyzing environmental data.
- Fast processing of large data volumes and protection against unauthorized changes.
- Standardized reports and dashboards that updates based on environmental impact data in the system. The reports and dashboards must be interactive, shareable, and exportable.
- Ability to generate and export reports for regulatory compliance and sustainability certifications.



[1] svstudioart. (n.d.). Banner with diverse happy people group standing together on white [Image]. Freepik. Retrieved from [https://www.freepik.com/free-vector/banner-with-diverse-happy-people-group-standing-together-white\\_12873006.htm#fromView=search&page=1&position=27&uud=f789654e-d293-4c2f-adc9-d60109001927](https://www.freepik.com/free-vector/banner-with-diverse-happy-people-group-standing-together-white_12873006.htm#fromView=search&page=1&position=27&uud=f789654e-d293-4c2f-adc9-d60109001927)  
[2] San Francisco Department of the Environment. (n.d.). Business Resources. Retrieved from <https://www.sfenvironment.org/business-resources>

# Jim: Supply Chain Ops Manager



**Characteristics:** analytical mindset, detail-oriented, strategic planner, decision maker, environmental stewardship

## Responsibilities

- Manages supplier relationships; collects supplier sourcing, transportation, and logistics data and sustainability certifications to ensure adherence to sustainable sourcing practices.
- Establishes supply chain transparency and traceability to track the origins of raw materials used in production.
- In collaboration with the Environmental Director, monitors environmental impact resulting from supply chain operations to ensure alignment with internal environmental goals and compliance with regulations.

## Pain Points

- As data volume increases, supply chain transparency and traceability is difficult to manage, and regular reporting is a time-consuming, repetitive task on Excel.
- Supplier information and sustainability certification is difficult to search and filter through.
- Limited analytics capabilities to assess supply chain process efficiency and environmental performance using Excel.

## Requirements

- Centralized system to easily import data from suppliers and manually enter internal environmental impact data and ensure data consistency, accuracy and integrity.
- System equipped with advanced analytics functionalities and the ability to easily repeat those analyses on the data I select.
- Easy-to-use interface to generate customizable reports and dashboards; the ability to save and templatize reports and dashboards for future use.
- Automated notifications if environmental metric thresholds are exceeded or anomalies are detected.

[1] svstudioart. (n.d.). Banner with diverse happy people group standing together on white [Image]. Freepik. Retrieved from [https://www.freepik.com/free-vector/banner-with-diverse-happy-people-group-standing-together-white\\_12873006.htm#fromView=search&page=1&position=27&uud=f789654e-d293-4c2f-adc9-d60109001927](https://www.freepik.com/free-vector/banner-with-diverse-happy-people-group-standing-together-white_12873006.htm#fromView=search&page=1&position=27&uud=f789654e-d293-4c2f-adc9-d60109001927)

# Oscar: Database Administrator

**Characteristics:** 5+ years of experience as a database administrator, excellent problem solver, security conscious, proactive planner, growth mindset

## Responsibilities

- Configures and maintains database management system for required updates and software patches.
- Manages system security and implements access controls and security protocols.
- Monitors system performance and troubleshoots technical issues.
- Conducts regular data backups and disaster recovery planning.

## Pain Points

- Excel does not have robust security features, so data security and compliance has been difficult to manage across local drives and shared network folders.
- File recovery in cases of accidental deletion, file corruption, and hardware failure is sometimes not possible due to the current lack of built-in backup and recovery mechanisms.
- Lack of centralized data repository for environmental information makes data management time consuming.

## Requirements

- Database system with automated administrative tools for routine procedures to optimize system efficiency and monitoring.
- Customizable security features for data encryption, user access controls, and security logs to protect confidential data and identify and mitigate potential risks.
- APIs to integrate the database with other systems and third-party applications.
- Comprehensive documentation and support resources to refer to for troubleshooting.





# Story Point Relative Sizing

To apply relative sizing for each user story, we identified value factors and gave each criterion a weight from an empirical scale of 1-5. Based on the value factor weights, a user story can receive a maximum of 25 story points.

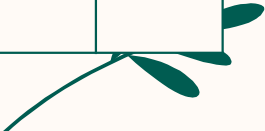
Value Factor	Description	Weight
<i>Business Impact</i>	Essential to core business operations, technical readiness, system setup, and core development.	5
<i>Strategic Importance</i>	Aligns with mission, objectives, and delivers value to stakeholders (i.e., enables stakeholders to perform responsibilities effectively - data analysis, report and dashboard creation, system and monitoring).	5
<i>Implementation Complexity</i>	Substantial technical development (i.e., re-design or new UI needed, algorithm development) and/or is a prerequisite for other components.	3
<i>Risk Mitigation</i>	Necessary to mitigate or prevent risks (i.e., security safeguarding data loss or breach.)	5
<i>Regulatory Compliance</i>	Essential for industry regulations and standards.	4
<i>Operational Efficiency</i>	Optimizes system and operational efficiency, contributing to cost-saving benefits.	3





# Environmental Director User Stories

ID	User Story	Acceptance Criteria	Story Points
★ 1.0 Epic	As Environmental Director, I want to create dashboards and reports using data integrated from the database management system to monitor environmental KPIs in a Dashboards & Reports Module of the EMS so that I can develop sustainability goals and ensure compliance with regulations.	<ul style="list-style-type: none"><li>• EMS integration provides access to data from database management system (SeedDMS and MySQL DBMS)</li><li>• User can create new dashboards and reports using Dashboards &amp; Reports Module</li><li>• Dashboards and reports are populated with the data the user selects</li></ul>	20
1.1	As Environmental Director, I want to export or share via link dashboards and reports from the Dashboards & Reports Module so that I can share them with stakeholders to verify our sustainability targets are met.	<ul style="list-style-type: none"><li>• Dashboards and reports can be saved and accessed again in the EMS.</li><li>• Users can export a local copy of dashboards and reports. Local dashboard copies are not interactive.</li><li>• Shareable link allows users with EMS access to view dashboards and reports.</li></ul>	15
1.2	As Environmental Director, I want to export multiple supplier sustainability certification documents at a time from the Supply Chain Module so that I can quickly consolidate documents for regulation compliance.	<ul style="list-style-type: none"><li>• Supplier sustainability documents appear in the Supply Chain Module.</li><li>• Multiple documents can be selected and exported at once.</li><li>• Export status message informs the user if the export is successful or failed. If failed, file(s) that failed to export are indicated.</li></ul>	19







# Supply Chain Ops Manager User Stories

ID	User Story	Acceptance Criteria	Story Points
★ 2.0 Epic	As the Supply Chain Ops Manager, I want to access supply chain ops environmental impact data (supplier information, raw material sourcing, manufacturing processes, transportation and logistics, inventory) from the Supply Chain Module (a consolidated view of supply chain data) of a reliable EMS with a system uptime of at least 99.5% so that I can ensure supply chain operations are in alignment with environmental goals and compliant with regulations.	<ul style="list-style-type: none"><li>• Data from all sources is accurately integrated and visualized within the Supply Chain Module without errors.</li><li>• The system processes and visualizes data within the stipulated time limits, ensuring efficient operations.</li><li>• The system uptime demonstrates reliability with at least 99.5% uptime, ensuring continuous operation.</li></ul>	25
2.1	As a Supply Chain Operations Manager, I need a system that generates detailed reports on material sourcing and supplier performance. These reports should include at least 95% of our active suppliers and cover key metrics like delivery time, cost compliance, quality of materials, and sustainability ratings, so that I can make well-informed decisions that enhance the cost-effectiveness and sustainability of our supply chain.	<ul style="list-style-type: none"><li>• The system includes data from at least 95% of active suppliers in each generated report.</li><li>• The metrics on delivery time, cost compliance, and other factors are accurately calculated and displayed.</li><li>• Reports are easy to access, readable by the chain management team, and interpretable.</li><li>• The reports reflect the latest and most accurate data on supplier performance.</li></ul>	25
2.2	As a Supply Chain Operations Manager, I need a system to gather and analyze data on the environmental impacts of our operations, including CO2 emissions, energy consumption, recycling rates, and waste generation. This system should allow for the analysis of historical data spanning at least the past five years, enable quick processing and visualization of new data within 24 hours, and facilitate the generation of automated compliance reports monthly. The system must also include APIs that enable integration with other corporate systems and support the extraction of environmental data for detailed analysis and reporting, so that we can comply with environmental regulations and support our corporate sustainability goals.	<ul style="list-style-type: none"><li>• The system correctly captures and analyzes specified environmental metrics and historical data.</li><li>• Data is processed and visualized within 24 hours, meeting visualization deadlines.</li><li>• Compliance reports are generated on schedule and adhere to regulatory standards.</li><li>• APIs demonstrate effective integration and robust data handling under operational conditions.</li></ul>	22
2.3	As a Supply Chain Operations Manager, I need a system that allows me to easily export data in multiple formats for detailed analysis and reporting. The system must support exporting data in at least three different file formats such as CSV, Excel, PDF, XML, and JSON. It should complete the export process within 5 minutes for reports up to 500 MB and allow for customization of the exported data based on user-selected parameters. The system should also maintain a log of all export activities, so that we can facilitate effective communication with both internal and external stakeholders, ensuring transparency and compliance.	<ul style="list-style-type: none"><li>• The system supports data export in at least CSV, Excel, PDF, XML, and JSON formats.</li><li>• The data export process completes within 5 minutes for reports up to 500 MB.</li><li>• The system allows for customization of the exported data based on user-selected parameters.</li><li>• Export activities log accurately, maintaining detailed and compliant records of user and file size activities.</li></ul>	20



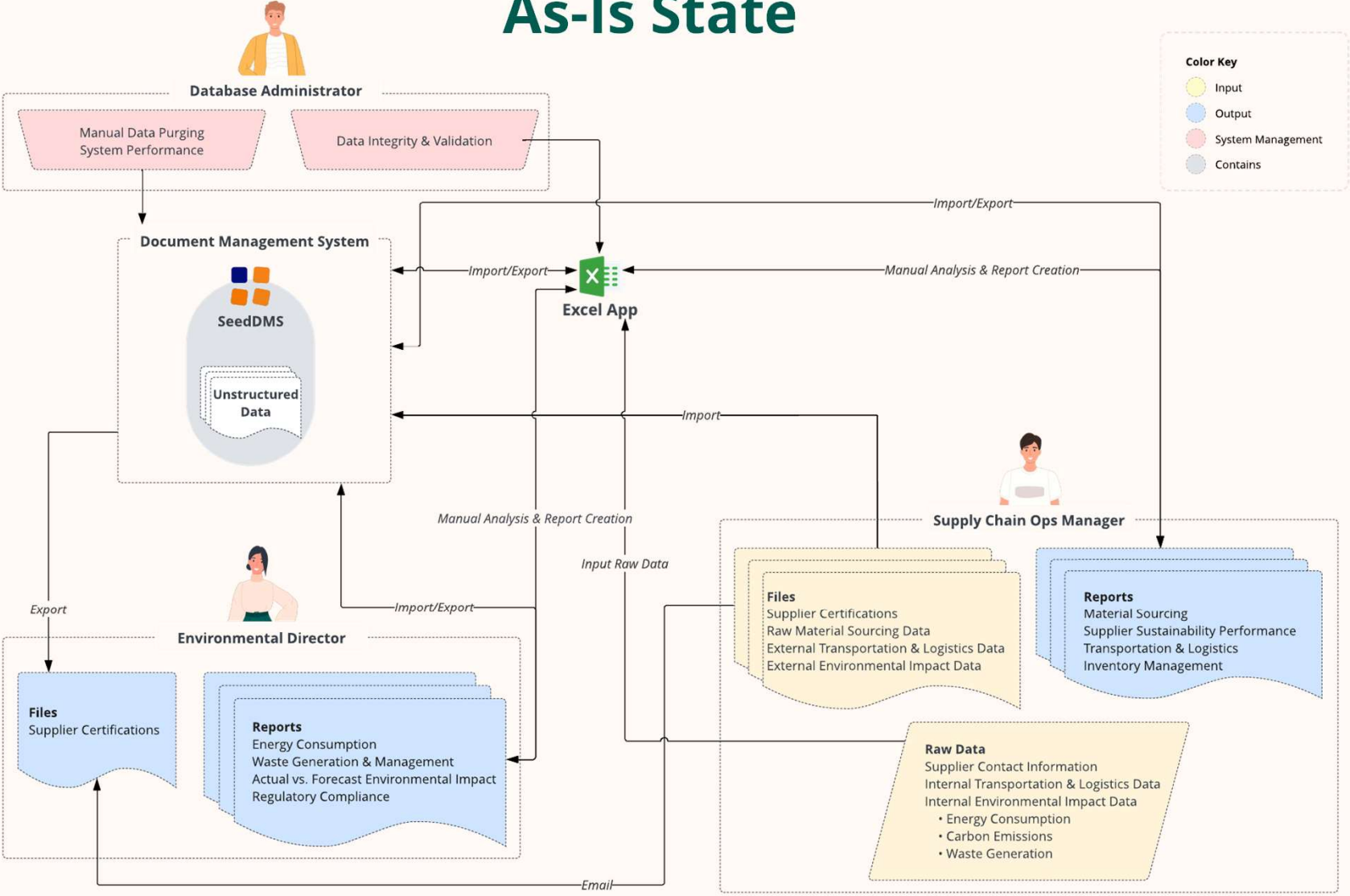


# Database Administrator User Stories

ID	User Story	Acceptance Criteria	Story Point
★ 3.0 Epic	As Database Administrator, I want to have admin access to configure security protocols and manage system access in the Administrative Dashboard, so that I can ensure that the system and internal data is secure.	<ul style="list-style-type: none"><li>• Only EMS admin users can access the Administrative Dashboard</li><li>• Admin user can configure and implement security protocols to the system according to their desired specifications.</li><li>• Admin user can implement data encryption algorithms for data at-rest and in-transit.</li><li>• Admin user can view system access attempts (log include: timestamp, user account involved, attempt status, and IP address)</li></ul>	25
3.1	As Database Administrator, I want to manage user access and permissions from the Administrative Dashboard, so that I can grant users access to specific data and functionalities and ensure data security.	<ul style="list-style-type: none"><li>• Admin user can create, edit, and delete system user accounts.</li><li>• Admin user can configure user account permissions to view or modify data in the database management system and actions within modules (i.e., generating reports).</li><li>• Enforces password policies and admin users can reset passwords for system users.</li></ul>	25
3.2	As Database Administrator, I want to have admin access to monitor system performance and data integrity at scale through the Administrative Dashboard so that the database operates efficiently and reliably to support business operations.	<ul style="list-style-type: none"><li>• Administrative Dashboard displays data integrity metrics (including number of errors encountered, data inconsistencies).</li><li>• Administrative Dashboard displays system insights for resource utilization, database uptime, and query response times.</li></ul>	25
3.3	As Database Administrator, I want to set up automated data purging routines in the Administrative Dashboard so that old, non-essential data is removed, and storage space is optimized for system efficiency.	<ul style="list-style-type: none"><li>• Interface provided to define data purging routines based on data age and tables to be purged.</li><li>• System logs automated data purging activities for audit purposes including activity timestamp and tables affected.</li></ul>	22

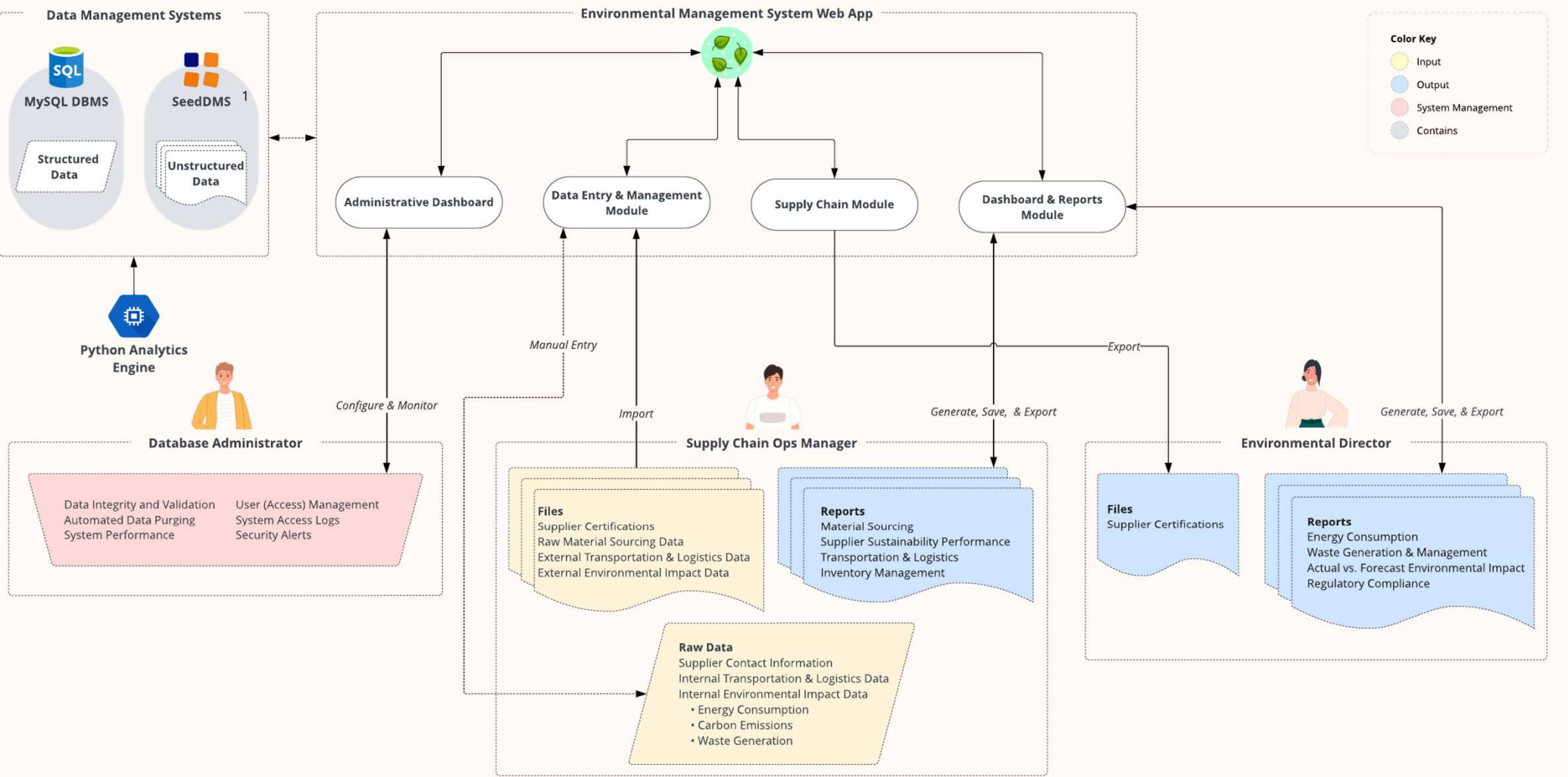


# As-Is State



Icons used to create diagram from Lucid (<https://lucid.co/>)  
[1] SeedDMS. (n.d.) SeedDMS Logo. Retrieved from <https://www.seeddms.org/images/seeddms-logo.svg>

AVERAGE



Icons used to create diagram from Lucid (<https://lucid.co/>)  
[1] SeedDMS. (n.d.) SeedDMS Logo. Retrieved from <https://www.seeddms.org/images/seeddms-logo.svg>

# Functional Requirements

## Environmental Director

- EMS Reports & Dashboard Module allows users to generate, save, share, and export customizable, interactive dashboards and reports based on selected data sources. Dashboards and reports can be templated and saved for future use.

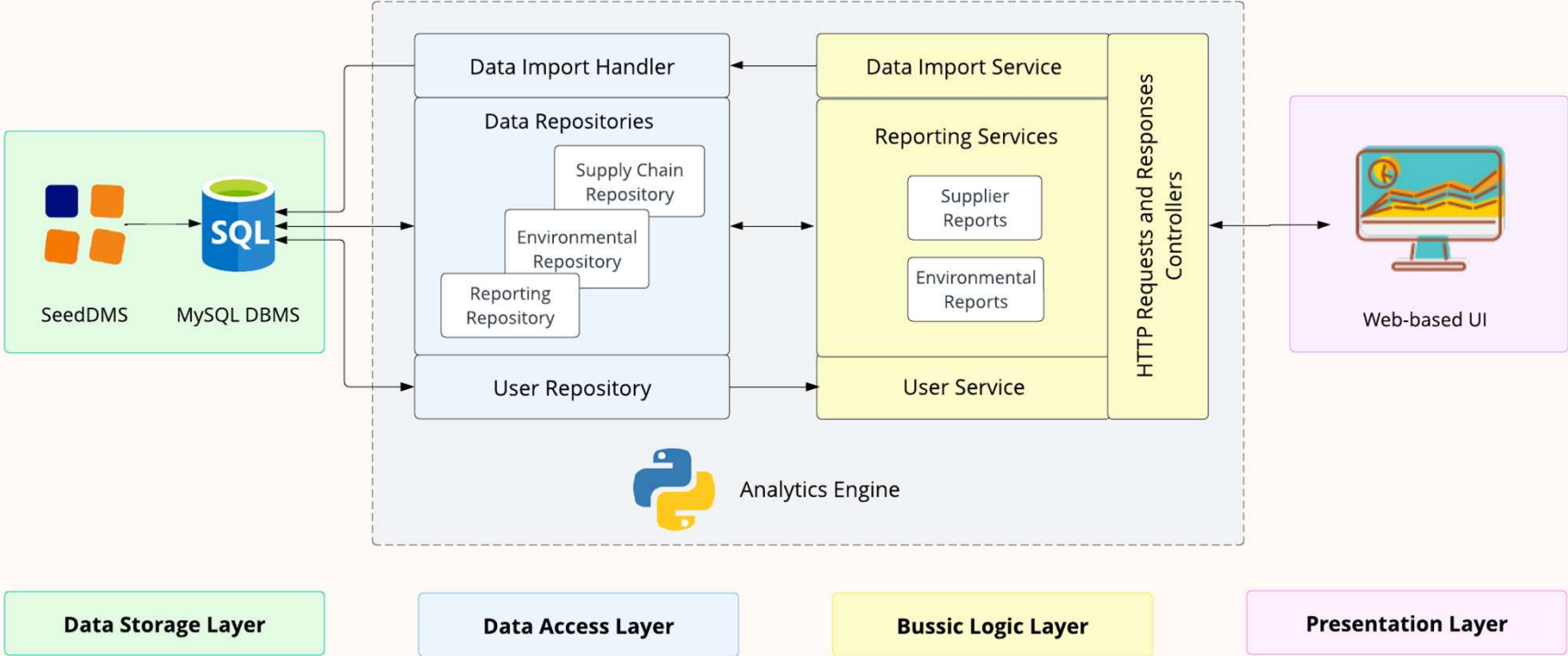
## Supply Chain Ops Manager

- EMS Supply Chain Module must provide a consolidated view of all structured and unstructured data pertaining to environmental impact resulting from supply chain operations. Must provide capabilities to search and apply filters to the data.
- EMS Data Entry Module must provide an interface for manual data entry and file imports and ensure data integrity. When importing Excel files, the interface must provide an option to convert the data to a CSV file and provide an interface to validate the data after conversion.
- EMS Reports & Dashboard Module must provide an interface with tools to perform advanced analyses based on selected metrics and analyses types. Must provide capabilities to automate analyses and report generation, and a system to notify (via email, SMS, or in-app) when automated reports are available.

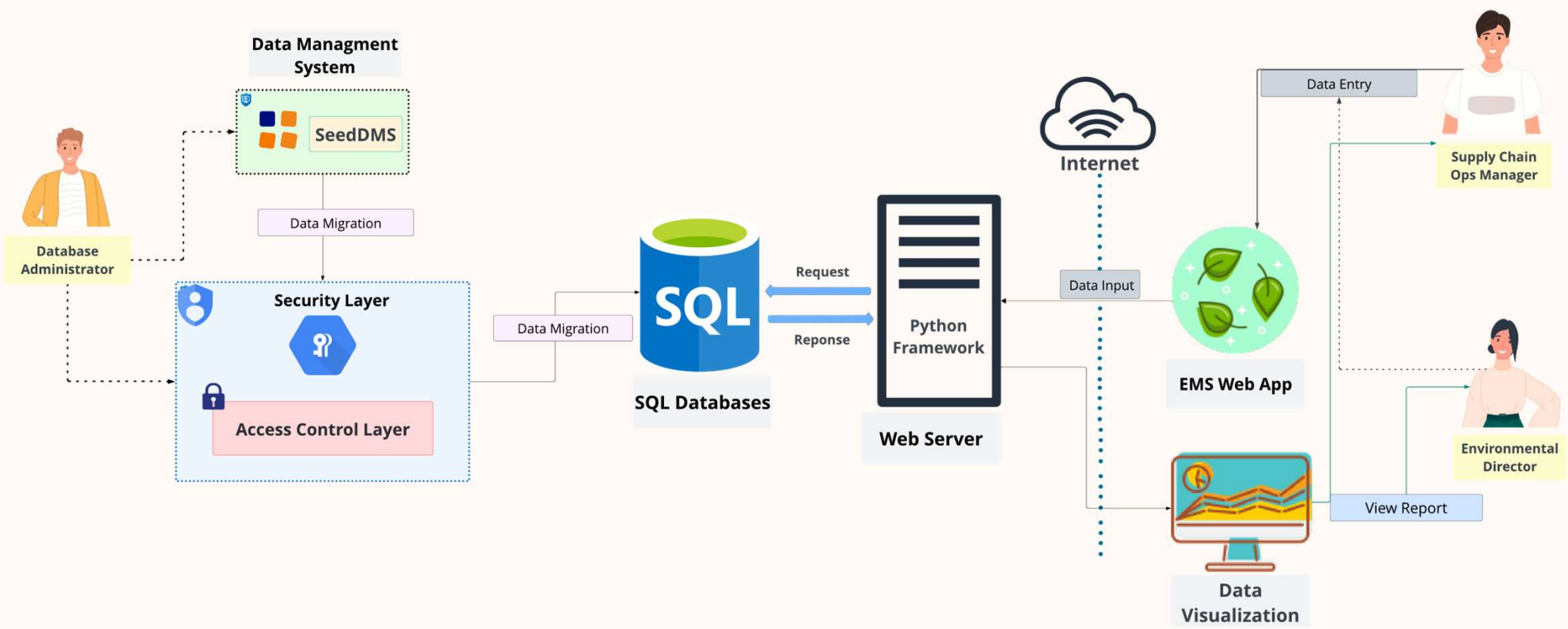
## Database Administrator

- EMS Administrative Dashboard must have restricted access for admin users.
- Administrative Dashboard provides an interface to implement automated system processes (i.e., data purging, user password resets, system data backup) and security protocols (i.e., encryption algorithms), manage users and access levels, handle data integrity and validation, and monitor the system (resource utilization, processing performance, system uptime).
- Must provide an alert system to configure notifications (via email, SMS, or in-app) when there are any potential risks or data breaches.

# Layered Architecture

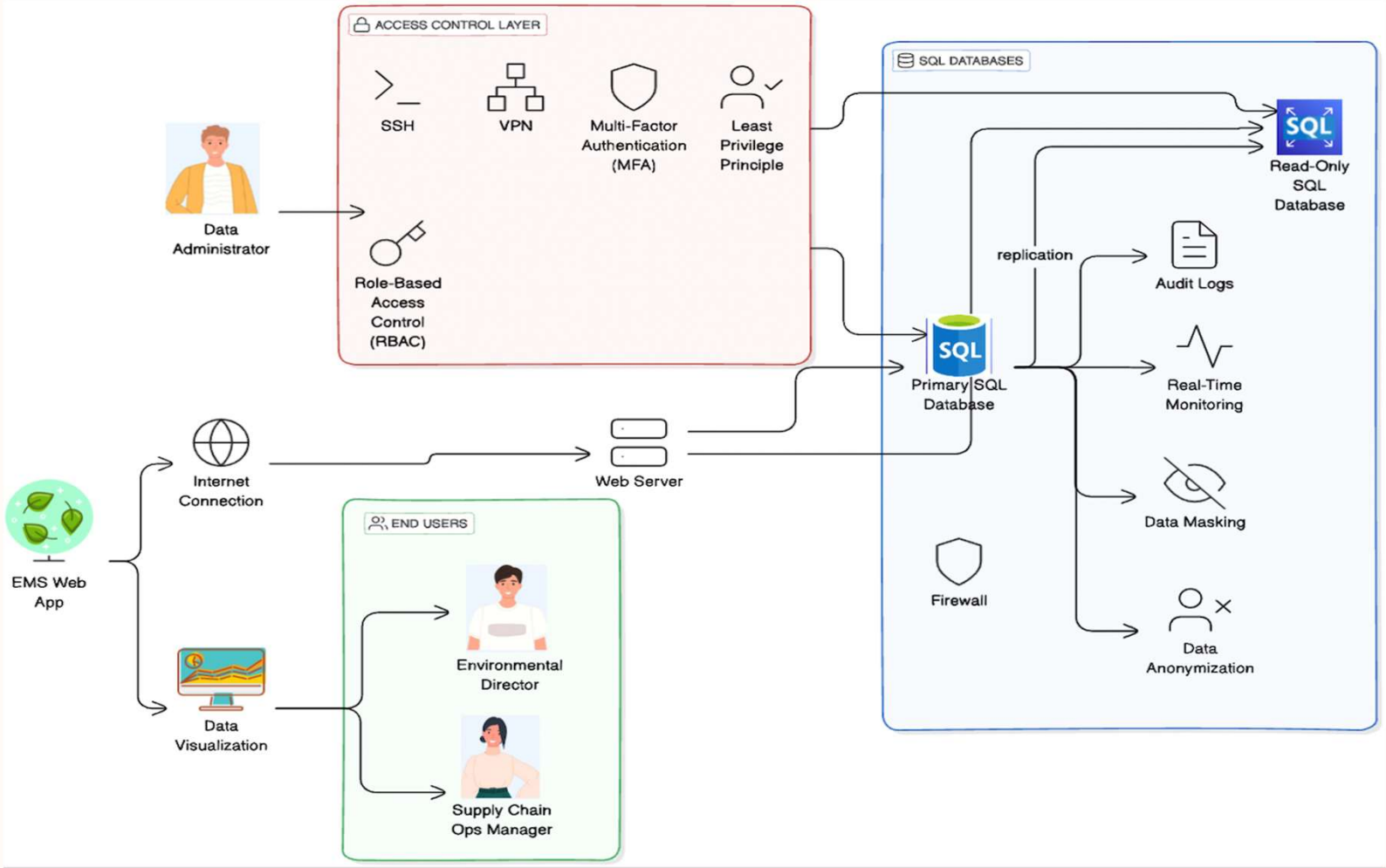


# High Level Architecture





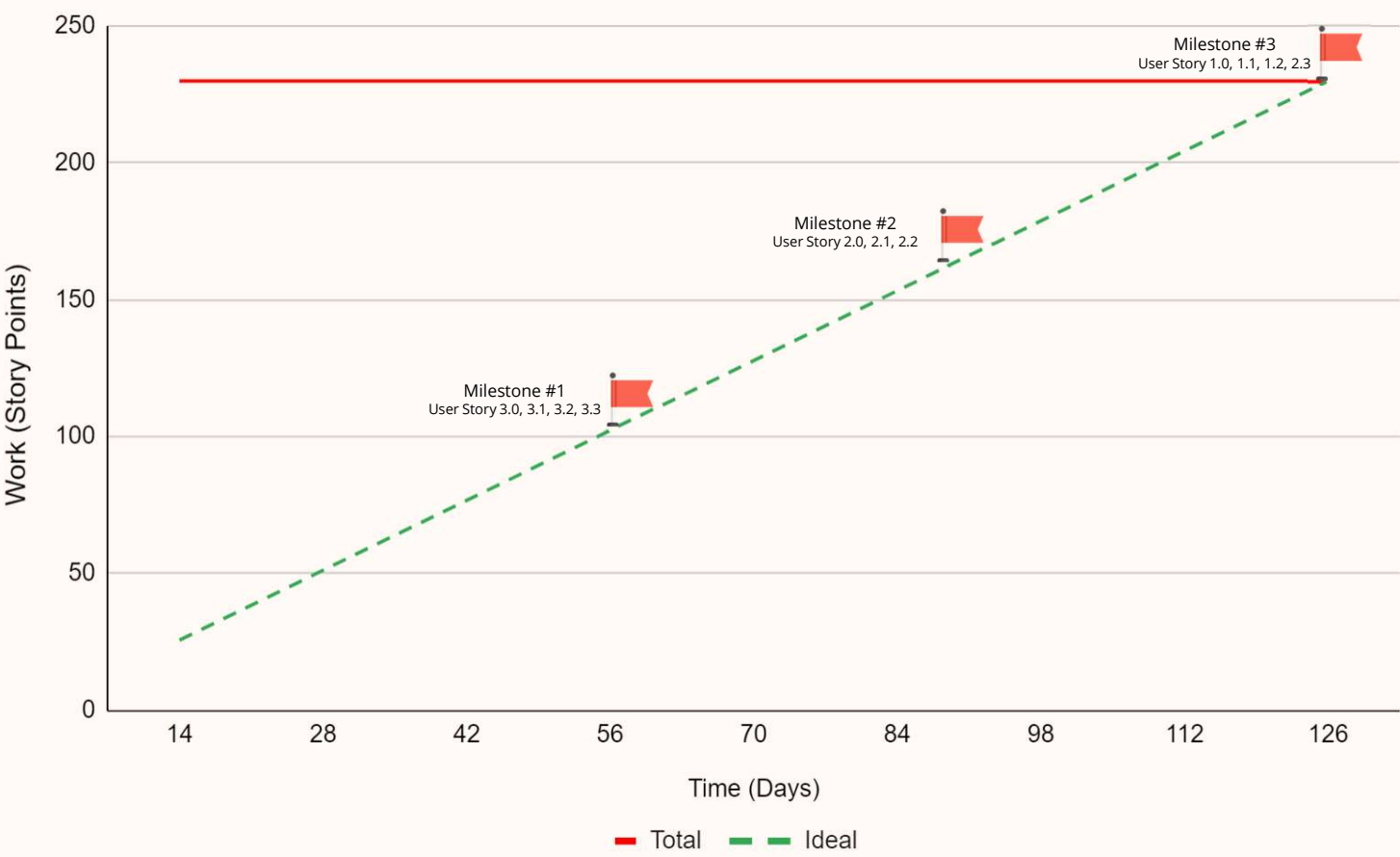
# Low Level Architecture



Icons used to create diagram from Lucid (<https://lucid.co/>) , Diagram flow from <https://www.erase.io/>



# Product Milestones & Burnup Chart<sup>1</sup>



**Milestone #1**  
*Database Foundation*

Backend MySQL database has been set up and integrated with SeedDMS. Simple UI for Administrative Dashboard deployed.

**Milestone #2**  
*Basic Functionality*

EMS web app with login (user authentication) and basic data management features and UI have been deployed and tested.

**Milestone #3**  
*Enhanced Web App*

EMS is equipped with reporting, dashboards, data visualization, and capable of advanced analytics with Python integration.

[1] Clarios Technology. (n.d.). What is a Burn-Up Chart? Retrieved from <https://www.clariostechnology.com/productivity/blog/whatisaburnupchart/>

# Product Roadmap

Design

- Database Schema
  - Integration with SeedDMS
  - User Management System
  - Administrative Dashboard
- Data Entry Module with fields to manually enter data and import files
  - Supply Chain Module and interface to search and apply filters
  - Login/User Access UI
- Refine and Improve Existing Features
- Reports & Dashboard Module to create and customize report templates
- Interactive and customizable data visualization dashboard views in the Reports & Dashboard Module
- Python-MySQL Connection Handler
  - Query Executor
  - Testing Suite

Develop

- Data Migration
  - Encryption algorithms and data integrity procedures
  - Comprehensive incident response procedures and data security education
- Simple Web App
- Refined Web App
- Dashboards with customization
  - Report export functionality
- Data visualization tools
- Integrate Python and data analytics libraries for comprehensive analysis

Test

- Data Validation and Error Checking
  - Secure User Access
- Test with 3-5 users
- Test with 3-5 users
- Dashboard Customization
  - Report Accuracy
- Data visualization functionality, accuracy, and usability
- Run unit tests for functionality
  - Assess processing speed



# Product Backlog

Priority	Story ID	Story Points	EMS Entity	DBMS Function
1	3.0	25	Administrative Dashboard	Encryption Algorithms, Data Security
2	3.1	25	Administrative Dashboard	User Management, System Access, Data Security
3	3.3	22	Administrative Dashboard	System Performance Optimization
4	3.2	25	Administrative Dashboard	System Monitoring
5	2.0	25	Supply Chain Module	SeedDMS Integration
6	2.1	22	Data Entry Module	SeedDMS Integration
7	2.2	22	Supply Chain Module	SeedDMS Integration
8	1.2	19	Supply Chain Module	SeedDMS Integration
9	1.0	20	Dashboards & Reports Module	SeedDMS Integration, Python Analytics Engine
10	1.1	15	Dashboards & Reports Module	SeedDMS Integration, Python Analytics Engine
11	2.3	20	Dashboards & Reports Module	SeedDMS Integration, Python Analytics Engine

# Release Criteria

Focus Area	Release Criteria	Objective	Release Artifact	How
Functionality	System supports at least 95% accuracy: <ul style="list-style-type: none"><li>User Authentication</li><li>Data Management</li><li>Data Import/Export</li><li>Dashboard Creation and Customization</li><li>Report Generation and Export</li><li>Supplier Document Consolidation</li></ul>	Ensures the system is usable for basic operations	Verify through unit and integration tests that all functions work correctly	Execute test cases that validate each functional requirement
Performance	<ul style="list-style-type: none"><li>System processes and visualizes data within 3 seconds for 90% of operations</li><li>Visualizes data within 24 hours</li><li>Export process completes within 5 minutes for reports up to 500 MB</li></ul>	Supports efficient operations and ensures usability	Measure the time taken for data processing and visualization tasks	Conduct performance testing using tools like JMeter and LoadRunner
Bug Resolution	100% of critical-severity and high-priority resolved and no more than 5% of non-critical bugs remain open	Maintains system stability and reliability	Track and prioritize bug resolution	Use JIRA to track bugs, ensuring adherence to the resolution criteria
Security	100% of sensitive data encrypted and access controls implemented for all user levels	Protects sensitive data from unauthorized access and ensures accountability	Verify encryption and access controls through security audits and penetration testing	Perform security audits and penetration tests to ensure all data is encrypted
Data Migration	99% of data accurately migrated and integrated from SeedDMS to MySQL	Centralizes environmental data for efficient management	Validate data migration accuracy through data integrity checks and reconciliation processes	Use data migration tools and perform data integrity checks
User Acceptance Testing (UAT)	85% of UAT participants approve the system functionality and usability	Ensures the system meets user needs and expectations	Collect feedback from UAT participants and measure approval rating based on their experience with the system	Conduct UAT sessions, collect feedback through surveys, and analyze approval ratings

# Release Checklist

Tasks	Artifact	RACI	Phase & Checkpoints
Feature Verification	Requirements and user stories detailing system functionality and acceptance criteria	Responsible: Product Owner Accountable: Scrum Master Consulted: Stakeholders, Developers Informed: Project Manager, Users	Planning Phase: requirements documentation approved; user stories documented
Performance Testing	Plan outlining testing strategies, and reports documenting performance and load testing results	Responsible: Testers Accountable: QA Lead Consulted: Developers, Product Owner Informed: Project Manager	Testing Phase: performance and load testing completed
Bug Fixes	Bug report by priority and severity shows zero critical-severity OPEN bugs and high-priority OPEN bugs	Responsible: Developers Accountable: QA Lead Consulted: Product Owner, Testers Informed: Project Manager, Users	Testing Phase: UAT test completed; system test completed
Security Validation	Summary of findings from security audits and penetration tests	Responsible: Security Team Accountable: Security Lead Consulted: Developers, Testers Informed: Project Manager	Testing Phase: security audits and penetration testing completed
Compliance Check	Documentation proving adherence to relevant regulations and standards	Responsible: Compliance Officer Accountable: Security Lead Consulted: Product Owner Informed: Regulatory Bodies	Review & Approval Phase: compliance review and approved
Data Migration Validation	Details the processes and results of migrating data from SeedDMS to MySQL, ensuring 99% accuracy	Responsible: Database Admin Accountable: Scrum Master Consulted: Developers, Testers Informed: Project Manager	Data Migration Phase: data migration completed and verified
User Documentation	Manuals and materials to help users understand and effectively use the system	Responsible: Technical Writer Accountable: Product Owner Consulted: Developers, Testers Informed: Project Manager, Users	Deployment Phase: user documentation reviewed and approved

# Release Roadmap

Timeline	June		July		August		September		October		November	
Sprints	1	2	3	4	5	6	7	8	9			
Releases	Version 1.0.0 08/21/2024 Alpha Release				Version 1.1.0 09/30/2024 Beta Release			Version 1.2.0 11/30/2024 Final Release				
Milestones	Database Foundation				Basic Functionality			Enhanced Web App				
Features	<ul style="list-style-type: none"><li>Setup and configure the MySQL database.</li><li>Establish basic user authentication and access controls.</li><li>Enhance data management capabilities.</li><li>Implement data import/export</li></ul>				<ul style="list-style-type: none"><li>Develop supply chain and data entry modules.</li><li>Implement reporting functionalities.</li></ul>			<ul style="list-style-type: none"><li>Integrate advanced security and UI features.</li><li>Ensure compliance and perform final adjustments.</li></ul>				
Testing	<ul style="list-style-type: none"><li>Functional testing to validate functionalities as described in user stories.</li><li>Integration testing for user authentication and access controls.</li></ul>				<ul style="list-style-type: none"><li>User acceptance testing for supply chain data entry.</li><li>Functional testing for reporting tools.</li></ul>			<ul style="list-style-type: none"><li>Security testing and penetration testing.</li><li>Final system testing and compliance verification.</li><li>Regression testing to ensure new changes do not affect existing functionalities.</li></ul>				

# Bug Management Workflow

	Description
Bug Reporting	A tester discovers a bug during integration testing. The tester logs the bug in Jira with all necessary details and attaches relevant screenshots.
Bug Triage	During the triage meeting, the bug is reviewed, given a high severity and P1 priority due to its impact on a critical functionality. The bug is assigned to a developer with the relevant expertise.
Bug Fixing	The developer starts working on the bug, implements the fix, and updates the bug status to "In Progress." Once the fix is implemented, the developer updates the status to "Ready for Review."
Testing	A peer developer reviews the code changes and approves them. The tester performs regression testing to ensure the fix hasn't introduced new issues.
Release Readiness	Before the release, a final review of all bug statuses is conducted. The fixed version is deployed to the staging environment for UAT. After successful UAT, stakeholders sign off on the release.
Post-Release	The application is monitored, and any new bugs reported by users are logged and addressed as per their severity and priority.

# Bug Management Steps

Step	Description
Bug Reporting	<p><b>Bug Tracking Tool:</b> Jira, Bugzilla, GitHub Issues.</p> <p><b>Bug Report Template:</b> Bug ID, Status, Severity, Priority, Title, Description, Steps to Reproduce, Expected Result, Actual Result, Screenshots/Attachments, Reporter Information, Environment Details (OS, Browser, etc.), Assignee</p> <p><b>Bug Status Description:</b></p> <ul style="list-style-type: none"><li>• <b>New:</b> The bug has been reported and is awaiting triage.</li><li>• <b>In Progress:</b> The bug has been assigned to a developer and is currently being worked on.</li><li>• <b>Resolved:</b> The developer has fixed the bug, and it is awaiting verification.</li><li>• <b>In Review:</b> The bug fix is undergoing peer review.</li><li>• <b>Verified:</b> The bug fix has been tested and verified by the QA team.</li><li>• <b>Closed:</b> The bug has been fixed, verified, and no further action is needed.</li><li>• <b>Reopened:</b> The bug has reoccurred, or the fix was not effective, and it needs to be addressed again.</li><li>• <b>Deferred:</b> The bug has been acknowledged but will not be fixed in the current release cycle.</li><li>• <b>Duplicate:</b> The bug report is a duplicate of another already reported bug.</li><li>• <b>Rejected:</b> The bug report is invalid or not considered a bug.</li></ul>
Bug Prioritization	<p><b>Severity Levels:</b></p> <ul style="list-style-type: none"><li>• Critical: Blocks development/testing, no workaround.</li><li>• High: Major functionality is impacted, workaround is available.</li><li>• Medium: Non-critical functionality impacted.</li><li>• Low: Minor issues or cosmetic defects.</li></ul> <p><b>Priority Levels:</b></p> <ul style="list-style-type: none"><li>• P1 (High): Fix immediately</li><li>• P2 (Medium): Fix in next sprint/release</li><li>• P3 (Low): Fix when possible.</li></ul>



# Bug Management Steps

Step	Description
Bug Triage Meetings	<p><b>Frequency:</b> Conduct triage meetings twice a week.</p> <p><b>Attendees:</b> Product Owner, Scrum Master, Developers, Testers.</p> <p><b>Agenda:</b> Review new bugs, update the status of existing bugs, prioritize and assign bugs.</p>
Bug Fixing Process	<p><b>Assignment:</b> Bugs are assigned to developers based on expertise and current workload.</p> <p><b>Fix Implementation:</b> Developers fix the bugs and document the changes made.</p> <p><b>Code Review:</b> Peer review of bug fixes to ensure quality and prevent regressions.</p>
Testing	<p><b>Unit Testing:</b> Automated tests to ensure individual components work correctly.</p> <p><b>Integration Testing:</b> Tests to ensure modules work together as expected.</p> <p><b>Regression Testing:</b> Re-test previously working functionality to ensure new changes haven't introduced new bugs.</p> <p><b>User Acceptance Testing (UAT):</b> Involve a select group of end-users to validate the system meets the business requirements.</p>
Release Readiness	<p><b>Bug Status Review:</b> Before the release, review the status of all bugs. Ensure that all critical and high-priority bugs are resolved.</p> <p><b>Staging Environment:</b> Deploy the application to a staging environment for final testing.</p> <p><b>Sign-off:</b> Obtain sign-off from key stakeholders before going live.</p>

# Return on Investment (ROI)



### Assumptions

Employee Salaries<sup>2</sup>

- 1. Software Developer: \$80,000
- 2. Data Architect : \$70,000
- 3. DevOps Engineer : \$70,000
- 4. QA Tester : \$65,000
- 5. Junior Sustainability Analyst: \$110,000
- 6. Data Entry Clerk : \$55,000
- Burden Rate: 25%
- Saving from Penalty: \$20,000
- Hardware and Network Equipment Cost: \$8,000 (Network Equipment, Servers, Cabling and Installation)
- Training and Implementation: \$30,000

### Given

- Project Duration : 6 Months
- 4 team members will be required (Software Developer, Data Architect DevOps Engineer QA Tester)
  - Average Monthly Salary: \$23,000
  - Total Salary for 6 Months: \$138,000
  - Total Salary including Burden Rate: \$172,500
- Total Investment Cost: \$210,500
- After the project we will be able to move our 3 resource to another project (2 Data Entry Clerk and Junior Sustainability Analyst)
- Salary of 2 Data Entry clerk and Junior Sustainability Analyst include Burden Rate : \$275,000
- Total Benefits: \$295,000

### Calculating ROI For 1<sup>st</sup> Year

$$ROI = \left( \frac{\text{Total Benefits} - \text{Total Costs}}{\text{Total Cost}} \right) * 100$$

$$ROI = \left( \frac{295,000 - 210,500}{210,500} \right) * 100$$

$$ROI = 40.14 \%$$

With an ROI of 40.14%, the project yields more in benefits than it costs within the first year, indicating a profitable investment. The qualitative benefits, while not directly calculable in financial terms, contribute significantly to the long-term value and sustainability.

[1] Ethixbase360. (2023, Nov 10). Beyond the Numbers: Corporate ESG Spending Gains Momentum Amid Calls for Transparency. Retrieved from <https://ethixbase360.com/beyond-the-numbers-corporate-esg-spending-gains-momentum-amid-calls-for-transparency/>  
[2] ZipRecruiter. (n.d.). Salaries. Retrieved from <https://www.ziprecruiter.com/Salaries>



# Return on Value (ROV)

Value Factor	Description & Calculation
<i>Sustainability Performance</i>	Improving sustainability metrics can save \$20,000 annually through reduced energy consumption, waste management, and optimized raw materials. Additionally, revenue can increase by \$10,000 yearly from eco-friendly products boost and marketing advantages, resulting in a total benefit of \$30,000 annually.
<i>Brand Differentiation</i>	By leading in sustainability, the company distinguishes itself in a competitive market. This could enhance brand loyalty and attract new customers who prioritize eco-friendly products. Estimating an additional 3% increase in customer base <sup>1</sup>
<i>Productivity Increase</i>	Through smart manufacturing technologies we target productivity increase from 5% - 15% <sup>2</sup> <ul style="list-style-type: none"><li>• Environmental Managers: We expect 4% increment through faster data access and automated reporting for improved analysis and collaboration.</li><li>• Operations Managers: Data-driven decision-making, process optimization, and efficient resource allocation might achieve 6% - 10% productivity increase.</li><li>• Supply Chain Managers: Supplier performance monitoring, risk management, and cost savings through optimized logistics could realize a 5% gain.</li></ul>
<i>Regulatory Advantage</i>	Proactive compliance can lead to preferential treatment under certain regulations, grants, or tax benefits. Estimating a financial impact, such as qualifying for a green tax credit or reduced fees, could add approximately \$20,000 in annual savings. <sup>3</sup>

[1] UBQ Editorial Team. (2023, Nov 7). Sustainability in Manufacturing Processes. Retrieved from <https://www.ubqmaterials.com/blog-post/sustainability-in-manufacturing-processes/>  
[2] Automation.com. (2020, Dec 3). Impacting Energy Through Smart Manufacturing. Retrieved from <https://www.automation.com/en-us/articles/december-2020/impacting-energy-through-smart-manufacturing>  
[3] Strategy+Business. (2022, Dec 1). Green taxes and incentives can help businesses achieve ESG goals. Retrieved from <https://www.strategy-business.com/article/Green-taxes-and-incentives-can-help-businesses-achieve-ESG-goals>

## Change Management Plan

1. **Preparation:** The IT Team will create an FAQ document and high-level deck with an overview of the project, outline benefits of the new system, and provide a project timeline.
2. **Communication & Awareness:** Employees will be informed about the project via email (attaching the FAQ document and high-level deck) and managers will be instructed to inform their teams. IT leaders will be readily available to answer questions from teams; individual contributors should consolidate their inquiries to their managers to streamline communication.
3. **Data Migration & System Integration:** IT will collaborate with SeedDMS and MySQL administrators to establish secure integration protocols and conduct thorough testing to ensure data integrity and functionality after migration. If there is any potential loss of access to SeedDMS during data migration and system integration, employees will be notified in advance to export any documents prior to the scheduled activities.
4. **System Training & Support:** A live training session will be offered by the IT team to train employees and admin users on how to use the EMS; the session will be recorded and available for employees who are unable to attend. Additionally, the IT team will provide video tutorials and guides on how to navigate the EMS and explain the capabilities of the Dashboards & Reports Module. The IT team will intake feedback and questions throughout the process and create and share additional documentation as needed.
5. **System Rollout:** When the EMS is deployed organization-wide, the IT team will provide continuous support and welcome feedback. As new updates or future functionalities to the EMS become available, the IT team will develop standardized communication templates and a communication plan to inform employees.

# Software Disasters & Mitigation

Disaster	Description	Impact	Mitigation
<i>Data Breach<sup>1</sup></i>	Data breach occurs when unauthorized individuals gain access to sensitive environmental data stored within our system, such as customer information, compliance records, or research data.	Compromised user privacy, loss of trust, legal consequences.	<ul style="list-style-type: none"><li>Enforce strict access controls and authentication mechanisms (User Story 3.1).</li><li>Implement robust encryption protocols to safeguard sensitive data stored within the system (User Story 3.3).</li><li>Conduct regular security audits and vulnerability assessments (User Story 3.3).</li><li>Provide user education on data security.</li></ul>
<i>Data Loss<sup>2</sup></i>	Data loss occurs when critical environmental data stored within our system is accidentally deleted, corrupted, or becomes inaccessible due to software errors, hardware failures, or human error.	Loss of valuable data, hindrance to decision-making processes.	<ul style="list-style-type: none"><li>Implement data backup and recovery procedures (User Story 3.0).</li><li>Conduct regular backups of environmental data (User Story 3.0).</li><li>Test backup and recovery processes for data integrity (User Story 3.1).</li></ul>
<i>System Downtime<sup>3</sup></i>	System downtime occurs when our Environmental Management System experiences prolonged periods of unavailability due to software bugs, hardware failures, or cyberattacks	Disrupted access to critical environmental data, loss of productivity	<ul style="list-style-type: none"><li>Implement redundancy and failover mechanisms (User Story 3.1).</li><li>Conduct regular system maintenance and updates and monitor system health and performance (User Story 3.2).</li><li>Establish incident response procedures (User Story 3.1, 3.3).</li></ul>

[1]. IBM. (n.d.). Data Breach. Retrieved from <https://www.ibm.com/topics/data-breach>  
[2]. Wikipedia. (2024, Apr 14). Data loss. In Wikipedia. Retrieved from [https://en.wikipedia.org/wiki/Data\\_loss](https://en.wikipedia.org/wiki/Data_loss)  
[3]. Legowski, A. (2022, June 6). System Downtime. Pretius Blog. Retrieved from <https://pretius.com/blog/system-downtime/>



# Risk Management<sup>1</sup>

Type	Priority	Risk	Likelihood	Impact	Mitigation
Technical <sup>2</sup>	1	Challenges in data migration from Excel to MySQL	High	Data inconsistency, and disruption of business operations	Develop a detailed migration plan, utilize MySQL Workbench Migration Wizard, and collaborate with stakeholders
	2	Potential security vulnerabilities within the new system	High	Data breaches and compromised system integrity	Conduct security assessments, implement access controls and encryption, and engage with cybersecurity experts for testing
	3	Insufficient validation leading to inaccurate data	Medium	Compromised data integrity and erroneous decisions	Implement data validation protocols, provide training on data entry best practices, and establish data quality standards
Project Management	1	Scope creep to extended timelines and increased costs	High	Delayed project delivery, budget overrun	Define clear project scope, establish change control process, and regularly communicate with stakeholders
	2	Underestimation of time and resources needed for tasks	Medium	Missed deadlines, resource shortages	Conduct thorough project planning, involve team in estimation, and regularly monitor and adjust project schedule

[1]. Wikipedia. (2024, Apr 14). Risk management. In Wikipedia. Retrieved from [https://en.wikipedia.org/wiki/Risk\\_management](https://en.wikipedia.org/wiki/Risk_management)  
[2]. Nasa. Technical Risk Management. Retrieved from <https://www.nasa.gov/reference/6-4-technical-risk-management/>





# Risk Management

Type	Priority	Risk	Likelihood	Impact	Mitigation
Regulatory and Compliance	1	Non-compliance with data protection laws	High	Fines, penalties, reputational damage	Ensure system compliance with regulations, implement strong data protection, conduct regular audits, and provide staff training
	2	Future changes in regulations that the system not handle	Medium	Fines, penalties, legal issues	Monitor regulatory changes, maintain flexibility in system design, conduct regular compliance audits, engage legal counsel for advice
Organizational	1	Resistance to change from employees leading less adoption	High	Reduced productivity, project failure	Communicate the benefits of the change, involve employees in the process, provide training and support, address concerns
	2	Loss of key project personnel can lead to knowledge gaps	Medium	Disruption of project continuity, loss of expertise	Cross-train team members, document processes and knowledge, develop succession plans, incentivize retention
	3	Insufficient training for users of the new system	Medium	Low user adoption, decreased efficiency	Develop comprehensive training programs, provide ongoing support and resources, gather user feedback for continuous improvement

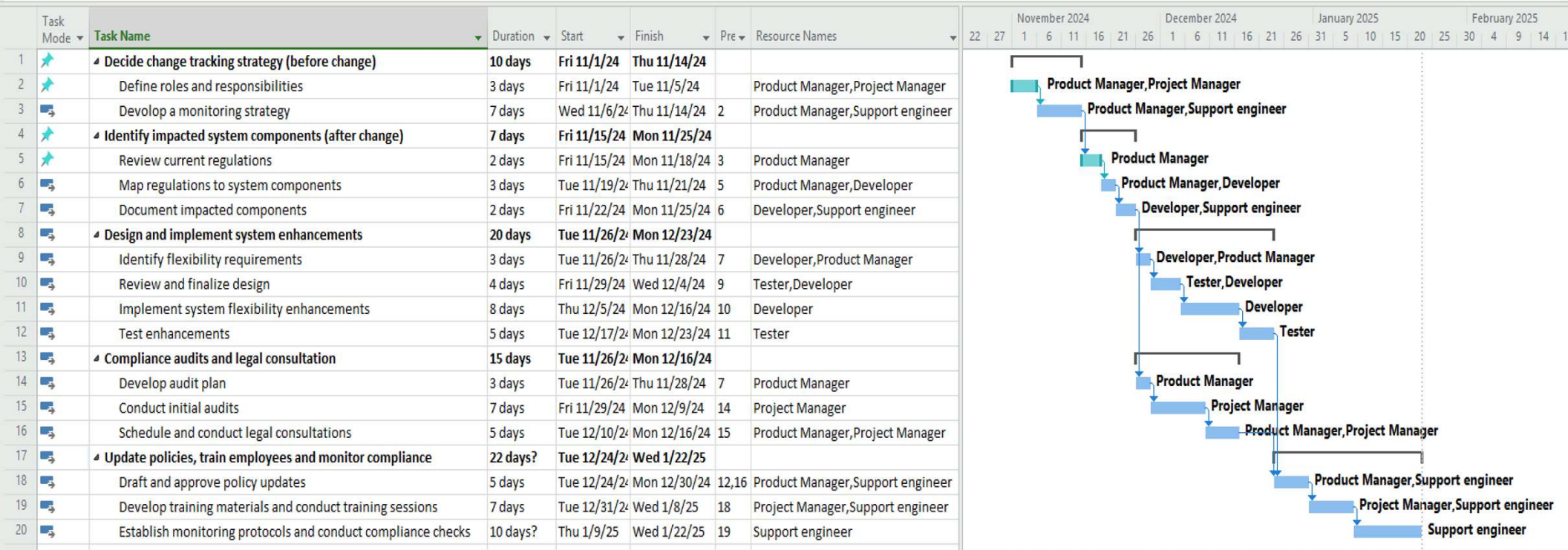






SIMPLE

# Mitigation Plan for Regulatory Change







# Test Strategy<sup>1</sup>

Test Strategy	Objective	Approach	Tools
Test Development	Develop detailed test cases and scripts based on the user stories	<ul style="list-style-type: none"><li>• Write test cases for each user story and increment.</li><li>• Use Behavior-Driven Development (BDD) to create test scenarios in Cucumber.</li><li>• Ensure test cases cover functional, integration, system, security, performance, and compliance aspects.</li></ul>	Cucumber for BDD, Selenium for automation, Postman
Test Execution <sup>3</sup>	Execute test cases to validate each increment and ensure the system meets requirements.	<ul style="list-style-type: none"><li>• <b>Unit Testing:</b> Validate individual components.</li><li>• <b>Functional Testing:</b> Validate functionalities as described in user stories.</li><li>• <b>Integration Testing:</b> Ensure integrated components work together.</li><li>• <b>System Testing:</b> Validate the complete system against requirements.</li><li>• <b>Security Testing:</b> Test for vulnerabilities and access controls.</li><li>• <b>Performance Testing:</b> Assess system performance under load.</li><li>• <b>Regression Testing:</b> Ensure new changes do not affect existing functionalities.</li><li>• <b>User Acceptance Testing (UAT):</b> Validate system functionality from an end-user perspective.</li></ul>	Selenium, JIRA, LoadRunner, JMeter, OWASP ZAP.

Test Strategy: <https://katalon.com/resources-center/blog/test-strategy>  
Tools : <https://www.geeksforgeeks.org/software-testing-tools/>  
Type of testing : <https://www.geeksforgeeks.org/types-software-testing/>





# Test Strategy<sup>2</sup>

Test Strategy	Objective	Approach	Tools
<i>Performance and Security Testing</i>	Validate system performance and security to ensure reliability and data protection	<ul style="list-style-type: none"><li>• Simulate peak load conditions using LoadRunner/JMeter</li><li>• Identify and mitigate vulnerabilities using OWASP ZAP</li></ul>	LoadRunner, JMeter, OWASP ZAP
<i>User Acceptance Testing (UAT)</i>	Ensure the system meets business requirements and user expectations.	<ul style="list-style-type: none"><li>• Engage end-users to validate the system.</li><li>• Conduct testing sessions to collect user feedback.</li><li>• Make necessary adjustments based on feedback.</li></ul>	UAT checklists, feedback forms
<i>Compliance and Reporting</i>	Ensure the system complies with all regulatory and compliance requirements.	<ul style="list-style-type: none"><li>• Conduct compliance tests to verify adherence to regulations.</li><li>• Validate reporting functionalities for accuracy.</li></ul>	Compliance testing tools, Selenium for automated tests
<i>Continuous Improvement</i>	Continuously improve testing processes and methodologies.	<ul style="list-style-type: none"><li>• Collect feedback from testing team and stakeholders.</li><li>• Analyze testing metrics and outcomes.</li><li>• Implement process improvements based on feedback and analysis.</li></ul>	JIRA for feedback collection, data analysis tools for metrics

Test Strategy: <https://katalon.com/resources-center/blog/test-strategy>  
Tools : <https://www.geeksforgeeks.org/software-testing-tools/>  
Type of testing : <https://www.geeksforgeeks.org/types-software-testing/>





# Test Methodology

Testing Type	User Story	Objective	Outcome	Test Tools	Test Environment	Acceptance Criteria
Unit Testing	All user stories	Validate individual components for functionality and reliability.	Ensure each component works as expected in isolation.	JUnit, NUnit, PyTest	Development environment	Components meet specified functional requirements and pass all unit tests
Integration Testing	As a Supply Chain Ops Manager, want data consolidated in the Supply Chain Module from various supply chain aspects. ( User Story 2.0)	Ensure seamless integration of data from supplier information, raw material sourcing, manufacturing processes, transportation and logistics, and inventory into the module.	Data from all sources is accurately integrated and visualized within the Supply Chain Module.	Postman, SoapUI	Integration testing platform.	All data sources are integrated without errors and display correctly in the module.
	As a Supply Chain Ops Manager, I need APIs that facilitate data integration and extraction for detailed analysis. (User Story 2.2)	Assess API functionality for system integration and robust data handling under operational conditions	APIs effectively integrate and perform data handling.	Postman, SoapUI	Integrated development environment (IDE) with live data streams.	APIs demonstrate successful integration and data handling capabilities.





# Test Methodology

Testing Type	User Story	Objective	Outcome	Test Tools	Test Environment	Acceptance Criteria
Performance Testing	As a Supply Chain Ops Manager, I need the system to perform efficiently and handle operations quickly. (User Story 2.0)	Test system performance to handle simultaneous data queries and operations effectively and efficiently.	System processes and visualizes data within acceptable time limits, supporting efficient operations.	JMeter, LoadRunner	Production-like environment.	System response times for data processing and visualization are within acceptable limits.
	As a Supply Chain Ops Manager, I need quick processing and visualization of environmental data. (User Story 2.2)	Ensure the system processes data and provides visualizations within 24 hours.	Data is processed and visualized within the 24-hour timeframe.	JMeter, LoadRunner	Production-like test environment.	System meets the 24-hour processing and visualization deadline.
	Export process efficiency. (User Story 2.3)	Ensure that the export process does not exceed 5 minutes for reports up to 500 MB.	Export completes within 5 minutes.	JMeter, LoadRunner	Production-like environment	Export process is efficient and meets the 5-minute requirement.





# Test Methodology

Testing Type	User Story	Objective	Outcome	Test Tools	Test Environment	Acceptance Criteria
Reliability Testing	The EMS should have a system uptime of at least 99.5%. (User Story 2.0)	Confirm the system meets the uptime requirement to ensure continuous operation.	System demonstrates reliability with at least 99.5% uptime.	Pingdom, Uptime Robot	Operational environment.	System uptime meets or exceeds 99.5%, ensuring reliability for operational continuity.
Data Coverage Testing	Coverage of at least 95% of active suppliers. (User Story 2.1)	Verify that the system includes data from at least 95% of active suppliers in each generated report.	Comprehensive data coverage in reports.	SQL queries, Data validation tools	Development environment	Reports include data from at least 95% of active suppliers.
Data Accuracy Testing	Current and correct data on supplier performance. (User Story 2.1)	Confirm that reports reflect the latest and most accurate data on supplier performance.	Data in reports is up-to-date and correct.	Data verification tools, Database audits	Production environment	Data is verified as current and accurate in final reports.

E. W. Dijkstra, JANUARY 28, 2021(<https://www.gremlin.com/blog/reliability-testing-definition-history-methods-and-examples>)  
Helen Soloveichik, August 30, 2023(<https://www.ibm.com/blog/7-data-testing-methods/>)





# Test Methodology

Testing Type	User Story	Objective	Outcome	Test Tools	Test Environment	Acceptance Criteria
Usability Testing	Report accessibility and readability. (User Story 2.1)	Test the ease of access and the readability of the reports by supply chain management team.	Reports are easily accessible and interpretable.	User testing protocols, Survey feedback	Staging environment	Reports are user-friendly and easily interpretable.
Compliance Testing	As a Supply Chain Ops Manager, I need automated compliance reports generated monthly. (User Story 2.2)	Test the system's ability to automate and schedule environmental compliance reports.	Compliance reports are generated on schedule and meet regulatory standards.	ComplianceQueue, Qualys	Cloud-based environment with compliance data.	Automated reports are generated monthly and adhere to compliance standards.
Security Testing	Maintaining a log of export activities. (User Story 2.3)	Confirm that the system logs all export activities accurately, including date, time, user, and file size.	Complete and accurate activity logs are maintained.	Security audit tools, Log analysis tools	Production environment	Activity logs are detailed and comply with audit standards.
System Testing	Comprehensive system validation	Validate the complete and integrated system to ensure it meets all specified requirements.	Ensure the entire system works as intended when all components are integrated.	Selenium, JIRA	Staging and production environments	System functions correctly in an integrated environment, meeting all functional and non-functional requirements.

Hotjar, 9 OCT 2023 (<https://www.hotjar.com/usability-testing/>)  
Oliver Moradov, May 29, 2022 (<https://brightsec.com/blog/security-testing/>)





# Test Methodology

Testing Type	User Story	Objective	Outcome	Test Tools	Test Environment	Acceptance Criteria
Functional Testing	Metrics on delivery time, cost compliance, etc. (User Story 2.1)	Ensure that all required metrics are correctly calculated and displayed in reports.	Accurate and complete metrics display.	Selenium, TestComplete	Testing environment	Reports accurately reflect all specified metrics.
	As a Supply Chain Ops Manager, I need to analyze environmental data including historical data up to five years. (User Story 2.2)	Verify system capabilities to capture and analyze environmental metrics and historical data.	System correctly handles specified metrics and historical data analysis.	TestComplete, Selenium	Development and staging environment.	Accurate capture and analysis of specified environmental metrics.
	Ability to export data in multiple formats. (User Story 2.3)	Verify that the system supports data export in at least three formats: CSV, Excel, PDF, XML, JSON.	Successful data export in chosen formats.	Selenium, Postman	Development environment	Data export is supported in at least three specified formats.
UAT	Final system validation	Ensure the system meets business requirements and user expectations.	Validate system functionality from an end-user perspective	UAT checklists, Feedback forms	Staging and production environment	Users confirm the system meets all their requirements and is ready for deployment.
Regression Testing	All user stories	Ensure new code changes do not adversely affect existing functionalities.	Maintain system stability after changes or updates.	Selenium, JIRA, TestRail	Development and staging environment	System remains stable with no functional regressions after updates.





# OSS Project Sprint Plan: Timeline

Projects / Srumtastic

## Timeline

Give feedback Share Ex

ES

JY

SK

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DS

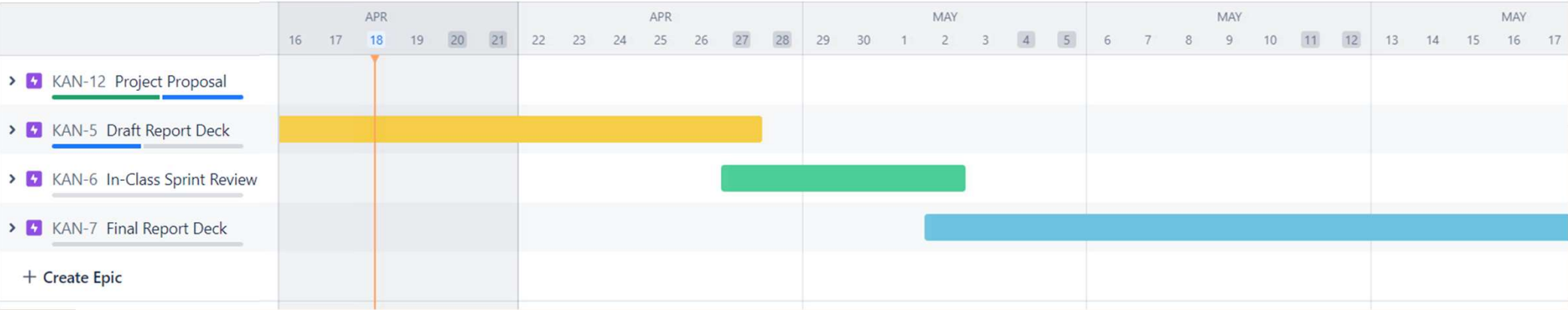
Add people

Status category ▾

Epic ▾

Clear filters

View set







# OSS Project Sprint Plan: Project Tracker

G			H			I			Rubric #	Task Name	Assignee	Status	Sprint	Overall Status				
To Do	In Progress	Done	Sprint	Done	In Progress	To Do	Grand Total											
Revise Business Objective to SMART Goal	Architecture Diagram	Company Overview	1	Revise Business Objective to SMART Goal	Ashley	Done	3. Final Report											
Architecture Diagram	High-Level Design Diagram	Business Problem	1	EMS Proposal	Chen Chen	Done	1. Proposal	1. Proposal	11			11						
High-Level Design Diagram	Risk Management/Analysis	Business Objective	1	As-Is Diagram	Emily	Done	3. Final Report	2. Draft Report	51			51						
Release Roadmap	Change Management	EMS Proposal	1	To-Be Diagram	Emily	Done	3. Final Report	3. Final Report	34	4	5	43						
Release Criteria		Define Environmental Impact Metrics	1	Revise EMS Proposal	Emily	Done	3. Final Report	Grand Total	96	4	5	105						
Bug Management		As-Is Diagram	1	Company Overview	Samiksha	Done	1. Proposal											
Release Checklist		To-Be Diagram	1	Business Problem	Samiksha	Done	1. Proposal											
Focused Risk Management		Revise EMS Proposal	1	Reporting Environmental Impact	Samiksha	Done	1. Proposal											
Testing Strategy		OSS Competitive Analysis	1	OSS Decision Criteria	Samiksha	Done	1. Proposal											
Testing Methodology		MySQL SWOT Analysis	1	Define Environmental Impact Metrics	Samiksha	Done	1. Proposal											
Testing Strategy		OSS Success Stories	1	Messaging	Samiksha	Done	1. Proposal	Resource Usage										
Testing Methodology		OSS Success Stories	3	Coordinating with team for meetings	Samiksha	Done	1. Proposal											
Testing Success Factors & Metrics		MySQL OSS Overview	1	Assigned the project tasks to team members	Samiksha	Done	1. Proposal											
Testing Success Factors & Metrics		MySQL Upstream & Downstream	2	OSS Competitive Analysis	Chen Chen	Done	1. Proposal											
References		Environmental Director Persona	2	OSS Decision Criteria	Chen Chen	Done	1. Proposal	Assignee	# of Tasks	% of Total								
Pitch Dry Run #1		Supply Chain Ops Manager Persona	2	MySQL SWOT Analysis	Dhvanil	Done	2. Draft Report	All	6	6%								
Pitch Dry Run #2		Database Administrator Persona	2	Revised Swot analysis	Samiksha	Done	2. Draft Report	Ashley	6	6%								
		Combine OSS Decision Criteria & Competitive	2	Added airbnb MySQL success story	Samiksha	Done	2. Draft Report	Chen Chen	10	10%								
		OSS Principals	2	Messaging	Samiksha	Done	2. Draft Report	Dhvanil	19	18%								
		Environmental Director User Story & Accepta	2	Assigned the project tasks to team members	Samiksha	Done	2. Draft Report	Emily	32	30%								
		Supply Chain Ops Manager User Story & Acco	2	Revised Upstream & Downstream	Dhvanil	Done	2. Draft Report	Samiksha	32	30%								
		Database Administrator User Story & Accepta	2	MySQL Upstream & Downstream	Dhvanil	Done	2. Draft Report	Grand Total	105	100%								
		User Story Relative Sizing	4	OSS Success Stories - RTTS	Emily	Done	2. Draft Report											
		SDLC Rationalization	3	MySQL OSS Overview	Emily	Done	2. Draft Report											
		SDLC Increments	3	OSS Research: License Terms & Conditions	Emily	Done	2. Draft Report											
		SDLC Rationalization	3	OSS Research: Sponsors & Financial Supporters	Emily	Done	2. Draft Report											
		SDLC Increments	5	OSS Research: Critical End Users & Adoption/Distribution	Samiksha	Done	2. Draft Report											
		SDLC Blending	3	OSS Success Stories - Airbnb	Samiksha	Done	2. Draft Report											
		SDLC Blending	3	Revised Database Administrator User Stories	Samiksha	Done	3. Final Report											
		Revise Sprint Plan	3	Implemented Database Administrator User Stories on slide	Dhvanil	Done	3. Final Report											
		Sprint Plan	4	Database Administrator Persona	Chen Chen	Done	2. Draft Report											
		Product Roadmap																
		Burn Down Chart																
		Product Backlog																
		Revise DBA User Story																
		Revise DBA Acceptance Criteria																



# Burndown Chart

Sprint	Planned Story Points	Completed Story Points	Remaining Story Points
1	21	18	3
2	18	15	3
3	20	17	3
4	22	20	2
5	19	16	3
6	17	14	3
7	16	13	3
8	15	12	3
9	14	11	3