Vision and Scope Document

for

BlueSphere

Version 1.0 approved

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Revision History

Name	Date	Reason For Changes	Version
Dushyn Bohdan	30.12.24		1.1

1. Business Requirements

1.1. Background

The need for efficient management of large aquariums has grown due to increased demand from commercial venues like shopping malls, restaurants, and corporate offices. Currently, maintaining optimal water quality and ensuring proper care for aquatic life require significant manual effort and expertise. The absence of a centralized system leads to inefficiencies, such as inconsistent maintenance schedules, suboptimal feeding, and delayed responses to water quality issues. The proposed system addresses these gaps by providing an automated, data-driven solution.

1.2. Business Opportunity

The project addresses a significant market opportunity in the aquarium maintenance industry, where few solutions combine IoT-enabled monitoring, automated analytics, and personnel management in one platform. Current alternatives often lack integration, requiring businesses to use separate tools for monitoring water parameters, scheduling maintenance, and analyzing data. The proposed system is attractive because it offers:

- Real-time water quality monitoring using IoT sensors.
- Centralized data analysis for informed decision-making.
- Streamlined scheduling and personnel management.
  This system positions itself as a competitive advantage for aquarium service providers and facility managers, aligning with market trends favoring automation and data integration.

1.3. Business Objectives and Success Criteria

Objectives:

- Automate 90% of water quality monitoring tasks by integrating IoT sensors.
- Reduce maintenance costs for clients by at least 20% through optimized scheduling and predictive analytics.
- Increase service provider efficiency, enabling personnel to manage 25% more aquariums without additional staff.
- Ensure scalability to support 10+ aquariums within the first year of deployment.

Success Criteria:

- Successful integration with IoT sensors, achieving real-time data accuracy of over 95%.
- Positive customer feedback with a satisfaction rate of 85% or higher within the first 6 months.
- Revenue growth of 30% for service providers using the system within the first year.
- Deployment of the system within the planned timeline and budget.

1.4. Customer or Market Needs

Key customer needs include:

- Real-time water quality monitoring for temperature, pH, oxygen levels, and other critical parameters.
- Alerts for water quality deviations to prevent harm to aquatic life.

- A centralized platform for managing aquarium data, including fish species, feeding schedules, and temperature requirements.
- Automated scheduling for maintenance tasks with location-based assignment for personnel.
- Historical data analysis and reports to optimize feed and chemical usage.
- Compatibility with existing aquarium equipment and IoT infrastructure.

1.5. Business Risks

- Marketplace Competition: Similar systems may emerge, leading to reduced market share.
- Timing Issues: Delays in development could result in missed opportunities during peak market demand.
- Implementation Issues: Challenges in integrating IoT sensors and ensuring data accuracy.
- Scalability Risks: Difficulty in handling a growing number of aquariums or clients.

2. Vision of the Solution

2.1. Vision Statement

The proposed system aims to revolutionize the management of large aquariums by providing an intelligent, integrated platform that combines real-time water quality monitoring, automated analytics, and streamlined personnel scheduling. It caters to the diverse needs of aquarium service providers, commercial venues, and aquarium enthusiasts, delivering an intuitive and scalable solution that aligns with modern technological trends and sustainability goals.

2.2. Major Features

IoT-Based Water Quality Monitoring

- Continuous tracking of key parameters like temperature, pH, oxygen levels, and ammonia concentration.
- Automated alerts for deviations from optimal conditions.

Centralized Aquarium Management System

- Database for fish species, feeding schedules, and temperature requirements.
- Recommendations for optimal feeding and chemical usage based on historical data.

Advanced Scheduling and Personnel Management

- Automated task scheduling for maintenance staff with location-based optimization.
- Real-time updates on task status and personnel performance tracking.

Comprehensive Analytics and Reporting

- Detailed reports on water quality trends, maintenance activities, and resource usage.

- Predictive analytics for feed and chemical requirements to optimize inventory management.

User-Friendly Web Platform

- Dashboard for real-time data visualization and control.
- Integration with mobile devices for on-the-go monitoring and management.

Scalability and Integration

- Support for managing hundreds of aquariums across multiple locations.
- Compatibility with existing IoT infrastructure and third-party systems.

2.3. Assumptions and Dependencies

- Reliable IoT sensors and hardware for water quality monitoring.
- Availability of cloud infrastructure for data storage and analytics.
- Third-party APIs or systems for integrating existing aquarium equipment.

3. Scope and Limitations

3.1. Scope of Initial Release

The initial release will focus on delivering core functionality that provides maximum value to customers while ensuring a streamlined development process. Key features will include:

Real-Time Water Quality Monitoring

- IoT-based tracking of temperature, pH, oxygen, and ammonia levels.
- Automated notifications for deviations from set thresholds.

Aquarium Information Management

- Database for fish species, feeding schedules, and environmental requirements.
- Recommendations for feed types and chemical usage.

Personnel Management and Scheduling

- Automated task allocation for maintenance staff based on location and availability.
- Calendar view for tracking scheduled maintenance tasks.

Analytics and Reporting

- Basic reporting on water quality trends and maintenance activities.
- Predictive analytics for resource planning, including feeds and chemicals.

Web Platform

- Dashboard for visualizing real-time data and managing schedules.
- Mobile-responsive design for easy access on-the-go.

3.2. Scope of Subsequent Releases

Future releases will expand functionality and improve user experience with the following features:

Enhanced Analytics

- Advanced reporting capabilities, including customizable metrics and forecasts.
- Integration of machine learning for predictive maintenance.

Integration with Third-Party Systems

- Support for external aquarium equipment and additional IoT devices.
- APIs for data export and integration with other platforms.

Mobile Application

- Dedicated mobile app for enhanced accessibility and notifications.

Scalability Improvements

- Support for thousands of aquariums across multiple geographic locations.
- High-availability infrastructure to ensure seamless operation.

Customization Options

- Tailored dashboards and alerts for different customer roles.
- Multi-language support for broader market reach.

3.3. Limitations and Exclusions

Limitations in Initial Release

- Advanced AI-based analytics will not be included.
- No integration with third-party hardware or software systems.
- Limited customization options for dashboards and reports.

Exclusions

- The system will not directly provide hardware components like IoT sensors or maintenance tools; customers must procure these separately.
- No on-site setup or maintenance services for IoT sensors will be included.
- The product will not include features tailored specifically to small personal aquariums, as the focus is on commercial and large-scale applications.

4. Business Context

4.1. Stakeholder Profiles

Stakeholder	Major Value	Attitudes	Major Interests	Constraints
Aquarium Service Providers	*Improved productivity through automated scheduling and water quality monitoring.*	*Receptive, especially to cost-saving and efficiency-improving features.*	*Centralized management of multiple aquariums, analytics to reduce operational costs, and scalability.*	*Must integrate with existing IoT infrastructure and provide easy onboarding for personnel.*
Commercial Venue Managers	*Reduced frustration through real-time monitoring and predictive analytics to prevent aquatic life issues.*	*Receptive to user-friendly dashboards and reports but wary of implementation complexity.*	*Reliable water quality alerts, easy-to-use platform for non-technical users, and detailed reports.*	*Limited time to train staff; system must be intuitive and require minimal setup.*
High-End Private Clients	*Peace of mind from real-time updates and automation, ensuring healthy aquatic environments*	*Enthusiastic about state-of-the-art solutions but expect high customization.*	*Aesthetic dashboards, compatibility with luxury aquarium setups, and reliable alert systems.*	*Expect a premium experience; system must cater to unique setups and designs.*
IoT Sensor Providers	*Increased hardware adoption due to integration*	*Supportive, as collaboration drives sensor sales and*	*Seamless compatibility with their sensors and*	*Dependence on timely updates to API documentation*

	with the system.	*broader market adoption.*	*opportunities for co-marketing efforts.*	*and technical support.*
Development Team	*Clear requirements and scope reduce rework and improve development efficiency.*	*Motivated if requirements are well-defined and achievable within the timeline.*	*Integration with robust cloud infrastructure and minimal external dependencies.*	*Limited development time; dependencies on third-party integrations and hardware reliability.*

4.2. Project Priorities

Dimension	***Driver (state objective)***	***Constraint (state limits)***	***Degree of Freedom (state allowable range)***
Schedule	*Release 1.0 must be available by 07/01, Release 1.1 by 10/01.*	*Delays beyond 30 days are not acceptable.*	*До 10% затримки в етапних датах для критичних функцій.*
Features	*75% of high-priority features included in Release 1.0.*	*Remaining features to be deferred to subsequent releases.*	*Allow inclusion of lower-priority features in later releases.*
Quality	*90% of user acceptance tests must pass for Release 1.0.*	*95% acceptance required for Release 1.1.*	*Minor non-critical bugs acceptable in Release 1.0.*
Staff	*Maximum team size is 5 developers + 3 testers.*	*Limited ability to scale team size mid-project.*	*Redistribution of resources between teams if necessary.*
Cost	*Budget overrun of up to 10% acceptable.*	*Any overrun above 10% requires executive approval*	*budget overrun up to 15% acceptable without executive review*

4.3 Description of software and software tools

The project to create a software system for monitoring aquariums will use the following software and tools:

FastAPI

FastAPI is a web framework for creating APIs in Python, which allows you to quickly and conveniently create RESTful services.

SQLAlchemy

SQLAlchemy is an object-relational mapper (ORM) for Python, which allows you to work with relational databases.

MySQL

MySQL is a relational database management system (DBMS), which is one of the most popular among web developers due to its reliability, speed and ease of use.

Scikit-learn

Scikit-learn is a Python machine learning library that provides extensive capabilities for data analysis, including linear regression and other statistical methods.

Pydantic

Pydantic is a Python data validation and model building library that is used to create validation schemes for input and output data in FastAPI.

Requests

The requests library in Python is one of the most popular tools for working with HTTP requests.

JSON

JavaScript Object Notation (JSON) is a lightweight data exchange format used for storing and transmitting data.