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Technology Tech. Technologies, Inc.

Feasibility Study for the Blue Lakes Project

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Problem Statement

The primary purpose of this project is to analyze the impact of development projects on the resiliency of lakes within the Land Between bioregion. However, analyzing environmental data for a region as large as the Land Between, which contains over 2400 lakes, is a daunting task. Research results are constantly in flux, as large areas see increasing development, which puts immense strain on the shorelines of nearby lake basins. This impacts the health of nearby wildlife, including fish communities, reducing the resiliency of the region as a whole, though we cannot accurately estimate the true range of these effects without careful analysis of relevant data. This project will connect multiple project databases to perform an analysis of individual lakes and regions as a whole, outlining the impacts of development now, and over time. The Land Between offers a large collection of environmental data in the region. The Blue Lakes project also provides regional data but focused on the effects of development on shorelines. Finally, the Angler Diaries collects observational data from fish caught in the area, providing population data for fish in the given lake. It is the task of this project to copy the existing databases, and streamline the data for an up-to-date analysis of a given lake or region that identifies areas of concern in order to properly prioritize the needs of that area.

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Identification of stakeholders

1. **The Land Between**
    a. A conservation organization concerned with creating adaptive solutions to the environmental impact of development in the Land Between bioregion.
    b. Focused on cooperation between sectors and levels in organizations.
    c. Require a streamlined analysis process to identify the issues impacting the bioregion.

2. **Blue Lakes**
    a. A dynamic database, providing a suite of tools and distinct datasets relating to lake health in an ESRI framework.
    b. Provide the data required to improve the health and sustainability of lakes.
    c. The current database could benefit from additional datasets of Calcium levels and the Angler Diaries.

3. **Angler Diaries**
    a. A flexible collection of data pertaining to catch rates, growth, and health of fish populations.
    b. Datasets contain a record of the duration of a fishing trip, the number and type of fish caught, and their measurements.
    c. Follow the typical fishing interests volunteers to encourage data collection.

4. **Residents** (Home and cottage owners)
    a. Live within the domain of the Land Between bioregion
    b. Provide information about the lakes in their immediate vicinity. Inform about what they can do to improve their local lake health. Ability to upload data through the form of Angler Diaries
    c. Ability to view statistics related to their lake, and the ability to upload their local data

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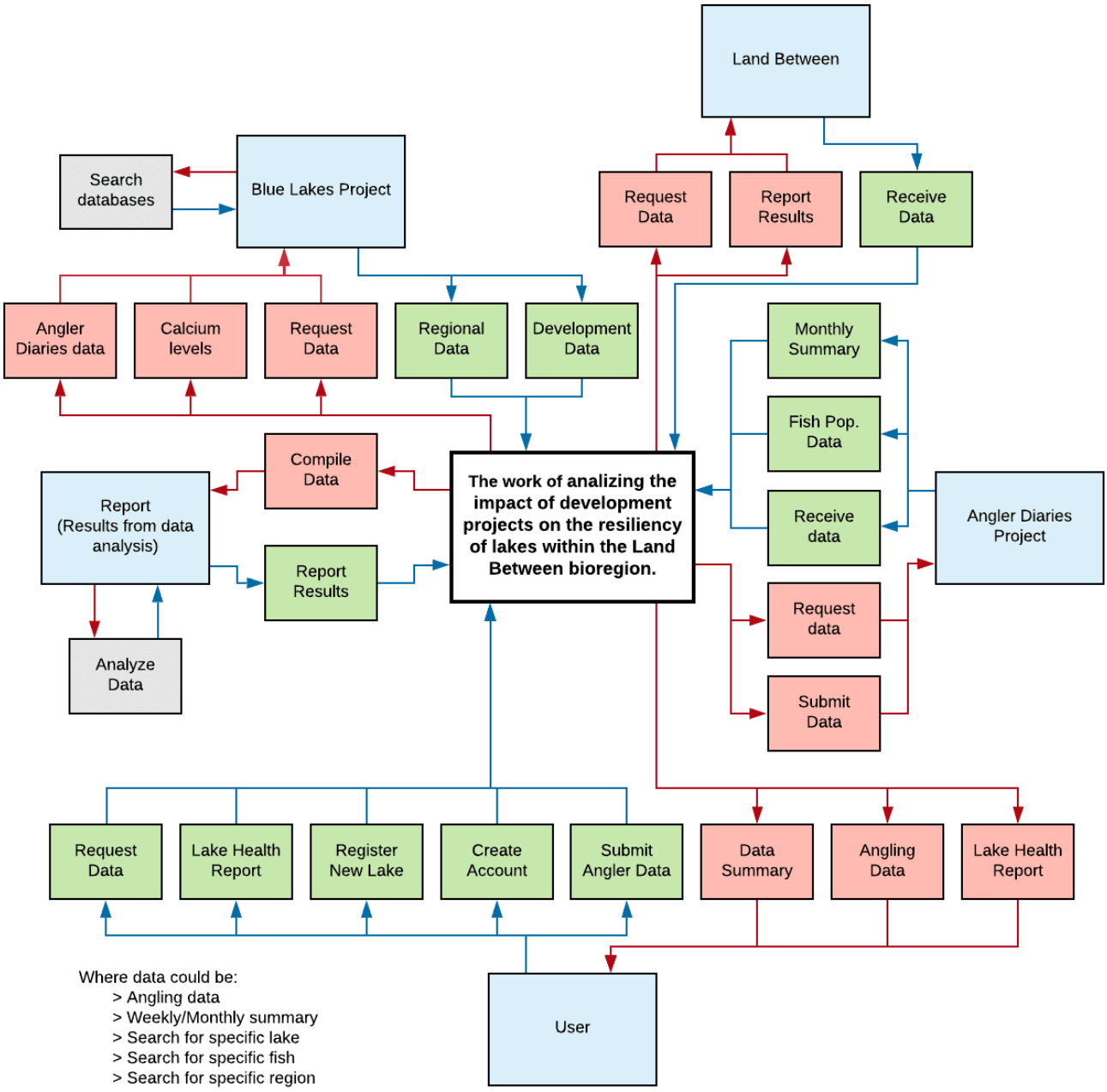
Identification of the scope.



Context Diagram

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Business events and their inputs/outputs.

1. **User submits new lake health report**
    a. IN : health report information
    b. OUT : report available for viewing

2. **User registers a new lake**
    a. IN : Lake information
    b. OUT : Lake available for reporting

3. **User views specific lake data**
    a. IN : Lake identifier
    b. OUT : Specified lake information and reports

4. **User shares lake health report**
    a. IN : Current lake health report
    b. OUT : Report in a shareable format

5. **User sorts lakes by health**
    a. IN : Sorting arrangement
    b. OUT : Lake listing accordingly

6. **User creates Angler Diary Account**
    a. IN : Account Information
    b. OUT : Account in Database

7. **User requests fish species in a location**
    a. IN : Fish Information
    b. OUT : Fish Statistics

8. **User requests to view lake profile**
    a. IN : Lake Identifier
    b. OUT : Specified lake information

9. **User submits angling data**
    a. IN : Fish statistics and count
    b. OUT : Account in Database

10. **Anglier Diaries pushing monthly fish data**
    a. IN : Fish statistics and count
    b. OUT : Account in Database

11. **User views weekly/monthly angling data for a location**
    a. IN : Location + Timeframe
    b. OUT : Angling data accordingly

Identify the goals of the business problem.

1. ***Purpose***: Analyze lake health on an individual basis
    a. ***Advantage***: Allows researchers and users to view the health of a lake on an individual basis; recognize priority areas and required actions for specific areas
    b. ***Measurement***: Program accurately determines priority areas

2. ***Purpose***: Analyze the overall lake health for a given region.
    a. ***Advantage***: Allows researchers and users an overview of the health of a given region; recognize specific areas that may require individual attention.
    b. ***Measurement***: Program accurately determines priority areas

3. ***Purpose***: Conserve biodiversity
    a. ***Advantage***: Create a system of stewarded and protected habitats across the region to maintain a balanced population which can renew itself
    b. **Measurement**: Areas will not enter a stage where a species is considered “endangered”

4. ***Purpose***: Sustain Water Quality
    a. ***Advantage***: Maintain a significant level of “unaffectedness” so as to maintain water quality and healthy habitats
    b. **Measurement**: Number of new priority areas, or areas that are becoming at-risk

Identification of Constraints.

1. **Solution Constraints (e.g. platform constraints)**
    a. The system shall be available as an applet for both iOS and Android.
    b. The system shall be accessible via a webpage
    c. The application requires an internet connection to request datasets.
    d. The system must analyze the health, changing fish communities, and overall resiliency of lakes in the Land Between bioregion.
    e. The system must analyze data provided in an ESRI framework.

2. **Partner or Collaborative Application Constraints**
    a. The system must consider the following data parameters from the Blue Lakes Project database: dissolved oxygen levels, temperatures for water columns, phosphorus levels, stocking history, and shoreline development.
    b. The system must consider data for shoreline calcium levels.
    c. The system must partner with the Angler Diaries program to collect data from fishing catch trends.
        i. The system will consider data on catch trends, fish spawning success, and the survival and growth rates for fish populations.
    d. The application will automate the analysis of new data and display results to the user within 1 second.

3. **Off-the-Shelf Software**
    a. The application must not be reliant on ready-made software or hardware, aside from the previously listed collaborations.

4. **Schedule Constraints**
    a. The application will be available by June 2021.
    b. The application beta will be available for testing before April 2021.
    c. The application will begin alpha testing before November 30th, 2020.

Naming Conventions (Terminology).

Alpha	A working prototype that is not yet feature-complete. A project enters alpha as an advanced proof of concept prototype, demonstrating the feasibility of the project.
Angler Diaries	A collection of time-series information from fishing trends, providing rich data on local fish populations.
Application	A piece of software to be run on a specified device.
Beta	A working prototype that is mostly feature-complete. A project enters beta when it is primarily in its bug-testing phase.
Blue Lakes	Provide a dynamic database that tracks and highlights areas of concern from shoreline development or water quality. Primarily concerned with conservation.
Database	An electronically stored collection of data pertaining to a specific field or category of study.
ESRI framework	Standards-based protocols to allow multiple services to run on the same framework, with little risk of compatibility issues.
Land Between	An organization focused on building the capacity for conservation and developing adaptive solutions to issues facing the Land Between bioregion.
Land Between Bioregion	A bioregion spanning across central Ontario, from Georgian Bay to the Ottawa Valley.

Risk assessment.

1. ***Risk***: Database outage, test results cannot be viewed or uploaded
    a. ***Probability***: Low
    b. ***Effect***: Catastrophic, program failure

2. ***Risk****: A* user is unable to immediately upload results in remote locations.
    a. ***Probability***: Moderate, especially in areas with poor cellphone service.
    b. ***Effect***: Mild. Time-based data may lose accuracy.

3. ***Risk***: Mobile application becomes out of date, or incompatible with the new OS.
    a. ***Probability***: Moderate
    b. ***Effect***: Mild, compatibility update may be required

4. ***Risk***: Application development timelines aren't met.
    a. ***Probability***: Moderate
    b. ***Effect***: Moderate, due dates may need to be pushed.

5. ***Risk***: Not enough users reporting data to Angler Diaries for proper data
    a. ***Probability***: Low
    b. ***Effect***: Severe, incomplete data results in inaccurate data analysis.

6. ***Risk***: Global pandemic requires all researchers to quarantine in their homes.
    a. ***Probability***: High
    b. ***Effect***: Moderate, data collection will be paused for a minimum of 2 weeks.

7. ***Risk***: Software is inefficient at analyzing data.
    a. ***Probability***: low
    b. ***Effect***: Fatal, requires complete rework of the project.

8. ***Risk***: Database retrieval takes longer than 1 second.
    a. ***Probability***: low
    b. ***Effect***: Moderate, potentially frustrating user experience.

9. ***Risk***: The user interface is not intuitive.
    a. ***Probability***: low
    b. ***Effect***: Catastrophic. Usability requires that the software is easy to use.

10. ***Risk***: A user records incorrect or incomplete data.
    a. ***Probability***: low
    b. ***Effect***: Mild, it is unlikely that enough users would report erroneous data to impact the analysis.