Software Requirements Specification for SFWRENG 4G06: subtitle describing software

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Date	Version	Notes
Date 1	1.0	Notes
Date 2	1.1	Notes

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2 Stakeholders

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2.4 Hands-On Users of the Project

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4.1 Glossary of All Terms, Including Acronyms, Used by Stakeholders involved in the Project

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7.1 Business Data Model

Insert your content here.

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8 The Scope of the Product

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Insert your content here.

15.3 Privacy Requirements

Insert your content here.

15.4 Audit Requirements

Insert your content here.

15.5 Immunity Requirements

Insert your content here.

16 Cultural Requirements

16.1 Cultural Requirements

- The primary language for the product will be English, tailored specifically to Canadian dairy farmers.
- All data and measurements will follow Canadian standards, including the use of liters for milk production, kilograms for weight, and hectares for land area Other relevant units such as Celsius for temperature and metric tons for larger quantities may also be used

17 Compliance Requirements

17.1 Legal Requirements

- The project must comply with the Code of Practice for the Care and Handling of Dairy Cattle, which is a government-regulated standard in Canada. This code outlines mandatory guidelines for the ethical treatment, health, and welfare of dairy cattle. Any management recommendations or actions suggested by the machine learning model will align with these regulations to ensure ethical practices in dairy farming.
- The project must comply with PIPEDA (Personal Information Protection and Electronic Documents Act) for any personal information related to dairy farmers or other individuals involved. This includes

the handling of contact details, financial information, and other personally identifiable data.

17.2 Standards Compliance Requirements

- There are no specific standards for collecting dairy farming data in this project. All relevant aspects of data collection and handling are already covered under Legal Requirements, specifically in compliance with PIPEDA for managing sensitive information about dairy farmers, and the Code of Practice for the Care and Handling of Dairy Cattle for ensuring the welfare of the animals.

- For coding standards, the project will adhere to PEP8 to ensure consistent and readable Python code. More information on PEP8 can be found here.

18 Open Issues

- **Data Availability and Quality:** The accuracy of predictions will heavily depend on the quality and completeness of the data obtained from CATTLEytics and Lactanet. Inconsistent or missing data might affect the performance of the model.

- **Model Accuracy:** The machine learning model may need to be fine-tuned multiple times to achieve high accuracy in predicting cow traits. This requires testing with diverse datasets to ensure the model generalizes well.

- **User Interface Usability:** The graphical representation of the family tree and predicted traits needs to be intuitive and user-friendly for farmers with varying levels of technical skill. Determining the best design and ensuring it meets users' needs could take time.

- **Integration with CATTLEytics:** Seamlessly integrating the tool into the existing CATTLEytics system without causing disruptions or requiring major system changes could be technically challenging.

- **Regulatory Compliance:** Ensuring that the predictions and recommendations made by the model comply with Canadian regulations for

dairy farming (Code of Practice for the Care and Handling of Dairy Cattle) will require thorough review and potential adjustments during development.

- **Model Interpretability:** Farmers may need clear explanations for how predictions are made to trust and use the tool effectively. Ensuring the model's predictions are explainable is an open issue.
- **Performance Considerations:** The tool needs to be efficient and scalable, handling large amounts of data without significant lag or performance issues, especially as it gets adopted by multiple farms.

19 Off-the-Shelf Solutions

19.1 Ready-Made Products

- There are no fully ready-made products that address the predictive capabilities being developed in this project. While tools like Lactanet provide dairy farm data, they do not offer predictive models based on genetic and health data. Lactanet data will be used primarily for training the custom machine learning model.

19.2 Reusable Components

- Machine learning libraries, such as PyTorch or TensorFlow, will be utilized to develop the custom AI model for cow trait prediction. Additionally, front-end libraries such as D3.js or React Tree Visualization libraries could be considered for visualizing the family-tree diagrams.

19.3 Products That Can Be Copied

- There are no existing products to be copied for this project. However, open-source family-tree visualization tools might serve as inspiration for the graphical aspects of the project.

20 New Problems

20.1 Effects on the Current Environment

- Introducing this system could change how farmers currently select sires or evaluate herd performance. Some may resist adopting new technology due to unfamiliarity.

20.2 Effects on the Installed Systems

- The project will be integrated into the existing Cattleytics software, which is already used to manage dairy farms. The machine learning tool will act as an additional module within Cattleytics, allowing farmers to visualize the family tree of cows and predict future traits based on genetic data. Seamless integration with the current system will be prioritized to ensure smooth adoption and ease of use.

20.3 Potential User Problems

- Users may face difficulties interpreting complex AI model outputs, so ensuring the tool's recommendations are easy to understand is key.

20.4 Limitations in the Anticipated Implementation Environment That May Inhibit the New Product

- The tool will need to function effectively on standard farm computing systems, which may have limited processing power or internet connectivity.

20.5 Follow-Up Problems

- Continuous updates may be needed to improve the model based on feedback from farmers. Future updates may also need to address changes in farming practices

21 Tasks

21.1 Project Planning

Insert your content here.

21.2 Planning of the Development Phases

Insert your content here.

22 Migration to the New Product

22.1 Requirements for Migration to the New Product

Insert your content here.

22.2 Data That Has to be Modified or Translated for the New System

Insert your content here.

23 Costs

Insert your content here.

24 User Documentation and Training

24.1 User Documentation Requirements

Insert your content here.

24.2 Training Requirements

Insert your content here.

25 Waiting Room

Insert your content here.

26 Ideas for Solution

Insert your content here.

Appendix — Reflection

The information in this section will be used to evaluate the team members on the graduate attribute of Lifelong Learning. Please answer the following questions:

1. What knowledge and skills will the team collectively need to acquire to successfully complete this capstone project? Examples of possible knowledge to acquire include domain specific knowledge from the domain of your application, or software engineering knowledge, mechatronics knowledge or computer science knowledge. Skills may be related to technology, or writing, or presentation, or team management, etc. You should look to identify at least one item for each team member.

2. For each of the knowledge areas and skills identified in the previous question, what are at least two approaches to acquiring the knowledge or mastering the skill? Of the identified approaches, which will each team member pursue, and why did they make this choice?