Use Case: Improve Auto Dick

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Actors

- Tigo Goes, Luco Berkouwer, Stijn Ooms

- Product Owner (Elmar Pigeaud)

- Stakeholders (Robin de Jong/ koninklijke zeil en roeivereniging)

- End Users (Race Teams and Officials)

Goal

Enhance the Auto Dick based on feedback to make it more robust, user-friendly, and reproducible.

Preconditions

- Access to current design documentation (2D and 3D drawings, schematic designs).

- Availability of the current version of Auto Dick.

- Testing environment for implementing and testing improvements.

Trigger

The development team receives feedback from the product owner and stakeholder during meetings, prompting the initiation of improvement activities.

Problem Description

The Koninklijke Zeil- en Roeivereniging (Royal Sailing and Rowing Association) is encountering significant challenges due to these issues. Without the reliable performance of the Auto Dick, the association must rely on many volunteers to manually perform tasks that should be automated. Finding and coordinating these volunteers is often difficult, and their involvement is essential for organizing races. The current problems with the Auto Dick force the association to invest considerable time and effort into tasks that could be automated, placing a substantial burden on the available volunteers and reducing the efficiency of race organization.

The Auto Dick is currently encountering several critical issues impacting its durability, functionality, and consistency. The housing lacks water resistance, posing a risk of damage and malfunction during races. Insufficient speaker volume complicates communication of crucial signals to race participants. Moreover, synchronization problems between the display and speaker undermine the reliability of countdowns. The display is challenging to read, and the absence of event logging impedes post-race analysis. Incomplete documentation and unclear code further complicate product replication and maintenance.

Addressing these issues would not only improve the product's performance but also drastically reduce the number of volunteers needed. Better documentation and more intuitive code would simplify maintenance, decreasing the reliance on technical volunteers. This would allow the Koninklijke Zeil- en Roeivereniging to utilize their limited volunteer resources more effectively, ultimately enhancing the overall organization and execution of sailing races.

Stakeholder Analysis

The Product Owner (Elmar Pigeaud) is primarily interested in ensuring that the product meets market needs and stakeholder expectations. The impact of the product owner is high, as they provide key feedback and approval for improvements. Elmar Pigeaud has the most interest, frequent contact, and considerable influence over the project. For detailed information, see Appendix A for the stakeholder overview image.

The Stakeholders (Koninklijke Nederlandse Zeil- en Roeivereniging) are concerned with the reliability and usability of the Auto Dick during races. Their impact is high because their feedback reflects the needs and experiences of actual users. They have moderate interest, frequent contact, and major influence over the project. Detailed information about these stakeholders is available in Appendix A.

The End Users (Participants in races) are focused on ease of use, clear signals during races, and reliable performance. Their impact is low as they are the primary users who will benefit from the improvements. They have little interest, no contact, and minimal influence over the project. See Appendix A for a detailed overview of these stakeholders.

Problem-Solution Alignment

- **Housing Robustness:** Addressing water ingress and robustness directly improves the durability and reliability of the Auto Dick, meeting the needs of race officials and teams who operate in potentially harsh conditions.
- **Speaker Quality:** Enhancing the speaker ensures that race participants can hear signals clearly, addressing the concerns of both officials and racers.
- **Synchronization:** Fixing synchronization issues between the display and speaker improves the accuracy and reliability of countdowns, crucial for race timing and coordination.
- **Display Readability:** Making the display more readable addresses usability issues, ensuring that information is clear and accessible to all users.
- **Logging System:** Implementing a logging system helps in tracking and analyzing race events, benefiting stakeholders interested in post-race analysis and continuous improvement.
- **Reproducibility and Documentation:** Enhancing documentation and code clarity ensures that future development teams can easily reproduce and maintain the product, supporting long-term sustainability and improvement.

Primary Flow

1. Collect Feedback:

- The development team conducts meetings with the product owner and stakeholder to identify issues and improvement points.

- Document the feedback.

2. Analyze Issues:

1. Housing Robustness:

    1. Current Issue: The housing is not robust enough and allows water ingress.
    2. Analysis: The housing does not meet the IP54 water resistance standard, and the buttons are prone to rust and water damage.
    3. Requirement: Design a new housing that meets the IP54 standard and select water-resistant and rust-proof buttons. Speaker Quality:
    4. Current Issue: The speaker produces sound of too low calibre.
    5. Analysis: The current speaker is insufficiently loud for the intended use.
    6. Requirement: Find a new speaker with higher volume output and adjust the software to support the new speaker.

2. Synchronization of Display and Speaker:

    7. Current Issue: The display and speaker countdowns are not synchronized, with at least a one-second delay.
    8. Analysis: There is a timing issue in the software causing the delay.
    9. Requirement: Modify the software to ensure that the display and speaker count down simultaneously.

3. Display Readability:

    10. Current Issue: The display is not sufficiently clear and readable.
    11. Analysis: The font size is too small, and the text spacing is inadequate.
    12. Requirement: Increase the font size and adjust text spacing to enhance readability.

4. Logging System:

    13. Current Issue: There is no effective system for logging key events.
    14. Analysis: The lack of a logging system means important events are not recorded.
    15. Requirement: Develop a logging system that records the following events with timestamps:
        a. Flags raised.
        b. Race delays.
        c. Race starts.
        d. Participant finishes.
        e. False starts.
    16. Ensure logs are stored on an SD card for easy retrieval and analysis.

5. Reproducibility:

17. Current Issue: The product is not easily reproducible.
18. Analysis: Incomplete or inadequate documentation and design materials hinder reproducibility.
19. Requirement: Ensure comprehensive 2D and 3D drawings and schematic designs are included in the documentation.

6. Code Quality:

20. Current Issue: The code is not sufficiently clear or maintainable.
21. Analysis: The lack of comments and documentation makes the code difficult to follow and maintain.
22. Requirement: Add detailed comments and documentation, including flowcharts and control flow diagrams, to improve code clarity and maintainability.

7. Documentation and Demo:

23. Current Issue: Insufficient instructional materials for future development and user understanding.
24. Analysis: The absence of a detailed demo video and multi-level architecture design.
25. Requirement: Create a demo video explaining the system's functionality and design a multi-level architecture blueprint.

3. Design Improvements:

- Housing:
  - Design a more robust housing that meets IP54 water resistance standards.
  - Select buttons that are more resistant to water and rust.
  - Conduct a robustness analysis to verify improvements.
- Speaker:
  - Find and select a new, louder speaker.
  - Develop and test necessary code modifications for the new speaker.
- Display:
    - Ensure the display and speaker count down synchronously.
- Improve display readability with larger fonts and more space between text.
- Logging:
  - Develop a logging system that records:
    - Flags raised.
    - Race delays.
    - Race starts.
    - Each participant finishes.
    - False starts.
  - Ensure logs are stored on an SD card with timestamps and are readable.
- Reproducibility:
  - Ensure complete 2D and 3D drawings and schematic designs are included in the transfer package.
- Code Quality:
  - Enhance code clarity and maintainability by adding necessary comments.

    - Create and share flowcharts and control flow diagrams.
- Documentation and Demo:
    - Create a demo video explaining system functionality.
    - Design a multi-level architecture blueprint.

4. Implementation:

- Implement the proposed improvements.
- Build and test prototypes.

5. Testing:

- Test the improved Auto Dick in various conditions to ensure all enhancements are effective and reliable.
- Gather feedback from end users and make further adjustments if necessary.
- See Testrapport.pdf

6. Delivery:

- Deliver the final version of the improved Auto Dick to stakeholders.
- Provide transfer documentation, including design drawings, schematic designs, code, and a demo video, to the product owner and potential future development teams.

Postconditions

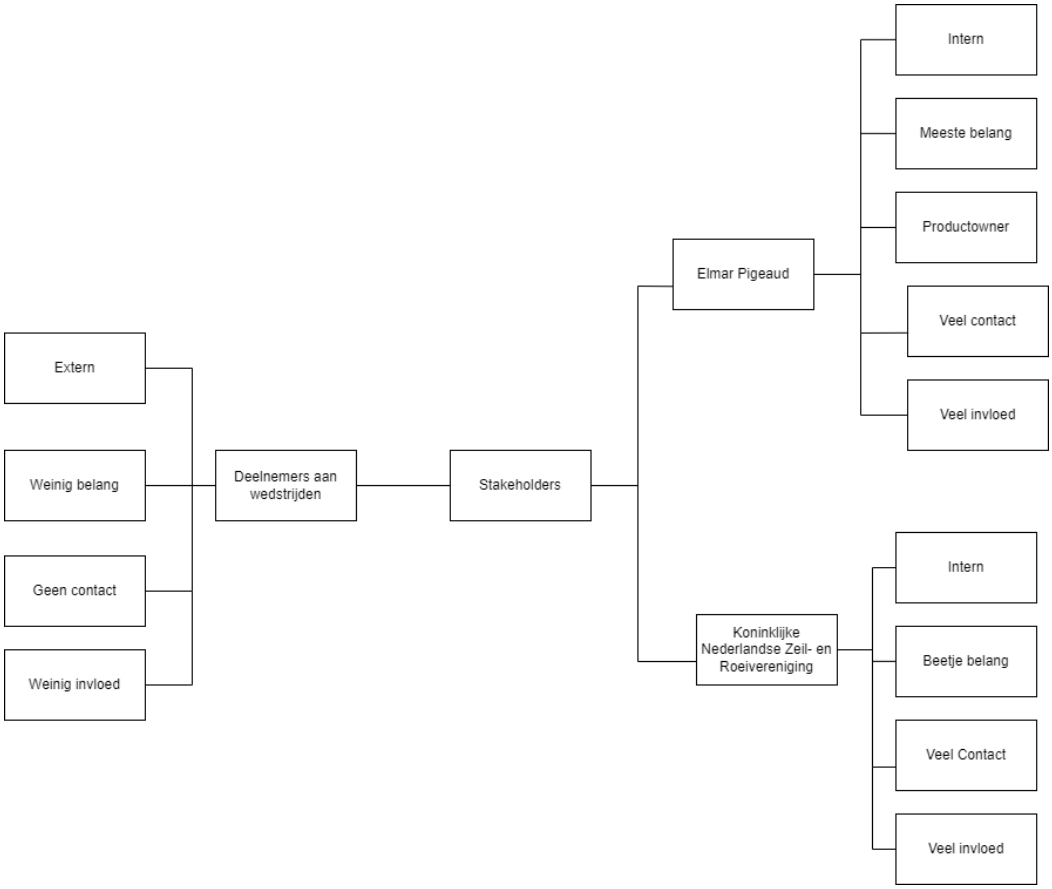
- A more robust, user-friendly, and reproducible version of Auto Dick is available for use.
- Comprehensive documentation and code are available for future development teams.

Special Requirements

- Thorough testing to ensure enhancements in water resistance, sound quality, display functionality, and logging reliability.
- Regular collaboration with the product owner and stakeholders to ensure all requirements and expectations are met.

Appendix

Appendix A (stakeholders Analysis):



Changelog

Date	Change made	Author
16/02/2024	First version made	Tigo Goes
19/6/2024	Implemented feedback	Luco Berkouwer