DAF Maintenance Prediction

Design Oriented Research: Plan

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# Introduction

This detailed research paper covers all the important questions we need to answer in order to reach our project goals. To tackle these questions, we're using the Development Oriented Triangulation Framework (DOT) framework and customizing methods for each smaller question. This way, we can carefully and methodically study the topic, which helps us gain a solid understanding and finish the project successfully.

# Research Questions and Methods

## Main question

How can we optimize the data visualization techniques currently used by DAF to detect potential component failures in the DAF engine plant?

## Sub-questions

* What does the current database schema look like? What are its drawbacks?
  + [Workshop (Root Cause Analysis)](https://ictresearchmethods.nl/Root_cause_analysis)

Understanding what the problem is and specifying what the focus of the solution should be.

* + [Field (Task Analysis)](http://ictresearchmethods.nl/Task_analysis)

Gain a proper understanding of the function of the database in relation to the project and the current design.

* + [Field (Problem Analysis)](https://ictresearchmethods.nl/Problem_analysis)

Making sure the problem definition is correct and that we are not solving the wrong problem.

* Is there a more optimal solution for data representation than Grafana?
  + [Library (Available Product Analysis)](https://ictresearchmethods.nl/Available_product_analysis)
  + [Library (Competitive Analysis)](https://ictresearchmethods.nl/Community_research)

A research document will be made containing all available Grafana alternatives and their pros and cons. In conclusion, the best fitting visualization tool for this project will be highlighted.

* How can visualization usability be improved and made easy to use?
  + [Library (Community research)](https://ictresearchmethods.nl/Community_research)

Check out if others have had a similar problem and what they have done to resolve it. Any information gathered will be written down in a research document.

* + [Workshop (Prototype)](https://ictresearchmethods.nl/Prototyping)

An example graph displaying the temperatures of a machine will be made to go through the process of creating a query in order to observe the challenges.

* + [Lab (Usability testing)](https://ictresearchmethods.nl/Usability_testing)

A manual usability test will be performed and results will be laid out in a document.

* How can we expand the database to handle new sensor data?
  + [Lab (Data Analytics)](https://ictresearchmethods.nl/Data_analytics)

Gain understanding of the needed data.

* + [Workshop (Prototype)](https://ictresearchmethods.nl/Prototyping)

Create diagrams and prototypes for the database.

* How can data be queried to ensure load times stay as low as possible?
  + [Lab (Non-functional test)](https://ictresearchmethods.nl/Non-functional_test)

General system validation on if it fulfills non-functional requirements agreed with the client in terms of performance.

* How can queries’ complexity be minimized?
  + [Library (Design Pattern Research)](https://ictresearchmethods.nl/Design_pattern_research)

Investigation on the current approach for querying data and implementing on it the most recent design patterns for minimizing complexity.

* How can we ensure and optimize scalability for additional machines?
  + [Lab (Non-functional test)](https://ictresearchmethods.nl/Non-functional_test)

General system validation on if it fulfills non-functional requirements agreed with the client in terms of scalability.

# Research deliverables

At the end of the research, we plan to deliver a combination of prototypes and documents. The main deliverables are:

* Grafana usability research document.
* Grafana alternatives research document
* Database optimization research document
* Database expansion and ERDiagram

# Time estimation

Conduction of the research is planned to go parallelly with the work related to the group project, so right before the end of the semester this Design Oriented Research is supposed to be finished.