Background and motivation
When selling major equipment such as MRI and CT scanners to hospitals, Philips typically also offers service contracts for maintenance, that include yearly up-time requirements to the customers. In order to satisfy these requirements, Philips has an extensive network of service engineers and spare parts, so that when the equipment breaks down, the required engineers and spare parts can quickly reach the hospital. The spare part is either dispatched directly to the hospital, or picked up from a so-called Pick-up, Drop-off (PUDO) location by the service engineer. Positioning these PUDOs strategically is crucial for a swift response to breakdowns.

Goal of the project
The goal of this project is to develop models and methods to determine ‘optimal’ locations for the PUDOs, which requires addressing the following challenges:

1. Develop models to predict the location of future breakdowns and the PUDOs used, based on historical data;
2. Discuss with internal stakeholders at Philips to gain an understanding of the costs associated with moving and maintaining PUDOs, and travel time for service engineers;
3. Develop a mathematical model for the optimization of the PUDO locations;
4. Analyze the quality and efficiency of the algorithms;
5. Develop a prototype implementation of the methods.

Collaboration Philips Customer Care Center and Centrum Wiskunde & Informatica
The internship is part of a research collaboration between Philips and the National Research Institute for Mathematics and Computer Science in the Netherlands (CWI). CWI is an internationally renowned research institute with many collaborations to societal parties, like companies and governments. The project is part of a bigger project between CWI, Philips, TU/e and the Amsterdam Fire department, on the design and operation of so-called emergency service networks. You will receive an internship contract with CWI, but will also be at Philips on a regular basis. At the CWI there is a lot of expertise available in the area of forecasting, modeling and planning.

Requirements
1. The student should have a background in mathematical modeling and statistical analysis.
2. The student should be comfortable with computer programming and comfortable with exploring datasets in order to analyze and model historical trends.
3. The student should be able to take initiative and work independently.
4. The student should enjoy applying mathematical knowledge to real-world practical problems.

Compensation
The student will receive an internship contract via CWI and will receive standard internship compensation per month. For more details about the assignment, please phone or mail to Prof.dr. R.D. van der Mei (mei@cwi.nl, 0613492229).