Project Plan

4Energy

Infiniot

Date	**:**	**21-02-2022**
Version	**:**	**v0.2**
State	**:**	**concept**
Author	**:**	**Author**

Version history

Version	Date	Author(s)	Changes	State
v0.1	18-02-2022	Anas, Samir	Initial version	concept
v0.2	21-02-2022	Whole group	Added information about the testing environment, risk analysis, budget, scope and planning	concept

Contents

1. Project assignment

1.1 Context

The Dutch energy sector has a decoupling between utilities and electricity supply. While generation and retail of electricity in the Netherlands are liberalised, the transmission and distribution were and are still centralised and operated by the system operator and the utilities. The system operator, TenneT, is the only stakeholder responsible for managing the high-voltage grid (between a voltage of 110 kV to 380 kV) in the Netherlands. There are several utility companies that own the regional energy grids.

With the transition to renewable energy and (large-scale) consumers becoming “producers” as well (with e.g. solar arrays, battery farms), these utility companies must be able to balance their grid: under-capacity can lead to black-outs (consumers/factories not getting electricity) and over-capacity can lead to grid failure (exploding power houses, burnt wires, etc.), each leading to fines and extra costs.

To be able to predict the future electricity market, the utility companies need to simulate different scenarios. E.g. based on (simulated or real) real-time weather conditions, location and time of day/year, supply and demand will change.

1.2 Goal of the project

The goal of the project is to create an enterprise software for Infiniot to simulate a distributed electricity (market) for one regional energy grid utility company. It will prove that the system complies to all functional and non-functional requirements. In particular, a developing tool to prove that the system is available 24/7 and performance tests to prove that the system can handle the incoming messages from electricity meters, power- and price fluctuations. Also, it will demonstrate interoperability with systems from the other utility companies and the BRP.

The advantages are as follows:

1. It will help the utility company to track the energy flow in a region.
2. Monitoring energy prices in the Netherlands and neighbouring countries.

1.3 Scope and preconditions

<<What activities and which end products (to what extent or quality) belong to the project, and which don’t.>>

Inside scope:	**Outside scope:**
1 Grid Operator B-Grid (Groningen, Friesland, Drenthe, Overijssel) energy grid	1 Energy Production Companies
2 Large-scale consumer	2 Payment
3 Utility company	3 Integration with other countries in the EU
4 Energy price/consumption prediction	4 Consumer dashboard
5 Services status dashboard	

<< Indicate any preconditions. E.g., think of technology choices that have already been made by the company. Note that you are also expected to retain a critical, but constructive, mindset for choices already made >>

1.4 Strategy

As a group of seven we decided to use the agile approach with the Scrum-methodology. Sprints will be of three weeks and stand-ups on Monday.

1.5 Research questions and methodology

1.5. Main research question:

How can a website help a utility company with their field of work?

5.1. Questions breakdown

Based on the main question, several sub-questions are determined, as follows:

1. What is the current state of the energy grid in the Netherlands?
2. How can real-time data be obtained (if the company does not have real time time data already)?
3. How can we predict the future electricity market, considering whether conditions, location and time of day/year, supply, and demand?
4. What is the best way to visualise the (national) electricity market, grid status and energy output and demand in real-time?

5.2. Activity Description

In this section the sub-questions will be answered and the activities to answer those questions will be stated. And in order to choose the correct activity, DOT framework research methodology (Heck, apr 9, 2020) will be applied. The project will start with **requirements prioritisation (Workshop)**. **Library-research** will be applied to all sub-questions with the Literature Study method, in order to get more knowledge in these areas.

1. What is the current state of the energy grid in the Netherlands?
   In order to find out the current state of the energy grid, the **expert interview(Library)** and **available product analysis (Library)** strategies to be utilised .
2. How can real-time data be obtained (if the company does not have real time time data already)?
   In order to find out the real-time data, the **available product analysis (Library), and Interview(Field)** strategy will be used.

3. How can we predict the future electricity market, considering whether conditions, location, time of day/year, supply, and demand?
   A **brainstorm(workshop)** technique will be utilised to realise how the forecast may be created in order to anticipate the future power market. When it comes to producing predictions, the **Data analytics(Lab**) technique will be employed initially in order to comprehend the data. The solution will be created using **Usability Testing (Lab)** and **Product Review (Showroom)** methodologies.

4. How can we visualise the (national) electricity market, grid status and energy output and demand in real-time?
   Available product analysis (Library): will be used to get ideas in solutions for visualisation.
   Stakeholder analysis (Field): will be used to visualise the data according to the stakeholders.

   A/B testing (Lab): is used to see the preference in how the data is shown (graph, table, map).

2. Project organisation

2.1 Stakeholders and team members

Name	Abbreviation	Role and functions	Availability
Ahmad, Anas	A. A	Student	2.5 days a week.
Bassa,Martijn M.A.	M.A	Student	2.5 days a week.
Eickmans,Jan J.	J.E	Student	2.5 days a week.
Zhou,Tony T.	T.Z	Student	2.5 days a week.
Hadzhikolev,Kristian K.P.	K.H	Student	2.5 days a week.
Schoenmakers,Duncan D.B.W.W.M.	D.B.W.W.M.	Student	2.5 days a week.
Zalmay,Samir S.	S.Z	Student	2.5 days a week.
Schouten,Gertjan G.C.	G.C	Teacher, Product Owner	
Kenneth Ruys		Infiniot representative	
Ton Smets		Infiniot representative	

2.2 Communication

As Corona-rules are still in place, multiple communication guidelines have been set up by the team. Teams:

Role	Purpose of communication	Means of communication	Frequency
University Teachers	To check the progress, for presentations and lectures	· On location · MS teams	Thrice a week
Clients	To check the progress, and ask product related questions	· MS teams · Email · On location	Twice a month (If needed)
Students	To check progress, meetings, helping each other, and working together	· On Location · Discord · MS teams	2.5 half days a week

3. Activities and time plan

3.1 Phases of the project

Phase	Name	Sprints	Deliverables
Phase 1	Trigger & Specification & design	Sprint 0-1	Project Plan Design Choices Wireframes Use cases Collaboration Contract Presentation Peer review document
Phase 2	Realisation	Sprint 2-3	DOT research document Product deliverables Test document Peer review document
Phase 3	Evaluation & Handover	Sprint 4-5	Peer review document Test document Evaluation

3.2 Time plan and milestones

Every monday we will have a stand up at 9:15, At the end of every sprint we will have a demo with the PO and a retrospective.

Phasing	Start date	Finish date
Sprint 0 “Planning”	07-02-2022	27-02-2022
Sprint 1 “Research & Design”	27-02-2022	27-03-2022
Sprint 2 “Implementation”	27-03-2022	17-04-2022
Sprint 3 “Implementation”	17-04-2022	15-04-2022
Sprint 4 “Deployment & Testing”	15-05-2022	05-06-2022
Sprint 5 “Handover”	05-06-2022	19-06-2022-

4. Testing strategy and configuration management

4.1 Testing strategy

Frontend

Linting	Eslint, Prettier, Husky, Lint-staged
Unit testing + Integration testing	Jest + React Testing Library
E2E testing	Playwright, Cypress
Performance testing	Google Lighthouse
Code Quality	SonarQube
Security	GitHub Dependabot

Backend

Linting	Checkstyle
Unit testing + Integration testing	JUnit, Mockito
Performance testing	To be decided (JMeter + Grafana?)
Code Quality	SonarQube
Security	GitHub Dependabot

Met opmerkingen [1]: https://performancelabus.com/load-testing-for-microservices/#4
https://www.blazemeter.com/blog/how-to-use-grafana-to-monitor-jmeter-non-gui-results

Unit test, component test, integration test, system test, acceptance testing.

<<Which testing strategy do you envision? E.g., on which levels will testing take place? Consider that you could choose unit, component, integration, system, or acceptance testing.

Justify your strategy, and also set goals where relevant. E.g., percentage code coverage for the relevant unit tests. For each of the planned tests, indicate what will be automated and what not.

Also think of quality testing setups like, e.g., Sonarqube.
>>

1.6.

4.2 Test environment and required resources

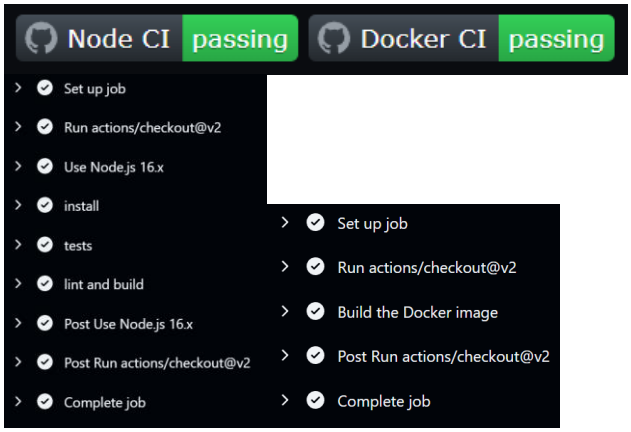
Step 1 Code Linter
Run a code linter for code consistency. Consistent indentation, accessibility and other standards are checked with a Git pre-commit hook to make code more readable and prevent bugs.

Step 2 Testing
The tests of the frontend and backend are automatically run to make sure everything still works after updating the dependencies, refactoring, bug fixes or introducing a new feature.

Step 3 Building the projects
Make sure the project still builds properly and can run.

Step 4 Deploying Project
deployed on a staging server to manually review the project if needed.

Step 5 Migration
Perform migration on the production database.



4.3 Configuration management

<< Describe the project approach with respect to version management (e.g. your GIT repository). This might include things like tooling, branching strategy, promotion-, release- and baseline strategy.

Also, when relevant, think of a mechanism to deal with change requests and problem reports.>>

5. Finances and risk

5.1 Project budget

For now there is no budget required but maybe we need funding for the energy information API and deployment in the cloud.

5.2 Risk and mitigation

1.7.

Risk	Prevention activities	Mitigation activities
1 Sickness	-	Good planning, so you can work from home.
2 Teacher is absent	-	Plan a meeting on another day and use your time productively for something else.
3 Technical problems (f.e. laptop breaks down).	Be careful with your items	Borrow ISSD items. Work from home environment.