



## Fisheye on Blockchain

To what extent can the challenges in the current fish supply chain be mitigated by using blockchain?

Written by

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## Revision History

Date	Version	Description	Author
27.01.2022	1.0	Added the Gantt diagram, timesheet, risk assessment table, and meeting notes.	Arsenii Dmitriev, Karl Gjølshjøl, Adrian Eidsnes Phillips.
25.02.2022	2.0	Renewed the timesheet, proper Gantt was added, and more risks were added.	Arsenii Dmitriev, Karl Gjølshjøl, Adrian Eidsnes Phillips.
20.05.2022	3.0	Edited according to the received feedback	Arsenii Dmitriev, Karl Gjølshjøl, Adrian Eidsnes Phillips.

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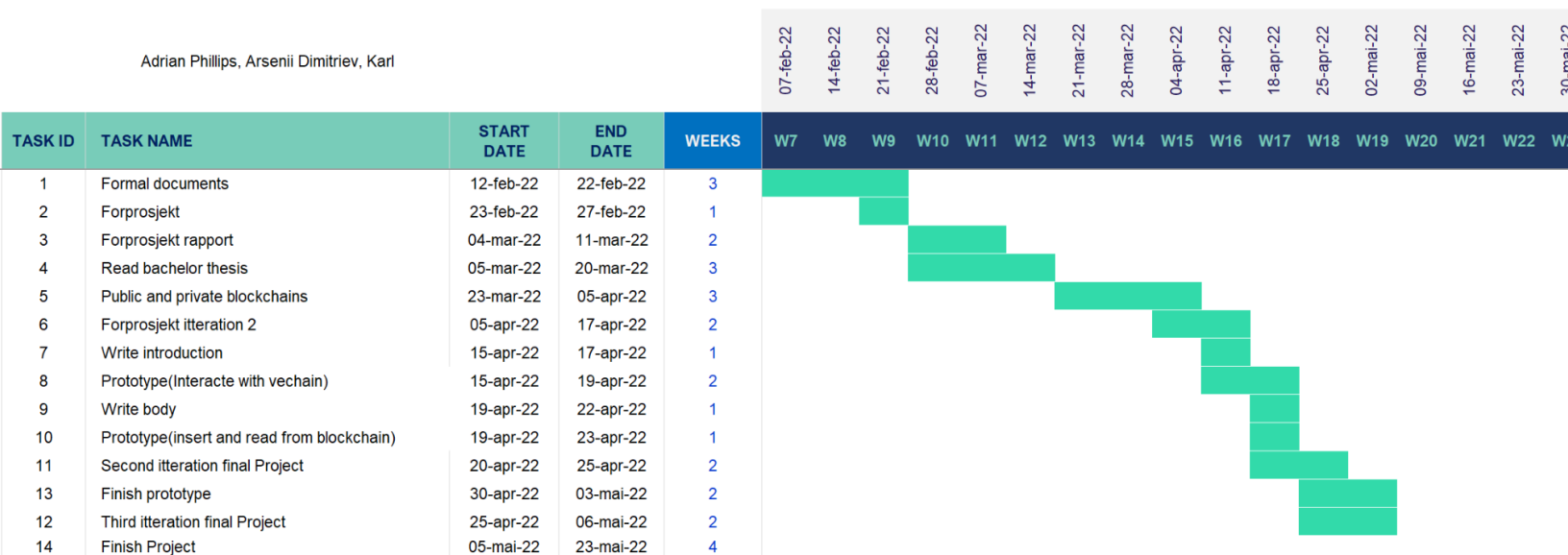
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## Goal

The current goal of the bachelor's project will be to do extensive research on the topics of the supply chain on the blockchain. The study will be the foundation for Ørn technologies developments in blockchain. Combined with the investigation, we hope to deliver a prototype with the essential functionality.

## Gantt diagram

Adrian Phillips, Arsenii Dimitriev, Karl



## Risk analysis

Risks	Cause	Probability	Consequences	Risk evaluation	Mitigation
Project risks					
1. Inefficient teamwork	Poor communication, unfair workload, conflicts,	1	4	4	Every opinion is considered and discussed. The workload is distributed in the presence of everyone. Consistent communication. Team socializing activities.
2. Infection spread restrictions	The spread of the virus.	3	3	6	Wear facemasks, sanitize hands, and use as many shared technologies as possible.
3. Poor communication with the company representative and the University advisor.	The inflexibility of the team members.	1	6	6	Our team has established weekly meetings with Tom Hendrik to keep both parties updated. We also try to agree on discussions with the University supervisor in advance.
4. Wrongly defined problem	Not enough research and minimal resources were spent defining the scope	2	5	10	Discuss project-related aspects, investigate and share information among the team members. Communicate to project

	of the problem.				coordinators.
5. Lack of collaboration	Poor communication, different perspectives of group members, and inefficient time management.	2	7	14	Our team tries to work together as much as possible to make sure the needed assistance is present. We also attempt to work efficiently: 45 minutes and 5-10 minutes break for 3-4 hours total.
6. Inefficient writing/use of language	Poor English, a lack of experience writing academic papers.	3	3	9	Review each other's texts. Read other theses in English.
7. Lack of understanding	Not understanding complex terms and concepts in the blockchain field	2	6	12	Learn the concepts properly
8. Reduced working capacity	The constrained geopolitical situation, health problems	1	6	6	Schedule the upcoming work and leave buffers to mitigate unexpected events that might hinder our progress.
Product risks					
8. Fees for the operation of a blockchain increase	Blockchain transaction fees increase/the increase of the exchange rate of a cryptocurrency	4	1	4	Decrease the rate of transactions, and parse as little data as possible (hash) to the blockchain. Be ready to convert to another blockchain (flexibility).

9. Breach of confidentiality	Sensitive data ends up on a Blockchain.	1	1	1	The data to be sent to the blockchain is sanitized and filtered in advance.
10. Unfriendly user dialogue	Inadequate approach for customer attraction.	2	6	12	Competent staff will be hired for promotion purposes.

12th of April, we have added two new risks.

1. #6 has been added after getting a review of our text.
2. #7 has been added, as we have experienced that the field is hard to understand.
3. #8 has been added as we have experienced a political situation in Europe affecting the team.





## Meeting reports

### Meeting 1.

The first meeting took place on 17.01.2022 at 12:30. Arsenii Dmitriev, Karl Kristen Gjølshjøl, and Adrian Eidsnes Phillips were present, as well as the University supervisor, Lars-Petter Helland, and Ørn Software representative Tom Henrik Aadland.

#### Contents

- Ørn Software's expectations on this project.
- What technologies the company uses nowadays.
- What kind of transition the company wants to perform.
- Ownership of the final report and the source code.
- Establishment of weekly meetings each Monday with the company's representative.
- Tools we may use for communication and development and version control.
- The standards our team should stick to.
- Problem definition.
- Legal security aspects.

### Meeting 2.

The second meeting took place on 21.01.2022 at 14:00 Arsenii Dmitriev, Karl Kristen Gjølshjøl, and Adrian Eidsnes Phillips were present and the University supervisor Lars-Petter Helland.

## Contents

- Advice on the contract between us and Ørn technologies
- Guidance on how we can get started
- Planned new meeting
- Discussed the guidance plan
- Private vs. public blockchain
- Distributed file system vs. centralized

## Meeting 3.

The third status meeting took place on 24.01.2022 at 15:00 Arsenii Dmitriev, Karl Kristen Gjølshjøl, and Adrian Eidsnes Phillips were present on-air with Tom Hendrik, discussing the project and the upcoming work.

## Contents

- The data we receive and process in the future.
- The data flow.
- Public vs. Private Blockchain.
- The process of receiving/gathering data (it comes from several sources).
- The money we may spend on the project.
- Copyright issue.
- Not a fixed frequency. TH estimated the data upload frequency needed for one fish/batch.
- Possible similar projects - ATEA, IBM
- Costs

## Meeting 4.

Status meeting on 31.01.2022 at 15:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Tom Hendrik.

### Contents

- Copyright agreements can't be applied to us. Thus we should get copyright templates by ourselves.
- The application of blockchain technology in the production of other goods - the process doesn't differ much: data gets into blockchain among various production stages and is retrieved on-demand, keeping track of the entire production/transportation cycle of a particular good.
- We decided to create a communication chat for brief questions on Discord.
- Tom Henrik doesn't know if he will come to Bergen in February :(
- A presentation from ATEA/IBM addressing the possible use of blockchain
  - Why Ørn Software works with food production companies - food production is a huge sector of the economy that correlates to ecology (sustainable food production, food waste) and technology (to mitigate the externalities).
  - Private and Public blockchain -
  - Fish production supply chain/fish lifespan - caviar and genetics, production, transportation, batching, distribution, sell
  - Tom Henrik shared a data flow in a fish-producing company.
  - Problem formulation - the targeted company, wants a secure and transparent way to operate data.
  - A documentary we should watch that would help us get familiar with the ecological side of food production. Seaspiracy, Unit 731 and racing extinction.
  - Wrong labeled food/items. Either by failure or by cheating.
  - Can we reduce the amount of wasted food?

## Meeting 5.

The status meeting took place on 01.02.2022 at 13:20 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Lars-Petter.

Before the next meeting, we agreed that the problem must be defined and discussed precisely.

## Contents

- We discussed the contract between Ørn Software and us and decided to use NTNU's template for copyright agreements.
- Furthermore, we received past bachelor's and master's theses on the relevant theme we may refer to. Thus, we are going to go through them and extract useful information.
- The lack of information from the Ørn Software company may make us push more to acquire the answers we need for a proper analysis. Otherwise, we will try to reach out to the fish farms.
- We discussed the project handbook: what we should elaborate on further
  - Meeting reports must be more detailed.
  - The progress plan needs to be more descriptive for deeper analysis.
    - More details such as iterations - we should break the upcoming work into milestones and keep their progress.
- Risk analysis feedback
  - Should be considered in regards to the main goal of the project
  - The project is more about finding out/giving advice
  - Fees and sensitive data may not be a huge risk
- What do we want to find out during the meetings?
  - Questions that arise during the work
  - Agreements we negotiate. Include more of what the different parts commit (forplikter) to do.
- Time list - Gantt diagram
  - Include tags/task
- Vision document
  - Interessenter (interested parties) is more all the parties that will be affected directly or indirectly.
  - The target audience
  - Tests
  - Requirements
  - Who will use the product within the industry
  - How many roles are involved?
  - User environment
    - Office work or out in the field

- After the introduction in the vision document, we should specify the project's essence
- We are to define the problem precisely for the next meeting with Ørn Software
- Data requirements
  - Data should be legit
  - Importance of finding validating data before trusting it
  - Sensitive data, updates, formatting, and more information, in general, should be present
  - Maybe contact the industry directly for data gathering
- ATEA presentation on food production is discussed.
- The vision document is to be elaborated as our perspective is rather limited now.
- Blockchain programming languages were discussed (Solidity, Plutus).
- Use of test nets rather than the main net of the blockchain.

#### Specific smaller tasks

Lars Petter shall send us a master thesis from HVL.

We are to find the NTNU contract template.

#### Meeting 6.

The status meeting took place on 11.02.2022 at 15:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Tom Henrik.

#### Contents

- Public vs. Private blockchains: we discussed the advantages of the public blockchain and possible cheating in private blockchains. For E.g., the nodes that proceed to a consensus might be corrupted, and the source code is closed.
- VeChain is a decent option to go with: distinctions with other options were discussed, and some essential VeChain properties were highlighted: e.g., transaction fees are adjusted, and the price stays approximately the same; this blockchain is designed specifically for businesses; it supports IoT and thus might be greatly integrated into an API

- We will be signing the contract on Monday.
- We discussed the possibility of getting the data samples and possible attributes - fish rates, food, mortality rates (and causes), cheating, supply chain milestones, “CV” of a fish. Generally, it’s up to us to define the information being saved. Furthermore, there is a chance to send our questions directly to the target customers (fish farms).
- They have data from fish farms currently stored on their systems. The amount of fish in the cage, daily feeding amount, mortality, fish lice.
- Dilemmas regarding registration and identifying individual fish. Some farms might use fish tags but to an unknown extent.
- Briefed the current problem statement.

#### Tasks for the group

- We are to investigate the fish production process to examine a possible flow of data and define a most-likely scenario.

#### Tasks for TH

- He needs approval from Ørn Software for the contracts he made
- TH will check out fish registration details. Chips and so on.

#### Meeting 7.

The status meeting took place on 14.02.2022 at 15:00 with Arsenii Dmitriev, Karl Kristen Gjølshjø, Adrian Eidsnes Phillips, and Tom Henrik.

#### Contents

- The contract is being set up.
- Status meetings are rescheduled for Fridays at 12:30.
- The data sample will be most likely extracted from Ørn Software’s databases and presented to us later.

## Meeting 8

The status meeting took place on 14.02.2022 at 15:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Tom Henrik.

**Meeting form:** Teams

**Duration:** 15 minutes 30 minutes.

### Contents

- Still waiting for the legal office to prepare the contract.
- TH has covid and hasn't done much work.
- Still waiting for data.
- Next meeting Monday 28th of February.
- Week 8 TH will have a winter vacation.

## Meeting 9

The status meeting took place on 14.02.2022 at 15:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Tom Henrik.

**Meeting form:** Teams

**Duration:** 30 minutes.

### Contents

- Explaining the status of the project. Regarding research. Public vs. private blockchains, Vechain, etc.
- Talked shortly about how the team is doing in terms of collaboration.
- Not much has been written in the report yet. We should start if we want better feedback.
- Developing a method isn't that important for our project since the project is more about research. Thus, we spend significantly more time researching and writing the report rather than coding.
- We could look into research methods since they are more relevant for our project.
  - Thinking about the test phase?
  - Blockchain-specific research method?

- How to weigh standard weighing? Choose/prioritize subject.
  - LP asked Carsten about the project, but Carsten responded that it is a bit too early for a bachelor's.
- The master's students focused on the security aspects. Is it possible/feasible to make the application updateable
- Next Meeting: 2-nd of March.

**For the next meeting:**

- Not discussed. Send LP the project title, problem statement, and possibly the current project report.

## Meeting 10

The status meeting took place on 28.02.2022 at 15:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Tom Henrik.

**Meeting form:** Teams

**Duration:** 20 minutes.

### Contents

- Status on our project briefly. The group hasn't been able to do much. Partially because of document writing.
- The only thing left with the contract is changing the template and replacing some content. E.a. replace NTNU with HVL. The group agreed to find out (ask LP) whether or not it is sufficient.
- TH would like to receive the documents we are working on to keep track of our project. The group said they could ask LP about details.

## Meeting 11

The status meeting took place 02.03.2022 at 13:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Lars-Petter Helland.

**Meeting form:** Zoom



**Duration:** 50 minutes.

## Contents

- The meeting will mainly revolve around recent assignments as well as the overall status of the project.
- Pre-project report
  - Wrong template-should have used the official one from Canvas.
  - The quality of the language isn't sufficient. Spelling flaws and subjective /objective forms are used inconsistently.
  - The language should be formulated in a short and precise manner.
  - Too many technical and unnecessary advanced words/terms. E.g., skimming, cheating, leaking.
  - Not a sufficient report. Since the submission date for the next version is the 11th of March, the project group will deliver an updated version by then.
  - The summary should be about the project and not about the report.
  - The Background chapter should be more generalized. Maybe make a story around the problem to make our project more appealing to the reader. It shouldn't contain technical details. The background needs to be better explained.
  - The technical details and other information that should be explained in later chapters are overwhelming for a reader in these early chapters.
  - In the 2nd chapter, information is repeated from the previous chapter.
  - The scale of the project:
    - "Scale of the project" may be announced when we explain the research/development method and not just the (irrelevant) system development method.
  - Look into literature and existing solutions.
- Chapter 3:
  - The evaluation plan is missing.
  - Chapter 4.2, test methods need to be discussed with the industry/Ørn.
  - Evaluation should be about how well our solution meets the needs of the problem statement.
- Still should request data from Tom Henrik. Data from one part of the supply chain is better than no data.
- The project is behind schedule. Contacts should be established earlier.
  - Contact with "Det Norske Veritas" is requested but not established
  - Push for contact with others.

- GANTT
  - The view is too narrow. It should fit into a page for an overview.
  - Does not need to be as detailed. The milestone might be shown after sprints.
  - It is not necessary to use the GANTT diagram as long as the milestones are present in a useful plan.
- Requirements document
  - The submitted document doesn't provide anything useful.
  - Discuss if there is an alternative way to describe API
  - The domain model is wrong. The model is about the real world, which the underlying technology uses as a reference.
- The upcoming presentation (14.-20. march) is briefly discussed.

## Meeting 12

The status meeting took place on 02.03.2022 at 13:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Tom Henrik.

**Meeting form:** Zoom

**Duration:** 50 minutes.

### Contents

- Signed by the professor and supervisor.
- HVL created a template.
- A digital signature is possible.
- Stick to having little information available.
- The end customer might help us define the desired type of information.
- Can all the different parts of the supply chain provide the needed information?
- LP thought it was too much. The scope should be narrowed to something more concrete.
- Minimal viable products include all parts of the product. A mock product of blockchain, for example.
- Six weeks implementation period is recommended.
- Weekly SCRUM sprints may be the most effective.

- TH can be an evaluator.
- Background enough next week
- Proof of concept
- Test period in normal circumstances

## Meeting 13

The status meeting took place on 17.03.2022 at 13:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Lars-Petter Helland.

**Meeting form:** Zoom

**Duration:** 70 minutes.

### Contents

- In Lars's opinion, the project presentation was great.
- We were informed that we are getting close to the indeed problem.
- The final report thoughts:
  - The grammar we use must be fixed and reviewed.
  - Some segments of the text might be copied.
  - The reference list must be stylized and formed according to the requested format.
  - The client must be specified on the front page.
  - Stealing, thieving, frauds - these terms must be clearly defined in the text.
  - The fishing boat industry. What is a fishing vessel? "The new perspective on handling data" - what does it mean, should be expanded.
  - Allocated to servers.
  - We should refer to the specified properties more often.
  - Some claims are not supported by arguments.
  - Motivation is not the team's motivation. But rather the reason why Ørn Software is interested in this project.
  - 2.3 is poorly written and is unclear. It should be linked to the project. Blockchain as a Service (BaaS) must include a reference.
  - Perspective solution -> Prospective solution (the one that has potential).
  - The fish industry necessitates - what does it mean? It doesn't fit the context.
  - We should be more critical and bring negative sides as well.
- Project description

- The blockchain description is not precise. We should try presenting another way.
  - “Concept was described in 1991” as plagiarism.
  - Principle - what does it mean.
  - Use a dictionary to utilize words efficiently.
  - Computers that prove authenticity and mine cryptocurrency don’t belong to a blockchain.
  - We should specify which blockchain type/technique is used.
  - We should use more synonyms for the words “Authenticate” and “Validate.”
  - We should also consider decentralized databases.
  - Attacks can be different.
  - One type of attack that can affect a blockchain: is making 51% of the Nodes (inject nodes) corrupt an agreement and fail the authentication.
  - The word Tamper is unclear.
  - The validation of a transaction is called pow. It produces a hash that is resource-demanding to accomplish.
  - The nonce that is described in the report is not replaced.
  - PoW security issues.
  - Ethereum must be mentioned as a reference blockchain.
  - Public or private blockchains. Use other words for these terms to avoid tautology.
  - Validate it. The smart contract makes the poll redundant.
  - Verify or Validation - misuse of these words.
  - A smart contract may be duplicated on private blockchains - how?
  - We should describe the new opportunities blockchain allows.
  - We must look at the real data samples and think of a way we may verify them.
  - Oracle - chainlink that verifies data before it enters a blockchain.
  - If automated sensors are used in fish farms, it makes it difficult to corrupt data.
  - Python or Javascript compiled along with solidity. Solidity code doesn’t run twice
  - We should cover some information on everything that relates to blockchains. E.g., bitcoin, Vechain, etc.
  - 3.1.1 Related documents/Previous work should refer to other documents/projects that correlate to our project.
  - Initial claim. The project description is not concrete enough.
- Resources

- The fish industry
- 3.4. It Is good. More examples would be recommended.
- Chapter 4
  - Vechain should be described in a better way.
  - A research project is intended to be more general. Not much should be written in the development method part. The research methodology must be expanded.
  - Gantt diagram should be reformatted to show weeks only.
  - The risk list must be populated with: the risk of the product getting canceled in the future, the risk of inefficient writing/use of language, and the risk of a lack of understanding
  - The problem statement must be more concrete.
    - Say more on the way similar solutions work nowadays.
    - How can we know if the data we proceed with is true?
    - Replace the gasket later
    - If the solution is not confidential, address the requirements.

## Meeting 14

The status meeting took place on 29.03.2022 at 13:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Espen Strand Pedersen, a Norway-in-a-Box and Reveel general leader.

**Meeting form:** Teams

**Duration:** 40 minutes.

### Contents

- Collaboration with Vechain, China, since 2018.
  - NiBChain is based on VeChain. The company still operates Vechain.
    - Although, NiBChain doesn't depend on Vechain.
  - Reasons why Vechain: the entire network and offices are in China.
  - Some technical aspects:
    - NiBChain is a product Norway-in-a-Box sells.
    - For thousands of customers in China, the goods are sold at higher prices because the customers choose confidentiality

- The largest market is targeted abroad because people are less insecure there.
- The customers are concerned mostly about the origin of a product as well as the data integrity.
- The product distributors are interested in such information to an extent.
- In the beginning, the largest producers didn't take blockchain seriously.
- But they focus on the result.
- RFID systems, temperature gauges, efficient statistics, etc., work in theory. But a lot of things are going on in real life.
- It is useful to distribute responsibilities somewhere in the supply chain.
- Large players have their procedures.
- Lots of travel and blockchain convictions. But in fact, very little user-case and lots of bragging.
- There are costly joints, large margins, and costly transaction joints.
- DNV GL Italia, Sebastian.
  - The only Norwegian producer that uses Mystory as a label.
  - ATEA, IBM.
- The development is very expensive as well as it is hard to find suitable people.
- Cons:
  - Development is hard
  - Transaction rates and fees
  - Architecture design
  - A lot of outsourcing and a small team in Stavanger
  - Most of the team is in Ukraine and East-Europe
- It should be possible to contact Chinese VeChain representatives directly.

## Meeting 15

The status meeting took place on 31.03.2022 at 12:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Lars-Petter Helland.

**Meeting form:** Zoom

**Duration:** 40 minutes.

## Contents

- Norway in a box meeting discussion.
- Simulation of the test should be possible.
- XRP to get an address, we also tested the number of tokens one transaction takes.
- We received a supply chain management thesis that may help us.
- The upcoming work should be planned thoroughly.
- An Agile method must be implemented when it comes to the respective development.
- The goals of the project must be set up realistically. Better if it is split into milestones.
- We should decide whether we stick to smart contracts or not.
- Delegated proof of stake to those who invested in this.
- Performance/permission/open.
- It is fine to write too much, so we should not be afraid of having too much information since it will get checked by Lars afterward.

## Meeting 16

The status meeting took place on 31.03.2022 at 12:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Tom Henrik.

**Meeting form:** Teams

**Duration:** 25 minutes

## Contents

- Signed the contract
- All sorts of transportation offer freezers. Thus, we have to take this into consideration.
- A master thesis distinguishes between A and B. An A can be published.
- Next meeting tasks:
  - Design architecture.

## Meeting 17

The status meeting took place on 08.04.2022 at 13:00 with Arsenii Dmitriev, Karl Kristen Gjølsjø, Adrian Eidsnes Phillips, and Tom Henrik.

### Contents

- Problem statement
  - TH likes the second one more (To what extent the challenges in the current fish supply chain be mitigated by using blockchain?), but it needs to be elaborated. Some aspects must be specified: e.g., food safety, inefficient supply chain, problems to be solved, Food safety of ineffective supply chain may be resolved by using blockchain.
  - The word “Challenges” must be substituted with some real-life problems.
- ER diagram
  - Fish\_id -> batch\_id or fishGroup\_id (Entities should be renamed to reflect the reality)
  - The data sample is in the General channel.
  - We don't need to care about the way fish transfers on a fish farm. There will be a service that filters data and etc. We only receive data and push it onto a blockchain.
  - The information varies at different steps during the transportation, so ER diagram is not precise and can't be precise. Probably, it should be renamed to production and involve transportation, processing, distribution, and sale.
  - We need to think of the way we may “add” data to fish\_id/fishGroup\_id when there's a new step in the logistics process
- Architecture diagram
  - Needs to be elaborated. But looks like a good start.
- Other topics
  - Data will be coming from different sources, and we need to think of a way the verify that the data is coming from a known party. Thus, we need to make sure nobody else is pushing data to our service. It's important generally but probably a bit off the scope of our investigation. I propose to implement a Kerberos-like system with public/private keys to verify the involved parties and make it robust and efficient.



## Meeting 18

The meeting took place on 22.04.2022 at 11:00 with Karl Kristen Gjølshj, Adrian Eidsnes Phillips, and Lars-Petter Helland.

**Meeting form:** Zoom

**Duration:** 20 minutes

### Contents

- Problem formulation
  - Looks good for our project since the requirements are not that high.
  - We should do research mostly.
  - But on the other hand, a product is expected.
  - Prototype:
    - Instead of asking “how?” we should question the way concrete blockchain solutions change the game.
    - Bachelor's requirements are the main goal.
    - The title must be so that it's easy to understand and brief/sharp.
- Which task (technical or theoretical) task would Lars-Petter have chosen for himself?
- The actions we take to tackle the problem help achieve the best result. Sketching a prototype. It is the basis for the later work. Moreover, we learn while attempting and sketching.
- Validity: to what extent our work answers the initial questions?

## Meeting 19

The meeting took place on 14.03.2022 at 12:30 with Karl Kristen Gjølshj, Adrian Eidsnes Phillips, and Tom Henrik.

**Meeting form:** Teams

**Duration:** 15 minutes

### Contents

- Discussed the cv
- Architecture looks fine
- Full focus on prototype

## Meeting 20

The meeting took place on 29.03.2022 at 15:00 with Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Tom Henrik.

### Contents

- Meeting canceled by TH.

## Meeting 21

The meeting took place on 14.03.2022 at 12:30 with Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Lars-Petter.

**Meeting form:** Teams

**Duration:** 15 minutes

### Contents

- Are we submitting the project handbook
  -
- handbook
  - GANTT diagram - nyttig.
  - Vise prototype ørn software. Til ørn. Bør presentere til ørn. Enten rapporten i seg selv, men gjerne en presentasjon av resultater / prototype.
  - Prototype viser kvalitet /gyldighet på arbeidet.
  - Risikoanalyse.Mye farger. Noe rare farger.
  - Jobbet for lite på prosjektet. For få timer totalt.
  - Justere timene. Betyr timetall noe for sensuren. De har ikke noe å si noe på antall timer i prosjektet nr det kommer til evaluering.
  - Må kunne demonstrere, API'et. Må gjøre det.
  - Teste det å hente data underveis når vi lager API. Hvordan teste API'et.
  - Klientprogrammer for API request. Postman. CURL. kommandolinjeverktøy.
  - Testing av api bør brukes. Et API.
  - Verktøy for API dokumentasjon.
  - Batch endpoint?.
  - Database- Transaksjonsid.

- Kan vi ikke bare spørre vechain om å få alle transaksjoner på en fisk.
- Er database nødvendig? Sentralisert løsning.
- Er datene i database ikke endret på? Privat informasjon, kryptere dataene på blokkjeden, hashed? Hvis det er dyrt å lagre.
- Smart kontrakter? Kan finne IDer der.
- Må begrunne veldig godt. Alternativ vil ikke fungere på grunn av .....
- 
- Rapport
  - Skulle egt lever visjonsdokument.
  - Skal leveres visjonsdokument. Kravspesifikasjoner og systemspesifikasjon.
  - Kravspesifikasjon er viktig.
  - Kapittelnummer på forord er uvanlig.
  - Språk.
    - Stor og små bostaver på blockchain.
    - Ørn software stor og liten s
  - The way TH described the project. It's not a quote.
  - "Proceeding" - feil ord.
  - "Innovative" er litt for skrytete/personlig.
  - "Frauds" plural. "Stealing fish companies." The sentence is not complete.
  - "Resource stealing" what resource?
  - "Tunnels", "facts", "allocated to servers", what does all of this really mean? Is the data "stored" there?
  - "The demand basis" -> "a demand basis"
  - "On the other" compared to what. Maybe write "one possible ..."
  - The language needs to be fixed.
  - "Attitude", "characterized" -> what people think. Explain more the relevance and the reference.
  - "The innovative approach" is still too early to talk about.
  - "Relevance"
  - Vi omtaler litt for klart at dette skal oppgaven handle om.
  - Gå litt mere gradvis. Kan være aktuell, aktuelle egenskaper.
  - "Resulting in increased revenue and increased market share" mangler referanse. Vær nøye med beskrive
  - "To use a new popular technology" - "new solutions ..."
  - "The final variant of the report" rather use "outcome"/"results"
  - "Project owner" før "context", mulig?. In i konteksten med problemstilling.

- Sitat kan være både på norsk og engelsk, men bør innledes bedre.
- “There are” to “Their”, “they” to ørn
- Skrifttype/linjeavstand forskjellig.
- IEEE refereringen er fin. Litt større dokumenter kunne sidetall osv inkluderes i referansen.
- “Aquaculture”, “Fishindustry” what do they mean.
- 2.4 problem description
  - Forskningsspørsmål
  - Underspørsmål?
  - Når man kommer til slutten av rapporten, bør jobben være gjort grundig slik at konklusjonen er troverdig.
- “Blockchain” -”blockchain” “blockchain technologies” vær konsekvent
- “Ensuring quality” what quality?
- Begrunn godt hvorfor data og kilder fra utlandet er relevant.
- Forklar at kilden til data fremdeles kan legge inn falsk data.
- Ha gjerne med gode data i IOT.
- Må nummere bilder.
- “The team’s” -> “The project”
- “marine life” ->
- Snevre det inn .
- Goal
  - “To achieve the goal” ...
  - Evaluere.
  - Metodisk fremgangsmåte.
- Oppbygging av rapport skrive hva alle kapitell inneholder. En paragraf og hvert kapitell.
- Ny side for hovedkapittler
- The practical background contains general blockchain technology. It should be in its own chapter.
- Theory chapter.
  - Litt mye - distribute attack to different chapters
  - Kanskje andre ting som burde være med.
  - Angrep
    - Er det relevant å ha med så mye.
    - Mange av angrepene handler om mye av det samme.
  - Det som er bra å skrive er hvilke egenskaper til blokkjeder er nyttig iforhold til oppgaven.

- Egenskaper ift. Sentralisert database løsning.
- Smart kontrakter. hvor data er lagret. Skriv mer om.
- Referanser i historiedelen.
- What is decentralized
- The authenticity of transactions is not done by the blockchain. They validate them.
- “Calculated the consensus algorithm.” What does that mean? It bitcoin the longest chain rules.
- More references
- Temper-proof. Means temperament.
- Difference between nodes and addresses.
- “Miners propose ..” Minere samler transaksjoner, blokker og hasjer.
- “The validation og transaction is called PoW” is wrong.
- Verification/validation.
- Nonce sentence rewrite
- Mining funksjonen.
- “Zeros if front of random” is used to explain but not actually used
- “Proof of Stake”
- Blockchain 2.0, a valid term?
- “Every node has its own blockchain”
- Angrep
  - “If a single hash function..50%” wrongly said
  - You don’t verify transactions. You sign them.
- Kildene.
- “Selecting a robust blockchain is not an easy task”. Stemmer ikke.
- “Smart contract is created and transmitted”. Explain smart contracts first. You dont vote on the validation. They vote about.
- Fort blanding av tema.
- Være mere strukturert.
- Ethereum, bitcoin , vechain. Få frem disse variantene.
- “The source code of a private blockchain is closed“ is wrong.
- “Bitcoin is the most expensive” The market cap.
  - “Reletad project”. Nevn flere ikke bare ett. har nevnt several other companies.
- Initial claim. Kommer kanskje for seint
  - “The project is scaled down to focus on the research.” explained in another place. Shouldnt be here.

- Time
  - Resource
  - Maybe to much
- “Fiant money” , should rather use real money.
- “In a nutshell we ...” delete sentence
- Litterature var god,
- Inkluder også bachelor fra molde.
- Proof of stake
- Beskrive alternative i forhold til problemstilling.
- Nodepriser er kanskje ikke så aktuellt for prosjektet, men kan være det
- “Vechain transparency” ikke godt forklart
- “size ,team testing” not valid resouns to choose one over another. Gjør valg utifra det som er omtalt tidligere.
- Git osv. Kanskje ikke nødvendig å gå inn på.
- Forskningsmetodikk. -hvordan få informasjon- hvordan evaluere- hvordan komme frem til et troverdig resultat.
  - Design and Creation. Lager noe for å utforske noe
  - Litteratur analyse
  - Design science- google it
- LP skal tenke på om risiko og gantt plan skal med.
- Api overskirt, ikke arkitektur.
- Er modell ikke fullstendig? Finne en bedre løsning enn å ha database.
- Resultat
  - Handler om hvordan
- Post/http metode.
- Arbeid igjen på rapporten, lage ferdig et fungerende api.
- Støttedokumenter er indirekte en del av evalueringen. Møterapport er ikke så nødvendig.
- Krav er forskningsspørsmål.
- Konsentreer oss

## Meeting 23

The status meeting took place on 13.05.2022 at 14:30 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Lars-Petter.

**Meeting form:** zoom

**Duration:** 2 hours

## Contents

- Tittelsside
  - LP snakket med professor fra Molde. Påtrykk fra fiskeindustrien der.
  - Gå over styling. Linjeavstand.
    - Stylling på font og skrifttype kan velges.
  - “This data”
  - “Fraud”, “theft” istedenfor false vaccinating, faking.
  - The use of “Prove” is ambitious.
- “Being able to have more data about the fish and” . Kanskje mere nøyaktig er riktigere.
- “Cheating during the production” er et tungt avsnitt.
  - Holde seg til domene. Er fiskebåter med eller ikke.
  - “Although”
  - “Attitude” hva som menes. “People tend to think.”
  - Henvis nøyere. Altså henvis til det kilden faktisk viser.
  - Før problem description. Fortell, kontekst,. Norsk fiskeindustri selger til utlandet. I “utlandet” stoler de mindre på informasjon.
  - Vent med forskningsspørsmålet kanskje. Få det tydeligere frem. Siden den er generell. Spesifiser de spesifikke tingene. Diskusjon først.
  - I goal henvis til forskningsmetodikk. LP synes bi-tingene kommer litt for mye frem.
    - Begrunn metodikk.
  - Oppbygging av rapport
    - Hver konkret til artikkelnummer. Slik at lesere enkelt kan finne frem til det som er interessant.
  - Theoretical background.
    - Egenskaper, fordeler, transparans, teknisk
    - Ta med vechain ethereum der?
  - Fordeler og ulemper i kapitell 4.
  - Diskusjon, evaluering.
  - Tittel navn. Hver mer spesifikk, ikke nødvendigvis bruk malen.
    - Egen kapittel blokkjede supply chain kapittel?
      - What is blockchain
  - Practical background

- Initial requirements. Ikke Initial claim.
  - Kanskje ikke ta med i det hele tatt.
  - Nytt navn eller ta det med et annet sted. Et kapitell om ørn software.
  - Siste avsnitt om verktøy. Passer bedre et annet sted.
- Løsningside. Hvis arktitektur også der.
- Limitations- ta opp research spørsmål. Repeter det.
- Design av kapitell. Finne en god løsning.
  - Diskusjon og valg av god løsning.
  - Fokuser utifra kravene.
- Alternativene. Er for overfladisk. Den store diskusjonen handler mer om blokkjedet valge.
  - Hvordan denne kan brukes på best måte.
  - Diskuter løsningene hver for seg. Smart contract vs without. Blockchain 1 vs 2. Database with and without. Distributed storage solution vs sentral.
- Project method, move to goal?
  - Git og Postman har med utviklingsmetode ikke forskningsspørsmål.
- Prosjektplan og riskovurderingene ligger i vedleggene. Trengs kanskje ikke å tas med.
- Løsningsdetaljer for prototype. API.
  - Ta med nettverkstrafikk. Ta med god innledning.
  - Proof of concept. Mere riktig begrep.
- Ta med API i initielle krav.
  - Ta med klienter.
  - Begrunn hvorfor bare API. Hvorfor bare lage det? Funker for mennesker, automatiske ting.
- Hvor er walleten lagret.
- API
  - Ta bort hardkode
  - Sier ikke så mye om valgene som er tatt. Repeter gjerne eller ihvertfall referer.
- Resultater
  - APIet virker.
- Evaluering
  - Tilbake til forskningsspørsmålet. Svar på det.
  - Metode. Hvordan evaulere.
- Discussion
  - Diskusjon om prosjektet



- Se utenifra. Se på det man har forsket på, men også prosjektgjennomføringen. Hvor gyldig er svarene.
- Conclusion
  - Very brief.
- Så lenge det ikke er visjonsdokument ikke så nøye.
- Få bedre samkjøring fra visjonsdokument inn i rapporten.
- Ikke funksjonelle krav. Ta med visjonsdokument.
  - Funksjonelle dokument. Konkrete krav fra bruker.
- System documentation
  - Important, but could also be explained in the main document.
  - Project structure
- Project Handbook

## Meeting 24

The status meeting took place on 20.05.2022 at 15:00 with Arsenii Dmitriev, Karl Kristen Gjølshjøl, Adrian Eidsnes Phillips, and Tom Henrik.

**Meeting form:** teams

**Duration:** 25 minutes

### Contents

- Presisere at i Norge så er det uvanlig at fiskeoppdretterne ikke jukser. Strengt regulert og overvåket.
- "Ekstra" sikkerhet for kunden
- I stedet for navnet på bedriften. Bruk et fake navn. Mock navn. Site name. Gps koordinater.

## Time Sheet

	Arsenii (Tasks)	Hr	Karl (Tasks)	Hr	Adrian (Tasks)	Hr
Week 2	Discussed and got ready for the upcoming meeting with other group members. Gantt tasks: reading on solidity, investigating blockchain, working on the documents.	2,0	Discussed the upcoming meeting with other group members and participated in writing the weekly meeting report. Lectures. Gantt tasks: reading on solidity, investigating blockchain, working on the documents.	6,0	Could not attend	0,0
Week 3	Attended meetings, created online documents and means of communication, and participated in writing the weekly meeting report and lectures. Contributed to discussing the project. Gantt tasks: reading on solidity, investigating blockchain, working on the documents.	23,0	17.01 attended meeting(2h), 18.01 document writing and setup(2h), 19.1 planning meeting with Tom Henrik and Lars-Petter + theoretical discussion (3h), 20.1 lecture(2h) Gantt tasks: reading on solidity, investigating blockchain, working on the documents.	22,0	The attended meeting, responsible for booking rooms. Discussed upcoming meeting with the other members. Contributed to writing the weekly meeting. A planned meeting with teacher and Ørn technologies. Discussed what technologies we can use and how we should proceed. Gantt tasks: reading on solidity, investigating blockchain, working on the documents.	17,0
Week 4	Meeting with the company's representative, working on the project, lectures, cooperative work. Gantt tasks: reading on solidity, investigating blockchain, working on the documents.	16,0	24.1 Meeting with Tom-Henrik(3h), 25.1 problems defining 1(hour) Gantt tasks: reading on solidity, investigating blockchain, working on the documents.	17,0	Meeting with the company's representative, cooperative work with the team members. Gantt tasks: reading on solidity, investigating blockchain, working on the documents.	14,0

Week 5	Attended two meetings and worked on the handbook and the vision documents and lectures.	16,0	Meeting with TH on Monday(2h), meeting with LP on Tuesday(2h), solidity(10h), vision document, and handbook working(3h).	17,0	Attended meetings	14,0
Week 6	7.1(2.5h), Investigating Vechain and alternative blockchains. Weekly meetings.	16,0	7.1(10 h),8.1 document writing, 11.1 meeting with TH	16,0	Comparisons on a blockchain, meetings	16
Week 7	Reading the previous bachelor theses and applying an analysis. Watching lectures and writing an overview of private vs public blockchains for the final report. Also, further investigation into Vechain and comparing it to the possible alternatives. We also discuss the meetings and determine the upcoming work.	15,0	Reading through and analyzing bachelors(2h).Big group analyzing meeting (2.5h). Seminar analyzing bachelors(4h). Two meetings LP and TH, preparation + after work (4h).	12,5	Reading and analyzing bachelor's Writing the comparisons on competitors to Vechain. Reading more on testing on Vechain. Looking more into the blockchain course	12
Week 8	Correcting the vision and the handbook documents. Working on the requirements document. Participating in the discussion on the agenda.	12,0	Work with the handbook, the vision, and requirements.	9,0	Sick, reading/correcting documents	2
Week 9	Attended meetings and have been working on the main document.	10,0	Meeting with TH + documentation writing (6h). Documentation writing 3h. Meeting with LP++(2h). Translate and format the meeting report	12	Meetings, research, editing documents	12

			(2h).			
Week 10	Weekly meeting and editing the main document	14	Vechain research	10	Testing and programming	22
Week 11	Weekly meetings, research regarding the way a blockchain works and editing the report.	15	Editing report, weekly meetings	15	Editing report, Weekly meetings and continue testing and programming	22
Week 12	Weekly meeting and editing the main document	15	Weekly meeting and editing the main document	16	Weekly meeting and editing the main document	18
Week 13	Weekly meeting and editing the main document	17	Weekly meeting and editing the main document	18	Weekly meeting and editing the main document	18
Week 14	Weekly meeting and editing the main document	12	Weekly meetings and editing the main document	20	Weekly meetings and editing the main document	22
Week 15	Working on the project handbook and the report	24		2	Weekly meetings and editing the main document	2
Week 16	Correcting the main document according to the received feedback.	27	Weekly meeting and editing the main document	24	Weekly meetings and editing the main document	24
Week 17	Editing the main document, investigating Solidity, meetings	36	Designed alternative solutions. Learned solidity development. Smart contracts development.	36	Researching smart contracts, and APIs. Started working on the new solution. Wrote on the report	36
Week 18	Correcting the main document, meetings, working on the solution: concept and implementation	36	Worked on solution documentation and development.	35	Worked on the API and smart smart contract.	35
Week 19	Working on the report	46	Writing, architecture documentation.	30	Architecture and Documentation	30

Week 20	Report	55	Writing.	44	Working on the report	45
	ESTIMATION		ESTIMATION		ESTIMATION	
Week 21	Getting a presentation ready, preparing for the presentation	35	Presentation and export preparation, reflection writing	35	Presentation and reflection	35
Week 22	Presentation, Expo	30	Presentation , expo.	30	Presentation, expo	30
Results:		472		429,5		409,0