

Project Plan “Conditioned goods”

V2.0

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Projectgroep “Conditioned goods”, bestaande uit:

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Version management

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Table of content

Table of content	2
1. Glossary	4
2 Introduction & background	5
3 Project definition	6
3.1 Context	6
3.2 Problem	6
3.3 Goal	7
3.4 Assumptions	7
3.5 Dependencies	7
3.6 Scope	8
3.7 Business case	8
4 Project product definition	9
4.1 Details	9
4.2 Definition of Done	9
5 Plan of approach	10
6 Project management organisation	11
6.1 Stakeholder analysis	11
6.1.1 Spark! Living Lab	11
6.1.2 Lamb Weston-Meijer (LWM)	11
6.1.3 Daily Logistics Group (DLG)	12
6.1.4 Lineage Logistics	12
6.1.5 Windesheim Zwolle	12
6.1.7 InnoTractor	13
6.2 Communication	13
6.2.1 Communication Plan	13
7 Risk Analysis	15
8 Management strategies	17
8.1 Risks analysis	17
8.2 Communication strategy	17
8.3 Document strategy	17
8.4 Quality management	17
8.5 Security agreements	17
9 GANTT chart	19
10 Personal learning goals	21

11 HBO-ICT Competence compliance matrix	22
Bibliography	23

1. Glossary

Discord: An informal Voice over IP (VoIP), messaging and digital distribution platform.

2 Introduction & background

We are a group of students from different nationalities and backgrounds who have come together to work on behalf of the Windesheim Zwolle on a project for the external organization Spark! Living Lab.

We are all attending the security engineering minor at Windesheim Zwolle through which we have gotten the opportunity to work with Spark! Living Lab on their “Conditioned goods” project. We are the third iteration of developers working on the blockchain project hoping to deliver something new and usable in the (cold) supply-chain industry.

We believe security is a big aspect of the future of IT and want to explore the subject and familiarize ourselves with it. Through the “Conditioned goods” project we hope to be able to be part of a project which brings advancements to the future of blockchain trust and security while being given the opportunity to explore our interests, develop our professional skills and improve our knowledge about security and blockchain.

3 Project definition

3.1 Context

Lamb Weston-Meijer (LWM) is a large manufacturer of french fries and other processed potato products. They distribute their goods all over Europe using coldchain. In this kind of chain, the produced goods are kept in controlled environments targeting cold preservation of goods. From the moment they are being processed in the factory until the moment they are stored in the customers' fridge, the temperature is kept within pre-agreed boundaries.

These temperature boundaries are described in a "Service Level Agreement" (SLA). An SLA describes the expected quality of service accompanied by measurable objectives. When, for example, the aforementioned temperature boundaries are exceeded, there is a case of an SLA breach.

LWM acknowledges handling these disputes as a rather difficult process in terms of proof. Difficult as these measurements are made by humans and usually documented using paper. In addition, it gives minimal insight into the delivery times, conditions, and origin of the goods within the chain.

Entering Spark! Living Lab (Spark), Spark is tasked with researching a better alternative to LWM's current cold-chain monitoring process. This by exploring the possibilities of applying blockchain and the internet of things (IoT). Spark invites students from several universities to make iterations on a working prototype. So far (2021-09-30) two groups have finished. Included but not limited to doing a feasibility study and starting to create a first proof of concept using Hyperledger Fabric.

3.2 Problem

Now that we know blockchain will be useful and that the system is already implemented, we have to ensure the data can be trusted. Once the data is entered in the blockchain system it can not be modified without everyone seeing it. However, how can we be sure that the data entered is trustworthy? In fact, anyone who has access to the Blockchain can put data in it. Moreover, how can we be sure that the data actually is coming from the sensors?

For now, there is no access control and no way to check where the data come from.

It is important to trust the data otherwise you can't trust the whole system and, in our case, you can't be sure if the cold chain is respected. Indeed, the "SLA" could not be respected if the data is wrong. That could cause a lot of problems to Lamb Weston-Meijer such as paperwork or fines.

Managing to solve this problem will allow every company who needs to share data to use the Blockchain technology and trust it at one hundred percent.

3.3 Goal

The goal of the “Conditioned goods” project is to realize data trust and integrity in the system and to act as factual evidence in possible SLA disputes. LambWeston will as well be automatically monitoring their cargo more closely. The primary data input to this blockchain system will be sensors.

Furthermore, LambWeston will get a list of possible security related risks and events that could harm the integrity of the data. Additionally, LambWeston will receive a risk analysis that proposes solutions aiming to solve, avoid or mitigate possible consequences.

3.4 Assumptions

The following assumptions are made for the cause of this project:

- **The Orbitz sensor can be used in the case of “conditioned goods”.**
For one of the goals of the project we will need sensors which provide us with a range of different data. We assume the necessary sensors for the project will be delivered to us by innotractor in time and the sensors are compatible with the goals and systems of the project.
- **There exists a solution in what the group from the last semester delivered.**
We assume the product the previous group delivered is the key to the success of our project goals, the assumption is the functionalities of the system gives us the ability to apply data trust to the environment.

3.5 Dependencies

The following dependencies are applicable to this project:

- **InnoTractor provides the sensors for this project.**
For entry of data in the system and prototype on the data trust between the sensors and the system we will need to receive the physical sensors from InnoTractor. If we don't receive the sensors in time we will be forced to simulate data entry and will be unable to properly test trust between the sensors and the system.
- **We have to build upon the work of previous groups and their research. We cannot start entirely from scratch.**
We assume the product the previous group delivered is functional and we will be able to build our work on the previously delivered product allowing us to work with and test on a functional system which portrays a production environment.
- **We are dependent on the documentation of the previous groups as the knowledge is not internally available.**

The goals of sparklabs are new and have not previously been developed leaving a lack of documentation and explanations of how to approach the challenge. To get started we will need documentation of the previous groups to gain a basic understanding of how the environment works .

3.6 Scope

The scope of this project is focused on realizing data trust and access-control to the current “Conditional goods” blockchain application, based on a set of predefined scenarios proposed by either the stakeholders and/or the nature of their role in the business process.

We’re not going to find new sensors or develop a new API but we will use the sensors provided and try to link it with the blockchain. However, if we are not able to do it in a reasonable amount of time, we will not continue and we can declare that it could be a project on its own.

Additionally, the previous group left behind a few possible improvements:

1. Error monitoring using a service such as Sentry or Datadog.
2. Avoiding query operators such as “\$or”, “\$in” and “\$regex”.
3. Use an off-chain database for the dashboard such as CouchDB that keeps track of the chain state.
4. Applying access-control to the blockchain on a channel- or chaincode level.
5. Expanding the tailored use case to, for example, handle different types of SLAs as well.
6. Get rid of the pre-generated certifications used to authenticate.

For more information see [4].

Only 2 and 4 are related to the scope of this project.

3.7 Business case

In the process of transporting cargo from a sender to the receiver, conditions can be involved as part of a service-level-agreement (SLA). When those conditions have been broken, a long and expensive paper process is usually followed as a result. The goal of “Conditioned goods” is to digitize this expensive paper process automatically and involve the blockchain in that as a single immutable source of truth. To ensure the integrity of this “source of truth”, exploits must be minimized.

4 Project product definition

4.1 Details

The products provided by the execution of this project is included but not limited to the following items:

1. A risk and threat assessment based on the provided code of “Conditioned goods” containing a list of possible events that could happen as a result of any interaction of a user with data in the “Conditioned goods” application. The events will be partially provided by real customers.
2. An assessment on the current state of access-control and data integrity within “Conditioned goods” and how it can further be enforced.

4.2 Definition of Done

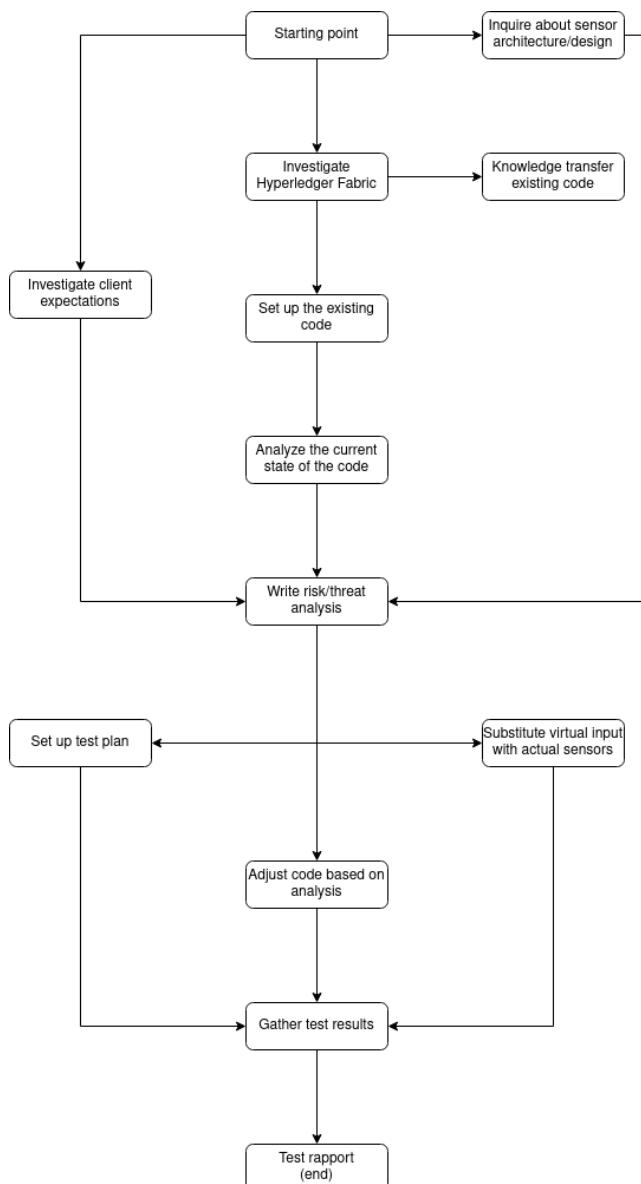
The agreed on criteria for a deliverable to be done:

1. Documents are in proper English and every paragraph has been checked for spelling and proofread by at least two other team members.
2. Date notation per ISO 8601 (ISO, 2019).
3. All tests have been passed or explained why they cannot be passed and what purpose they serve and cover.
4. A written confirmation of quality and receipt by the product-owner on handing in.
5. Interviews have been recorded and the conclusions have been checked for corrections with the interviewee in the form of a written confirmation.
6. Every source used is notated per the APA style and can be found in the bibliography at the bottom of the document.
7. The written code must be covered by some form of logging.
8. In the added database queries it is justified why query operators like “or”, “in” and “like” have been used.

5 Plan of approach

For the execution of this project, we plan to use the Scrum project management methodology as this is already being used within Spark! Living Lab. Additionally, we have the advantage of keeping ambiguities as small as possible in our development process while having enough steering space to adjust our planning (if it is within our scope).

The order looks like the following diagram:



6 Project management organisation

6.1 Stakeholder analysis

6.1.1 Spark! Living Lab

Description: An educational institution focused on supply-chain development by applying block-chain and internet of things.

Role in this project: Responsible for taking the use-case provided by LambWeston and it's partners. They want to find out whether the proposed use-case by LambWeston is possible to be created using block-chain and IoT (Internet of Things) and potentially provide them with a proof of concept.

Interest: Spark! Living labs wants to generalise the potential findings by conducting this research. They try to expand the use of the blockchain in the supply-chain and to find a solution to democratize it to the companies.

Impact: Positive, they potentially have a new product on their hands.

Influence: High, they could put the project to a stop, having consequences for our education as well.

6.1.2 Lamb Weston-Meijer (LWM)

Description: Lamb Weston is one of the world's leading companies in high-quality frozen potato products. It has six factories in Europe, Middle East & Africa. Four of these factories are located in the Nederland. The potatoes are processed at Lamb Weston into a final product which is then frozen to minus 80 degrees Celsius. The frozen products are then transported to the customers (mainly in the catering industry).

Role in this project: Providing a use-case to Spark! Living Lab.

Interest: Transparency, traceability, security and sustainability for their supply-chain.

Impact: Positive, lowering the time necessary to handle incidents involving their shipment and providing trust.

Influence: High, they are our direct source of real-world experience and provider of the use-case.

6.1.3 Daily Logistics Group (DLG)

Description: DLG is a Logistic Service Provider and direct Partner of LWM. Daily Logistics Group is a leading transport company, specialized in multimodal conditioned transport throughout Europe.

Role in this project: Logistics partner of LWM.

Interest: They want to prevent potential disputes in the future and create sustainability and cooperate in this research.

Impact: High, lowering the time necessary to handle incidents involving LambWeston's shipment.

Influence: Medium

6.1.4 Lineage Logistics

Description: Lineage Logistics is an international warehousing and logistics company. As the world's largest refrigerated warehousing company, it has around 200 facilities in North America, Europe and Asia.

Role in this project: Providing cold storage warehouse space to LWM.

Interest: Similar to DLG.

Impact: High, they will be interested in better dispute management.

Influence: High

6.1.5 Windesheim Zwolle

Description: Dutch university of applied sciences.

Role in this project: Providing students to Spark! Living Lab

Interest: Maintaining a good relationship with Spark! Living Lab and providing students with a good learning opportunity.

Impact: Low

Influence: High, they put the project to a stop.

6.1.7 InnoTractor

Description: “InnoTractor implements digital technologies for a better world. Using IoT (Internet-of-Things), blockchain, cloud and the latest wireless technologies we reduce waste and emissions. Waste can be anything from waste of time, operational inefficiencies, loss of client opportunity but also wasted physical goods due to insufficiently controlled conditions during transport.” - InnoTractor. (2021, July 15). InnoTractor | Implementing Digital Technology For A Better World | IoT company. <https://innotractor.com/>

Role in this project: Provide Spark! Living Lab with sensors for the “Conditioned goods” project.

Interest: Obtaining product orders on their sensors.

Impact: Depending on how much the project once succeeded blows up it will receive new orders for sensors.

Influence: High, necessary for real-world application. In case that they fail to supply appropriate sensors Spark! Living Lab must look for a new sensor supplier.

6.2 Communication

Well thought out communication is essential to keep all stakeholders well informed about the progress of the project which in turn ensures a higher quality product to be delivered.

6.2.1 Communication Plan

Stakeholder	Communication channel	Description
Spark! Living Lab	Discord	Every Thursday at 1pm, there is a weekly wrapup with all teams which acts as a retrospective. Every Tuesday at 10am, there is a progress meeting in order to ask questions or discuss blockers and also to make decisions if they are not urgent in the short term.

		<p>Otherwise Maxime Bouillon can be reached by mail: mfy.bouillon@windesheim.nl</p>
Lamb Weston-Meijer	In a planned meeting by Maxime.	<p>A stakeholder meeting planned by Spark! Living Labs to update their stakeholders on the progress made.</p> <p>Otherwise Mathijs Tomeij can be reached by mail: mathijstomeij@lambweston.eu</p>
Daily Logistics Group	In a planned meeting by Maxime.	<p>A stakeholder meeting planned by Spark! Living Labs to update their stakeholders on the progress made.</p> <p>Otherwise Diana van Zielst can be reached by mail: diana.van.zielst@dlg-logistics.com</p>
Lineage Logistics	In a planned meeting by Maxime.	<p>A stakeholder meeting planned by Spark! Living Labs to update their stakeholders on the progress made.</p> <p>Otherwise Marijn Timmermans can be reached by mail: mtimmermans@lineagelogistics.com</p>
Windesheim Zwolle	Microsoft Teams or verbal	<p>We have a meeting with our project coach every wednesday 9:30am to discuss questions, blockers, etc.</p> <p>Otherwise Bram van der Ploeg can be reached by mail: aq.vanderploeg@windesheim.nl</p>
InnoTractor	In a planned meeting by Maxime.	<p>A stakeholder meeting planned by Spark! Living Labs to update their stakeholders on the progress made.</p> <p>Otherwise Magriata Noordmans can be reached by mail: magrita.noordmans@Innotractor.com</p>

7 Risk Analysis

This chapter will outline the risk factors and the management strategies used to minimise the risks' likelihood and impact.

		Influence				
Chance		Small	Mediocre	Moderate	Serious	Disastrous
	Very likely	5	10	15	20	25
	Probably	4	8	12	16	20
	Possible	3	6	9	12	15
	Unlikely	2	4	6	8	10
	Very unlikely	1	2	3	4	5

id	Risk	Chances	Influences	Risk value	Measure
1	Files get corrupted	Very unlikely	Disastrous	5	If files become corrupt, the team will try to find a solution. The client and mentor will be informed. When necessary, they are involved in finding a solution.
2	Personal problem	Possible	Moderate	9	When a team member cannot complete their work due to personal circumstances, the others will evaluate how much work is left and how they can divide this up to achieve the deadline. The team will also inform the mentor and client about the problem.
3	Not enough knowledge on the	Possible	Serious	12	Take more time on research before beginning the

	blockchain subject				technical part
4	Sensors can be not adapted to the project	Possible	Serious	12	Work from simulated data entering the blockchain
5	Scope not relevant anymore	Unlikely	Moderate	6	Adjust the scope regularly
6	Need to change the current API	Unlikely	Disastrous	10	Try to find a new API supporting the blockchain system
7	Cannot find a way to ensure data integrity	Possible	Disastrous	15	Do more research in order to find a unexpected way to do it
8	Current platform does not support our project goal	Unlikely	Disastrous	10	Try to find another platform which is supporting the project
9	Another lockdown	Possible	Small	3	Do all the project online at home

8 Management strategies

8.1 Risks analysis

8.2 Communication strategy

We mainly use Spark! Living Lab's own Discord server to communicate. There we have a meeting with them every week to share our progress and when we have questions we can ask them on different channels created only for our project.

We meet every week with our project coach provided by Windesheim.

Within our project group we use Discord to share our thoughts and we have at least 2 meetings per week.

8.3 Document strategy

Google Drive is primarily being used to share documents and additionally use Google Docs as our word processor. Additionally within every deliverable a versioning table will be kept.

We use Trello (an online scrum board tool fitting our project management methodology) to share the tasks we have to do, what is ongoing, what has to be reviewed and what is done. So that everyone is up-to-date on what's going on at all times. Not only our team but also the product owner of the project from Spark! Living Lab's have access to the trello board.

8.4 Quality management

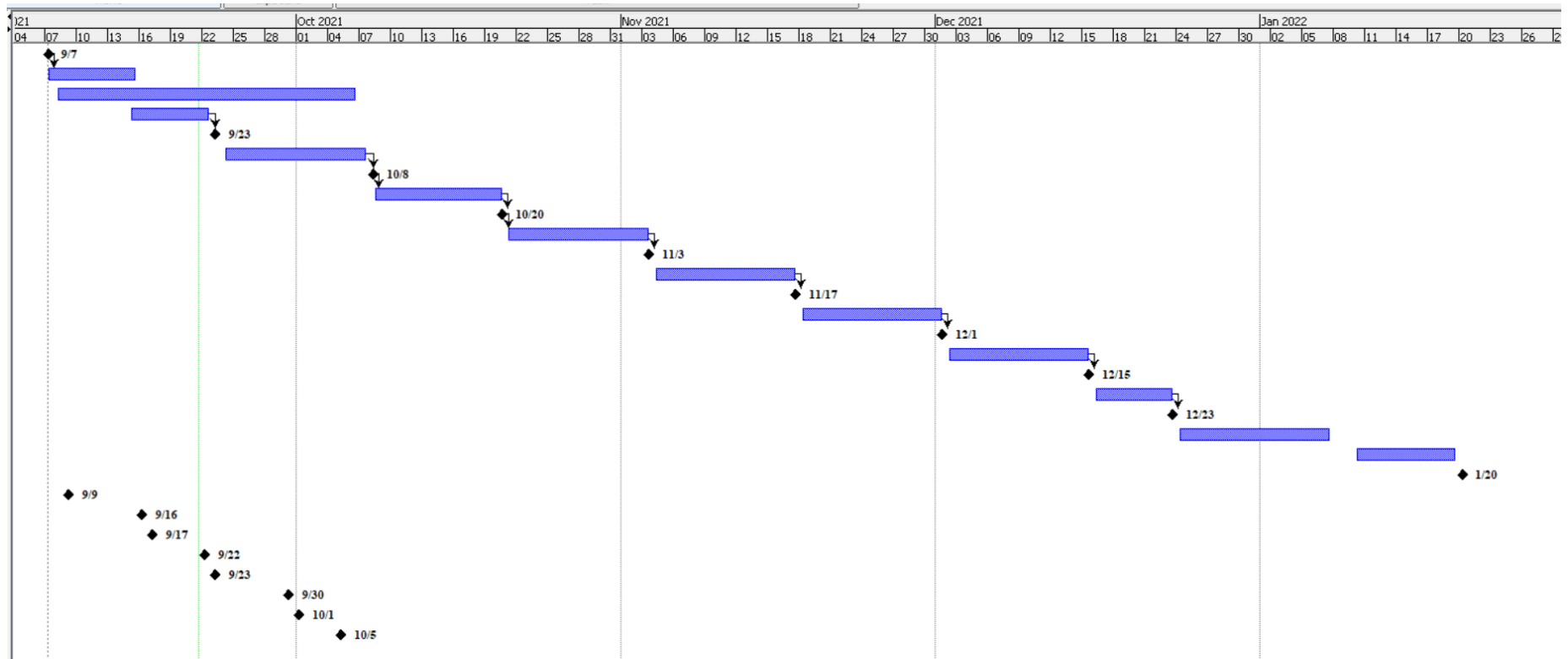
Our project will be managed by scrum which means that we will proceed by sprints of two weeks concluded by sprint reviews. These reviews will bring a retrospective aspect which will let us know if the sprint was useful, well-scoped or if the goal was maybe too easy to achieve.


























We also have planned meetings with the product owner to know if our work is going well or not, and also with our coach who will give us some advice to guide us.

8.5 Security agreements

- Credentials will not be shared outside of this group.
- There will not be any intentional backdoors added.

9 GANTT chart



		Name	Duration	Start	Finish
1		Kick-off session	0 days	9/7/21 9:30 AM	9/7/21 9:30 AM
2		Get to know	6.75 days?	9/7/21 10:00 AM	9/15/21 5:00 PM
3		General research	21 days?	9/8/21 8:00 AM	10/6/21 5:00 PM
4		Project Plan	6 days?	9/15/21 8:00 AM	9/22/21 5:00 PM
5		Dragon's Den presentation	0 days	9/23/21 8:00 AM	9/23/21 8:00 AM
6		Get familiar with Hyperledger	10 days?	9/24/21 8:00 AM	10/7/21 5:00 PM
7		Review	0 days	10/8/21 10:00 AM	10/8/21 10:00 AM
8		First Sprint	8.375 days?	10/8/21 2:00 PM	10/20/21 5:00 PM
9		Review	0 days	10/20/21 5:00 PM	10/20/21 5:00 PM
10		Second Sprint	10 days?	10/21/21 8:00 AM	11/3/21 5:00 PM
11		Review	0 days	11/3/21 5:00 PM	11/3/21 5:00 PM
12		Third Sprint	9.875 days	11/4/21 9:00 AM	11/17/21 5:00 PM
13		Review	0 days	11/17/21 5:00 PM	11/17/21 5:00 PM
14		Fourth Sprint	9.875 days	11/18/21 9:00 AM	12/1/21 5:00 PM
15		Review	0 days	12/1/21 5:00 PM	12/1/21 5:00 PM
16		Fifth Sprint	9.875 days	12/2/21 9:00 AM	12/15/21 5:00 PM
17		Review	0 days	12/15/21 5:00 PM	12/15/21 5:00 PM
18		Sixth Sprint	5.875 days?	12/16/21 9:00 AM	12/23/21 5:00 PM
19		Review	0 days	12/23/21 5:00 PM	12/23/21 5:00 PM
20		Vacation	10.875 days?	12/24/21 9:00 AM	1/7/22 5:00 PM
21		Prepare finale presentation	7.875 days?	1/10/22 8:00 AM	1/19/22 4:00 PM
22		Winnovation	0 days	1/20/22 9:00 AM	1/20/22 9:00 AM
23		Workshop : Project Managem	0 days	9/9/21 8:00 AM	9/9/21 8:00 AM
24		Workshop : Project Managem	0 days	9/16/21 8:00 AM	9/16/21 8:00 AM
25		Workshop : Scrum(basic)	0 days	9/17/21 8:00 AM	9/17/21 8:00 AM
26		Workshop : Research Set-up	0 days	9/22/21 8:00 AM	9/22/21 8:00 AM
27		Workshop : Project Managem	0 days	9/23/21 8:00 AM	9/23/21 8:00 AM
28		Workshop : Consultancy	0 days	9/30/21 8:00 AM	9/30/21 8:00 AM
29		Workshop : Pitching	0 days	10/1/21 8:00 AM	10/1/21 8:00 AM
30		Workshop : Research Setup	0 days	10/5/21 8:00 AM	10/5/21 8:00 AM

10 Personal learning goals

Name	Goal	Practice
Nick	Working proactively	By swiftly acting onto (potential) new stimuli and keeping a mental model of all tasks and their respective priority.
Clément	Get into the security domain and learn as much as possible	By doing a lot of research and work with my team so we can progress together.
Thibaut	To look in the future and to be happy with what I have done and learn in this project	Always try to do my best and communicate a lot with my group to share concerns.
Florian	Learn as much as possible into the security domain, which I am interested, and use this knowledge when I come back to France in order to succeed in my next project	I will try to do my best, to work in team and be the most efficient that i can
Mischa	Understand the means what it takes to manage a project	I have had to guide and steer the project and make decisions halfway through, i wanna try to accommodate as much good advice as possible by listening to the individual suggestions of team members.

11 HBO-ICT Competence compliance matrix

The following matrix is filled in based on HBO-i domain description 2018 from the perspective of the architectural layer “software”.

Competency	Practice
Analysis	<ul style="list-style-type: none">- Behavioral requirements will be defined with the various stakeholders involved in the process.- Acceptance criteria based on the importance of issues. Where verbosity is synonymous to importance.- Overall attention to the security aspects.- Find the appropriate place to put access-control in the “Conditioned goods” code.- Analysing the previous group's findings of intended technical design.
Advice	<ul style="list-style-type: none">- Provide advice on whether the proposed use-case is possible.
Design	None
Realisation	<ul style="list-style-type: none">- Keep the application cloud scalable.- Automated testing using Git hooks.
Manage & control	<ul style="list-style-type: none">- Use Trello to support our scrum board needs where we will keep an up-to-date view of what is: on the backlog, ongoing, ready for review and done.- Git for our version control needs where we will utilise a pre-agreed workflow and follow (https://acompiler.com/git-best-practices/) as far as it is allowed by the used dev-tools.- Code is tested using docker to guarantee performance across all platforms.- No automated build and test infrastructure are provided in this project as of now.

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