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BLOCKCHAIN-BASED DIGITAL DATA CERTIFICATION AND TRACEABILITY SYSTEM

Feasibility Study

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TecnoCampus
Mataró-Maresme

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1. Planning

1.1. Initial planning

This project follows the Waterfall methodology. The tasks are done sequentially, meaning that each task is dependent to the one that comes before. The fact that tasks are done in a sequential way means that the critical path is the same as the execution path.

Furthermore, the planning for each task is represented in the Table 1:

Task Nº	Task	Dependency	Starting date	Ending date	Hours
1	Requirements	-	2021/12/15	2022/01/03	40
2	Research	1	2022/01/04	2022/02/11	120
3	Design	2	2022/02/14	2022/03/01	80
4	Development & Testing	3	2022/03/02	2022/05/30	260
5	Deployment	4	2022/06/04	2022/06/06	10
6	Documentation	5	2022/06/07	2022/06/14	20
7	Maintenance	6	2022/06/13	-	-
TOTAL					530

Table 1: Project Phases Source: Víctor Barroso Corchero

In the Figure 1 we can see the Gantt diagram where the phases are distributed through the weeks of the duration of this project.

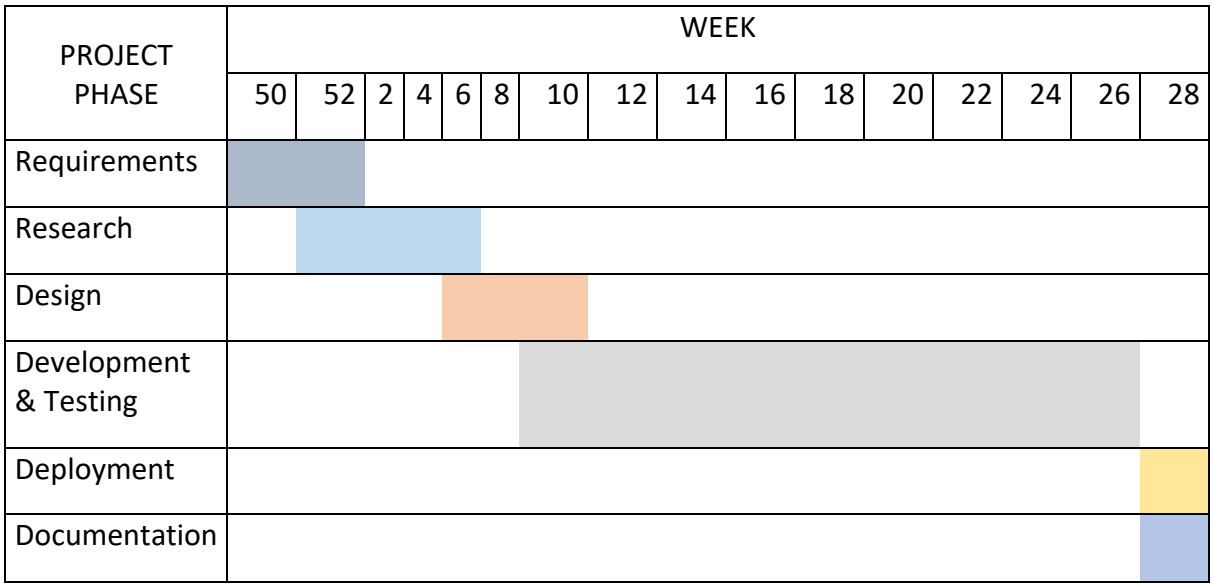

Figure 1: Gantt diagram of the project phases. Source: Víctor Barroso Corchero

1.3 Planning variances

The calendar has been followed throughout the phases of this project, fulfilling all the milestones as planned.

Also, the time invested in the design phase was minor than expected. As shown in the Table 1, it was planned to use 80 hours in the design phase, instead only 40 were used.

Moreover, the development phase has taken 30 hours less than expected in the Table 1, meaning that 230 hours have been used in that phase.

To conclude, in the Table 1 the total planned hours for this project were 530 hours, but in reality, it has taken 460 hours, 13’2% less than expected.

1.4 Project management

This point explains how the management of the project was carried out throughout its course.

First of all, since the start of this project until the last week there have been meetings with the tutor of this project, Léonard Janer García, each two weeks. The meeting minute is sent the day before each meeting, afterwards the minute is completed and stored into a Google Drive shared folder. Also, all the meeting minutes with the tutor are included in the annexes of this project.

As shown in the Figure 2, this example of a meeting minute shows how the document is structured:

- Date of the meeting.
- Present: Those attending the meeting.
- Next meeting: The date and location of the next meeting.
- Announcements: Topics to be discussed throughout the meeting.
- Discussion: Conclusions of the topics discussed.
- Roundtable: The work that should be done for the next meeting.

Also, with ESED there have been meetings every two weeks, like with the tutor, but no minutes were done.

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Meeting Minutes

January 13, 2022

Present: Víctor Barroso, Léonard Janer
Next meeting: January 27, 8, Office 9

1. **Announcements**
   - Check documents to fill out.
   - Check current work
     - Doubts about the work approach.
     - Doubts about context, background and state of art.
2. **Discussion**
   - Work approach is OK.
   - The document doesn't contextualize what the problem and the solution are.
   - The context needs to assure that everyone who reads it knows what we are going to do, why we are doing that and why will it be a good solution.
   - Needs to explain more in detail some terms like e-signing, email encryption, legal document ...
   - Paragraphs should be larger than one or two lines.
3. **Roundtable**
   - Víctor:
     - Write an index of what to write.
     - Expand the previous study.
     - Research possible blockchains and frameworks for the project.
     - Keep working on the rest of the document.

Figure 2: Example of a meeting minute. Src: Víctor Barroso Corchero

Lastly, the app used for managing the project phases and tasks shown in the Table 1 is called ClickUp [1], an application made for managing people and projects with interesting features.

To conclude, in the Table 1 the total planned hours for this project were 530 hours, but in reality, it has taken 460 hours, 13'2% less than expected.

2. Technical feasibility analysis

The blockchain technology is very recent, but that is not an impediment for completing this project thanks to smart contracts. The hardest part of this project is finding professionals with the required skills.

Moreover, since the computational power is provided by the chosen blockchain, sophisticated hardware is not needed for developing this project. Also, some blockchains, like Ethereum, have an alternative blockchain made for developers to test their code before uploading it to the real blockchain.

3. Economic feasibility analysis

First of all, the money for developing this project is provided by ESED and the target for this product are mostly companies, although this solution can also be used by individuals.

As shown before, in the Table 1, the budget needed for completing this project is 15.183,75€, most of the money goes for paying the hours of the people involved within this project. Also, this project is an interesting solution for adding a layer of protection against phishing, CEO Fraud and more cyberattacks we mention in the final report.

3.1. Budget

The cost of developing this project is shown in this point. Lastly, there is the Table 4, which summarizes the costs.

The material costs are shown in the Table 3, it also shows the amortization. The total cost of the technological platform is 347,67€.

The roles we need for this project are the following:

- Engineer: They are the responsible of the project management. They occupy the role of project manager. Also, as shown in the Table 2, they work in the phases of requirements, research and design.
- Blockchain developer: This role is new in the market; they will develop the application and document it. Furthermore, as shown in the Table 2, the work in the phases of Development & Testing and Deployment.

Human Resources				
Phase	Role	€/h	Hours	Cost
Requirements	Engineer	25	40	1.000,00 €
Research	Engineer	25	120	3.000,00 €
Design	Engineer	25	80	2.000,00 €
Development & Testing	Blockchain developer	20	260	5.200,00 €
Deployment	Blockchain developer	20	10	200,00 €
Documentation	Blockchain developer	20	20	400,00 €
Total			530	11.800,00 €

Table 2: Project costs. Source: Víctor Barroso Corchero

Technological requirements				
Technological requirement	Calculation	Price (€)	Amortization (€)	Cost (€)
Cloud server	1,248€/day*136days	169,728	-	169,728
Computer	https://www.pccomponentes.com/lenovo-ideapad-5-14itl05-intel-core-i7-1165g7-16-gb-512gb-ssd-14	849	212	159
Screen	-	100	25	19
Blockchain Platform	Free trial	0	0	0
Total				347,67 €

Table 3: Summary of technological costs. Source: Víctor Barroso Corchero

Also, the project budge includes 3.036,75€ for indirect expenses that includes marketing campaign, energy consumption, a physical space for working and internet. Furthermore, the summarize of the budget is shown in the Table 4.

Project phase	
Item description	Cost
Requirements	1.000,00 €
Research	3.000,00 €
Design	2.000,00 €
Development & Testing	5.200,00 €
Deployment	200,00 €
Documentation	400,00 €
Subtotal	11.800,00 €
Technological item	
Item description	Cost
Cloud server	169,00 €
Computer	159,00 €
Screen	19,00 €
Subtotal	347,00 €
Others	
Item description	Cost
Indirect expenses	3.036,75 €
Subtotal	3.036,75 €
Total	15.183,75 €

Table 4: Budget summarized. Source: Víctor Barroso Corchero

4. Environmental feasibility analysis

The blockchain technology is controversial because of the high environmental impact. According to The Cambridge Bitcoin Electricity Consumption Index [2] Bitcoin, the most mined cryptocurrency, uses 125,1 TWh per year, more than Norway. Moreover, if Bitcoin was a country, it would be on the ranking 27 of the annual electricity consumption.

Furthermore, in 2021 Spain consumed 256,462 TWh [3], that is a 205% of Bitcoin's energy consumption in 2021.

On the other hand, not all blockchains consume the same amount of energy, blockchains that uses other consensus mechanism rather than Proof of Work tend to be more environmentally friendly.

This project uses energy for maintaining the server on, for working and for each transaction made into the chosen blockchain, this is why this project uses a blockchain that is committed to the environment.

5. Legal Aspects

This project has in mind the privacy of the user, that is the reason the application only stores information that is not sensible or can be public into the blockchain. Saying that, the only information needed for each transaction is the one mentioned in the final report, which are the file name, file owner name, company name, transaction date, expiry date, version, UID and the hash of the file.

Also, the project has in consideration the General Data Protection Regulation (GDRP), personal data must be protected and should be shared only with the permission of the people.

Moreover, the theoretical part of this project can be freely shared, on the other hand the developed solution is not under any free software license, meaning that it can’t be shared nor used for commercial usage other than ESED S.L.

6. Bibliography

[1] ClickUp, "ClickUp," [Online]. Available: clickup.com/?noRedirect=true. [Accessed 6 June 2022].

[2] University of Cambridge, Camrbidge Centre for Alternative Finance, "Cambridge Bitcoin Electricity Consumption Index: Comparisons," 2021. [Online]. Available: https://ccaf.io/cbeci/index/comparisons. [Accessed 10 February 2022].

[3] Datosmacro, "Datosmacro," [Online]. Available: https://datosmacro.expansion.com/energia-y-medio-ambiente/electricidad-consumo/espana. [Accessed 10 February 2022].