PHASE 5b

Infrastructure Options and Barriers

begin blockchain

enabling new growth for sme's

CONTENT

DISCLAIMER

ABOUT THIS DOCUMENT

This is an optional module

There is a variety of blockchain technologies, networks, and operating conditions. Some blockchains are under heavy use and may have high fees, and others may be unreliable since they have not undergone proper security auditing, or there are doubts in their future evolution. This module is intended to dig deeper in the technical pitfalls and alternatives, in the case that the group has some members in an advanced state of knowledge.

SUMMARY

There is a variety of blockchain technologies, networks, and operating conditions. Some blockchains are under heavy use and may have high fees, and others may be unreliable since they have not undergone proper security auditing, or there are doubts in their future evolution.

This module is intended to dig deeper in the technical pitfalls and alternatives in the case that the group has some members in an advanced state of knowledge. It is also intended as a way to attempt to look forward to the evolution of the blockchain landscape and how we can incorporate adaptation mechanisms in the "genome" of the startup or innovative project

In this phase, there are **several critical elements** to be considered. The following are especially important:

01 Is the selected implementation platform mature and sustainable? Do you have alternative contingency plans if the underlying technology becomes obsolete, unreliable or impractical for some unforeseen reason?

02 Blockchains, even those private, have operating costs, and this is especially critical in public blockchains where, in general, there are fees paid to miners or validators in some form. Is the business model robust to changes in these operating or transaction costs? In addition, it has been seen that the blockchain landscape appears to pass through "bullish" and "bearish" stages. How does a "bear crypto market" affect our business particularly?

03 The uses of blockchain and decentralised technologies evolve, and arguably so do the uses of the blockchain (recent examples are DeFi, DeFi 2.0 or the NFT "mania"). How would the business model and technology design be prepared to adapt and eventually make a benefit of that evolution?

Once in previous steps, we have established a solid ground for the business model, governance model and base technology. Here we have to look forward to the future and make the solution resilient and adaptable. The three elements just mentioned can be understood as properties of our solution: SUSTAINABILITY, RESILIENCY and ADAPTABILITY. Our concern in this last step is finding the "-ilities" that would help in navigating a changing scene.

This step is fundamental to understand and critically think on the interplay of the idea that blockchain and, more generally, decentralisation is an evolving field, not only from the viewpoint of technological developments but also from the viewpoint of users or "consumers" that progressively discover new uses that may slowly reach wider audiences. In consequence, the blockchain space is a moving target. Since we cannot magically predict the future, the only action we can do is to establish a solid ground to anticipate change.

The end of this stage should be a clear separation of the business as of today and the mechanisms to adapt the business to a surely changing landscape, both from the perspective of the users and of the technologies.

The trainer may problematise the decision with hypothetical extreme events:

- The fees of the blockchain we use become prohibitively high, and we have to move to a temporary or alternative solution. How does this affect the business, the finances and the relation to our users or customers?

- New forms of governance have become more widespread, and now users are reluctant to our solution since it appears too "centralised", and other businesses are offering alternative solutions more appealing to the new mentality of users. How can we adapt to that new situation?

These are examples, and depending on the business sector, application or model, the tutor may find other more relevant ones.

The decision point to move to the next step is having a clear picture of the way forward to the future and being confident that the company has the right skills and attitudes to adapt.

IMPORTANT

This module requires getting deeper into the technology and the scene of innovation in blockchain technologies. Consequently, not all the groups may be prepared to go through it. This is a decision to be made by the tutor. If its contents and objectives are deemed too difficult for the group, you can jump to the section "Establish your future steps" at the end of this document.

LOOK AT THE RISKS AFFECTING YOUR COST AND REVENUE MODEL

04

In what follows, indications are given to raise the discussion in the PBL meetings. As it is common in PBL, the trainer should not be the leader of the discussion, but it might participate either at some points during the session (avoiding monopolizing the flow of the discussion) or as comments to the

minutes of the PBL session

Particularly, consider and discuss for privacy:

- Are we storing personal data in the blockchain or in any other complementary component (e.g. a decentralized file system)?

- Is it essential to record that data in the blockchain? Maybe some parts may be stored in traditional databases, which are "regular business" concerning privacy regulation. Does that traditional database compromise decentralization?

- Does the use of private blockchains, if viable for our need, solve part of the problems?

Ggg In general, even addresses are considered private data by the GDPR since they are pseudonymous, so they can be combined with other data to identify individuals. Typical solutions to this are storing hashes in the blockchain, but this is again pseudonymous. In consequence, in general, all personal information and even pseudonyms should ideally not be stored in the blockchain.

Other solutions to this project involve storing hashes of encrypted files, but this shall not be considered a general solution but a last resort in case there are no alternatives. In general, it is possible to minimize the storage of personal data in the blockchain by relying on other mechanisms that complement the use of the blockchain. This is a complex technical topic, and if the solution is not obvious, this is a point in which the intervention of a technical advisor would bring a lot of benefits.

And if confidentiality in business networks is required, consider, and discuss:

- Which information pieces can be made public to the whole consortium, which to only some of the participants, and which to only the two interacting partners in a transaction?

- Which are the negative impacts for a business of not having confidentiality for the elements identified in the previous question?

- Do these negative impacts affect the feasibility or sustainability of our business model?

*In a **consortium blockchain**, the incentives of businesses to participate are at least partially driven by the confidence they have in that sharing information will not be detrimental to their business. In some cases, revealing prices and transactions are a source of "competitive intelligence" that they will be reluctant to share as it will be detrimental to their interests.*

Of course, this problem of disclosure of business-related information also appears in public blockchains, but in the case of private or permissioned networks the analysis may be more difficult. The first important element to consider is privacy and confidentiality. For privacy, regulations as the GDPR offer a solid foundation to evaluate your business. In the case of confidentiality concerns for business actors, you would need to go back to the design of the business network of the consortium. The first important concept here is using Layer 1 (L1) and Layer 2 (L2) blockchains and the security, maturity and decentralization/security.

RESOURCE 1:

Blockchain and the GDPR

The European Commission published a study on the issues and challenges blockchain poses to the GDPR. The study was intended to propose policy options in Europe, but it can be used as a point of departure for the analysis of this non-easy topic.

It is particularly important to understand the incompatibility of GDPR "right to erasure" of personal data with the general attribute of blockchains that make it onerous and complicated to erase data in general. While there are some technical solutions to that erasure, they are not adopted in major blockchain implementations as they are perceived as incompatible with the immutability of blockchains.

PILLAR B
CORPORATE & FINANCIAL REGULATIONS

05

At this point, you have to consider **three major elements**:

01 Your business will be based on some jurisdiction,

02 Your customers, in most cases, are likely to be international.

03 If your solution involves the spawn of some form of DAO for the decentralized governance of a protocol, or some aspects of the service, this may have legal implications.

You have to consider and discuss the following:

REGARDING 01

- Which are the applicable regulations to my business with regards to the use of blockchains technologies (if applicable)?
- If my company is acquiring some form of blockchain asset as tokens, how does tax regulation affect my business?
- If my company is providing some form of financial service via the blockchain, how do KYC and/or AML regulations affect my business?

REGARDING 02

- How does the fact that my customers are international affect my business?
- Do I need to carry out full KYC to comply with regulations even if the users are in other jurisdictions?

REGARDING 03

- How do the law and my business (the legal entity) interact with each other?
- If the DAO is truly autonomous, but my business has some degree of control, at least in the initial stages, does this affect regulatory compliance?

DD. As mentioned, this part of the discussion and study may require significant effort to find out about national or regional regulations. The possibility of having some professional legal advice would be beneficial to this task.

# RESOURCE 2:

Crypto regulations around the world

Regulation in the blockchain is a moving target, and in the current state of affairs, it is likely that changes will happen from what is provided here.

While some businesses will be intended for a concrete jurisdiction from the beginning, in some cases, entrepreneurs are comfortable with the idea of moving abroad or being "digital nomads". For that reason, it might be interesting to start from a map or general overview of global crypto regulation, even if it is just to identify more "crypto-friendly" jurisdictions. There are different maps and resources that attempt to give this overview, although they become outdated quickly.

An example is the following map:
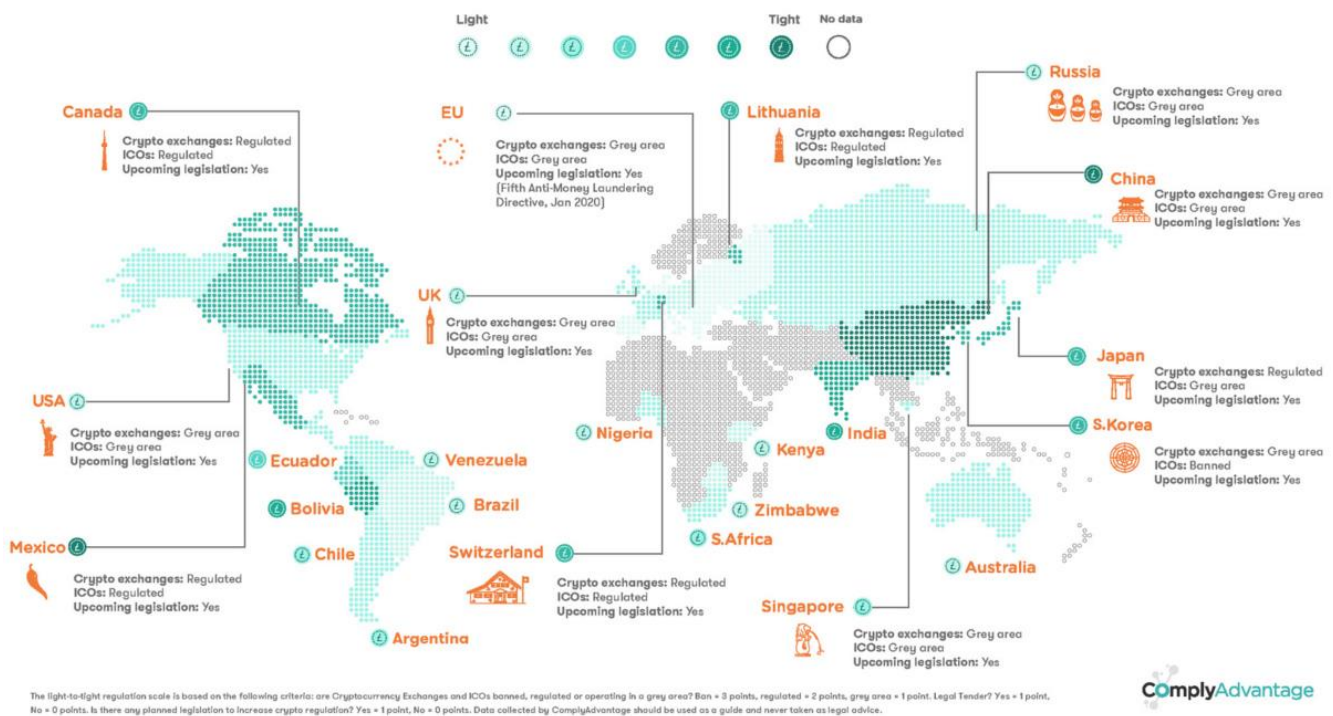
As a first approach to the task, looking at differences across countries can be illuminating, so that later the team may zoom in a particular region or country.

Once the **regulatory aspects are clear**, we still need to **understand the impact of our business** at least at **two levels**:

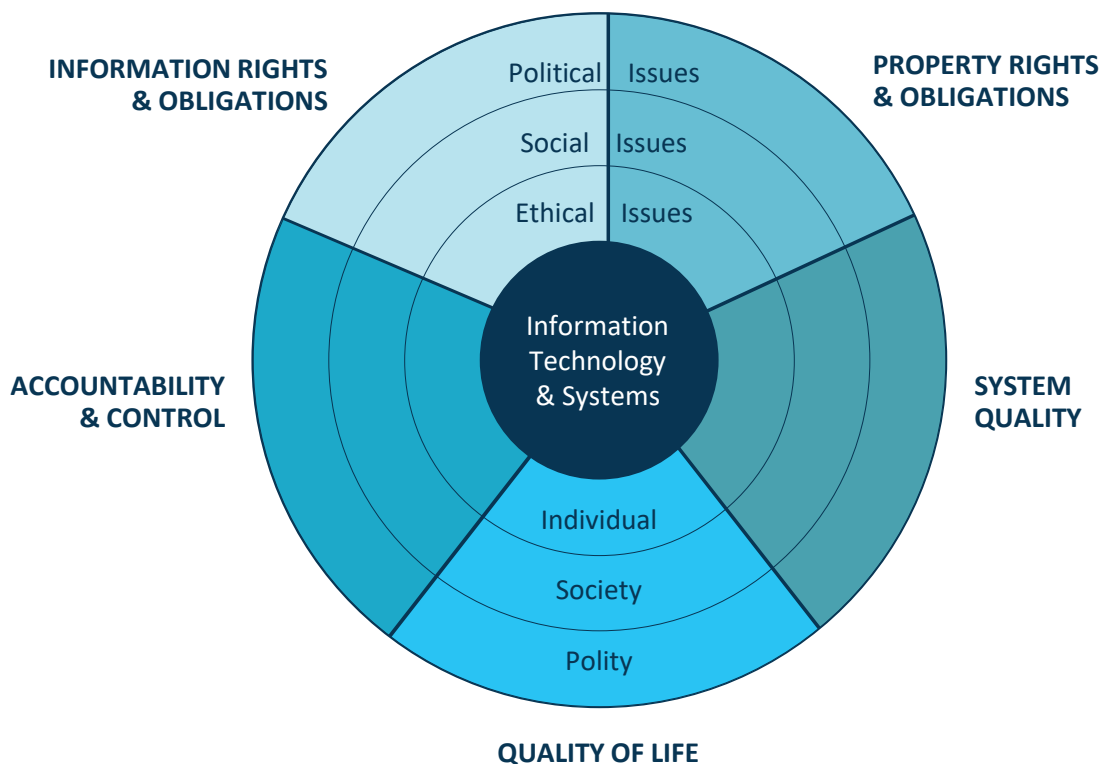**01** The users of our service, be they final users, developers, miners, validators, or other actors.

02 Society, in general, or maybe the environment.

*In this last step, we take a **final even broader view of the business designed** so far. Some projects will need to look at this more carefully than others, so some consideration from the tutor before starting may be beneficial if the group cannot identify key ethical issues.*

A blockchain service or application is an instance of an information system, i.e. a socio-technical system that combines technology with people and processes. Different generic IS "ethical frameworks" are regularly used to analyze these dimensions.

Maybe one of the most popular is the one included in the Management IS textbook of Laudon&Laudon, which is summarized in the following diagram, which can be used as the starting point for a comprehensive analysis at this point.

INFORMATION RIGHTS & OBLIGATIONS

PROPERTY RIGHTS & OBLIGATIONS

Political Issues

Social Issues

Ethical Issues

Information Technology & Systems

ACCOUNTABILITY & CONTROL

SYSTEM QUALITY

Individual

Society

Polity

QUALITY OF LIFE

RESOURCE 3:

The blockchain ethical design framework

While generic IS ethical frameworks may be sufficient in many situations, the "Blockchain ethical design framework" by Lapointe & Fishbane provides a more specific account for blockchain technologies.

The authors discuss "why intentionality of design matters, identifies the key questions that should be asked and provides a framework to approach the use of blockchain, especially as it relates to social impact". They start with a review of blockchain solutions' key attributes that are summarized in the following diagram.
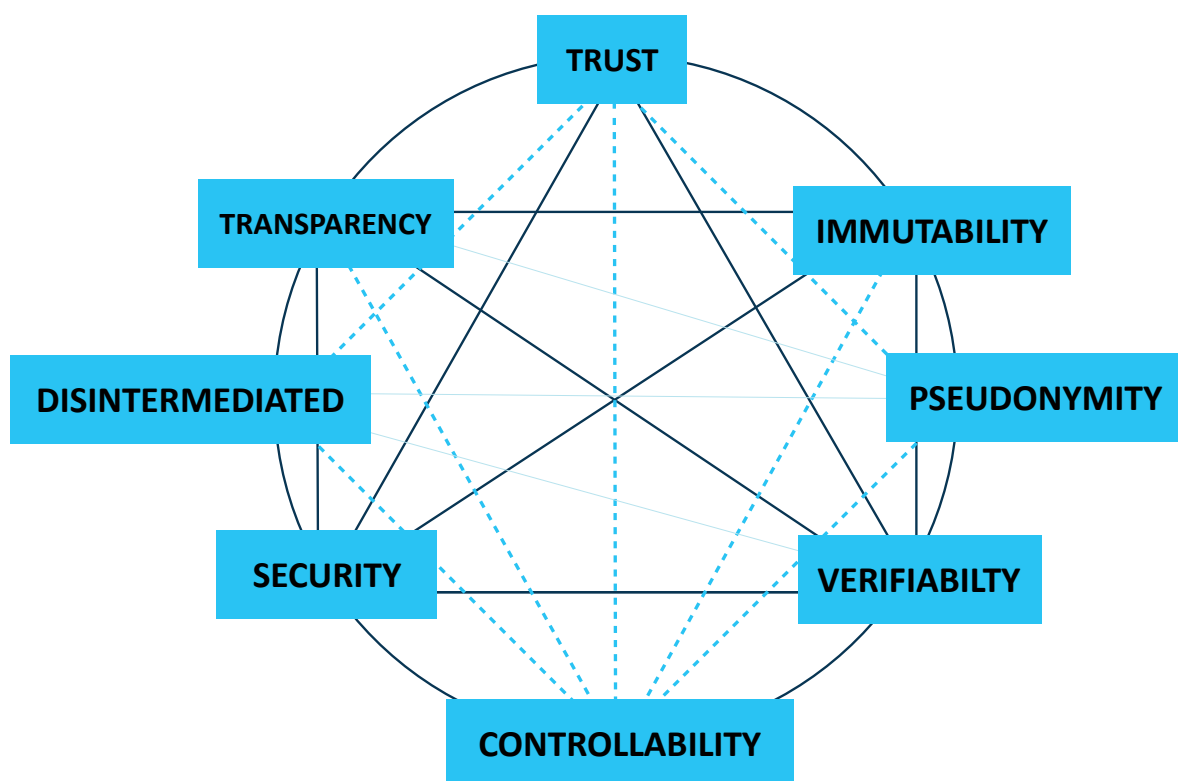
And then discusses some "social goods" applications of blockchain technologies.

The narrative of "blockchain for social good" is frequently found in some solutions and protocols. Maybe that is also the case of the business model of a group, and it was considered from the beginning. But maybe that "social good" angle was neglected, and it can be incorporated here.

The framework itself is depicted in the following figure. The phases depicted in red at the upper part of the diagram have already been done except for the ethical approach, which can be now incorporated. Also, many of the elements in the design spiral have most likely been addressed in previous steps, but the diagram is of help to revise them under a new light to understand if some aspect was missing that may require refinement or reconsideration of design options.

RESOURCE 4:

## Blockchain and the environment

Blockchain systems often involve mining to confirm transactions. This essential process allows transactions to be validated and added to the blockchain, but unfortunately, it involves the use of vast amounts of energy.

A typical example is that of Bitcoin's miners' consumption, which has been estimated at around 91 terawatt-hours of electricity annually, more than consumed by Finland, a nation of more than 5 million people.

On the other hand, miners say they use lots of renewable energy that may otherwise be lost, such as wind power surpluses or hydropower. Estimates range Bitcoin mining energy being from 39% up to 74% renewably sourced. So, there is a lot of debate about blockchain's benefits against energy use and

environmental impact. The European environmental agency has published a briefing on the issues and challenges blockchain poses to the environment, which can be accessed here.

It is important to understand the problem and its different implications, but also to know the main related EU policies such as the 2030 Climate and energy framework, the Environment action programme to 2030 and the EU Trade policy, among others

ESTABLISH YOUR LEARNING GOALS
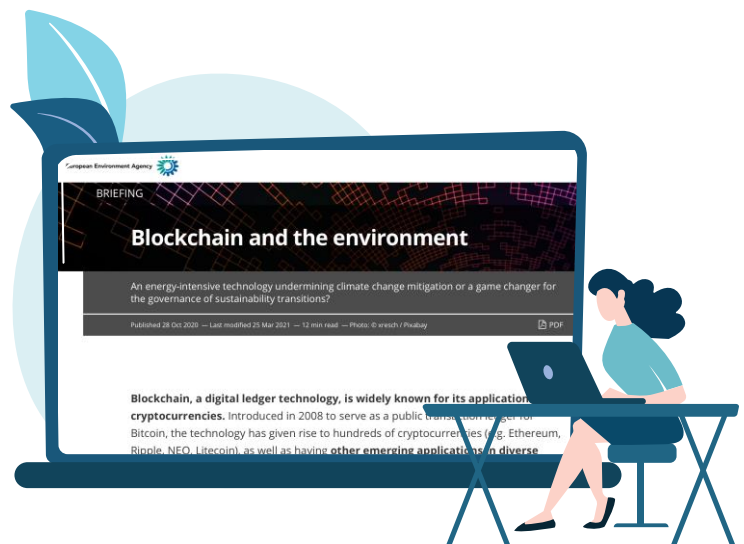
*At this point, you would have **assessed your proposal under a different lens**. However, this may require that you reconsider **some decisions taken and maybe even step back and change part of your business proposal** or technical decisions. This is to be expected in many proposals, and it may require, in some cases, some serious reworking. The trainer should not bias the decision on iterate or progress, but any missing elements not discussed that may affect that decision should be raised. Here it is crucial to manage eventual changes in the business model or technological platform selected that may require some form of stepping back that may be troublesome to manage.*

SOME DOUBTS ON REGULATION, ETHICAL ISSUES OR IMPACT

- Depending on your proposal, this step may take less or more effort. Maybe you decided to consider each of the aspects one after the others, and then you simply need to iterate several times.

- In any case, this would require significant effort, and you should, at a minimum, have clear that your business is complying with regulations.

- In this module, maybe you have even to step decided to step back to considerations of previous steps, even to reconsider the use of blockchain in itself! Do not be hesitant in those reconsiderations even if they seem painful or in some way disappointing at this moment.

YOUR BUSINESS MODEL IS TRUSTWORTHY

- Congratulations for reaching this point

- You have now to move to the last step **"5b Infrastructure, Options And Barriers".** That last step is optional, but in any case, the team must consider taking it or at least looking at the end of the step, to understand that this is more a beginning of your journey rather than an end to it.

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