

CURRICULUM

Areas of study, learning objectives
& related competences



begin
blockchain



enabling new growth for sme's

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*This document is part of the results of the **BEGIN** project and is part of Intellectual Output 2 (IO2). This is aimed at entrepreneurship educators and business advisors, a large and diverse group working across enterprise centres, incubators, chambers of commerce, regional colleges and more*



The resources that are outcome of IO2 respond to the following needs, identified through our own Needs Analysis (NEN, Business Adviser Attitudes to Blockchain, 2020):

Entrepreneurship educators who are interested in introducing training, but are inhibited by their own inexperience and/or those who rely on traditional “lecture” approaches and lack the pedagogic strategies to enable effective 21st century skills’ development.

SME managers and entrepreneurs who as adult learners, require dynamic teaching approaches that value their previous experience and demonstrate clear relevance to their daily work. They need digital skills to understand the potential of blockchain, and the entrepreneurial skills to identify and evaluate and implement opportunities.

Lean Startup and the Business Model Canvas

The Lean Startup methodology is a widely adopted method used in entrepreneurial endeavors. One of its main artifacts is the Business Model Canvas (BMC) or “Lean Canvas” that summarizes the projected business model in a single page, making it easy to identify and discuss the different aspects of the project.

We depart from the assumption that entrepreneurs that initiate BEGIN training have previously received some training about the Lean Startup method and how to compose a BMC (or self-learning, as there are MOOCs and tutorials that explain the essentials of it).

Starting out with a business idea

In addition to understanding the BMC, students are expected to enter the training having sketched at least an initial BMC for a business idea that has as one of its main components the use or deployment of blockchains, or related decentralization technologies. Since a proper understanding of those technologies and their potential uses is actually part of the training itself, it is not expected that they develop a perfect BMC for start. On the contrary, the training is intended as a way of “refining” an imperfect BMC.

Problem-based learning approach

The selected instructional approach is Problem-Based Learning (PBL). Concrete guidance for the application of PBL in BEGIN is provided in a separate document. It is expected that trainers have some knowledge on PBL but it is not required that the students have experienced this learning method before. Introducing the steps of the PBL process and its main principles and outcomes is the role of the tutor before the training starts



DIFFERENCES FROM OTHER BUSINESS MODELS

The point of departure and motivation of our approach is that when entrepreneurs start a project in which blockchain or related technologies are involved, they face two problems that require specific addressing.

PROBLEM #1

Learning curve of the fundamentals of blockchain technologies

This is related to the inherent complexity of blockchain technologies, that nowadays is still surfacing even for end users, which need to get used to wallets and the notions that the digital assets are in a network and not in a file in their computers. Grasping the idea of a decentralized ledger where no company or state has control requires some basic understanding of networks. Previous understanding of other decentralized networks as BitTorrent are extremely useful to understand the internals.

PROBLEM #2

Understanding the profound differences in the business model that decentralization involves

The effect of decentralization is that the typical business model of the “dot com” era is not applicable. It is not possible to build systems that attract users and then these users and their data are locked into a site. That “winner takes it all” model conflicts with the idea of decentralization, in which the way a company may benefit from a DApp is more difficult to conceptualize. This results in a potential conflict of the mental model of the digital entrepreneur and the blockchain or decentralization entrepreneur. It is also important to understand here that the community that uses public, permissionless blockchains and DApps has also a distinctive culture regarding decentralization and a sense that a single company appropriating all the value is in some way illegitimate. This cultural aspect is important since it might become a barrier for a project in attracting users. Of course, this is less an issue in private and consortium blockchains

PROBLEM #3

Scarcity of developers and complexity of options

The current growth of the investment in blockchain applications and new technologies makes it very difficult to attract developers. In some cases, startups make use of the professional profile of a “Developer relations” or “developer evangelist” role. These are essentially employees with a technical background but that devote their effort to communication with potential developers, in cases in which a DApp will only have success if it is able to attract third parties that will develop on top of it. Even for user-facing, simple DApps, this scarcity needs to be considered in the funding model.

ASSESSING THE LEVEL OF STUDENTS

Due to the potential departure problems in understanding, trainers need to start from an assessment of the current level of understanding of the students. It is difficult to draw frontiers between levels, but as a rough categorization that may be useful, we sketch here three levels.

BASIC LEVEL

Understanding basic operations: wallets, addresses and forks

Understanding how to manage tokens or cryptocurrencies is the best way to have the basic level of understanding in a practical way. These in turn require understanding the basic cryptographic primitives (digital signatures, hashes) and the idea that the networks are the decentralized database where the tokens and applications reside, and our private keys are the locks for these assets that belong to us. It is important to understand also that there are many public blockchains and that it is possible also to engage in private or consortium ones, but these latter cases are profoundly different since they are controlled by networks of known business and thus do not require the kind of incentive systems that are essential in public, permissionless ones.

INTERMEDIATE LEVEL

understanding smart contracts and tokens that are used for specific applications

The second important milestone of understanding blockchain is understanding smart contracts. Since it may appear intimidating for some users, introducing the idea of basic smart contracts in a practical way for example using Remix and looking at some Solidity contracts and how they may be deployed in a blockchain and made public to explorers as Etherscan scales up quickly the understanding. This is without need of teaching any programming, just understanding smart contracts as automation of tasks that can be initiated by users, and that may involve interchange of assets. Discussing token standards as ECR20 or ERC721 helps in understanding that all these systems talk to each other with a degree of standardization.

ADVANCED LEVEL

Beyond the previous levels

Ideally, a group of students may have a mix of intermediate and advanced with some basic level participants. In that case, that knowledge can be used to assemble groups if possible (if the students do not have peer entrepreneurs or partners already established), or at least as a way to decide if some background previous training would be necessary, before entering the PBL process.

1

PROBLEM

- Are one of the justifying elements of blockchain (transparency, security, decentralization, etc.) clearly an important component of the problem?

2

CUSTOMER SEGMENTS

- Do the proposition require some knowledge from its potential users that may become an inhibitor?
- Are these customers in the sense that they pay you directly or are “users” of the decentralized app, that pay for their use to different actors in the networks? Are some of these actually not users but “partners” that will also benefit from the DApp?

3

UNIQUE VALUE PROPOSITION

- Is the unique value proposition reliant on the use of a blockchain or decentralization?
- Why is it different from the value proposition of similar non-blockchain applications?

4

SOLUTION

- Which of the elements of blockchain are important in the solution proposed?

5

UNFAIR ADVANTAGE

- This element is controversial in applications in public, permissionless blockchains, since they are by design typically easy to be copied (open source, fully documented) and there is no way of “buying” an application since its data resides in the public network and a company cannot have control of it.
- This may still have sense in consortium or private blockchains.

6

REVENUE STREAMS

- Is there a need to tokenize? Shall these tokens be utility or assets or both?
- Is the startup going to retain part of an initial launch of a new protocol or application? What will be the rules that can be considered “fair” for the users of the protocol?
- Is the startup engaging in collecting fees? Note that in general, these fees would be open to collection for any participant if in a public blockchain.
- Is the startup considering grants/VC or other sources of income for the development, different from those inherent to the tokenization if applicable?
- How all the above fits in a unified cryptoeconomic model? (this may not apply to private or consortium blockchains)

7 COST STRUCTURE

- For private or consortium: compare the hosting or blockchain as-a-service options.
- For public blockchains: in this case, for most cases the cost structure shall be analyzed in the protocol or DApp, and the startup will be one of the participants that will incur in these costs.
- For all cases: consider the difficulty in recruiting developers

8 KEY RESOURCES

- Which elements of a blockchain do you require to create value for your customers?
- The blockchain infrastructure should allow you to create, deliver and capture value... which are the blockchain key resources that are indispensable to your business model?
- You will not perform all key activities nor you will have all key resources so, which are the key partners / technologies that will leverage your business?

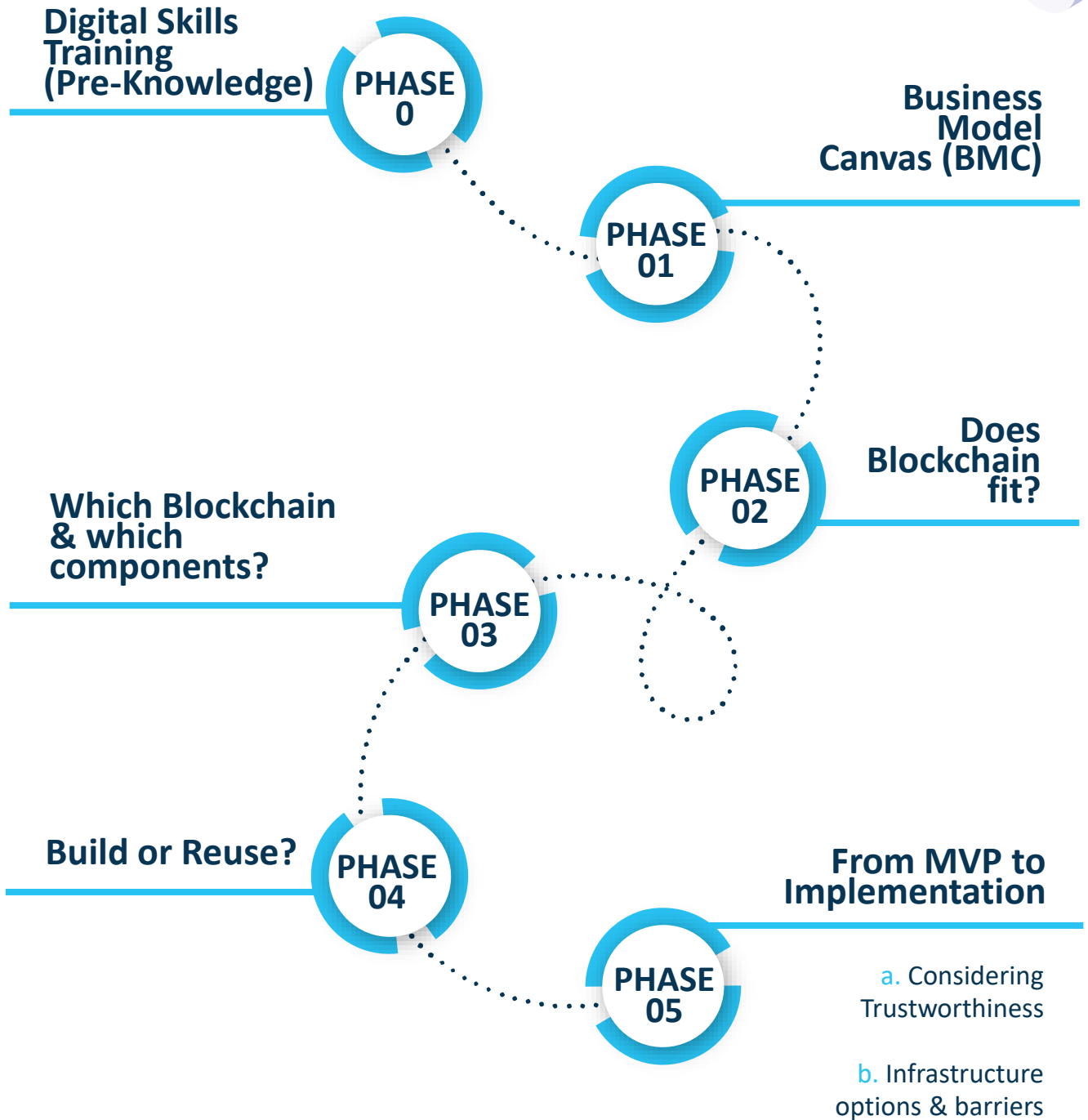
9 CHANNELS

- How value propositions are delivered to your customers (customer channels)?
- Are there different channels for the different customer segments identified?

It should be noted that the BMC especially in the case of projects that involve public blockchains becomes very different from conventional ones. This is to be expected due to the problems discussed above, and is the core of the training, since students would need to deal with a change in the way the conceptualize the model, if they are still not used to the idea of decentralized applications and protocols.

MAIN STAGES + SEQUENCING

From the above discussion, we describe here the stages and sequencing for the training, guided by the following diagram.





PHASE 0

The trainer may decide to provide some brief training of basic blockchain terminology and use to reach a basic level of understanding (as defined above), if some of the students had little or none exposure to blockchain. This can be as simple as some practical sessions using an in-browser wallet as Metamask to understand addresses, networks and transfers, and some input on the basics of the main blockchains as Bitcoin and Ethereum. However, it is possible to skip this step and let these gaps to be filled during the training, in which case it may be expected that the first PBL cycles may be devoted to them, maybe making the training more extended in time.

Business Model Canvas (BMC)



PHASE 01

This is still previous to the training, and it is a regular process of sketching a business canvas for a project that involves blockchain. The level of detail or concreteness needs not be high, as it is intended to refinement and change during the training. This can be done in an explicit training, for example in the case that students are in an incubator that already provides this kind of training.

Does Blockchain fit?



PHASE 02

This module requires critically assessing if a blockchain solution is the right one for the business proposed, so it is a validation of the initial business hypothesis. This can be done by identifying the key elements for that solution, which may or may not be already present in the Canvas. This also requires studying similar existing blockchain solutions and how they are different or limited with respect to the student's envisioned solution

Which Blockchain & which components?



PHASE 03

In this phase, there are several critical elements to be considered:

- Shall the solution be based in open, permissionless blockchains or private/consortium?
- Once (1) is clarified, which particular blockchain/solution? Which are the costs and benefits of existing ones and their degree of maturity?
- Finally, it is important to identify further elements of the solution. Notably, the use of decentralized file systems (as IPFS) or the need for decentralized Oracles should be considered here.

In this phase, the students need to evaluate the decision of building a new piece of technology (not a new blockchain but maybe a new protocol or DApp), or reuse or build on top of existing ones. If the solution is simple and the resources or initial funding small, reusing can be the right option.

Further:

- In the case of a public DApp, the incentives model need to be defined and tested here.
- In the case of private/consortium, the rights and obligations and roles of the participants in the business network need to be clearly specified.

Here there are three modules that may be optional in some cases. The decision procedure is described in the following Table.

CONSIDERING TRUSTWORTHINESS

WHEN TO USE IT:

- Blockchains are pseudonymous (except some exceptions that include privacy-oriented blockchains), and if the project requires some sort of private data to be held, there is a need to reconsider the use of a blockchain.
- In the case of a consortium network, if a number of companies share a blockchain, the activities of the others are in principle visible to each other, and this may reveal information or activity to competitors.
- Further, there is in general a consideration of ethical use of blockchains with regards to the business model. Users are in many cases unaware of consequences of their use of the DApps due to the technical complexity of the solution, and this needs to be accounted for.

INFRASTRUCTURE OPTIONS AND BARRIERS

WHEN TO USE IT:

- 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.

Here we describe the competencies that are expected to be acquired by all the students, and those that are optional. Then, we detail concrete learning outcomes.

C1 Be able to articulate and discuss the role of blockchains and decentralization for a particular use case

- Understanding the distinctive features of blockchain networks.
- Understanding how blockchains enable decentralized applications that are radically different from centralized ones.
- Identifying how a blockchain solution builds a protocol or DApp for which control cannot be allocated in a single organization

C2 Be able to choose the type of blockchain network required based on the participants, and required level of decentralization

- Understand the need of cryptoeconomic incentives in public permissionless blockchain applications.
- Selecting a public, permissionless blockchain or a private/consortium one based on the requirements and business model.

C3 Identify candidate blockchain technologies or networks assessing their features, level of maturity and other potential risks related to a use case

- Be able to compare blockchain networks and technologies based on technical features, and also on the history and evidence of the level of maturity and potential.
- Be able to identify components of a blockchain solution that also required decentralization, as decentralized file systems, oracles or indexers.

C4 Be able to take the decision to reuse or build components for a blockchain application based on the requirements of the use case and business model

- Design incentive mechanisms and evaluate them based on projections of their potential patterns of use.
- In the case of consortium blockchains, be able to create complete analysis of the rights and obligations of participants and motivate their interest in the participation.

C5 Be able to assess the trustworthiness of a blockchain solution, including how it meets requirements of privacy and confidentiality.

- Understand the limits and problems of privacy and regulation in blockchains and be able to take decisions based on that.
- Understand the problems of confidentiality in consortium blockchains and be able to apply technical means as private transactions to solve it.
- Evaluate the impact of the blockchain solution on its users and stakeholders from an ethical perspective.

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