

# Strategic innovation in financial sector: Blockchain and the case of Spanish banks

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## ***Abstract***

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Similarly to the rising of the Internet, Blockchain has the potential to disrupt multiple industries and make processes, more democratic, secure, transparent, and efficient. Entrepreneurs, startup companies' investors, global organizations and governments have all identified Blockchain as a disruptive opportunity to change the current paradigm.

Blockchain it is not much well known as Bitcoin, but it the backbone technology behind Bitcoin. Blockchain is a distributed ledger technology that offers immutability in transactions and implies a change on the system and it is also is one of the hottest technologies currently in the market. Furthermore, according to Google analytics, since 2013 Google searches for "Blockchain" have risen 1900%.

Banks are not characterized for being neither agile nor fast when embracing new technologies due to their legacy system. However, times are changing and new technologies are being offered. In order to adapt to new times and shifting to more scalable systems and interconnected world, banks will have to adapt to new technologies and embrace changes easily.

Strategic Innovation is an approach that brings together all the creative assets, capabilities and disciplines to an organization in order to work together on producing breakthrough ideas and driving new business growth. At this point it is intended to view Blockchain as an opportunity for the Banks that is needed to be treated as strategic in order to not be left behind by the fintech startup companies.

The main scope of this thesis will be indentify what functions in the financial landscape are suitable for a Blockchain based technology, focusing on banks in the Spanish region and more how strategic innovation could help on deploying this technology in banks.

**Key-words:**

Strategic Innovation, Digital Innovation, Financial Services, Blockchain, Smart Contracts

# FOREWORD

*This thesis would not have been possible without the support and patience of my supervisor Serdar Temiz. I would also like to thank Mr. Terrence Brown, director of M.Sc. Entrepreneurship and Innovation Management at KTH Royal Institute of Technology for this help, guidance and comprehension through all the process.*

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*I would also thank my family and my friends for the comprehension during this time and all the support received, especially to my parents and grandparents for their unconditional love and their faith on me on the hardest times and when I needed the most.*

"Incredible change happens in your life when you decide to take control of what you do have power over instead of craving control over what you don't."

Steve Maraboli, "Life, the Truth, and Being Free"

## ABBREVIATIONS

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DAO	Decentralized Autonomous Organization
Fintech	Financial Technologies
API	Application Programming Interface
M2M	Machine to Machine
H2M	Human to Machine
M2H	Machine to Human
SME	Subject Matter Expert
EURIBOR	Europe Interbank Offered Rate
ROI	Return of Investment
PSD2	Payment Services Directive 2
IMF	International Monetary Fund

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# 1. INTRODUCTION

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The word strategic innovation sometimes has a fuzzy meaning. It has been used to describe something that needs to be innovated urgently or with important consequences (Benveniste, 2013). Of course these definitions shed some light on the real meaning of this couple of words, but what really does strategic innovation so strategic? What is the difference between strategic and non-strategic innovation?

Many companies started to have its own innovation department within the company in order to be more competitive and able to adapt to the new times. Specially, technology companies who have to deal with the continuous change and cope with everything that it imply.

Although Blockchain is not a new concept and has been used for almost 8 years since the first confirmation of Bitcoin operations (History of Bitcoin, 2016) by Satoshi Nakamoto (Nakamoto, 2008), it seems it has become a hot topic over the last 2015 and it will continue being the buzz word for the financial technologies during the 2016.

Bitcoin could have negative connotations (Chuen, 2015)(the reason why will be more studied in further chapters), the fact is that Blockchain (which is the technology that Bitcoin runs on it)

Blockchain can be understood as a secure database ledger that is shared by different parties in a distributed network that record and store any transaction that occurs in this network. Thanks to this, it is created a transaction history that is irrevocable and also auditable. Those characteristics have made Blockchain the perfect technology to run smart contracts on it.

As we will see on chapter 2, the term smart contract is not something new. In fact, the first references for smart contracts come from the year 1994 by the hand of Nick Szabo (Szabo, 1994). According to Szabo definition, a smart contract is a computerized transaction protocol that executes the terms of a contract. The main objective of a smart contract is to satisfy the common contractual conditions but automated by certain amount of programmed lines of code.

Different participants have different views of the future of Bitcoin, but many big financial institutes have identified the underlying block chain technology as interesting for their financial software platforms. The scope for this master thesis is to analyze which is the current state of the Spanish financial sector and which are the main challenges to face in the near future and opportunities to develop its business within strategic innovation scope.

## **1.1. Purpose, goals and research question**

In this master thesis it is intended to analyze different types of innovation, particularly strategic innovation and the current status of Blockchain technology from the business side. Combining along both concepts and analyze how Blockchain could be adopted by Spanish banks firms within strategic innovation scope and which are the challenges and actions the system will have to take to make this change smooth. So, I considered 2 different research questions:

**RQ1: Can strategic innovation help Spanish financial sector with the Blockchain?**

**RQ2: Is the Spanish financial sector ready to adopt a disruptive technology such as Blockchain?**

This study has also the objective to create a generic methodological framework for the case of the banks that have the intention to adopt a new and disruptive technology, for this case the focus will be set on the Blockchain that will be seen in chapter 4. Large banks use to be old-thinking organizations and driving an internal change it is mostly of the times a hard and arduous task. The adoption of disruptive technologies that implies big changes internally and externally has to be planned taking in consideration many variables in order to succeed.

## 2. THEORY AND RESEARCH BACKGROUND

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### 2.1. Strategic Innovation

#### 2.1.1. Definition of innovation

Innovation has its origin on the Latin “*innovatus*” and it is related to the change that introduces novelties. In colloquial and general use, the concept is used specifically in the sense of new ideas, inventions and economic implementation. In the strict sense, however, it is said that ideas can only be innovations after they are implemented as new products, services or procedures that are really successful application

In economics, Joseph Schumpeter who introduced this concept in his “theory of innovation”, in which it defined as the establishment of a new production function (Schumpeter J. A., 1939). The economy and society change when production factors are combined in a new way. It suggests that inventions and innovations are the key to economic growth, and those who implement this change in practice how entrepreneurs.

Innovation could be also associated to process, products, methodologies or any kind of issue. When innovation is referred to a company, it is the process that helps a company to reach their goals, and helps to bring new ideas and products to a company. The world is forever changing, so companies need to ensure that they are continually innovative in order to be adapted to the constant changes.

#### 2.1.2. Types of innovation

Innovation can come from many ways. However, for the intention within this thesis innovation will be considered from the (4P’s of innovation) (Francis, 2005):

- **Product innovation-** are the changes in the things (products/services) that an organization offers to their users/customers
- **Process innovation-** this form of innovation takes in consideration the way in which the products are created and/or delivered to the user.
- **Position innovation-** this process involves a relocation of the user perception about certain product. The innovation coming from changes in the context in which the products or services are introduced
- **Paradigm innovation-** It is related to the mental models that define and frame what a certain business is about or what the organization does.

#### 2.1.3. Innovation process model

Once the types of innovation are defined, it’s convenient to understand how innovation is managed through the time, how the process of changing from legacy to “new” is carried on. There is a set of three main activities that take place: **search**, **select** and **implement** (Joe Tidd, 2005). At the same time, the latter one is divided into *acquire*, *execute*, *launch* and *sustain* (Joe Tidd, 2005).

### **Search phase**

This phase consists of detecting signals in the environment for the potential change. This phase could be embodied on new technological opportunities or changing requirements on the part of markets. These opportunities could be the result of legislative pressuring requirements on the part of markets, the result of legislative pressure or competitor action. Most of the innovations are the result of the combination of different forces: some of them come from the need of change pulled by innovation and others as a result from the push that comes with new opportunities.

At this point it will not be a surprise that organizations search with a criteria and seek in places where they expect to find something helpful. A key challenge in innovation management combines to the clear understanding of what factors shape the selection environment and the development of strategies to ensure that the boundaries of this are stretched.

### **Select phase**

Innovation inherently has a risk associated; even wealthy companies cannot take unlimited risks. When innovation is being considered, there's always a risk of failure despite everything was planned minutely. Therefore it is very important to select which technological opportunities and choices are made that fit with the firm's strategy and build upon established areas of technical and marketing competence.

The main purpose of this phase is to resolve the different inputs from the previous phase into an innovation concept that could be progressed through the organization.

### **Implement phase**

This is the latter phase of the process and consists on the realization of the initial ideas to a successful deliverable (new product or service, a change in process, a shift in business model, etc.). In some ways, implementation phase can be seen as the one that gradually puts together different pieces of knowledge and surge them into an innovation. Of course that on an early stage there is a high component of uncertainty coming from technological feasibility, market demand, competitor behavior or from the regulatory. However, this uncertainty is gradually diminished as long as implement phase goes on and this uncertainty is replaced with the knowledge acquired.

As said on the beginning of this section, **Implement** phase can be divided into Acquire, Execute, Launch and Sustain (Joe Tidd, 2005):

- **Acquire:** consist in acquiring the knowledge resources to enable the innovation (via technology transfer, strategic alliance, etc.)
- **Execute** the project under conditions of certain uncertainty that require extensive problem solving.
- **Launch:** consists on perform customer testing, developing a marketing plan and strategy, launching into an internal market.
- **Sustain:** once the innovation is performed, it should be continuously restudied and putted into further feedback in order to re-innovate.



*Illustration 1: Innovation process Model (Joe Tidd, 2005)*

#### **2.1.4. Definition of strategic innovation**

Strategic innovation is a future-focused business development framework that identifies breakthrough growth opportunities, accelerates business decisions and creates a near-term impact within the context of a longer-term vision in order to get a competitive advantage (Kaplan, 2012)

By combining traditional consulting models with creative approaches of innovation, strategic innovation framework inspires and guide cross-functional teams within an organization in order to identify new revenue streams, create breakthrough growth strategies, define new products and business models and stimulate new business relationships and rethink current business practices. Strategic innovation challenges an organization to look beyond its established boundaries and participate in an open-minded creative exploration. Note that has no space for the mundane, incremental product extensions (the “me-too” business models). According to (Heiko Gebauer, 2012), strategic innovation does not only consist of simple brainstorming-facilitated ideas nor the linear principles of strategic planning which only focus on extrapolating the past or attempting to predict the future.

The power of strategic innovation has two dimensions:

- **First dimension** it's founded on blending non-traditional and traditional approaches to business strategy by deploying practices from “industry foresight”, “customer insight” and “strategic alignment”.
- **The second dimension** consists on combining expansive possibilities and visionary thinking with pragmatic actions. It is a combination of exploring long-term possibilities while taking a down-to-earth implementation that led towards a short-term measureable business impact.

### 2.1.5. Incremental versus radical innovation

Incremental Innovation	Radical Innovation
Builds upon existing knowledge and resources	Requires new knowledge and resources
Competence-enhancing	Existing competence loses value?
Relatively small changes in performance / utility	Step changes in performance
The lifeblood of innovation?	Relatively rare

*Table 1: Incremental vs. radical innovation (Tony Davila, 2012)*

### 2.1.6. Innovation versus Strategic Innovation

Some organizations only rely on serendipitous acts of creativity to foster innovation or take an ad hoc unstructured approach. What they obtain as a result is only incremental improvements. However companies that apply strategic innovation have as an output a bigger business impact (Kaplan, 2012)

According to Soren Kaplan, Innovation becomes strategic when it is an intentional, repeatable process that creates a significant difference to the value delivered to the customers or within the organization (Kaplan, 2012). Strategic innovation generates a portfolio of breakthrough new businesses (See table 2).

Traditional approaches	Strategic Innovation approach
Adopt a “present to future” orientation – takes today as the starting point	“Starts with the end in mind” – identifies long-term opportunities and then “bridges back to the present”
Assume a rule-maker/taker (defensive/follower) posture	Assumes a rule-breaker (revolutionary) posture
Accept established business boundaries/ product categories	Seeks to create new competitive space/ playing fields
Focus on incremental innovation	Seeks breakthrough, disruptive innovation – while continuing to build the core
Follow traditional, linear business planning models	Marries process discipline with creative inspiration
Seek input from obvious, traditional source	Seeks inspiration from unconventional sources
Seek articulated consumer need	Seeks unarticulated consumer needs
Are technology-driven (seek consumer satisfaction)	Is consumer-inspired (seeks consumer delight)
May have a “one-size-fits-all” organizational mode	May experiment with entrepreneurial “new venture” or other organizational structures

*Table 2: Differences between traditional approaches to strategy and strategic innovation. (Kaplan, 2012)*



### 2.1.7. Dimensions of strategic innovation

According to (Kaplan, 2012), within the strategic innovation framework there are two main dimensions that are combined together in order to produce a range of innovative, growth-oriented deliverables. At the creative center of the framework there is a Managed innovation process that orchestrates external value drivers and Internal Organizational Drivers.

<b>External Value Drivers</b>	<b>Industry Foresight</b>	Provides a “top-down” perspective and a solid understanding of the complex forces driving change depending on the industry. This perspective includes emerging and convergent trends, competitive strategies, potential dislocations and alternative scenarios.
	<b>Customer Insight</b>	Provides a “bottom-up” perspective, a deep understanding of articulated or unarticulated needs of existing or potential customers.
<b>Internal Organizational Drivers</b>	<b>Core technologies and competences</b>	Assesses internal capabilities by taking a hard look at organizational competences and assets that could be released to deliver value to customers (it could include technologies, intellectual property and strategic relationships)

Table 3: dimensions of strategic innovation (Kaplan, 2012)

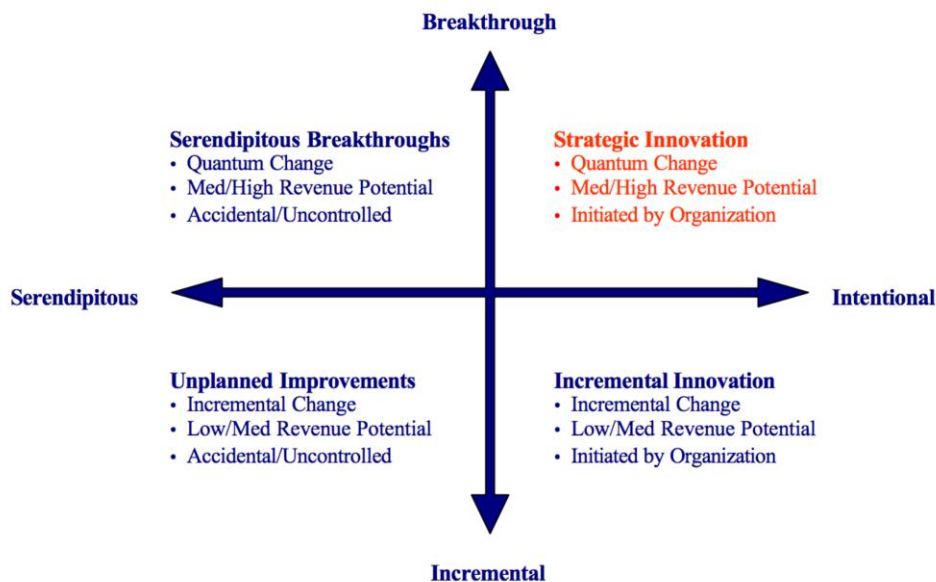


Illustration 2: Innovation models, adaption from (Kaplan, 2012)

There are eight phases that encompasses strategic innovation:

### 2.1.7.1. A managed Innovation process

Combines Non-traditional and traditional Approaches to the Business Strategy. Has its principle in a provocative “all-things-possible” perspective that challenges the status quo and calls for left and right brain thinking among an organization’s key stakeholders.

This approach includes facilitated workshop sessions distributed in mainly 5 stages (Kaplan, 2012):

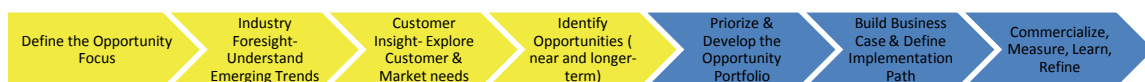
- Part information exchange
- Part exploration
- Part mediation
- Part creative invention
- Part improvise theater

The whole approach is divided into two phases: divergence and convergence:

- **Divergence:** Lies at the heart of the Strategic Innovation approach and is characterized as an open-ended explanatory creative thinking and future visioning techniques. This process includes market research and qualitative exploration of the market trends and speculates on an eventual industry discontinuity. As a result, breakthrough innovation opportunities can be identified.
- **Convergence:** This phase encompasses processes that resemble more traditional business planning and development and potential opportunities are evaluated, refined and subsequently executed. Throughout the entire process the focus is on short-term opportunities paired with the perspective of mid-long-term breakthrough growth opportunities.

**Divergence** –Discovery and Exploration

**Convergence** –Evaluation and Implementation



*Illustration 3: Strategic innovation process map. Based on (Kaplan, 2012)*

Although it could seem that there’s a sequence, in fact there is no rigid roadmap. The whole process is flexible and creative and provides the necessary elements that the dimensions of Strategic Innovation needs in real time.

### 2.1.7.2. Strategic Alignment

Strategic Alignment consists in choosing the key stakeholders on this collaborative process. It is important to select a core team with cross-functional knowledge and an open mind. This core team has four different perspectives: subject matter expert (SME), decision makers, implementer and freethinkers, the role of which is to challenge the team beliefs and assumptions.

In order to ensure ongoing support during the whole process, sponsorship from a single functional area it is not enough, and executive support should be gained.

#### **2.1.7.3. Sustainable Innovation**

If the aim is to succeed on long term, a platform for ongoing competitive advantage should be created. It is necessary to move from a process based on serendipity or unstructured approach (ad-hoc), where the inspiration may come from a bunch of “creativity consultants” once a year.

Inside the organization, this ad-hoc inspiration could be seen as an “another round of innovation” and therefore not receive engagement enough internally in order to accept and adopt it (Afuah, 2009).

The organization will need to intentionally and deliberately build an innovation-biased culture and develop innovation processes and methodologies that are appropriate. Internally and at organizational level it will be the need to regularly communicate the task, the trials, the failures and the successes. Although initially it is an as an overwhelming task, the results are rewarding and the initial effort worth it.

#### **2.1.7.4. Disciplined Implementation**

In the context of strategic innovation the concept implementation includes a broad set of activities that call for support and involvement across the organization: the transition to specific projects or programs, technical development, design and prototyping; test marketing; developing new business processes or creating new organizational structures.

The work of Strategic Innovation sometimes implies deep operational, structural and business process change. Other times an innovation effort may call for building a new “business-within-a-business”.

##### **2.1.7.4.1. Implementation Model for Strategic Innovation**

There are several High-level elements to be considered when it comes to the implementation model for strategic innovation:

#### **Implementation of the Skillsets and Mindsets**

Some of the team members will play a role through strategic innovation on an early stage, and others will be called to participate when the process unfolds. Whereas the Industry Foresight (2.1.6.7) and Customer insight (2.1.6.8) calls for a more explorative dimensions and imaginative mindset, Disciplined implementation calls for more pragmatic skills and based on “doing” and the executing. At this point, a mental flexibility in order to apply different decision rules to the new business will be required from the individuals and also the from the organization itself.

#### **Momentum**

Despite the initial enthusiasm and the apparent energy during the “Divergent” phase of an innovation initiative, there’s always the risk of going towards a halt. Organizational inertia, higher priorities or competing demands for personnel could endanger the process.

There are five strategic points that must be followed in order to maintain the momentum inside the implementation model (Kaplan, 2012):

1. Strategic alignment: If everything has gone well in earlier stages, the process will be based on solid foundation for cross-organizational support from organization stakeholders.
2. It is important to minimize the time reinventing the wheel. Creating ad-hoc practices on the fly only increases the time to market and inhibits further development of new ideas and products.
3. The initiative must maintain visibility. This can be achieved by a good communication strategy. In order to transmit business impact, senior management and key stakeholders must remain involved.
4. Demonstrate early success, particularly when the effort is highly strategic and requires senior management to make long-term commitments.
5. A rigorous and formal Project Management approach creates itself performance and momentum.

#### **A formal Project Management Approach**

For delivering and creating business value the strategic thinking has to be converted to actionable projects.

#### **An Understanding of Organizational Priorities**

It is very important to be aware of how the organization prioritizes and continue its initiatives. An ad hoc decision process could consider any initiative as a potential risk.

One possible solution that could mitigate this risk is that the members of the cross-functional innovation team would have linkages with other change initiatives. This would allow having a broad perspective on the relative importance of other internal efforts and what are the interdependences between them.

#### **2.1.7.5. Organizational Readiness**

During the Convergence stage it is essential to have a clear understanding of company organizational readiness, which is the ability to act upon and implement innovative ideas and strategies. Even with the most inspired vision, innovative products and adequate funding, an organization may simply not be able to effectively implement. (Afuah, 2009) There are two dimensions that should be considered before investing money into newly identified growth opportunities:

- **Cultural readiness:** It measures how is the organization culturally and philosophically prepared to embrace innovation considering factors as business boundaries and thinking, innovation mindset, bias for collaboration, internal power struggles, willingness to embrace change and penchant for action.
- **Operational readiness:** It is an organization's ability to take the action depending on factors such as suitable organizational and technology infrastructures, efficient business

processes and practices available funding, available and qualified staff to assign to specific projects.

#### **2.1.7.6. Core Technologies and Competences**

In order to leverage core competences for strategic innovation, technical and operational capabilities should be considered. Capabilities that are integral to an organization success yield significant customer benefits, and provide competitive differentiation. A solid understanding of the core competences and technologies creates the perfect environment where imaginative ideas are shaped into practical opportunities where it is worthy to invest.

In large organizations with multiple business units, one group may have developed its own operational processes and have valuable competencies and best practices to share. In order to make them viable, short and long term innovations must possess a link to core competencies (Kaplan, 2012).

#### **2.1.7.7. Industry Foresight**

Based on (Kaplan, 2012), industry foresight consists on a top-down approach that explore which are the trends and enablers and also the opportunities on one or more industries. If companies want to create breakthrough they must go and look beyond their limits and boundaries. A good solution might be creating a panel leader, where the different leaders collaborate within the working environment.

#### **2.1.7.8. Customer Insight**

Although mostly of the organizations consider them as customer driven, the fact is that the majority fail on having identified perceptions and needs of their customers and also their behaviors.

Companies should shift from product driver to customer driver perception in order to identify customer behaviors and customer needs. The process of going towards more customers oriented does not require extra effort; but it should go beyond than simply soliciting customer response: they may call for an action in order to explore fertile opportunities or unarticulated needs.

The process of shifting towards more customers oriented could be also extended to partners, suppliers or investors additionally to the customers. In fact, there is a big opportunity on involving customers as partners in the innovation process by adopting Customer Insight approach. (Kaplan, 2012)

## 2.2. Blockchain

### 2.2.1. What is Blockchain?

The Blockchain story started back in 2008 when an anonymous person under the pseudonym of Satoshi Nakamoto wrote a paper (Nakamoto, 2008) that intended to start a revolution in digital payments by setting up the framework for a new a cryptocurrency system named Bitcoin.

Bitcoin is a network that allows its users to exchange a digital asset that has the same name of its network: Bitcoin. The main difference regarding to the former digital assets networks is that with Bitcoin the problem of double spending (which consists in being easily replicable and allowing the user to double spend them) is solved and also the need of having a central counterparty for transactions between two entities. The public database where the transactions are distributed and properly recorded by the network node has the same as the technology (Blockchain).

In fact this was not the first initiative on history when it comes to digital payments since in 1980's David Chaum in two publications (Chaum, Blind signatures for untraceable payments, 1983) and (Chaum, Security without identification: Transaction systems to make big brother obsolete, 1985) introduced the idea of digital cash and after this, some institutions attempted to made some cryptocurrency commercialization by introducing e-gold or e-cash. Although all the efforts, those initiatives did not succeeded because of reasons as network centralization structure, lack of regulatory benchmark compliance or the use of centric based network (Frisby, 2014). Although the first application of the Blockchain came with the Bitcoin, we should differentiate the anonymous and controversial cryptocurrency from the technology that is used on this technology.

From a technical point of view the Blockchain is defined as a distributed and replicated database that allows secured transactions without the need of a central authority that validates the transactions and therefore Blockchain could be seen as a decentralized autonomous organization (DAO). This organization could run completely autonomously, decentralized, transparent and secure thanks to the Blockchain.

All these features seem pretty interesting, but what does Blockchain offer? (Champagne, 2014)

- *Decentralized*: It means that it can run entirely through all the nodes of the network. A Blockchain network is composed by several nodes (for the particular case of Bitcoin is 7025 –see illustration1) that are independent and every node have the same copy of the ledger.
- *Transparent*: All the transactions are public and the network is open to everyone (this last condition could be slightly different depending on the nature of the network)
- *Autonomous*: Each node is autonomous in the sense that doesn't have need of a central organization that coordinates the transactions. This is functionality is possible because the network has protocols that dictate the rules of all transactions on the network.
- *Secure*: The Blockchain network is secured thanks to cryptographic algorithms that are set by the members of the network and the consensus set among all the participants.

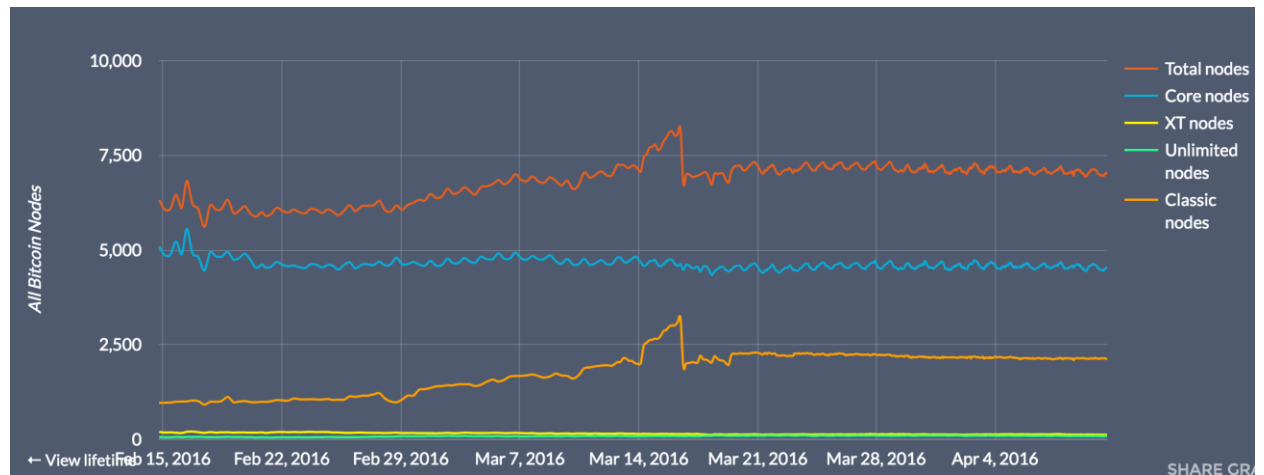


Illustration 4: Number of all Bitcoin network nodes. Source (B.K.)

## 2.2.2. Technical aspects of Blockchain

Since the Blockchain intends changing the rules of the game by cutting out the role of a central entity that validates the process, from a functional point of view a Blockchain network is composed by mainly two types of participants or entities: **participants** and **peer-to-peer network of nodes**.

- **Participants:** The participants are those entities (private or public) that perform the operations and transactions through cryptographic signatures.
- **Peer-to-peer network of nodes:** All the nodes are in charge of validate and store a record in the ledger all the transactions made by the different participants.

Once we have met the principal components of a Blockchain network it's time to disclose where the name of Blockchain comes from.

The origin of the term comes from the union of two words: "Block" and "chain". In order to put some light on the origin of the term; it is needed to visualize how validated transactions become recorded into the network.

All the transactions made by the participants are grouped in blocks (there is still a current discussion about what is the amount of transactions that should be grouped in each block in order to make transactions more efficient (TradeBlok, 2015) that are submitted to a network validating nodes. Once a block is validated, it is accepted and subsequently broadcasted to the network and added to the top of the Blockchain with a timestamp and a reference to the previous block (Bonneau, May 2015).

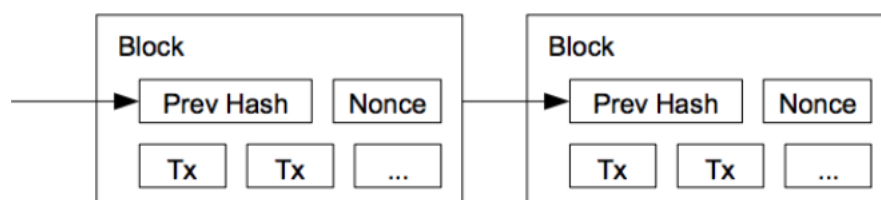


Illustration 5: Representation of two blocks of the Blockchain network. Source (Nakamoto, 2008)

Through the consensus process among the different nodes of the peer-to-peer network is guaranteed the transactional security. Once a block is validated, it is broadcasted throughout the

network and is verified by each node. In case of the verification process works fine, the local copy of the database (ledger) is updated. This update consists in only adding this new block to the existing chain, but the previous block cannot be altered as it can be seen on illustration 5.

All Blockchain nodes among the network are controlled through a protocol that is embedded on the Blockchain software. This protocol detects and determines which is the state of the database even the database is empty (it means that there is not a previous copy of the ledger) through a process that receives the name of consensus protocol. Thanks to this process is added a special Blockchain feature: Immutability. A Blockchain is immutable in the sense that once a block is validated currently it is not feasible to change the Blockchain without tampering evidences that could be checked at some point (Bitcoin Network Capacity Analysis – Part 1: Macro Block Trends).

A Blockchain network can be composed on different ways and depending on the morphology of the network, there are different types of consensus protocols that can be identified (Wattenhofer, 2016):

- **Proof of Work:** Is the mechanism used by the Bitcoin Blockchain. It is based on solving a mathematician algorithm. The winner (i.e. the first node in solving this quiz) is the node that will have the permission to validate all the transactions. This consensus method is the less efficient since the average work required is exponential in the number of zero bits required and can be verified by executing a single hash (Nakamoto, 2008), but as the same paper states, it must be a tradeoff between security and energy consumption; that's why the network (in that case Bitcoin network) rewards with certain amount of Bitcoin the validator node.
- **Proof of Stake:** In this mechanism, the validating nodes are required to previously agree on a consensus of how the permission to validate transactions will be valid by putting certain amount of assets "at stake", so that if they become malicious, they can lose the stake. So that it is a disincentive to become malicious. (Buterin, Ethereum blog, 2014).
- **Byzantine-fault-tolerant:** This mechanism is based on a consensus method between authenticated validators and is resistant to the possibility that a subset of the network nodes behaves maliciously, named byzantine attack (Miguel Castro, 1999).

Depending on the permission of the network, there are mainly two categories of Blockchain networks (Prisco, Bitcoin Magazine, 2015):

- **Permissioned:** Anyone can access to the network since the access is free and also there's no restriction for setting up a node and validate transactions. Examples of this category could be Ethereum and Blockchain.
- **Permissionless:** The access to a permissionless network is restricted and only a set of known participants who previously set up the rules of the transactions is granted. New members can join according to a previous agreement settled among the different participants.



Additionally to the categories we've seen previously, there is also a particularity when it comes to who can or cannot access on the distributed ledger. Blockchain can be public or private and the differences between one and the other are the following: (Buterin, Ethereum Blog, 2015)

- **Public Blockchain:** on a public Blockchain anyone of the world can read and anyone can send transactions and expect to see them included to be validated. This Blockchain is open to the world and anyone in the world can participate on the consensus processes (consensus process is a process that involves different participants in order to accept if a transaction is valid or not).
- **Consortium Blockchain:** is a type of Blockchain network that sets the consensus process according to certain amount of a pre-selected set of nodes. Those participants can read or write depending on their permissions. On this network topology, the right to read can be public or restricted.
- **Private Blockchain:** Private Blockchain is characterized for having a centralized permission to an organization. Permission for writing or reading can be public or restricted depending on the needs of the network and these properties can be configured for each participant. Participants can act with different roles and profiles (auditor with no rights to writing, database management, among others)

## 2.3. Smart Contracts

### 2.3.1 Origin of the concept

According to (Rocket Lawyer, 2014) a contract in a traditional is a “way of seeing it is an agreement between two or more parties to do or not do something in exchange for something else”. In order to fulfill its side of the obligation, each part must trust the other part. In case that at least one part does not fulfill its obligation, a contract becomes invalid.

The concept of Smart Contracts is not something new. The computer scientist Nick Szabo coined this term on 1993, with the aim of emphasize what he found high evolved practices of contractual relationships on the design of electronic commerce protocols between strangers on the Internet

On his first paper, Szabo did not have a proper platform for implanting smartcontracts according to his definition (trust in a central authority had to be assumed to some extent). With the release of cryptocurrencies the idea of smartcontracts started to have more importance and feasibility since they provide a secure way of proving performance in decentralized structure. (Szabo, 1994)

In Blockchain context, contracts become smartcontracts. From a Blockchain point of view, Smartcontracts go beyond the typical procedure seen on Bitcoin where the purpose is to buy or sell through a cryptocurrency.

### 2.3.2 Characteristics and technology

Smartcontracts add three features that cannot be seen in regular contracts and therefore make smartcontracts different than all what it was seen up to date from regular contracts. (Swan, 2015)

- **Autonomy:** Once the clause is initiated or activated by the initial agent it can be running without the need of any other interaction of the initial agent.
- **Self-sufficiency:** A smart contract is self-sufficient in its labor of marshaling resources and manage the transactions among the different partners in the transactions.
- **Decentralization:** Smartcontracts are distributed across the different nodes of the network without having a particular fixed point.

### **3.1. *Research approach***

In this section it is intended to cover the methodologies that are used in order to answer the formulated research questions stated on the section 1.1.

Inductive research logic will be applied for this thesis (Jebreen, 2012); where through theories on innovation and strategic innovation along with Blockchain papers that shows what is the state of the art of such technology. Combining all of this, in chapter 4 will be defined what are the challenges that banks in Spain will have to face.

According to (Jill Collis, 2013), an inductive research describes a study in which theory is developed from the observation of empirical observation of the reality and general inferences are induced from particular instances. It is the opposite direction compared to deductive research, wherein it is described a study in which a conceptual and theoretical structure is developed and then is tested by empirical observation.

After different observations, as it was presented in section 1.1 the definition of an adoption path for disruptive technology will be created. For all the observation process is also intended to use different literature, case studies and white papers from different vendors, research centers and companies. Additionally, thanks to my current job position I could meet and talk to several of the companies shown and also attend to many events and (Fintech events and congresses), that helped me to broaden the knowledge of the Blockchain and Spanish current financial situation.

### **3.2. *Collection of Data***

Qualitative data has been obtained from the triangulation of different partners that use to work for a bank when creates innovation. Therefore it was considered to include the technological partner vision, the regulator but in its defect it was considered the expertise of a legal Blockchain specialist and finally the vision of a consultancy firm for the innovation.

Primary data is this kind of data that has been generated from an original source whereas secondary data is this kind of data that has been collected from an existing source (Jill Collis, 2013).

#### **3.2.1. Primary data**

Empirical data has been collected from a set of interviews guided by open questions and conducted by online meeting using Skype or face to face when it was possible. The reason why some of them were based via online-meeting is due to that two interviewees were one in Madrid and another in New York.

The questions and answers as a result of the transcription of the interviews are found in Appendix A.

Here are the relations of field-interview:

- **Blockchain technology**  
CEO of important Company based on New York (Blockchain and emerging technology consultants). More than 10 years of experience.  
Innovation senior consultant for international Firm (EVERIS) an NTT Company. More than 7 years of experience
- **Innovation area and also Blockchain specialist**  
Team lead of innovation department IBM. More than 10 years of experience in the field of innovation and banking.
- **Regulator point of view and expertise and also Blockchain entrepreneur**  
Lawyer and Blockchain specialist consultant and entrepreneur at Grant Thornton.

Interviewees were established through LinkedIn contacts and also from personal network. As initially introduced I've been working in financial sector for more than three years and currently working as digital innovation project manager. This position has made me able to attend to numerous conferences and events where I could meet and create a solid network of experts in this field.

Regarding to the meeting and interview procedure, interviewer made an introduction on the area of study and then started a question-answer dialog that last for at least 30 minutes. Interviews have been transcribed and as mentioned later, some of the parts have been omitted due to privacy of the interviewees and company policy / non disclosure agreements signed with their customer.

### **3.2.2. Secondary data**

In order to supplement primary data, secondary data has been used. This secondary data consist in specific and relevant literature on Blockchain, innovation and finance. Reports and white papers were also considered. Due to Blockchain is a very incipient technology, some of this information had to be found on the blog of one of the most charismatic and expert person on this area, Vitalik Buterin.

## **3.3. Limitations**

Although there are many sources that refer to Blockchain and also to Innovation, I am aware that information released by the Banks it will be biased because of strategically and political reasons. Many times banks do not want to disclose certain information because of the fear of the fierce competence. Taking this in consideration, the information chosen will also be minutely gathered and questioned.

Additionally, due to limited timeframe, the number of interviews conducted is 4. Although the scope is based on a qualitative research it might have been interesting having more inputs from experts on the field of the innovation and finance.

Although participants stated that wanted to be impartial on their answers, some bias in favor to the technology studied could be found since they are experts on the Blockchain.

Another limitation is the fact that it was intended to contact the head of innovation of the main banks but it has been almost impossible to reach them in so short time notice. The fact of not having internal opinion of the banks and a particular voice speaking for each of the main banks of Spanish financial sector makes this study more holistic and general. This weakness will be mitigated with meticulous study of the public information released by banks. Although all this limitations, it should be also told that interviews and data obtained from those interviews is from reliable and trustworthy sources with many years of experience and vision in the sector.

### **3.4. *Delimitations***

Given that Blockchain is currently a hot topic and there's huge amount information and also the field is too broad. The scope on Blockchain will be focused mainly into banking applications although general information for non-experts on cryptocurrencies and information systems will be also provided.

In this study technical details will not be questioned but will be shown the necessary information to understand the case and how disruptive is the Blockchain regarding to legacy systems.

It will be also studied an Innovation and strategic innovation framework and finally will be applied to a particular case for Spanish banks, disregarding a particular or specific case of a Bank since it was intended to do it initially but banks were reluctant to share their strategy due to logical reasons.

### **3.5. *Research paradigm***

The research performed along the elaboration of this study relies on the interpretivism. According to (Jill Collis, 2013), interpretivism is a paradigm associated with the use of qualitative data that involves an inductive process. The origin of the qualitative data used in this study are four deep interviews with open question to experts in the field of Blockchain and the financial sector and also keen in the field of innovation.

In order to achieve a holistic vision, and perspective, it is needed to take in consideration all the elements involved in the process (Patton, 1990), in that sense, additional literature has been used for the proper understanding of all the matters. Patton also accepts that for a case studio scenario, if the data is scarce it is correct to use a qualitative method. For the particular case of Blockchain, the amount of information is huge, but tightening for the specific case of Spanish banks, and what is its current status, this information becomes scarce and from unreliable sources unless it is a specific publication or press release from the involved bank.

### **3.6. Ethics and Sustainability**

During the process and all the phases that have been followed in this master thesis, there are several ethical considerations that have been taken in account. First of all, all the activities done by the researcher have been performed individually (research, data acquiring, examining the data and also conclusions).

All the interviews were done with the consent of the interviewees and some of them were done presently and others by Skype or telephone due to their different origin (New York, Madrid, Barcelona, or San Francisco). According to the book (Jill Collis, 2013), interviewees must have the right of not disclosing their identity or some sort of data. Furthermore it states that interviewees must not be coerced to answer and suggests not offering any kind of economical reward for the interviews.

For the interviews performed for this thesis, all the aforementioned good practices have been followed: all interviewees answered openly kind and in case that some of the questions they found out that were not in disposition to answer (due to not knowing the answer or they just wanted to avoid problems with any NDA signed) they just said they could not answer. For the case they did not answer, questions were not shown since they were more comfortable with this situation.

In that case, in some of the interviews, due to confidentiality and also internal company policy, interviewees preferred to not disclose their identity and their input is not in the name of the institution they are working for. Their input is rather based on their expertise in the field.

Additionally, some of the data and also some of the data have been omitted in transcriptions under their requirements and also due to internal policy.

Interviews were conducted in English although not all the interviewees had English as their mother tongue language (Catalan, Spanish or Indian).

Regarding to sustainability, there have been many studies in order to analyze what is more efficient, if a distributed or a centralized network. According to (Valancius Vytautas, 2009), by delivering content among the Internet, energy can be saved. The World Commission on Environment and Development in 1987 coined the definition of sustainability as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*” (WCED, 1987). The subject of this research (The Blockchain and strategic innovation), helps in part in order to save resources and make more efficient the transactions along the network. In that sense, it is possible to state that the Blockchain in Spanish banking paradigm can contribute to a more sustainable future.

## 4. BLOCKCHAIN IN FINANCE SECTOR

### 4.1. Current situation

The habits of the different customers has also changed when it comes to the way of interacting with the administration, shopping, consuming media contents and why not, the way of doing business with their banks. Some of the causes can be found on the smartphone penetration due to the lowering of the price of the mobile devices and the low fares that mobile operators are offering for 3G and 4G Internet access.

The financial sector has experienced an unexpected change during the last few years: Customers are expecting a more customized applications and customer oriented treatment from banks, and it is in fact a good sign that the sector is getting more and more adapted to the current times. Banks in fact have all information they need to process it and deliver right away what the customer needs. With their incomes, receipts, taxes and when and where they buy, the information to process is huge.

Additionally, the financial crisis started in 2008 has forced many banks and in order to cut costs and on the last quarter of 2015 and beginning of the 2016 the low interest rates (mostly based on EURIBOR –Table 5-) and lack of credit toward small customers, just affected the results of the main banks.

VARIATION PER :	01/04/2016	01/02/2015	01/02/2014	01/02/2013
Euribor - 1 week	-0.251%	-0.020%	0.183%	0.080%
Euribor - 2 weeks	-0.241%	-0.011%	0.194%	0.088%
Euribor - 1 month	-0.210%	0.016%	0.214%	0.109%
Euribor - 2 months	-0.168%	0.044%	0.251%	0.150%
Euribor - 3 months	-0.132%	0.076%	0.284%	0.188%
Euribor - 6 months	-0.041%	0.169%	0.387%	0.319%
Euribor - 9 months	0.002%	0.243%	0.478%	0.433%
Euribor - 12 months	0.058%	0.323%	0.555%	0.543%

*Table 4: EURIBOR rate variation (Source: European central bank)*

Financial services industry is a high regulated and generates upon hundreds of millions messages that should be stored safely and away from malicious entities that could use this data on their own good.

Another of the factors to watch is the incursion into the financial sector of big internet companies such as Apple, Samsung, or Alibaba, which recently offer financial products or ways of performing payments, in order to offer additional services to services they offer already. On the

other side, there are the mobile operators, which use their force and power into the market for offering similar services for payments.

From the interviewee 1 and 3 it is understood that banks are trying to find new ways of segmenting the market within the Blockchain scope and searching for new ways of increasing their productivity and profitability by using this new technology on their daily operational processes and they understand that there's some potential on it. However, in order to grasp these potential, banks must understand that by ending up using this technology customers will also be a part of the internal value delivery chain and must understand and be ready for the new insights and opportunity streams that are forthcoming.

Visionary Banks have to provide a business insight in the context, the demand and into every single point of interaction through the analysis of every available piece of information in their hands.

The characteristics of Blockchain are really interesting in financial sector since transparency; security and trust in transactions are the foundations of the system.

According to (Mainelli, 2015) can be identified three main catalysts of why Blockchain is getting more and more relevance over the fintech dialogue:

1. Shared ledgers have existed since 1970's but the concept of immutable entries have been made a reality by the use of cryptography and increased computer processing power.
2. Advancements in speed in other areas of finance make settlement times and money transfer look archaic and costly
3. Compliance changes, capital regulations and low interest rates are continuing to burden Banks with margin pressures

Banks still have lot to be gained from freeing up the sticky mechanisms used for clearing, settlement and internal ledger management.

In traditional systems, a central authority is in charge on connecting the nodes and establishes rules. This legacy systems owned by banks have are way expensive to maintain and large amount of employees are needed to monitor the workflow of thousands of transactions. It is notable that there is room for improvement. It will be further studied in chapter 4 but in order to summarize, the main improvements will be on the following areas within a bank:

- **Costs:** Blockchain pretends to reduce costs of paying a middle man or running a manual back office processor as currently is.
- **Capital:** Settlement risk derived from interbank transactions is minimized with automation due to there's no risk that the other part run out of capital.
- **Speed:** Transaction processing time is decreased and transactions are simplified since many times the days for settling a transaction is T+3 and up to T+30.

Big majority of big banks have started toying with Blockchain and developing prototypes but the development is far from the idealism of a fully distributed network where all the participating banks use the same protocol and where "real" money is transacted.

The passion with which banks and financial institutions have "bought" this idea is clear with the huge investment of Banco Santander in Ripple (Novoa, 2015), BBVA Coinbase (Rizzo, 2015),



or 22 banks these days are gathering in London to "design and implement technologies Blockchain based on the financial world. "

But against this fervor is always the worldly version stating that the only effect of the Balm of Gilead was his laxative capacity and the risk that eventually this effort comes to nothing by poor Bitcoin knowledge and forces who have made possible the Blockchain.

It is possible a Blockchain without Bitcoin? In fact Bitcoin and Blockchain are two related concepts. Of course the Bitcoin Blockchain is strong because their amount of users, but for the financial case (where the banks do not want to use Bitcoin) it is a completely different paradigm. If the banks create their own Blockchain (private) then there's no need to reward someone with Bitcoin, then the need of having Bitcoin disappear.

## **4.2. Regulations**

Together with scalability, regulation scope is one of the major concerns for banks and start-ups that are experimenting with distributed ledgers. Regulators are currently still getting to know the Blockchain. Truth to be told, Blockchain technology has many attractions to the regulations since they are looking to improve the robustness of financial and capital market infrastructures. Nevertheless, there are some questions regarding to the legal and jurisdictional issues that still need to be solved (Guadamuz, 2015).

Regulators always play a reactive behavior (Barth, 2004) and it is not expected that will head a proactive guidance on the future nature of Blockchain regulation any time soon. Currently, regulators have much pressing problems as they struggle to finalize the post crisis regulatory overhaul by the end of this current year 2016.

However, recent news from the last 29<sup>th</sup> April 2016 reveals that regulators commented that with new innovation brings new risks, but that crypto currencies and shared ledgers represent a cheap and efficient global payments infrastructure, the use of which should not be over regulated at this time (Patrick, 2016).

Those are good news since regulators start to consider that Blockchain could bring potential benefits since it will help to improve market infrastructure. Other benefit derived by the use of Blockchain refers to the banking supervision: if Blockchain works as it is expected, regulators could carry out stress test on the banks without having to rely on the banks to provide them with the data.

This regulation came just after the European commission found more than 70 potential risks of Bitcoin that may affect users, market participants, and financial integrity – by easing money laundering and other financial crimes. (Perez, 2015). From the interviewee 4, a legal expert on the Blockchain there are some key positives and also key negatives that can be taken in consideration:

Key positives	Key negatives / Challenges
More transparency	Lack of legal clarity over ownership
Reduced counterparty risk	Jurisdictional clarity
Greater diversity in settlement systems	Too systemic for start-ups
Infrastructure cost is reduced	Can AML and KYC be dealt with?
More automation	Problems related with automation and lack of human controlling: what happens if the circuit is broken?

*Table 5: Pros and cons that regulator will take in consideration (Source: Interviewee 4)*

### **4.3. Initiatives**

As the interest for Blockchain in financial sector has been increased and many initiatives have been launched in order to create a new paradigm on the field. It was taken in consideration mentioning and also studying them (Source: interviewee 1)

#### **R3CEV**

Is a consortium currently composed by more than 50 banks that started on September 2015 with 9 financial companies: Barclays, BBVA, Commonwealth Bank of Australia, Credit Suisse, Goldman Sachs, J.P. Morgan, Royal Bank of Scotland, State Street, and UBS. The scope of the banks associated there is to empower the next generation of global financial services technology and define the protocols and technology of the future-banking ecosystem by exploring the Blockchain opportunities and get to know the technology (Interviewee 1 and (R3CEV, 2016).

#### **HYPERLEDGER PROJECT**

The Hyperledger Project is a collaborative effort that was created to advance Blockchain technology by identifying and addressing important features for a cross-industry open standard for distributed ledgers with the objective to transform the way business transactions are conducted globally. Many innovative technology companies and banks are taking part. Actually, IBM just joined recently (Prisco, BitCoin Magazine, 2016). Input from IBM could be very valuable since their main customers are banks and they know internally how t banks work and which are their strong and weak points.

### **4.4. Blockchain Startups to consider**

There are several startups that are trying to disrupt the banking market and willing to change the current banking ecosystem whereas other startups accepted that banks are one instrument of the system that cannot be replaced and instead to compete with them, they try to cooperate in order to create synergies. The startups considered below are the result of a research based on their potential impact to the market and also the investment that Venture Capitalists have done and also by attending to several conferences and meeting with them.

Name	Description	Focus
<b>R3CEV<sup>1</sup></b>	Leads a group and of 40 global banks for R&D on Blockchain financial services	Commercial paper settlement, trade finance, OTC derivatives
<b>Digital Asset Holding<sup>2</sup></b>	Assist banks in post trading transactions. Founded in 2014	Corporate syndicate loans, US treasury Repo central clearing
<b>Ripple Labs<sup>3</sup></b>	Developed the Ripple payment protocol that can be used with any currency and runs over XRP coin.	Cross-border payments using the Ripple Protocol
<b>Credits<sup>4</sup></b>	It is an hybrid platform that allows banks to join multiple ledgers that receive the name of cross-chains	Encrypted digital identities and Blockchain to process any asset class
<b>ItBit<sup>5</sup></b>	Uses private and permissioned ledgers. Operate Blockchain for faster transactions	Gold trading, securities settlement

*Table 6: Blockchain Fintech Startups to watch (Source: Interviewee 1 and the involved startups WebPages)*

## 4.5. Smart Contracts

### 4.5.1.1. Smart Contracts and Creative destruction

As Joseph Schumpeter said, “Innovations imply, by virtue of their nature, a big step and a big change ... and hardly any ‘ways of doing things’, which have been optimal before, remain so afterward” (Schumpeter J. A., 1939)

Creative destruction refers to an innovation process or incipient product by which new production replace the outdated one. This process allows aspects of macroeconomic performance; in long term creative destruction contributes to the economic growth of the society. (Schumpeter J. , 1942)

When it comes to the disruption in the current business model, companies are increasingly experimenting with and implementing ways of smartcontracts for short and long-term advantage. The main issues are to think that data could become an important asset and also the need to building the capabilities necessary to capitalize the systems that will allow smartcontracts to run and last, but not least, embrace the creative destruction of today’s business models.

It is true indeed that smartcontracts do not make anything possible that was previously impossible. What is offered now is the allowance of solving common problems in a way that it is minimized the need for trust. This trust could be faced between both human interacting, or different combination as Machine-to-Machine communication (M2M) or Human to Machine (H2M)

<sup>1</sup> <http://r3cev.com/>

<sup>2</sup> <https://digitalasset.com/>

<sup>3</sup> <https://ripple.com/>

<sup>4</sup> <http://credits.vision/>

<sup>5</sup> <https://www.itbit.com/>

It brings us to the debate if a smartcontract creates a need or if it solves a need, but this it is intended to be further discussed on conclusions and further research.

#### 4.5.1.2. Use cases and value creation

It is difficult to separate Blockchain use cases than smart contracts applications. Smart contracts run over Blockchain and its applications combines some of the Blockchain network flavors.

Taking this in consideration, some of the identified use cases on finance sector are:

Use case	Description on how creates value
<b>Loans</b>	A loan can be seen as a smart contract. In that sense both parts have the information with the collateral. In case that the borrower misses certain amount of payments, the contract is executed and the keys for accessing the house deeds revoked.
<b>Inheritances</b>	The assets are digitally stored into the Blockchain network and once the smartcontract is executed by the trigger condition (someone dies), the contract goes into effect and the assets given away.
<b>Escrow</b>	The contract is settled as an escrow account where the buyer and the payer have a digital agreement (although this agreement can be between more parts). Then, the buyer executes a transaction for the amount of currency of the product that buys. This money becomes blocked and safely stored by a third party (Smartcontract) Once the product is sent and received, the money becomes unblocked and is automatically transferred to the seller's account.
<b>Cryptocurrency wallet controls</b>	Wallets are currently controlled by contracts that include several rules and controls: daily limits, exchange currency rate, revoke transactions towards certain entities. These rules could be automated and controlled by rules given through smartcontracts.
<b>Capital markets</b>	In capital markets there are thousands of transactions that could be automated, as buying / selling stocks, dividends, settling bonds or many others, depending on several business rules.

*Table 7: Use cases for finance sector. (Source: Interviewee 1)*

## 5. DISCUSSION AND CASE STUDY ON STRATEGIC INNOVATION FRAMEWORK ANALYSIS IN SPANISH FINANCE SECTOR

Spanish banks are experiencing leaner times with the traditional business. Net profit that came from taking and lending money is narrowing each day. Big majority of the earnings are in the services, and taxes paid for their customers for using their bank machines and many other alternative ways. Retail branches are currently a cost rather than a point of sale and the big majority of banks are shifting towards a major digitalization process.

The bank digitization has become a challenge for the sector. For half millennial, banks have been based on the retail, where customers had to go to a physical office in order to formalize their transactions and at the same point, lately the branches have been a place where the bankers tried to sell products to the customers based on their preferences and financial situation. Nevertheless, with the new Internet era, the situation has shifted and the banks are investing enough resources to continue the intense pace of advances and innovations in the technology industry. They are in the risk of losing customer, so therefore, the battle between entities is open (Skinner, 2014).

In Spain there are 5 main banks that rule the market nowadays (Table 8). Caixabank, Banc Sabadell, Banco Santander and BBVA are considered the most innovative and also the most important when it comes to revenues.

Rank	Bank	Assets in billion EUR (2014 FY)
1	Banco Santander	1,266.30
2	BBVA	631.942
3	CaixaBank	338.623
4	Bankia	233.649
5	Banc de Sabadell	163.396

Table 8: Total Assets, EUR billion. Source: (Realbanks, 2016)

Regarding to what the press says to de Spanish Bank digitalization (Farrés, 2016):

Caixabank
50 % of operations outside office Caixabank was one of the first to bet heavily on it. Rivals accuse him of having better marketing strategy than real product, but the investment in recent years has paid off. The president of the organization, Isidre Faine said in the presentation of annual results that 50 % of transactions are handled each day are made outside the office . The digital strategy undertaken leads to the vast majority of consumer loans granted in 2015 (48 % on the previous year) will be awarded through remote channels. Only 31 % of all offices were signed, one tenth above requested through a mobile device and 24% granted via on line.

### **Banc Sabadell**

*Sabadell ensures that its penetration in the online market exceeds the other great Catalan bank. Where appropriate, 85 % of the transactions are conducted outside the office, 18% of sales of all types of services running on the Internet and customers of the bank are connected on average more than 15 times a month the portal Sabadell Mobile. The total mobile customer base grew 41% in the past year. In addition, the financial group shows the index of satisfaction of the application that can be downloaded for free on the Google Play Android and the AppStore for iOS users chest. Remember that it is the best valued for the fourth consecutive year.*

### **Banco Santander**

*Santander: new account high per minute Banco Santander has also emphasized these days in the importance of implementing effective to improve customer service digital solutions. Ana Patricia Botin, the president of the organization, said at the press conference presenting results every minute 1, 2, 3 opens an account ( its flagship product ) online in Spain , that in the UK one in three savings products are enlisted in the network and in Poland , another market with an outstanding implementation of the entity, a loan is granted per minute on mobile .*

Those press releases are an indicator that Spanish banks are willing to change something and somehow deliver new value to their customers. Additionally interviewee 2 states that:

*“Spain is considered one of the most advanced country in Retail Banking and this will be a cornerstone for transformational changes in the future” and “ Banks need to find a new distribution model of their services that would allow them to reduce costs while keeping customer attrition levels as low as they are today”.*

Based on this statement, it is clearer that banks are willing to do something in order to not lose grip on this race for innovation.

Regarding to the fact of adopting new technology as disruptive as Blockchain, interviewees agree that banks are somewhat afraid due to the changes that it implies

## **5.1. Possible Blockchain solution**

According to the market needs and all the contextual market situation and what has been discussed in the chapter 2 regarding to Blockchain technology, for the particular case of this study, the case more adequate will be an **interbank payment solution**.

Several areas of application have been considered and also a deep study of possible legal and technological consequences. After these considerations, the most feasible application or use case given the current situation was the considered above: Banks want to keep data internal and also security and regulation is an important issue.

For implementing this solution, the technology used will be a permissioned Blockchain platform where all involved banks would become both participants and validator nodes in the network.

The main reason of why I chose this topology is the status of the marked and that the regulatory framework is still not mature enough for opening the data of the customers to the world and also for security reasons.

## Interbank Payments

Traditional interbank payments are usually performed using a central counterparty in which every bank has a local database. This database acts as authoritative ledger where all account balances and transactions are recorded. This procedure could be improved since it actually implies drawbacks such as:

1. The local databases must be reconciled and kept synchronized.
2. The payments performed settling net obligations through accounts recorded by a central counterparty.

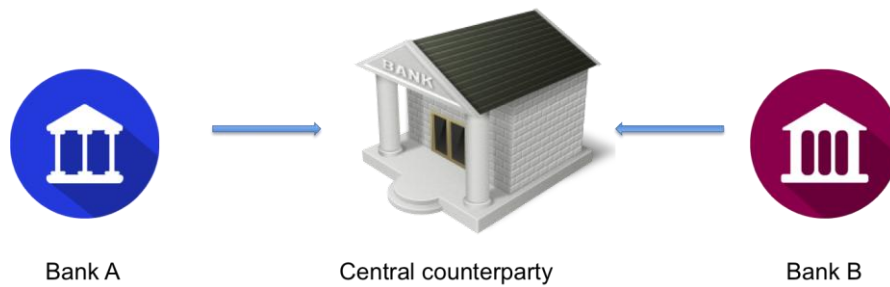


Illustration 6: Centralized payments architecture

With this Blockchain solution, a ledger could be adopted and used to substitute the central counterparty institution. At this point, each bank would become a node inside this private Blockchain network at the same time that would be a participant. Therefore the bank would be able to perform transactions and participate to the consensus as it is seen on illustration 6 and transactions managed by the Blockchain protocol.

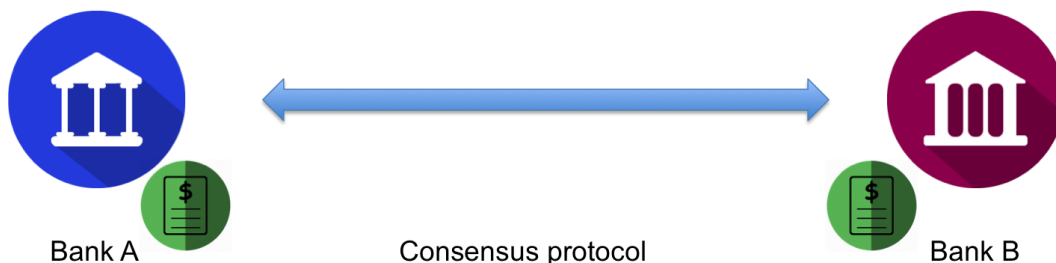


Illustration 7: Decentralized payments architecture

With this solution, reconciliation between different databases is no needed because a single ledger authoritative state has been obtained by consensus. Additionally, the payments can be settled between the banks without using an intermediary or third party and therefore the reconciliation time becomes seconds and the fees involved disappear. The execution of this process would happen in near-real time and therefore the counterparty risk is reduced and also the settlement time is lowered to seconds.

This case would be *regulator friendly* since every single transaction can be audited, accessed by the regulator and it is immutably recorded. The only thing it should be kept in mind is to encrypt securely all transactions in order to guarantee certain amount of privacy among the different networks participants.

## 5.2. Frictionless Blockchain adoption

According to the literature reviewed and the input from the interviewees it is intended to fill particularly how banks should face this process when adopting Blockchain technology. It should be noticed that all this steps are based on the observation of the data. These are 8 dimensions or stages according to what we have seen in “2.1.7 dimensions of strategic innovation”, but the description it is just particular for this case.

Stages	Description
<b>Managed Innovation Process</b>	This adoption process will need Combining Non-Traditional and Traditional Approaches to Business Strategy. By this, the solution have to be disruptive but continuative enough in the sense that although creates new needs in the business.
<b>Strategic Alignment</b>	Support among different areas and stakeholders will be needed since it is a huge shift on the banking procedures. The solution has to be presented to stakeholders and gain support enough to embrace this change of mentality.  Furthermore they should understand it will not be a short implementation or easy project.
<b>Industry Foresight</b>	Deep knowledge of Blockchain technology and structure is needed since there's a need to create a new paradigm. Banks must know a wide range of startups and companies that are currently working offering different solutions. It is also a must
<b>Customer Insight</b>	Final customer technically would not notice if the bank is using Blockchain or not, but should be taken in consideration and offer good publicity because sometimes Blockchain has bad connotations because of Bitcoin
<b>Core Technologies and Competencies</b>	Everyone that takes part on the project should be aware of technology capabilities and offer training among the different members of their team. This is obtained by divulgation of what Blockchain technology is capable to achieve and also
<b>Organizational Readiness</b>	Only banks that have an innovation culture adopted will be able to take part on this technology. Innovational teams must be solid and consolidated and also with deep knowledge of the technology. A previous Proof of Concept must have been completed successfully before.
<b>Disciplined Implementation</b>	The person who will lead the project will need discipline and follow the guidelines and the traced plan minutely. Additionally, communication among different banks that take part will be a must.
<b>Sustainable Innovation</b>	Once the technology is adopted, bank should have continuous feedback and be in continuous internal challenge to improve the system or find more disrupting solutions

Table 9: Stages for Blockchain adoption



## 5.3. Framework for the adoption and Challenges

### 5.3.1. Challenges

When it comes to the adoption of new technology there are always some challenges to surpass. In order to understand how difficult could be setting up a new technology, the technology adoption life cycle (Moore, 1991) should be taken in consideration. With his theory he says that people adapt differently to disruptive technology, and Spanish banks should become technology visionaries. I considered that banks are characterized by being rigid structures currently, so being technology enthusiasts are more for startups that can embrace change more rapidly. Additionally by this some risk (although economically banks can afford spending risks) when it comes to cultural, social and even other with higher implications: the regulator.

At this point, banks it seem reasonable to combine the best world of the startups with the stability that they have and use as a leverage to help others to cross the chasm.

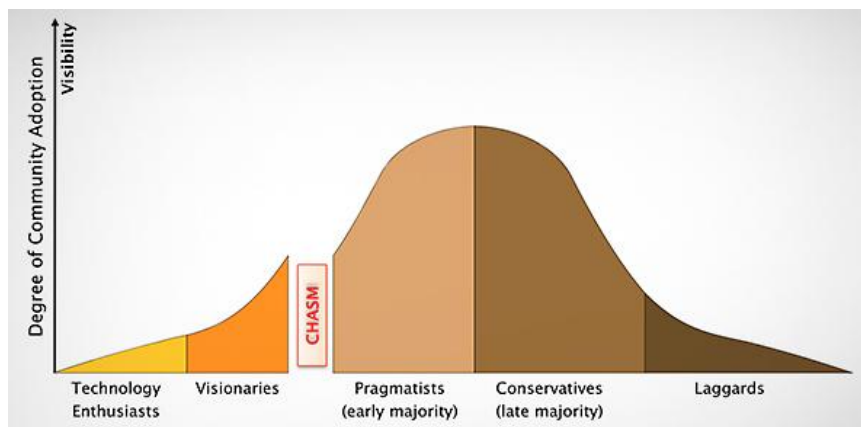


Illustration 8: Technology adoption life cycle. Source: (Moore, 1991)

According to interviewees 1 and 2 to the answer if a generic framework could be used for innovation their answer was that a generic framework for every business is not the solution, and that a proper framework for banking sector should be used:

**Interviewee 1:** *“Not sure it is difficult to follow some sort of predefined methodology on innovation sector, but it would really have helped in order to make this process more agile as well in banking sector.”*

**Interviewee 2:** *“Not as I am concerned. There are some initiatives from open source organizations but when it goes down the road, premium services to support sound transformational projects fall quite far of any generic framework”*

However, they also state that it is needed a proper framework in order to achieve successful results.

### **5.3.2. Framework for the adoption of disruptive technology**

Based on the literature from chapter 2 based on strategic innovation and also from the input of interviewees (input from interviewee 2 was more based on the phases and path to adoption new technology), a framework that contains the phases in order to adapt a new disruptive technology has been created.

As can be seen at illustration 9 the process of adoption a disruptive technology created for this specific thesis, as a result of the study is based on 5 main phases. These 5 phases are: Analysis, Enchant, Prototyping, Assessment and Production.

#### ***Analysis***

This is the starting point of the process and has as objective finding tendencies of innovation. This could be achieved either identifying technology or business trends. Furthermore the business problems must have been identified. Analysis could be classified inside a divergence phase and seen as some sort of brainstorming where emerging trends are and needs for the business areas identified.

This is an important ideation process where also competitive advantage among different ideas and also technologies or providers must have been studied. In case there is no business problem, it is created to proceed with the whole process.

#### ***Enchant***

It is the second phase of the process. Ideas are presented to the stakeholders and it is required their commitment. Stakeholder's commitment will be necessary for mainly two reasons. The first one is that their input is very valuable since they have a great vision of the market.

The second reason is an economic question: funds will be needed to make the idea real. For the benefit of the whole innovation process, stakeholders should open their minds and rely on the study of the market done and not banning ideas. When presenting to brainstorm with the stakeholders, it is absolutely necessary to present a risk analysis and a draft of the business case.

#### ***Prototyping***

Once ideas are more clear and selected, there's the need of starting to work on the technology and the business case. A detail in depth has to be provided and also building a prototype that will help to understand the technology and which will be the main challenges that will have to be solved on further phases. This is a convergent phase that needs more detailed design and development skills.

At this stage, all the different areas should be engaged in this process because otherwise in the *Assessment* phase there will be gaps and lack of implication, Furthermore, in this phase it is necessary input from all implicated areas.

## Assessment

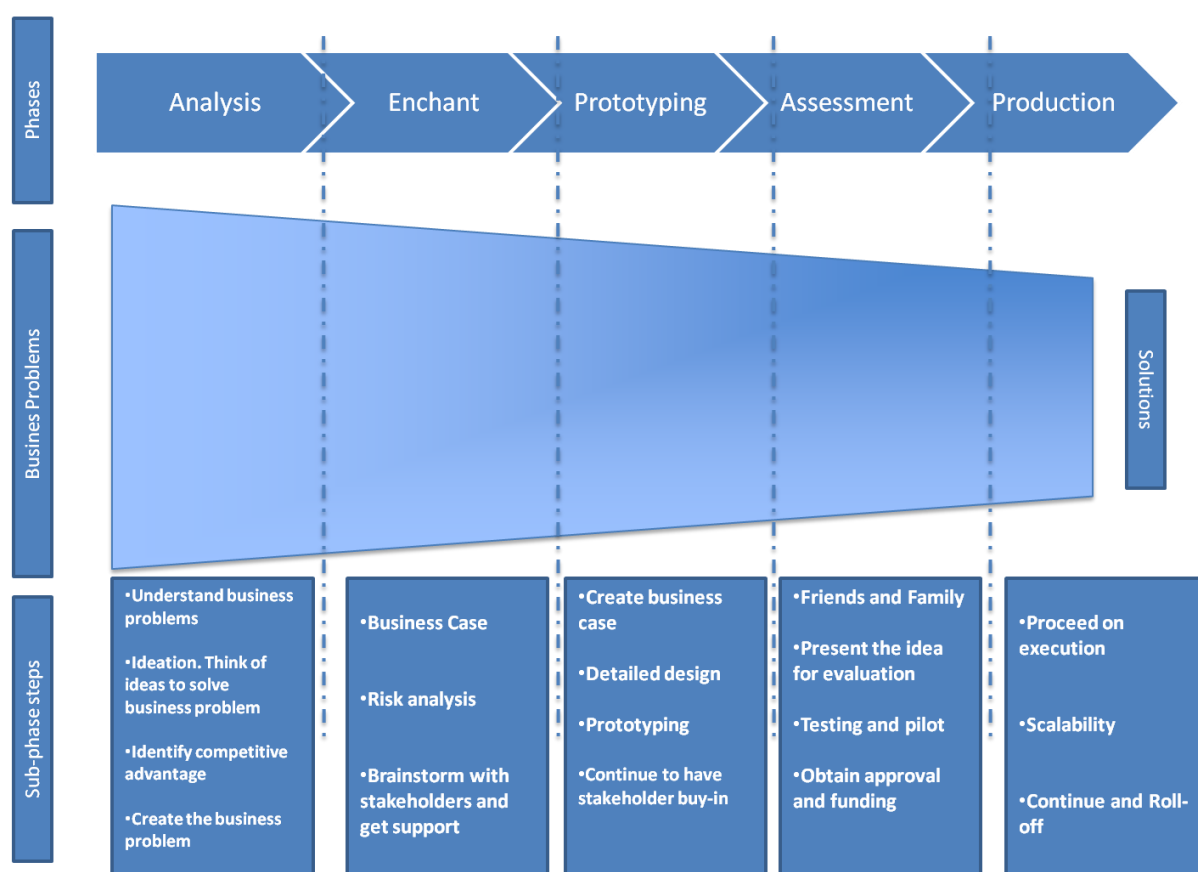
At this point project becomes from paper to real. The process could start by doing some sort of small demo, doing a Proof of Concept. In case that this PoC it is successful, then a small pilot should be launched. This process would be useful to sell the project internally and also as a test bed for mitigating future risks in case the project is launched finally.

This PoC could be analyzed by a “friends and family” process, where it is open to few people in order to obtain their feedback. After the evaluation, if proceeds it will be needed to obtain the approval and therefore funds in order to launch it into production.

## Production

At this point it the idea becomes a project that should be executed. Project can be managed as waterfall or agile process, although agile methodology is recommended. However there is no restriction at this point since it is considered that not all banks work with agile for big projects, so it will depend on the nature of the project.

Once the project is executed and set up into production, a review and an internal evaluation must be done in order to check if there is the need to correct any issue.



*Illustration 9: Disruptive Technology implementation Model for Spanish banks (Source: elaboration of the framework based on literature research and interviewees input)*

## 5.4. Legal issues and industrial strategy

Despite that the Blockchain that wants to be created for the financial sector will be private, in Blockchain every node is required to hold the entire database in order to check transaction legitimacy during consensus process. A deep study of the business through (William Mougayar, 2016) there are two mainly major issues identified:

- **Regulatory requirements:** in mostly of the cases information of customers must be kept private. Probably more encryption measures could be useful.
- **Industrial strategy:** as was previously indicated, in financial industry competitors want to keep private the information about their transactions.

Additionally, when it comes to compliance, information should be kept for certain amount of years, without surpassing certain limit. It could be a problem if the information is stored on the Blockchain and then wants to be removed or erased, since blocks written on the Blockchain for the sake of trust they cannot be modified, only append new blocks.

From the interviewee 4 it is also identified that regulation it is being a major concern when dealing with Blockchain, especially for the case of private data from customers:

*“It depends on the use case that we are analyzing. Data Privacy regulation is important in most of the use cases, given the information recorded on a Blockchain is immutable, and we have to be careful with the information we are sharing in this kind of networks”*

But there are many law issues regarding to Civil and commercial Law, Anti-money laundering and others that will have to be deeply studied in case of adopting such a solution. However, all news is not bad; with the adoption of new PSD2, Blockchain will make possible more communication and lowering the costs of some of the KYC directives that must have be checked on new customers ( Interviewee 4) .

## 6. CONCLUSIONS, AND FUTURE RESEARCH

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For the bank, technology, creativity, management and innovation are critical factors for profitability, growth and competitiveness. Spanish banks owe their origin and survival to the correct application of technology, the development of new products and improving manufacturing processes and / or services. Blockchain is a highly innovative technology that will bring changes to the current financial ecosystem. As we seen, innovation itself it is not enough for developing and grow an enterprise, banks will have to create the proper environmental conditions and allocate sufficient financial resources and close relationship between partners and communication internally.

After the whole study it's relevant that banks and fintech companies have strengths and weak points. For the case of Blockchain, this new digital technology will need the best parts of the two worlds. Banks have weak points in parts of the innovation process where the fintech are strong and fintech companies by itself it is quite difficult to settle breakthrough into a such regulated environment. Therefore, it is needed to create a collaboration environment as we've seen in "*2.1.7.4.1.Implementation Model for Strategic Innovation*". Banks can provide the customers and the regulated environment and fintech companies will bring technical expertise and the fresh culture and empowerment to the innovation process.

Of course being regulated has limitations for doing certain processes, but it creates what customer need on such important area: Confidence. If the banking sector fails to embrace the Blockchain, the field of "alternative financial services" (fintech) will accelerate its growth even more.

According to what we've previously seen, the way of how Blockchain is developed and the current players, it shapes a new paradigm on the banking sector where there are three players involved: challengers, collaborative innovators and regulators.

The Blockchain it is disruptive but not dangerous for the current structure and legacy it systems in the banks. However, it presents challenges and signals turbulent times for technology adoption. For many banks, adapting to the regulatory needs could be very expensive and they might not afford it, so, Blockchain could be a solution to consider for banks with few resources and small IT infrastructures.

Companies such as banks are on the right path since they're investigating and playing with the technology. Nevertheless, the strategic plan that it is for long term and therefore Blockchain becomes a strategic issue which adoption needs to be planned and studied since without an adoption of 3<sup>rd</sup> parties there is no potential use case of this technology.

As it is seen, the technology is quite mature and the only problems that the banks may have it is finding a proper use case where applying Blockchain may be useful and would offer a proper Return Of Investment.

After this deep study that have been performed, as a research conclusion, Blockchain currently is too disruptive and although a proper framework for its adoption is feasible and viable, there are several external factors that become an stopper for the proper adoption timeline although internally the stakeholders would like to make it real. Some of the factors are the regulators and also the agreement between different banks in order to trace an adoption pattern.

Therefore, in order to conclude it is needed to check the initial research questions considered in the initial sections of this research study. According to the research done and answers to the interviewees

### **RQ1: Can strategic innovation help Spanish financial sector with the Blockchain?**

According to the research it can conclude that strategic innovation can help Spanish financial sector with the Blockchain adoption since it is a disruptive technology that has to be planned and have a foresight 5-10 years ahead and the Spanish financial sector fulfill majority of the requirements that are needed to apply a strategic innovation framework. Additionally, Blockchain is a disruptive solution that as we seen on the interviews and also literature and discussion needs somewhat different on what today is being used.

### **RQ2: Is the Spanish financial sector ready to adopt a disruptive technology such as Blockchain?**

According to the research, it can be concluded that yes, banks are ready enough to embrace new and disruptive technology as Blockchain, but it will take up to 5-10 years to make it in production. Banks are mature enough and ready in order to start the process of this adoption, although this process takes time and effort.

Based on mostly interviews, Blockchain it is seen as a technology that will be mature enough and changing the market within 10 years. The main reason is because they do the comparison between all disruptive technologies

### **What is expected to happen in 2016?**

According to what is told by interviewees, apparently compliance will move to intelligence and regulators will show signs of re-invention. This is mainly because the banks will push the regulator as a lobby. KYC processes will find on Blockchain a new vehicle to improve their mechanisms and therefore this technology will play a key point in order to develop and create new ways of business and also open new inexistent markets.

Some Fintech companies will also be challenged by Blockchain contenders and come consortia (like R3CEV and Hyperledger) will start delivering some standards, but there still will be a dispute for setting a Blockchain standard de facto. However, this solution will have to embrace technical and business areas together. Many of the Blockchain startups will also die since I believe there's no room enough for such amount of investigators, and many of the startup companies will have to shift from investigate to adapt the standard that will be set and become a subject matter expert (SME) and help institutions to adapt to the new trend, it is become some sort of consultants.

### **Future research**

This field of study changes rapidly and within 6 month there might be other proposed solutions that will need to be considered. However, future research might be focused on new applications of smart contracts and trace what and how the banks implement at the end. Additionally, KYC

processes over Blockchain will be also on the center of the changing ecosystem and will play a key position.

The case of interbank payments will have to be deeply studied and will have potential new use cases. New laws and regulations will appear regarding to the Blockchain when it comes to European laws and also from the IMF (International Monetary Fund). At this point new applications and use cases that involve these institutions will come up to light.

Another field of research on the following semesters will be how evolved the different partnerships and also consortiums created currently and what are their outputs. A lot of expectation and capital have been invested and it is expected that they will set the standard that will have to be used in the financial sector, but the fact is that the answer will only be given by the time.

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## APPENDIX A: SUPPLEMENTARY INFORMATION

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Person: Interviewee 1

Function: Innovation senior consultant for an international firm ( EVERIS) an NTT company

**1. Do the Spanish banks need an innovation framework for performing their innovation?**

Work without a particular methodology is like trying to sail a boat without a fixed course. A bank ends up being a giant company in which working people of many nationalities, cultures and different ways of working. Brainstorming is fine, but this has to stop materializing. If a methodology is not followed specifically just working in an inefficient way, without getting the full potential and being mediocre. For innovation is no less: it is clear that a framework is needed and a structure to follow.

**2. Does a proper and generic framework could be used for innovation?**

Not sure it is difficult to follow some sort of predefined methodology on innovation sector, but it would really have helped in order to make this process more agile as well in banking sector.

**3. According to your expertise, does the banks behave similarly internally?**

Each bank has a different internal culture, even if there are patterns that follow: aversion to change , obsession with security, slow process ...However I could guess that banks in general would behave similar

**4. Do you consider strategic innovation could be a good implementation framework instead of traditional innovation methods?**

I guess so; none of standard frameworks could be flexible enough

**5. Is strategic innovation better than regular innovation?**

In this aspect it makes no sense to say better or worse. Just one is back to the other. And each should be applied differently depending on the result you want to obtain and environmental circumstances.

Strategic innovation is born from the need for companies today manage change in their organizations, in order to adapt to an increasingly competitive and turbulent. The outcome of the various methods have emerged and new business management tools that aim to manage innovation from a strategic perspective.

**6. Could you mention what are the strengths of the banks that are open to changes and their weaknesses?**

Strengths:

- a. Bank can evolve much faster, accepting challenges, attracting new communities, developers, etc.
- b. Be more friendly, hence attractive to more client

Weaknesses:

- c. New technologies are not always makes banks stronger, the pioneers' banks always risk more

**7. What phases does an idea follow since the idea is originated until it becomes real into production?**

Not sure if I get it but PoC ( Proof of Concept ) and UC ( Use Case) are the key phases.

**8. Do banks are afraid of using /embracing a disruptive technology?**

Banks tend to be very aversive to change. Everything involving a regulatory change or technological is not seen with good eyes because it can lead them into trouble. Banks are my rigid structures, both at personal mentality, and technological. The fact adopt a disruptive technology carries the risk that the regulator does not accept it, and therefore all the efforts made during the project is lost. They are also afraid that customers perceive it as a threat risk , since the main asset of the bank 's safety and soundness of their systems. However, fortunately, this mentality is now changing and are becoming proposals such as that of Blockchain although in some cases the technology is very incipient.

**9. Which are the identified challenges banks have to face when embracing a disruptive technology/ new business model?**

I guess main challenge is to be enough reactive (quick) and flexible to react on this kind technology.

**10. According to your expertise, which are the main challenges Spanish sector will have to face during the following 5-10 years?**

- a. Internally – learn how to be more agile, mobile, automated
- b. Externally – reduce amount of physical branches

**11. Is the Spanish banking ecosystem open to changes?**

Not enough – if we compare to UK or US, however it is lean toward it

**12. According to your expertise, does the banks behave similarly internally?**

Conservative one yes, but not neo banks

**13. Do you consider there is a bubble of speculation on Blockchain?**

There are a lot of buzzing, technology do have huge potentiality and definitely will used more widely. I would not use phrase “speculation bubble” technology is trending and could be applied in many sectors, however for banking sector there are not many UC I can see.

**14. Does stakeholders need to take part into a Blockchain adoption path, or is just purely technological process?**

It is important to follow the technology, however it from my point of view it is just well designed technological process like many others at this stage. I would not recommend to do adaptation, maybe on latter stage my opinion could change.

**15. Could you name and tell me what are the most use cases studied by your clients, I understand that you won't tell me who is doing what, but at least short description?**

The truth is that you will not say anything that has not been treated previously at many conferences or on the Internet. Of course you I cannot tell you what a particular customer is doing, but at least I can comment you use cases in which Blockchain can have an impact, and consequently are being studied:

- Loans
- Inheritances
- Escrow
- Cryptocurrency wallet controls
- Capital markets

If you want I can provide additional information about how it works...or you can check on pages like let's talk payments in order to understand how it works.

#### **16. Are any particular startups or initiatives that I should consider?**

Well ... according to your knowledge you must know the case of R3CEV and also Hyperledger, those are a must to know when you're in financial innovation. But for startups... probably you could keep an eye on Digital Asset holdings, Credits, itBit, Tallystics, Factom... There actually hundreds of them!

The case of R3CEV is a particular case where the most important banks around the globe joined in order to define a standard for the new Blockchain architecture. Some banks are Commonwealth Bank of Australia, Credit Suisse, Goldman Sachs, J.P. Morgan, Royal Bank of Scotland, State Street, and UBS. But they paid a huge amount of money to take part on it.

The case of Hyperledger is different. This one consists on a code repository where they can deposit their contributions.

#### **And what about ripple?**

Oh yes, I forgot it! Ripple is trying to change the rules on cross border transactions with his own agnostic platform.

Person: Interviewee 2

Function: Team lead on innovation department IBM. Source does not want to disclose more information.

**1. Does IBM has a research center on Blockchain?**

Yes, IBM has built two centers of Research of Blockchain based solutions. One in SF, and London.

**2. According to your expertise, which are the main challenges Spanish sector will have to face during the following 5-10 years?**

Blockchain success will depend quite significantly on the digital transformation in EU meaning that governments will have to support much aggressively the digital identification mechanisms for citizens

**3. Is the Spanish banking ecosystem open to changes?**

Yes, Spain is considered one of the most advanced countries in Retail Banking and this will be a cornerstone for transformational changes in the future

**4. What are the main needs of Spanish Banks?**

Banks need to find a new distribution model of their services that would allow them to reduce costs while keeping customer attrition levels as low as they are today.

**5. Do the Spanish banks need an innovation framework for performing their innovation?**

Yes, banks will need to be supported for government programs that would speed up the digital authentication mechanisms and use them across services in different sectors.

**6. When it comes to the innovation within banking / financial sector, who's the main driver? How does innovation comes into production?**

Main driver today is still cost reduction which means that most of the innovation taking place is still not being perceived by the end consumer as most the innovation falls on the backoffice processes even though front end digital channels are getting much more resonance on the media.

**7. Do you think banks are afraid of using such a disruptive technology?**

Yes. Banking industry relies very much on trust and this is a very important asset that should be kept secured.

**8. Which are the identified challenges banks will have to face?**

Banks will need to compete with new entrants that start from scratch with no burden of huge operation costs and they may take a small part of the value chain which is the relationship with the end consumer by using their 'think out of the box' approach when it comes to new value added services as bank aggregators, payments services, etc ...

**9. Does a proper and generic framework could be used for innovation?**

Not as I am concerned. There are some initiatives from open source organizations but when it goes down the road, premium services to support sound transformational projects fall quite far of any generic framework.

**10. What phases does an idea follow since the idea is originated until it becomes real into production?**

- Ideation
- Competitive advantage analysis
- Business case
- Risk analysis
- Detailed design
- Development
- Test
- Final assessment before friends and family in live
- Production level

**11. What does strategic innovation has to do vs regular innovation?**

It is the same or should be the same as everything has to go after a strategic plan of the company

**12. According to your expertise, does the banks behave similarly internally when it comes to adopt an innovative technology?**

No, there is a 2-speed process in the banks nowadays. Traditional business and innovation departments. They will keep this way at least 5-10 years more yet.

**13. How banks can deliver value to their customers by using Blockchain?**

Blockchain has to open markets in a way it will get easier for any of the players in a value chain to participate in the process. For instance, Trade Finance is called to be a process where Blockchain like technologies can help gathering information of how the trade process is progressing and get their accurate status at any time.

**14. Technologically, Blockchain is a reality since it is being used for Bitcoin. Then, why are many banks and other technology companies doing research and investing funds on it?**

Banks need to constantly investigate and do market research in order to be protected against fast competition to come up with some new that would displace them in the market. Blockchain falls into this category, as it was the same with mobile payments projects since 10 years ago.

**15. Which do you think would be the most disruptive and useful use case for the Blockchain?**

We still have to wait quite a few years but it will happen when citizen digital authentication will run under a government based digital Certificate Authority.

Person: Interviewee 3

Function: CEO at important company based in New York, (Blockchain & Emerging Technology Consultants)

**1. Based on your knowledge on financial sector, and the broaden scope acquired; what is the most challenging issue banks must overcome on the following 5 years?**

Inertia is the biggest challenge for a bank. If inertia can be overcome, a bank can act like a startup and it may be less riskier for banks to innovate. Another important factor (linked to inertia) is the “thinking out of the box” – if the same eye looks at the same picture – a mole is easily missed.

**But this is really challenging...**

(laugher) ... but it's currently needed...! Larger financial institutions can overcome this by spinning a smaller side department and giving it autonomy to succeed with knowledge, know-how and help from the main stream bank.

**2. Do you think fintech startups are a threat to the banks? Could they collaborate eventually?**

...Startups are not a threat to banks. Banks which are flexible and can understand the pace of change, are certainly in a better position to capture the market before the startups. There is Saks Fifth Avenue but the same organization also has a lower grade departmental store. Being able to cater different audience based on need, will serve as an advantage rather than an issue.

Additionally, if a bank can collaborate with a startup (lesser spinoff needs), they can leverage cheaper and quick to market scenarios. This will also let the larger banks “cherry-pick” the direction and leverage success that has been already demonstrated.

**3. But, dealing with regulations is easier for startups?**

I believe startups have a difficult time balancing regulation, since they may not be exposed and or staffed. Also high investment to take care of every regulatory body and change will kill startup innovation. I certainly do not mean that there should be no regulation, in fact, I stand by saying that there should be regulation from the outset – but standardizing the regulations and having a governing body – instead of every state or region making rules as they go, will hurt innovation and sometimes displace the innovation that starts in a region. Did you know that there have been a few startups in New York, USA that moved to Europe after the NYC crypto currency regulation?

**4. And... regarding to the Blockchain, what is your vision? It is as disruptive as people say?**

Blockchain is quad 4 worthy (Gartner) disruptive technology. The true use cases are too many and have not been exploited. I believe that Blockchain will need to pass from the height it is today to the disillusionment stage before it can stabilize. With too many



experimentations, the use cases for Blockchain many times moves from innovation to passion – and in between these two the actual advantage of a technology is missed.

**5. Is there any Blockchain application in production for financial sector?**

Blockchain platforms and players are not settled yet. I believe a lot of consolidation is yet to happen, and of course a lot of fallout too. That being the case, extensive care in selection of use case and technology along with due diligence of the product is essential.

**6. Everyone says Blockchain will be disruptive... am I right?**

Blockchain has the potential to create revolutionary (not evolution!) platforms and products. Currently fintech has been the most exploited / researched space, however the application and extensions of usage are immense – extending into IoT, Payments, chain of custody and more.

Considering the explosion of products, many of which are not best use cases for Blockchain (experimental use of Blockchain) the delusion stage (Gartner terminology) is imminent. Careful analysis and planning and more importantly validating the use case for best fit will help reduce frustration and best use of research ready resources.

**7. Which do you think will be the killer use case in Blockchain for financial institutions?**

The best use case for Blockchain for financial institutions would be KYC and chain of custody. The two as cited here are because; trust and decentralization are key pillars for recommendation of this technology. With the two as cited, both are extremely critical.

Person: Interviewee 4

Function: Lawyer and Blockchain specialist Consultant, Entrepreneur at Grant Thornton.

**1. Does the regulator accept Blockchain? Why?**

Up to know, regulators have been Blockchain friendly. In particular, UK government has been very interested in this field. With this regard they issued a report analyzing the opportunities of Blockchain, and predicting the role of the regulator in further Blockchain solutions. In this sense, the EU has also issued other report in the same line.

**2. Transactions are likely to be monitored, but will the banks accept that can be audited anytime / instantaneously?**

Traditionally, banks were not very likely to share their information with other entities. However, the upcoming regulation, such as PSD2, is will make the banks more opened. So, Blockchain could be the best standard to create a network where the parties don't trust each other.

Regarding the audit matter, in my opinion, it could be positive for banks. Nowadays, banks expend lot of money in compliance reports, monitoring transactions, etc. Blockchain could save billions in this field, given that real-time auditing could replace those burdensome procedures.

**3. Technologically, Blockchain is a reality since it is being used for Bitcoin. Then, why are many banks and other technology companies doing research and investing funds on it?**

It is true that Bitcoin is the first Blockchain, and this first Blockchain was created with one purpose, to launch a decentralized currency, which is not controlled by any central institution.

But this experiment brings with it a new concept: a real digital asset. Until now, digital assets (such as money, shares, bonds, etc.) were recorded on heterogeneous ledgers and its transmission relies on the trust between the participants. Blockchain allows the creation of autonomous assets that could be programmable, which is the basis of Smart Contracts.

The abovementioned means that we can apply business logic to these programmable assets, and this is why banks are interested in explore this technology beyond cryptocurrencies.

**4. What is the main reason because regulator would be interested on accepting a Blockchain solution based?**

This is simple, because Blockchain allows the decentralization of the truth (instead of the trust) through a network, which implies transparency and near real-time auditing to business.

Also, as mentioned before, the regulator could play an important role adding value to several Blockchain use cases.

**5. What are the main concerns for Spanish regulation?**

EU Member States are waiting for an EU position in this field. In my opinion this is a good choice, given that Blockchain is an open network that go beyond frontiers. If every State regulate Blockchain uses cases on their own, we would have a heterogeneous legal framework.

In particular, the Spanish regulator has answered to consultations related to cryptocurrencies (i.e. VAT exemption, Capital Gains at Corporate Tax, Bitcoin Gambling platforms and accounting), but we have no reports or opinions regarding other Blockchain use cases.

**6. When it comes to banking regulation, for the case of Spain, which is more restrictive, the Spanish or European framework?**

Given that the banking regulation comes from European Directives, the regulation is more or less homogenous along the European territory. However, the regulator should investigate this technology because a lot of banking procedures could be changed by Blockchain and, in that case, the regulation will not fit well with this kind of solutions.

**7. Which are the main laws that affect Blockchain into the Spanish paradigm?**

It depends on the use case that we are analyzing. Data Privacy regulation is important in most of the use cases, given the information recorded on a Blockchain is immutable, and we have to be careful with the information we are sharing in this kind of networks.

Civil and Commercial Law is also very important when we are developing smart contracts.

Anti-Money Laundering and Know Your Customer is the main issue we have to analyze when we are operating with cryptocurrencies (specially cryptocurrencies exchanges and miners)

And finally, Taxation and Accounting is crucial in cryptocurrencies transactions.

**8. How banks can deliver value to their customers by using Blockchain?**

The banking sector is enormous, and we have a wide range of business that can be performed or changed using Blockchain.

At this stage, banks are very interesting in the reduction of back office costs. With this regard, R3 CEV, a consortium of 44 banks, is investigating, among other things how Blockchain could be applied to create a cheaper and faster clearing house.

Regarding Retail Banking, Banco Santander has launched its first Blockchain prototype, using ripple for high volume, low-value global payments

**9. Do you consider there is a bubble of speculation on Blockchain?**

The expectation on this technology is really high. Millions of banks and startups are developing solutions using this technology. In my opinion, a lot of projects will not be successful, but others will. I have no doubt that Blockchain will disrupt most of the banking sector, but it is difficult to predict what exactly will be the killer app.

**10. According to your expertise, which are the main challenges Spanish sector will have to face during the following 5-10 years?**

- a. The first one is the regulation. Blockchain is disruption, but the problem with disruptive technology, especially in banking, is not to have a clear legal framework.
- b. Other important point is the technology. There are a lot of Blockchain projects that are having good results, but in some cases the technology is immature. So, we need them to be fast, secure and scalable.
- c. User Experience. Blockchain solutions for back office processes are easier to implement. However, B2C solutions (for example, in retail banking) need an education process of the users.

**16. Is the Spanish banking ecosystem open to changes?**

As mentioned before, the upcoming regulation will make banks more open. On the other hands, Fintech Startups are starting to create business model that compete with several bank activities. Those startups, being smaller, are more flexible to collaborate with other entities. In this sense, banks need to collaborate if they want to keep providing added value to their clients.

**17. Do the Spanish banks need an innovation framework for performing their innovation?**

Yes, they do. At this point, it is very important to look at what some countries, such as UK, are doing. They are creating sandbox in the City with regulators, banks and startups to develop this kind of new technologies. They are also being very flexible with the startups and their license requirements. It has no sense to invest a lot of money in a license if you cannot prove that your MVP works.

**18. What phases does an idea follow since the idea is originated until it becomes real into production?**

It depends on the use case that we want to develop. There are some use cases that are very simple to develop on a Blockchain (such as time stamping, creation of loyalty-points, etc.) and, on the other hand, other developments require more resources to be developed (such as Digital Identity, complex Smart Contracts, etc.).

**19. According to your expertise, does the banks behave similarly internally?**

As mentioned before, banks have a wide range of activities and, depending on their kind of clients, their size and other facts, they have different processes, requirements and resources. Consequently, banks are seeking different solutions for their own using this technology.

**20. Which do you think would be the most disruptive and useful use case for the Blockchain?**

There are ton of interesting use cases, but the real disruption is the Blockchain itself. All of the Blockchain use cases could be linked to others. For example, an immutable Digital Identity on a Blockchain could solve a lot of issues related to KYC processes, but this Digital Identity could be linked to Blockchain addresses, smart contracts, etc. Blockchain payments could be linked to connected assets (IOT) and those assets could be linked to the Digital Identity.

What I mean is that Blockchain is similar to Internet, it is just a network with a lot of capabilities, but the real disruption is to be able to connect these capabilities and to connect people, removing trust for truth.