Blockchain in Europe: Closing the Strategy Gap

Business leaders in Europe are fully aware of the potential introduced by blockchain, according to our recent research. To fully harness blockchain possibilities, however, they need to break through old mental models of company boundaries and markets, and grasp how blockchain could truly change the game by shifting entrenched views of institutional power.
EXECUTIVE SUMMARY

The breakthrough impact of blockchain on business has roiled industries throughout the world. From financial services, to manufacturing, to insurance, the distributed ledger technology underlying cryptocurrencies such as Bitcoin is poised to fundamentally redesign value chains, unlock our dependence on trusted intermediaries and forever alter our understanding of the function and role of institutions and markets.

The opportunities and disruptions of blockchain have now reached the executive floor of European corporates, with business decision makers fully aware of the technology’s major impact on their processes and industry. In our recent global study of organizations throughout the world and their attitudes and progress toward blockchain, however, European business decision-makers appear to be more conservative than those in other regions relative to judging the significance of blockchain (see study methodology, page 24, and the blockchain section of our website for more on our study findings across industries and in Asia-Pacific).

While European companies have identified breakthrough ideas on how blockchain could solve some of the most pressing problems in business and society today, according to our study, there is a huge gap in their progress toward turning those ideas into reality, particularly from a strategic viewpoint. Job one for business leaders in Europe is to break through their old mental models of company boundaries, markets, business models and competition, and begin opening their minds to how blockchain could truly change the game by shifting entrenched views of institutional power.

In other words, businesses need to look at the rules shaping their industry or company, as well as their habitualized practices of executing business processes that can be disrupted by blockchain. They need to dismantle old conceptions of using or valuing products, services and assets – and the purpose and value of institutions themselves.
Job one for business leaders in Europe is to break through their old mental models of company boundaries, markets, business models and competition, and begin opening their minds to how blockchain could truly change the game by shifting entrenched views of institutional power.
Key insights from our study, which surveyed 1,570 business decision makers in Europe, include the following:

• **Blockchain strategies are being created but must evolve.** An overwhelming majority of respondents in Europe have either already defined (50%) their blockchain strategy or are in the process of doing so (47%). At the same time, however, blockchain is being treated like any other technology innovation rather than for its breakthrough potential.

• **Competitive advantage is a top driver for adopting blockchain,** with 70% of respondents indicating that competitive differentiation is a major factor for pursuing blockchain initiatives. In order to truly harness blockchain as a way to reinvent business, however, businesses need to move past traditional ideas of competition and markets and see blockchain’s key features – privacy, security, immutability, transparency, reliability, process integrity – as design elements for a whole new way of doing business that disrupts institutional power and invites open participation and collaboration.

• **Traditional business opportunities are being pursued.** The top business opportunities named by respondents include the creation of new service lines (62%), customer segments (60%) and markets (58%). Fewer respondents, however, recognize the further reaching capability of blockchain to open up their internal assets to extract greater value, integrate themselves more directly into a network of business (i.e., by putting smart contracts on the blockchain), enable more customer autonomy or create and securely share “digital twins” and digital product memories to establish entirely new levels of transparency (see Quick Take, page 15).

• **Interest in collaboration is limited,** with only 2% of respondents saying they planned to join a consortium of start-ups and competitors as part of their blockchain pursuit. Most companies are working on blockchain opportunities internally, with only a few collaborating with external stakeholders or joining consortiums. This desire to drive their own blockchain agenda exemplifies the problem of older, legacy-based thinking.

**Businesses need to move past traditional ideas of competition and markets and see blockchain’s key features – privacy, security, immutability, transparency, reliability, process integrity – as design elements for a whole new way of doing business that disrupts institutional power and invites open participation and collaboration.**
Unlike most technology innovations before it, blockchain is an institutional innovation. As such, it is about open participation, collaboration and disrupting institutional power – not conducting business as usual.

THE BLOCKCHAIN STRATEGY GAP

There is no doubt that European business decision-makers see blockchain as a strategic imperative, with 83% of respondents expecting blockchain to have an important or very important impact on their industry, and most respondents (97%) claiming to have a blockchain strategy. Respondents’ blockchain strategies, furthermore, comprise the familiar elements of many digital initiatives today: identifying use cases and developing prototypes and minimal viable products (MVP), following an agile innovation process, mostly in a lab environment. This has led to an abundance of use cases addressing various, sometimes very significant, known problems in the areas of international payments, trade finance, insurance, supply chain, healthcare and taxes, among others.

For these businesses, however, blockchain is primarily being pursued in the same way that previous technology innovations have: as a new way of doing old things. Consider, for example, that nearly half of respondents (49%) said blockchain would add to current operating models, without drastically changing them (see Figure 1). However, in a blockchain-driven world, this response indicates a mindset locked in the past. Unlike most technology innovations before it, blockchain is an institutional innovation. As such, it is about open participation, collaboration and disrupting institutional power – not conducting business as usual.

Additionally, many companies (70% of respondents) consider competitive advantage to be a top benefit of blockchain (see Figure 2, next page). Blockchain, however, challenges traditional notions of competitive advantage in ways that many businesses may not be prepared to embrace. For example, if a company’s competitive advantage lies in its ability to run a particular process very efficiently (e.g., Li & Fung’s orchestration of global supply chains), and if these processes could now be run on a “self-organizing” open blockchain protocol, then the entire business model of that company would have to change dramatically.

Expected Impact of Blockchain

Respondents were asked how blockchain would impact their current operating models.

![Figure 1](image-url)
The fundamental question is, what would the competitive advantage be for companies effectively using blockchain solutions at scale in the future? It takes entrepreneurial courage to ask that question – and most companies are looking away, just as many European businesses are underplaying the impact of the digital revolution on their companies (as found in our recent survey).

Companies are more apt to ask questions such as, “What’s the business case?” or, specifically, “How can I use blockchain technology to cut costs or drive growth in my existing business?” After all, without a business case, there will be no funding.

This, however, is where things usually get stuck. The fact is, with blockchain, businesses can no longer pursue competitive advantage by building a castle, putting a moat around it and defending it to the death, as Columbia Business School Professor Rita Gunther McGrath explains in her book *The End of Competitive Advantage*. The reason this type of thinking is still predominant with most businesses today is that company success is measured by stock performance, which is assessed by the investor community; for value investors such as Warren Buffet, a “moat” is a highly desirable element when making an investment decision and protects a company from its competition over a long period of time (e.g., 10 years).

Blockchain, however, doesn’t strengthen the moat or solve problems for individual companies; instead, it addresses problems at the market level. Rather than a castle and moat mindset, in fact, businesses should view blockchain as the opposite of an exterior fortification, as it will ultimately open up the inside of a company and establish what we call a “trust zone” that goes well beyond traditional company boundaries (see Quick Take, next page).

This is because the technology allows the tracking and recording of assets and transactions without the presence of a central trust authority, and creates an immutable record of ownership. Complex algorithms drive consensus among users, ensuring that transaction data cannot be tampered with after verification. Only 15% of respondents, however, see blockchain opening the business to more open participation by other partners and customers.

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**Top Drivers for Pursuing Blockchain**

*Competitive advantage is a top driver for pursuing blockchain intitiatives. (Percent of respondents naming each driver as a major factor for pursuing blockchain.*)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived benefits of blockchain</td>
<td>72%</td>
</tr>
<tr>
<td>To use a blockchain as differentiator</td>
<td>70%</td>
</tr>
<tr>
<td>We usually test new technologies</td>
<td>56%</td>
</tr>
<tr>
<td>Competition</td>
<td>35%</td>
</tr>
<tr>
<td>Because other players can disrupt our business model using blockchain-based models</td>
<td>16%</td>
</tr>
</tbody>
</table>

Note: Multiple responses allowed.

![Figure 2](image-url)
The Trust Zone

The way companies conduct business and behave as organizations is driven by markets and competition. This has been very successful, especially in countries where markets are governed by effective institutions. (Markets and competition don’t work well in countries with weak institutions or rampant corruption). This reality drives the reason why companies exist. Ronald Coase, Nobel Prize winner in economics, has described this in his work “The Nature of the Firm.” In short, work inside the walls of a company can be organized effectively because people can trust each other. Think of it as operating in a “trust zone.”

Outside the walls of the company, i.e., outside of the trust zone, there is less or no trust. That’s why here, trust is established through contracts and institutions (banks, governments, lawyers, insurances, intermediaries). Such trust comes at a cost, which we call the “trust tax.” (For more on this topic, see our white paper “How Blockchain Can Slash the Manufacturing ‘Trust Tax.’”)

The trust tax, for example, is a severe problem in global supply chains, where a great deal of liquidity in terms of debt is tied up, and the cost of debt is driven by credit scores in favor of trusted large corporations. The trust tax inherent in the cost of debt raises the barriers to entry for global supply chains, crowding out many companies that are less trusted by current institutions - with a huge impact on global economic growth.

Because blockchain establishes trust among market players that don’t trust or know each other, it reduces risk and establishes a trust zone that extends beyond the walls of a company, covering whole markets or industries. The new blockchain-enabled trust zone is like “a company of strangers,” with no authority in charge.
The Role of Smart Contracts

Furthermore, the contracts used to establish trust between businesses and/or consumers are often complex, long term and incomplete, serving more as a reference point than a detailed map. The availability of data - e.g., through IoT and sensor data, combined with blockchain technologies - can be used to design trust into these contractual relationships through mechanisms such as smart contracts, dramatically slashing the trust tax. However, this approach cannot fully automate or replace some of the fuzziness that is required in contracts to incentivize the right long-term behaviors of the parties in a contractual relationship. That’s why blockchain-based business models usually require some “off-chain” governance and cannot be operated as a pure “decentralized autonomous organization” (DAO).

A good way to exemplify a trust zone is Airbnb. As Joe Gebbia, co-founder of Airbnb, explains in his TED Talk, the company uses design to build trust between hosts and guests. In this case, however, the trust tax is collected by Airbnb, while in a true peer-to-peer blockchain-based trust zone, there is no intermediary, and the hosts and guests would keep the trust tax.

It’s feasible to consider the development of blockchain-based platforms arising to compete with Airbnb – already, a decentralized, peer-to-peer blockchain-based competitor has emerged for Uber. However, contracts between hosts and guests on a blockchain-based version of Airbnb are also incomplete, as not all aspects of dispute resolution could be handled on the platform. Also, there is limited proof of authenticity of the reputational data on Airbnb. Hence, Airbnb could also not operate as a DAO.
BREAKING DOWN OLD MODELS AND INVENTING NEW ONES

The open ecosystem approach required by blockchain will require a dramatic mindset shift, including the need to collaborate with external partners in a way that few traditional businesses have done before. As reflected in our study, most companies work on blockchain opportunities internally, with less than one-third of respondents reporting that they have started to work with external stakeholders, such as industry partners or competitors (see Figure 3).

Internal Partners Pursued over External Partners

Respondents were asked to indicate the current status of their blockchain efforts with regards to key stakeholders/partners (percent saying they had already completed the task).

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working with stakeholders</td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifying internal stakeholders/partners</td>
<td>49%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifying external partners</td>
<td>32%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working with external partners</td>
<td>28%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working with other industry partners/competitors</td>
<td>21%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Multiple responses allowed.

At the same time, multiple industry consortia have been formed in Europe to collaborate on use cases. One example is the European Digital Trade Chain project, founded by a consortium of banks to build a blockchain-based platform for trade finance, to address the liquidity problem in global supply chains and enable small- and medium-size companies to have better access to European markets.10 (For more on this topic, see our series "How Blockchain Can Revitalize Trade Finance.") Another example is B3i, a consortium of European insurers working to apply distributed ledger technology to improve back-office efficiencies.11 However, insiders report that progress has been slow in some consortia, as many participants want to drive their own agenda.

Adopting a collaborative approach will be a challenge for most companies. Business leaders need to get comfortable with the idea of platform-based business models, the industrial sharing economy (e.g., sharing assets, resources and knowledge), data-driven business models and placing more trust in security and cryptography.

This mindset shift can be achieved by engaging business and IT leaders in jointly learning and collaborating, using a design thinking-based innovation process to get some hands-on experience in how blockchain technology can address a well-defined, substantial and real business problem in an ecosystem or market. For example, the European Commission is doing this in its #Blockchain4EU initiative, whose stated mission is to identify, discuss and communicate possible blockchain uses and impacts, mainly through stakeholder engagement and co-creation workshops12 to influence policy making in the European Union.
Many start-ups have ideas that “sound great” or claim to address a huge global problem, but they lack specificity on the problem to be solved and a deep understanding of the market and incentive mechanisms, including areas of competition for the market players and where they collaborate and why.

As the European Commission says, “it is crucial to understand which actions can or will be necessary to prepare for the potential transformations and possible disruptions brought by them to existing or future EU sociotechnical landscapes.”13 Currently, the initiative includes five prototypes: supply chains, authentication and certification, intellectual property, energy and advanced manufacturing.

**Discovering a Purpose for Blockchain**

Another challenge is to uncover these systemic problems and the “massive transformative purpose”14 behind solving them, and to design a market, platform or trust zone addressing the problem (see Quick Take, next page). Many blockchain use cases or start-ups are lacking this razor-sharp focus on identifying a specific problem to be solved and assessing the wider implications. Many start-ups, for example, have ideas that “sound great” or claim to address a huge global problem, but they lack specificity on the problem to be solved and a deep understanding of the market and incentive mechanisms, including areas of competition for the market players and where they collaborate and why. In our study, respondents said a top challenge of working with external partners and stakeholders was identifying and finalizing the purpose for blockchain, in the form of use cases (see Figure 4).

**Top Challenges of Working with Partners on Blockchain**

Respondents were asked to rate the following challenges of working with partners on blockchain (percent rating “high difficulty”).

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying and finalizing blockchain use cases</td>
<td>50%</td>
</tr>
<tr>
<td>Establishing connectivity with partner systems</td>
<td>47%</td>
</tr>
<tr>
<td>Convincing partners to share experiment data</td>
<td>41%</td>
</tr>
<tr>
<td>Developing monetization approaches</td>
<td>40%</td>
</tr>
<tr>
<td>Choosing which blockchain platform to work on</td>
<td>40%</td>
</tr>
<tr>
<td>Agreeing to a shared data model between parties for use in the blockchain</td>
<td>39%</td>
</tr>
</tbody>
</table>

*Figure 4*
Blockchain-based Solutions to Entrenched Problems in Healthcare

The healthcare industry offers many opportunities for resolving substantial, systemic problems. Globally, spending on healthcare is at about 10% of the global GDP even as chronic disease continues to rise and elderly populations grow. The challenge of reducing costs and improving outcomes is bedeviled by a highly regulated environment and conflicting interests of various stakeholder groups, including pharmaceutical companies, health insurers, practitioners, patients and researchers. With these diverging interests, there is a significant lack of transparency in the system, which – combined with increased patient empowerment – has led the call for evidence-based medicine and better measured outcomes.

With their key characteristics of immutability of information, transparency and open participation, blockchain-based trust zones could help provide such proof of evidence. While many blockchain projects deal with such areas as clinical trials, many other questions remain, such as an understanding of the incentives that drive particular research projects, and whether these motivations stem from a desire to improve health or make money on expensive therapies. A lack of transparency, openness and neutrality in this area of healthcare often leads to “sponsored content” supporting the most profitable therapeutic areas.

These and other issues have led to initiatives like citizen science and open science, which focus on open participation, collaboration, transparency and sharing of research assets and knowledge, all of which are key design elements of a trust zone that could be established through blockchain thinking and distributed ledger technology.

In Berlin, a key blockchain hub in Europe, the think tank Blockchain for Science is exploring how blockchain can be used as a platform for open science. Other projects are addressing the need for more transparency in medical research publications, such as PEvO and Blockchain for Independent and Transparent Science (BITS)’s Project Zille, which is introducing a “transparency token” on blockchain as a tokenized proof of neutrality to the market of scientific research publishing, with a vision to take the ideas of OpenTrials on the blockchain. According to Professor Tim Niehues, pediatrician and clinical immunologist at Children’s Hospital Krefeld, Germany, if this is widely adopted, it will have “a massive impact on global healthcare budgets and the value of science for humanity.”
Rather than focusing on the existing business, companies should envision scenarios of how blockchain will change global value chains, markets and institutions and derive the potential longer term fundamental change on their operations.
To make progress on identifying blockchain use cases and strategies, European businesses will need to overcome years of entrenched individual and collective conventional wisdom. Rather than focusing on the existing business, companies should envision scenarios of how blockchain will change global value chains, markets and institutions and derive the potential longer term fundamental change on their operations.

They can do this by using a scenario-based planning approach, sometimes called “future mapping”: thinking about the future as if it has already happened and considering the major possible future events that could lead to these futures. This approach can help companies and their ecosystem partners develop a scenario-based blockchain strategy in the context of possible futures, especially with respect to ecosystems, platforms and how blockchain technologies could enable these and create new market opportunities and address significant problems to be solved. The outcome of such a scenario-based blockchain strategy should be a prioritized list of use cases.

**DEVELOPING A BLOCKCHAIN USE CASE AND PROTOTYPE**

Many companies in Europe are already working on various blockchain use cases in a wide range of areas, with the greatest emphasis on operations, finance and IT (see Figure 5). Compared with their counterparts in the U.S., European businesses report an overall lower impact of blockchain on business functions overall, with a marked disparity in the areas of supply chain and procurement.

**Blockchain’s Functional Impact**

Respondents were asked to rate the impact of blockchain on key business functions (percent rating “high impact”).

![Figure 5](image-url)
From our observations, both supply chain and procurement will be highly impacted, however, particularly with some of the most appealing early-stage blockchain use cases in Europe being in the following areas:

- Digital twin/asset tracking (see Quick Take, next page).
- 3-D printing.
- Electrical vehicle charging/digital wallet on a car.
- Supply chain finance.
- Decentralized data exchange protocol/data marketplace.
- Shared services organizations.
- Pooled inventory management.
- Legal contract execution.
- Medical science/clinical trials.
- Internet of Things (IoT)
- Content curation.
- Reputation.
- Blockchain platform interoperability.

The financial services sector is still the most advanced when it comes to putting blockchain solutions into practice. Most large European banks are field-testing blockchain solutions in various areas, including BNP Paribas, which has already processed some live payments on blockchain and is testing international treasury operations to improve internal cash management efficiency between businesses.\(^{24}\) This solution improved the bank’s interoperability of its legacy systems by using software robots and application programming interfaces (API) to integrate a private blockchain with the existing IT environment.

The list of attractive use cases for banks is long, including international payments, interbank settlements, smart bonds, equity issuance, OTC derivatives and mortgage lending.\(^{25}\) Banks are also currently the most advanced in adopting collaborative approaches to blockchain use cases. One recent example includes the multi-firm implementation of equity swaps on blockchain, with the participation of BNP Paribas, Citi, Goldman Sachs, J.P. Morgan, Canada Pension Plan Investment Board and industry service providers IHS Markit and Thomson Reuters.\(^{26}\) (For more information on the use of blockchain among financial services organizations, see our report “Financial Services: Building Blockchain One Block at a Time.”)
Digital Twins: Sharing Information in a Trusted Way

The IoT, the Fourth Industrial Revolution, cyber-physical systems and the circular economy are all ideas that will significantly shape the future of our economy – with significant impact on manufacturing companies, but also for telcos, logistics companies, banks, insurers and leasing companies to offer pay-per-use models, micro-transactions, etc.

The fundamental concept underlying all these ideas is an open network for sharing trusted information and value among players that don’t necessarily know or trust each other. A key element of the information share is the digital representation of the physical world, or a digital twin.

A digital twin can include any information on anything: a product, a service, a machine, a building, a person (e.g., an athlete) or even a digital “thing” like a satellite picture. It can contain information such as the design specification, bill of material, bill of process, ownership, service manual, warranties and even digital tokens. If connected to sensors, it can also include important data on location, availability, status and other elements, to enable IoT-based platform business models.

A digital twin is a valuable data asset that can be used for a multitude of purposes, especially for asset-less, data-driven business models, open innovation, distributed manufacturing, personal fabrication and to enable the circular economy, which is an alternative to the linear “take-make-dispose” model. Blockchain is the keystone technology for a digital twin to make all of the above concepts possible, as it would add some unique properties:

- **Security:** Data can be entirely or partially encrypted. Certain parts of the data can be locked (i.e., restricted to use by owners of a key), while other areas can be open.
- **Proof of authenticity:** A user of a digital twin can authenticate the origin and integrity of the data.
• **Monetization:** Usage can be monetized using smart contracts.

• **Trusted history of usage:** A trusted record can be established for who has used the digital twin and for what purpose.

Spherity, a new start-up from Germany, is developing a blockchain platform called Twin of Things. First use cases have been realized for large industrial companies in Germany and beyond, including a trusted record of vehicle usage. Among other things, this would enable a more transparent secondary market or new business models for the leasing industry.

In an effort to decentralize and digitize all information about a car to a shared and immutable database, immune to fraud or tampering, BigchainDB is developing a car vehicle telemetry system called CarPass, alongside Spherity. The first phase of this “machine identity” initiative registered a car’s title, prior damage, service providers, maintenance history and inspection history to a ledger. The second phase includes telematics and sensor data, mileage, environmental data, financial services data and other third-party data streams.

“Our objective is to extend trust into the vehicle’s infrastructure down to the sensor level and to distribute vehicle data with a full audit trail across the parties involved in a car’s value chain,” says Carsten Stöcker, founder of Spherity GmbH.

Shared visibility into a trusted ledger benefits all parties. Governments can better audit car safety and enforce environmental laws; consumers gain transparency into the integrity of parts and wear and tear, and avoid lemons; technicians can assess maintenance history and user interactions; manufacturers and service centers can offer value-added data services such as replacing parts before they wear out.
The top internal barriers to adopting blockchain, according to respondents, were all related to simply understanding blockchain and the potential use cases, assessing the cost-benefits of use cases, and communicating all of this to senior-level staff (see Figure 6). Many companies and consortia working on blockchain use cases have not yet embraced “the art of the blockchain use case.”

Too often, the focus is on assessing the technology’s feasibility or comparing different blockchains (e.g., Hyperledger vs. Ethereum vs. Corda/R3, and public vs. private) and developing a small proof of concept and prototype for the use case to demonstrate how it could work. While this is an important step in the learning process, it often takes attention away from the need to focus on platform mechanisms and the governance of the trust zone that would emerge from the use case. As our study shows, most respondents are experimenting with private, or permissioned, blockchain use cases rather than open, or public, blockchains, as companies see a bigger risk of exposing critical data and have security concerns (see Figure 7, next page).

Regardless of whether private or public blockchain frameworks are the preferred solutions for a use case, the business model is usually still a platform-based one that requires design and governance. However, designing platform-based blockchain use cases requires organizations to work jointly with ecosystem partners to design the trust zone and its governance mechanisms rather than focusing only on the technology questions.

The Mindset Shift for Blockchain Use Cases

Developing blockchain use cases requires a mindset shift; key questions would change from, for example, “How can I use blockchain to improve the efficiency in my supply chain operations,” to “What is the root cause of problems in the supply chain in my industry,” or, “What are the truths and givens that are usually not challenged?”

In developing a blockchain use case, the following guidelines can help organizations begin to move in the right direction.33

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**Figure 6**

Top Internal Barriers to Blockchain

Issues around use cases top the list of internal barriers named by respondents (percent rating “high difficulty”).

- Evaluating cost-benefits of use cases: 51%
- Understanding blockchain and use cases: 50%
- Uncertainty around time needed to start reaping benefits: 46%
- Communicating blockchain to key decision makers: 46%
- Other technology investments are taking priority: 43%
- Reengineering business processes: 41%
- Understanding legal and compliance issues: 40%

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Set the overall transformative purpose and goals. Companies can start the blockchain journey by identifying problems they want to solve and quantifying the impact of solving them. The next key question is how the unique features of blockchain can help to solve at least part of the problem. This requires a deep understanding of how cryptoeconomics work. As stated above, a proven approach is scenario planning to help ecosystem participants think outside the box and break with existing mental models.

Draw the boundaries of the ecosystem. A deep understanding of the problems to be solved will draw a clear picture of the opportunity space and its boundaries, i.e., the key players to be included in the trust zone.

Some specific steps are:

- Identify new possibilities of working with new organizations, and shape a new ecosystem.
- Consider the benefits of the new ways of collaborating and innovating in the ecosystem.
- Determine the target ecosystem members and rules to determine who can and cannot join.
- Determine how the ecosystem should be controlled and by whom.

Assess potential risks, barriers and pitfalls. Regulatory issues are a key area for overcoming risks and barriers. This is particularly true when cryptocurrencies and utility tokens are involved in the use case, but even the business model setup will need to get some sort of regulatory approval. Specialized blockchain law firms should be involved in the process.

Further risks are related to antitrust laws. The governance of the consortium would need to incorporate appropriate compliance and enforcement measures. This may prevent the need to go through a public authorization process.

Define rules and governance and incentive mechanisms. The main business innovation is that rules and incentives are encoded on the blockchain. Most real-world implementations of blockchain solutions, however, require hybrid solutions, where part of the rules and incentives are “on-chain,” and parts are “off-chain.” These are critical design considerations in the ecosystem. Key rules to be defined include how to share assets, IP, risks and returns, collective choice rules (e.g., defining voting rights) and defining governance mechanisms on how to monitor compliance.
On-chain and off-chain incentive models will drive the right behaviors of the participants, and hence should minimize disputes. However, disputes can still occur and will need to be addressed in a jointly agreed-upon way.

Another critical element is to define resolution mechanisms for disputes that require off-chain human intervention. On-chain and off-chain incentive models will drive the right behaviors of the participants, and hence should minimize disputes. However, disputes can still occur and will need to be addressed in a jointly agreed-upon way (e.g., by choosing a court where they would be settled).

- **Define requirements.** The requirements definition should be exploratory, using an iterative design process, potentially using prototyping and various blockchain technology components. The set of requirements identified in this process should drive the decision on the platform to choose. Key requirements considerations include:
  
  » Identifying business processes in scope.
  
  » Determining how business processes will be reconstructed on the blockchain and in smart contracts.
  
  » Designing the smart contracts to automate the processes in scope and the governance mechanism that will be on-chain.
  
  » Detailing how governance mechanisms and incentives will be designed as part of the solution vs. what will be done off-chain.
  
  » Defining security and confidentiality requirements, including the permission design in terms of who can access which data (read/write), and who can validate data.
  
  » Designing the security and encryption solution (e.g., how the public/private encryption keys will be managed, who will hold those keys, and where the keys will be held).
  
  » Defining scalability requirements.
  
  » Designing the protocols related to permissions and consensus on the blockchain.
  
  » Considering how smart contracts are linked to real-world contracts.
  
  » Figuring out how to feed data from the off-chain world through so-called “oracles.”
  
  » Considering how to achieve interoperability with other blockchains.

- **Choose the blockchain platform and enterprise integration approach.** Based on the requirements, the appropriate blockchain architecture should be chosen and designed, using various technology components. Based on this, a more detailed design can be produced, based on the features of the chosen framework. According to our study, 40% of respondents currently face difficulties in jointly selecting the right blockchain platform with external partners.

Further, it is critical to think through how to operate and maintain a blockchain solution in the long run; whether “blockchain as a service” (BaaS) providers should be used (as well as which providers should be selected); and how to integrate the solution with other enterprise systems.
Large software companies such as Microsoft and SAP already provide BaaS platforms to significantly facilitate blockchain use case development and enterprise integration. For example, SAP launched its ready-to-use blockchain technology as part of its Leonardo product line, to be fully integrated with SAP applications. The solution also enables immutable data exchanges between enterprise processes that may not be hosted on an SAP cloud. SAP has already piloted some promising use cases (e.g., for product and asset tracking) that leverage blockchain technologies as part of its Asset Intelligence Network and Global Track and Trace solutions.

As many organizations trust large software providers such as SAP to run their core processes on their software, such BaaS offerings will significantly drive blockchain adoption beyond financial services into the corporate world. Most importantly, these offerings will significantly lower the entry barriers of small and midsize companies to adopt blockchain, as many of these are using standard ERP software. For example, the German SAP User Group (DSAG) alone has over 3,300 member companies and is planning to evangelize the benefits of blockchain throughout its member base.

**QUICK TAKE**

**GDPR: The Tipping Point of Widespread Blockchain Adoption?**

By May 2018, the General Data Protection Regulation (GDPR) of the European Union will become enforceable. The regulation intends to give data privacy rights to the consumer, the owner of the data, with the right to know, upon inquiry, what data an organization is using, as well as the right “to be forgotten.”

For example, Article 15 of the regulation specifically mentions the right for individuals to obtain meaningful information about the logic involved in certain automatic decisions concerning them, as well as the significance and the envisaged consequences of such processing for that individual. Furthermore, Article 22 establishes the right of individuals to not be subject to an automated decision-making process when those decisions have “a legal effect” or “a similar, significant effect” on the individual.

While some say this new regulation is a major advancement toward data security regulation and can drive significant improvements in building customer relationships,
streamlining IT and improving data management, others say it is not easily enforced and will significantly slow down research and innovation on AI in Europe.

The GDPR has also generated controversy in the blockchain ecosystem. The biggest problem is that the “right to be forgotten” is contradictory to the blockchain property of immutable information. Further, blockchains run on nodes, which can reside anywhere in the world and, hence, are not compliant with the GDPR’s requirement to track what data is leaving the boundaries of the EU.

On the other hand, blockchain does enable what the GDPR is trying to achieve: data privacy protection. However, it does so by different means, such as data encryption and self-owned data stewardship rather than relying on a controller, an issuer or processor to adhere to regulations to obtain, copy, move, transmit or secure the data. At the same time, the European Commission has initiated a project called DECODE to explore and pilot blockchain-based technologies to enable personal data sovereignty, giving people more control over how they store, manage and use their personal data.

Further, there are blockchain-based platforms offering GDPR compliance. For example, LuxTrust and Cambridge Blockchain are working together to create a platform designed to use “privacy by design” principles outlined in the GDPR to offer companies quick onboarding, consent management and compliance services for individuals, legal entities and devices. Further, Guardtime, the company enabling many blockchain-based services of the e-Residency program of the Estonian government, has developed a solution called Volta for GDPR compliance.

It remains to be seen how the GDPR will take effect, how enforcement will be realized and how companies will react. It will raise the overall public awareness of data privacy issues, also beyond the EU. The effort for companies to comply with the GDPR, as well as the effort to enforce it, could turn out to be much more significant than envisioned. This could create a wave of demand for blockchain-based identity solutions, which could potentially be designed to comply with the GDPR and would require less effort to implement/enforce.
Further, the GDPR could raise the public awareness of blockchain overall and trigger a public discussion on how regulatory bodies and governments deal with data security and identity overall and the associated cost to the taxpayer. A public opinion could form around why governments should use blockchain solutions to deal with identity- and personal data-related services to save costs (i.e., taxpayers’ money). The Estonian e-Residency program, which already does this, may receive much more attention as a “best practice.”

THE WAY FORWARD

European leaders need to embrace the potential of blockchain rather than protecting themselves from the potential disruptions that blockchain can bring. Some guiding principles include:

- **Adopt a blockchain mindset:** Blockchain should not be seen as a technology but as a market mechanism, a new dimension of doing business, enabling market participants to engage in trusted value transactions and trusted information sharing, establishing new ways of collaboration with new partners. The often stated “you can’t do everything with blockchain” is missing the point. You can’t do everything with electricity either, yet the introduction of electricity changed everything. The implications of blockchain will go far beyond what you can do with blockchain.

- **Develop use cases, prototypes and MVPs:** Blockchain use cases are a completely different game compared with the “traditional” digital innovation types of use cases. On top of testing and showcasing how the technology works, they involve working with ecosystem partners engaging in markets or multi-party processes to unravel the truths and givens of existing market mechanisms and institutions.

- **Dive deeply into the problem to be solved with blockchain:** This requires a blockchain design thinking approach that goes beyond the typical design thinking activities. In addition to industry experts, technologist and designers, it also requires people who understand economics and game theory, legal and social science – especially when thinking about how to scale up a use case to an industry-grade solution, i.e., “designing a market.”

- **Develop blockchain-based business scenarios:** In addition to use cases, companies should consider adopting blockchain thinking in their strategy development process. This requires breaking with the traditional mental models of how a company and an industry works. This can best be achieved using a scenario-based planning approach, with a multi-disciplinary team engaging in a strategic dialogue about possible future scenarios and future events that will lead to the scenarios.
A FINAL NOTE

In a very short time, blockchain has escalated from a technology with narrow applications related to cryptocurrencies, to one meriting attention from many highly respected and successful business leaders. Of course, skepticism still exists, most prominently by value investor Warren Buffett and others who still promote “castles with moats” thinking. But others, such as Goldman Sachs CEO Lloyd Blankfein or Citigroup John Gerspach, are more positive. Interestingly, Fidelity Investments CEO Abigaile Johnson, a blockchain enthusiast, recently said: “What we’ve realized is that if you only look at this technology through the lens of the problems that exist today, you will not find many compelling use cases – at least not that can be implemented at scale.”

It’s true that blockchain doesn’t fit into our current mental models and many strategic and implementation challenges remain, including scalability, latency and integration with enterprise applications.

As a result, while most large European corporations are already working on blockchain use cases, the journey to more widespread adoption from an enterprise computing perspective could be slow. Meanwhile, other geographic regions, such as Asia-Pacific, are investing heavily into blockchain and are quietly buying up assets and natural resources around the world. Can European companies lose their competitive edge? Are new forms of collaboration among European players required to stay competitive? How can governments, the EU and other organizations help by setting the right policies and standards? All of these are very difficult but important questions to answer.

On the bright side, corporate Europe is a powerhouse when it comes to know-how, infrastructure and smart people. This asset can, however, quickly turn into a liability as Europe has a “legacy problem;” for example, many manufacturing assets will soon be outdated and require significant investment to be up to par in terms of efficiencies and degree of automation. Knowledge is also quickly outdated.

The root cause of the problem is probably cultural - many companies are locked into the mindsets and ways of working that made them successful over the past 50 years. To some extent, the cultural dogma inherent in many European companies when facing change aligns with the three somewhat Kafkaesque arguments of the bureaucrats: “This will not work; we’ve always done it this way; if we do this, then everybody will want it.”

With respect to blockchain thinking, these three phrases need to be turned on their head: “This will work; we will do everything completely different now; and everybody can participate without asking.”

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METHODOLOGY

We conducted an online survey among 1,570 senior executives in Europe across the banking and financial services (719), manufacturing (201), retail (201), healthcare (166) and insurance (283) industries from January through August 2017. When asked to describe their level of understanding blockchain, 26% described themselves as expert, 42% as proficient, 23% as competent and 9% as beginner or novice.

The objectives of this research were:

• To understand the perspectives of senior executives on their blockchain strategy.
• To understand the major factors affecting the adoption of a blockchain strategy.
• To understand the external and internal roadblocks in adopting a blockchain strategy.

The respondents included 19% C-suite executives, 26% vice-presidents, 28% directors, 23% senior managers and 4% managers. This primary research study was conducted across Europe. The countries covered in Europe were Denmark, Finland, France, Germany, Sweden, Netherlands, Norway, Switzerland and the UK.
FOOTNOTES


3 Coined and popularized by Warren Buffett, a “moat” refers to a business’s ability to maintain competitive advantage over its competitors. In her book The End of Competitive Advantage, Rita McGrath argues that this is no longer a sustainable approach to winning in the digital age.


9 New Hampshire-based start-up Arcade City developed a ridesharing app based on Ethereum.


13 Ibid.


OpenTrials website: https://opentrials.net.

From a phone interview.


The term digital twin was originally conceived in the manufacturing area, as a core concept for digital manufacturing as part of the industry 4.0 vision, to digitally simulate how machine productivity can be improved or for preventive maintenance concepts.


An oracle, in the context of blockchains and smart contracts, is an agent that finds and verifies real-world occurrences and submits this information to a blockchain to be used by smart contracts. For more on this topic, see https://blockchainhub.net/blockchain-oracles/.

There are some technical concepts under development to enable “muting” data on a blockchain, which would have a similar effect as “forgetting” or erasing data.


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