United Arab Emirates
CENTRE FOR THE FOURTH INDUSTRIAL REVOLUTION

A Partner of the World Economic Forum Network for Global Technology Governance

WORLD ECONOMIC FORUM

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White Paper

Inclusive Deployment of Blockchain:
Case Studies and Learnings from the United Arab Emirates

In collaboration with the Dubai Future Foundation

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Preface

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The World Economic Forum's Centre for the Fourth Industrial Revolution Network is leading a project with a global, multistakeholder group to co-produce tools that aim to embed best practices and minimize the risks for the deployment of blockchain technology.

By bringing together public- and private-sector entities to share their lessons and insights on blockchain deployment, this project aims to reduce missteps and anchor effective methodologies within the technology. The United Arab Emirates (UAE) is an important contributor to this project made up of leaders from governments, companies, start-ups, academic institutions, civil society, international organizations and experts across the globe. The need for collaboration when developing governance for new technologies, as well as a systematic and inclusive approach to such technologies, is critical.

The UAE has long been a leader in the early implementation of emerging technologies. Use of blockchain technology in the public and private sectors has been no different. Spearheaded by the launch of the Dubai Blockchain Strategy in 2016 and the Emirates Federal Blockchain Strategy in 2018, the UAE government has taken active steps towards advancing the technology nationwide through industry creation, government adoption and international collaboration. Since then, the country has played host to a multitude of blockchain implementations, conferences and other initiatives. Each of these has yielded new insights into the major challenges and success factors encountered when deploying blockchain technology, now shared for the first time in this paper.

This paper, developed a collaboration between the Forum's Blockchain platform and UAE partners including C4IR UAE, Dubai Future Foundation and Accelliance, serves to showcase some of the collective experiences of the country by providing an overview of the current local and national blockchain strategies, the diversity of national use cases and the resulting learnings from implementation.

This paper is part of a broader project led by the World Economic Forum, focused on the co-creation of new tools to shape the deployment of distributed ledger technology in supply chains towards interoperability, integrity and inclusivity. Project outcomes include:

– A series of white papers published in 2019 and 2020[1]. Collectively and individually, these papers offer insights into and thorough examinations of specific considerations for decision-makers during blockchain deployments.

– A concise, easy-to-use toolkit[2] to be released in 2020 covering important topics for supply chain decision-makers to consider in order to ensure well-thought-out blockchain deployment.

Introduction

Blockchain and distributed ledger technology are being explored in almost every sector, ranging from energy to shipping to media. By taking a systemic and inclusive approach to this technology, it is possible to ensure that all, from the most marginalized members of society to the most powerful, realize the benefits from blockchain's transformative potential. With this purpose in mind, the World Economic Forum's Centre for the Fourth Industrial Revolution Network is working with a global, multistakeholder group to co-produce tools that aim to embed effective methodologies and minimize the risks for the deployment of the technology.

The World Economic Forum and the United Arab Emirates (UAE), together with the rest of the global multistakeholder project community, has the ambition to shape the trajectory of blockchain deployment. This paper offers real-world insights from the UAE blockchain ecosystem to provide decision-makers with the awareness of challenges and success factors they may face during blockchain implementation.

Since 2016, the UAE government has launched a series of blockchain strategies to spur exploration and adoption of the technology in the public and private sectors. As such, a multitude of blockchain projects have emerged nationwide that have yielded many experiences and learnings for participating stakeholders. This paper provides an overview of the collective learnings from blockchain implementation in the UAE through an assessment of the national ecosystem, followed by an examination of seven case studies to explore the common deployment challenges and success factors.

The aim is not to provide a definitive or exhaustive list of answers that can be applied to each project. Rather, this paper serves to raise awareness of the common challenges and success factors encountered by others in their blockchain deployments. As decision-makers globally develop their own blockchain solutions specific to their unique pain points and business needs, it provides insights into what issues may arise and the possible solutions to maximize the value of their projects while minimizing the potential risks.

The findings and insights from this paper will contribute towards the upcoming blockchain deployment toolkit to be released in 2020, providing common guidelines, frameworks and processes for well-thought-out blockchain projects.

The UAE: Launch of government blockchain initiatives

Under the auspices of the mandate to digitize the UAE, both the federal and local government have taken active steps in exploring and adopting blockchain technology across government services. In recent years, the country witnessed the launch of the Emirates Blockchain Strategy 2021 and Dubai Blockchain Strategy 2020 to enhance government services, develop industry and promote innovation in the space.

Emirates Blockchain Strategy

In 2018, under the supervision of His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai, the UAE government launched the Emirates Blockchain Strategy 2021. The strategy focuses on four main themes: happiness of citizens and residents; elevating government efficiency; advanced legislation; and international leadership.

The UAE government, as a part of its digital transformation efforts, decided to capitalize on blockchain technology to transform government transactions on the federal level, 50% of which will be conducted using blockchain by 2021.

Technological adoption at such a scale will support government preparation for future challenges by optimizing the transaction processing time and resources required, decreasing the ecological footprint by reducing the number of printed documents, and providing digital flexibility to the people to process their transactions at a time and place suited to their lifestyle and work.

By adopting blockchain technology, the UAE government expects to save:

- AED 11 billion (US$3 billion) in transactions and documents processed routinely
- 398 million printed documents annually
- 77 million work hours annually

The use of blockchain technology will not only allow operational cost reduction but will support the digital security of national documents and transactions, as well as accelerating decision-making processes.

Dubai Blockchain Strategy

The Dubai Blockchain Strategy, launched in October 2016 by His Highness Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, Crown Prince of Dubai and Chairman of the Executive Council, was the result of a collaboration between the Smart Dubai Office and the Dubai Future Foundation to continuously explore and evaluate the latest technology innovations that demonstrate an opportunity to deliver more seamless, safe, efficient and impactful city experiences.

The strategy establishes a roadmap for the introduction of blockchain technology for Dubai and the creation of an open platform to share the technology with cities across the globe. The Dubai Blockchain Strategy is built on three pillars of government efficiency, industry creation and international leadership.

– Government efficiency: under this pillar, the strategy will contribute to increased government efficiency by implementing blockchain and enabling a paperless digital layer for all applicable government services.

– Industry creation: this will support the creation of a blockchain industry by providing an enabling environment that encourages start-ups and businesses.

– Leadership: in line with the third pillar, Dubai aims to lead the global thinking on blockchain technology and become the hub for blockchain intellectual capital and skill development.

The UAE blockchain ecosystem at a glance

As a result of global technology trends and government initiatives, blockchain has swept the UAE as one of the most promising technologies for digital transformation. Government entities, banks, telecommunications providers and academia have begun exploring the applications of blockchain at an unprecedented rate. The results have been staggering, in both the public and private sectors – with more than 40 government entities and 120 blockchain companies covering 200-plus initiatives.

Source: Press releases, media coverage, interviews.

UAE learnings: Challenges and success factors

As part of its efforts to analyse the local blockchain landscape, the Centre for the Fourth Industrial Revolution UAE surveyed over 100 stakeholders from more than 60 various governmental and non-governmental entities across the country actively exploring or implementing blockchain. The primary purpose of the survey was to understand the maturity of the ecosystem and the relevant challenges and key success factors at hand.

Challenges

Top three challenges to blockchain implementation, sorted by stakeholder

Government

- **62%** Difficulty bringing together the required stakeholders
- **52%** Educating and awareness of the involved stakeholders
- **52%** Identifying and understanding the most relevant applications of blockchain

Corporate

- **67%** Unclear regulatory implications
- **50%** Difficulty bringing together the required stakeholders`
- **50%** Educating and awareness of the involved stakeholders

Service providers

- **62%** Unclear regulatory implications
- **52%** Difficulty bringing together the required stakeholders
- **43%** Educating and awareness of the involved stakeholders

Key Findings

Survey participants were unified on the opinion that the core challenges in blockchain implementation remain in the operational and regulatory sphere rather than on the technical side.

Bringing stakeholders to the table, alignment of interests, and communication between parties were ranked as top challenges for blockchain projects.

The public sector saw education and alignment with stakeholders as the most pressing challenge, whereas the private sector's key concern resonated around regulatory uncertainty.

Success factors

Top three success factors to blockchain implementation, sorted by stakeholder

Government

- **80%** Identifying the most valuable use case
- **40%** Well-defined scope, expectations, roles and responsibilities
- **32%** Continuous communication and alignment

Corporate

- **67%** Well-defined scope, expectations, roles and responsibilities
- **67%** Fostering internal awareness, understanding, and expertise
- **61%** Continuous communication and alignment

Service providers

- **52%** Identifying the most valuable use case
- **43%** Defining a clear engagement strategy
- **38%** Proper alignment of stakeholder incentives

Key Findings

Key success factors lie in the early stages of planning and defining blockchain engagement, as well as continuous communication and alignment between stakeholders.

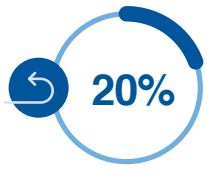
80% of government entities stated that the most important factor was planning and identification of the most applicable applications of blockchain early on.

For large organizations and some of the government departments, the key success factors were primarily related to definition of project scope, roles, and responsibilities, as well as managing expectations.

Service providers were unified in their opinion that a well-structured engagement strategy and use case definition enabled them to effectively structure implementation and deliver value for clients.

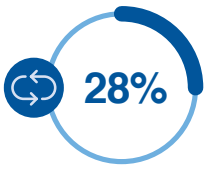
Respondent stages of implementation

Pre-Implementation



Planning stage

Implementation



Currently testing & implementing

Post-implementation

Projects implemented

Many private and public entities are engaged in blockchain projects, from which 80% are currently implementing or have already implemented the technology.

Upcoming toolkit addresses top blockchain deployment challenges

The World Economic Forum toolkit (publication 2020) will provide an outline of the crucial tasks, comprehensions, considerations and detailed instructional sections necessary for well-thought-out blockchain deployment. The diagram below showcases how different sections in the toolkit address some of the key issues identified in the survey with UAE stakeholders. C4IR UAE, in collaboration with the World Economic Forum, will work with local stakeholders to leverage this upcoming toolkit in the UAE ecosystem.

Ecosystem

- Difficulty bringing together the required stakeholders
- Education and awareness of the involved stakeholders

Consortia formation

- Difficulty bringing together the required stakeholders
- Addressing governance

Compliance-related sections

- Unclear regulatory implications
- Managing compliance and security standards

Digital identity

- Authenticating individual and firm identity

Consortia governance

- Addressing governance
- Difficulty bringing together the required stakeholders
- Addressing interoperability

Other

- Identifying and understanding the most relevant applications of blockchain
- Ensuring integrity of the data entering the chain

Security

- Managing compliance and security standards
- Ensuring integrity of the data entering the chain
- Authenticating individual and firm identity

Interoperability

- Addressing interoperability
- Identifying and aligning on blockchain standards
- Addressing governance

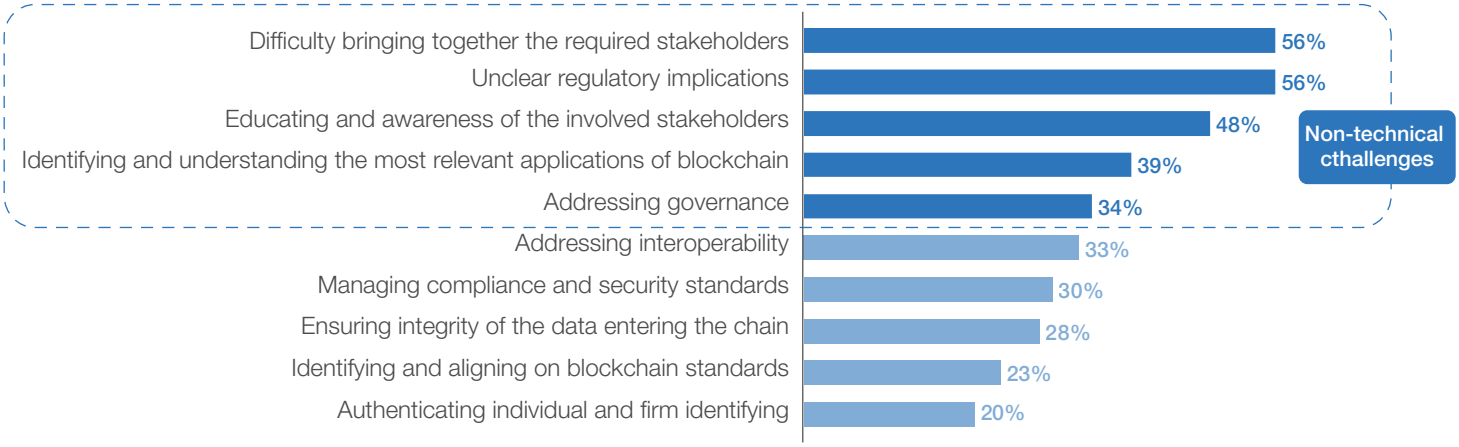
Key:

Toolkit topic

- Biggest challenges identified from UAE organizations surveyed

The challenges faced by organizations in the UAE are primarily related to the strategic, operational and regulatory aspects of implementation.

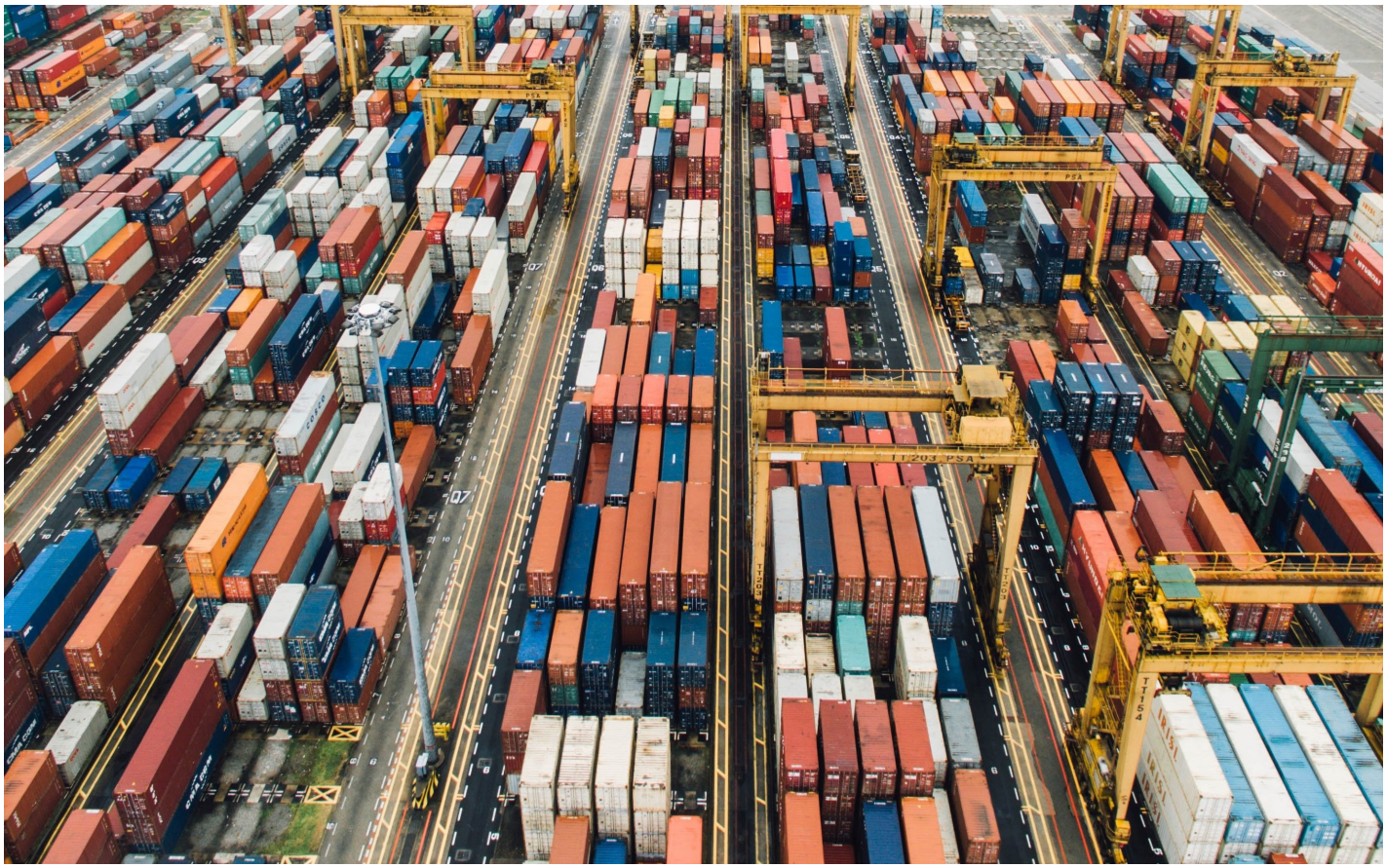
What were/are the biggest challenges in blockchain deployment?



Learnings: An analysis by case studies

The next section of the paper delves deeper into seven case studies to explore common experiences within the main blockchain deployment challenges and success factors.

Private sector



Case 1: DP World

Introducing a digital platform for enabling global trade

Case study overview

A wave of disruptive forces, such as shifting demand patterns, more complex and global supply chains, an ever-changing regulatory environment, an evolving customer base and changing relationships with shippers are driving the evolution of the global trade logistics industry. However, the industry remains slow to change and fraught with inefficiencies. It is still heavily dependent on complex and stringent paperwork, person-to-person physical interactions for managing the transition of goods and the facilitation of the financial settlements between importer, exporter and intermediaries. In response, DP World has been actively exploring new solutions and technologies to address these challenges, including identifying the most valuable applications of blockchain to contribute towards a trade logistics platform for businesses across the globe to easily share data and automate processes through open APIs and smart contracts.

About: DP World

DP World is a world leader in global supply chain solutions, specializing in cargo logistics, port terminal operations, maritime services, free zones and more. It is a leading enabler of global trade and an integral part of the supply chain. The trade enabler has a portfolio of more than 150 operations in 46 countries across six continents. DP World, UAE Region, is part of DP World and its portfolio includes Jebel Ali Port, Mina Rashid Cruise Terminal and Coastal Berth, P&O Marinas, Mina Al Hamriya in Dubai city and three zones – Jebel Ali Free Zone (Jafza), National Industries Park (NIP) and Dubai Auto Zone (DAZ) – plus World Security, a DP World security company.

Project goals

DP World's goals are twofold. First, collaborating with UAE entities for the two selected use cases: 1) new free-zone customer registrations – enabling the registration, licences and memberships of new traders to be held on a single platform; and 2) digitizing exit/entry certificates required at ports of exit/entry into the country, export authorizations to load cargo into ships, and certificates of origin (CoO).

Second, building on the success of the first paradigm, DP World aims to create a permissioned blockchain for beneficiary cargo owners and their trade-logistics business partners to promote data sharing and process integration. The goals were to improve trust among trade-logistics community members, reduce logistics lead time by eliminating waste in requesting and validating data, and enable smart trade through digitization and data-driven decision-making.

Implementation strategy

Development and implementation are being conducted in a phased manner. The first phase of the project includes the two UAE-centric use cases: customer registration and the digitization and securing of trade documentation. First, a memorandum of understanding was signed between participating organizations, and a roadmap was put in place to onboard additional entities as the project progresses through the phases.

Following this, the technology platform is being identified and the development is following iterative deployment cycles. In parallel, several workshops and awareness sessions are being conducted with a variety of decision-makers across the organizations to clarify the potential of blockchain technology and where it is relevant in addressing the current challenges in logistics and trade.

These phases lead into a broader vision of a universal platform for enabling global trade. Building on successes, DP World will work with pilot beneficial cargo owners (importers), freight forwarders and financial institutions, expanding to important port communities where DP World is present to promote adoption, scaling impact by forming a global trade network.

Traction and key metrics

To date, DP World has forged partnerships with stakeholders along the value chain for the first two use cases, ensuring that they possess the right foundations for full implementation. Moving forward for the global trade platform, progress will be measured by metrics such as the number of participating members, number of purchase orders, shipments and documents recorded in the blockchain and average lead time from shipping request to cargo arrival on targeted shipping lanes.

Key deployment challenges

1. **Aligning on questions of governance and operations**
   Organizations are still learning to structure project management in a federated and democratized manner to match the novel nature of blockchain architecture and governance. As a result, formalizing the engagement among participants on a co-owned platform that will require funding, hosting, operating and maintaining is a significant challenge.

2. **Unconventional project management requirements**
   Project management of the initiative is challenging as project-management methodologies across organizations and entities differ. Yet, since each primary entity has partial ownership of the platform, adjustments on project management, workflows and funding approval have to be customized. Again, related to project management, timelines and priorities could vary significantly between different entities.

Key deployment success factors

1. **Providing a single window into all processes**
   By providing a single view into all processes, the project is able to eliminate duplicate processes across organizations and enable traders to interact with these entities through a single window underpinned by the blockchain platform.

2. **Meticulous orchestration of stakeholder management**
   Maintaining close communications and positive relationships with engaged stakeholders is key to ensuring an inclusive and timely approach towards deployments. Managing expectations and working towards consensus on all project aspects will be a significant success factor.

Case 2: Emirates Airlines

Enhancing loyalty programmes

Case study overview

Emirates Skywards is the award-winning loyalty programme of Emirates and flydubai, with more than 25 million members. Members earn Skywards Miles with a variety of Emirates partners, from airlines to hotels and car rentals, among others. The Miles can then be redeemed for a range of rewards, including flight tickets and upgrades, hotel stays, events and more. Together with Loyyal, a blockchain-based loyalty and rewards platform, Emirates set out to explore the potential of using blockchain to enhance the Skywards loyalty programme.

About: Emirates Airlines

Emirates is the world's largest international airline with a global network of 159 destinations in 85 countries across six continents. It operates 269 modern aircraft, and has a multilingual cabin crew from over 135 nationalities. Having witnessed exponential growth since its founding in 1985, Emirates has preserved its entrepreneurial mindset in its approach to applying new technologies to advance operational effectiveness and customer service.

Project goals

Understanding the benefits of blockchain, Emirates and Loyyal sought to reduce the costs associated with reconciling accounts and managing payments. By introducing a standardized process for partner onboarding, they looked to reduce the time and cost of onboarding loyalty partners. The project aimed to improve brand perception and loyalty through improving the offering and ease of use of Skywards Miles.

Implementation strategy

On the technical side, the goal was not to replace existing architecture, but to augment it. Partners would continue to use their existing software but connect via blockchain to leverage the benefit of a shared ledger for payment reconciliation and management. After the initial implementation, Loyyal ran its platform in parallel with the legacy Emirates Skywards system for several months. After demonstrating the value of the application, the decision was made to proceed with a full roll-out of the solution in March 2019.

Traction and key metrics

Since moving to production, the project has yielded several positive results. Importantly, it has led to greater transparency between Emirates Skywards and its partners, enhancing security and decreasing fraud. The process improves traceability and reporting capabilities with blockchain audit trails, eliminating redundant processes for reconciliation. Other impactful benefits included improving the customer experience by providing instant earning and redemption for all partners on the platform through the single blockchain point of integration.

Key deployment challenges

1. **Moving the technology to production**
   Taking a minimal viable product (MVP) and moving to a production-grade solution, particularly with such a nascent technology and vendor, was a challenge as the process involved complying with a number of processes in regards to meeting internal policies, standards and requirements. Bridging the gap between initial validation and sign-off for further development and production roll-out was a time-consuming process to prove the technical and commercial feasibility to stakeholders.
2. **Stakeholder engagement and buy-in**
   Getting acceptance from the main stakeholders and convincing them that blockchain is the technology of the future that adds value to the organization was a challenge. While doing so, Skywards had to maintain a risk-based approach to avoid obstacles related to adoption of the new technology.

Key deployment success factors

1. **Innovation-driven approach**
   By cultivating an organizational mindset of innovation and early adoption of solutions to bring new business value and competitive advantages, Emirates created the right environment to help the organization experiment with blockchain and find the best match for business challenges and requirements.
2. **Government guidance**
   As an early champion of blockchain technology, the government played a unique role in promoting the right environment for blockchain innovation and encouraging organizations to experiment. Aligning with the government's vision of adopting blockchain and connecting to its emerging technology teams supported Emirates' journey in blockchain exploration and implementation.

Case 3: Emirates NBD

Combating cheque fraud

Case study overview

With the emergence of blockchain in the financial sector in 2015 and the launch of the Dubai Blockchain Strategy in 2016, Emirates NBD set out to explore ways in which it could apply the technology to create real impact at scale. In 2016, it tested blockchain for cross-border transactions and trade finance documentation in partnership with ICICI Bank in India.

Afterwards, the Emirates NBD team decided to use blockchain to tackle the sizeable challenge of cheque fraud. Cheques are an active instrument in the Gulf region. Fraudsters apply sophisticated printing technologies to simulate cheques, such as counterfeiting and forgery, as well as fraudulent alteration, which causes financial, reputational and legal risks. As the group issues close to one million cheques every month, representing 30% of total UAE clearing volumes, it is more likely to be susceptible to fraud. Hence, blockchain was explored as a mechanism to counter this risk.

About: Emirates NBD

Emirates NBD is a leading banking group in the Middle East, ranked as one of the largest by assets. The group has a significant retail banking franchise in the UAE and is a leading participant in the global digital banking industry, with over 90% of all financial transactions and requests conducted outside of its branches. The group has operations in the UAE, Saudi Arabia, Egypt, India, Singapore, the United Kingdom and representative offices in China, Indonesia and Turkey.

The Emirates NBD FutureLab was founded in 2016 as a key fundament of the bank's digital innovation strategy and long-term vision. Established with the mandate of developing the next generation of digital and mobile banking services, the FutureLab works with clients and government to accelerate adoption of new technologies in the country.

Project goals

The Emirates NBD project team set out to apply blockchain technology to improve the risk and security management process with cheques. Through applying a QR code on every page of a new chequebook and applying blockchain as a tamper-proof verification layer, the bank aimed to tackle cheque fraud.

- Scale and secure 10+ million cheques cleared monthly over branches for 50+ banks
- Launch e-cheques instrument to potentially save 1.2 billion pages annually
- Expand the service to digitize other documents – 1.2+ million paper letters such as no-liability letters, statements etc. are also requested and dispatched between the banks

Implementation strategy

The initial pilot was launched in early 2017, first reaching the headlines when the bank partnered with the Central Bank of the UAE on a blockchain trial focused on cheque fraud. Under the pilot, Emirates NBD worked with the Central Bank to prove the technology was capable of production volumes. Next, it issued chequebooks with unique QR codes on each cheque registered on the bank's blockchain platform. Additionally, a string of 20 random characters was generated and added to the MICR (magnetic ink character recognition) band of the cheque. After a successful pilot, the bank rolled out the project across the UAE in March 2018 for all customers, becoming the first bank in the region to do so.

Traction and key metrics

In the first month of launch alone, Emirates NBD registered almost one million cheques on blockchain. From January to November 2019, the network has mined over 35 million cheques. Furthermore, the bank has witnessed a reduction in cheque fraud of 99% since the launch in March 2018. The concept then led the bank to create a digital financial instrument with a legal framework in place: the e-cheque.

Key deployment challenges

1. **Tackling the human factor of technology projects**
   As the bank adopted blockchain early on, there were many concerns to be addressed in terms of the risks and viability of the project. One of the main challenges of the project was convincing stakeholders at the bank about the technology, its promise and the technical feasibility, as well as clearly outlining the return on investment.
2. **Asynchronous process of finalization**
   Due to the distributed nature of blockchain, it requires consensus among participants. Hence, data finalization is an asynchronous process, but the traditional core servers are centralized. Therefore, when a transaction is endorsed and submitted to the blockchain, the network must ensure that consensus has been achieved before consuming the data. Thus, the finality of the data to be persistent is a prime factor, ultimately creating a complex technology integration.

Key deployment success factors

1. **Defining a clear roadmap from the outset**
   Proper planning by outlining a clear roadmap and vision from the start was critical to ensuring the survivability of the project. With a long-term implementation with clear next steps for moving beyond pilots and scaling across the bank and beyond, the project team was able to steer the project effectively, minimizing confusion and avoiding roadblocks.
2. **Continuous engagement with stakeholders**
   The project team was in constant contact with the relevant stakeholders in the bank and invested a significant amount of time and resources into explaining the technology, project and developments, showcasing the results over time. There was a focus on confirming that the project had the right technical architecture and business returns, ensuring that both the technical and business angles were considered.

Case 4: Etisalat Digital

Securing invoice financing

Case study overview

In the UAE, financial institutions are increasingly focusing on the small and medium-sized enterprise (SME) segment as a growth opportunity. However, the lack of digitization and mechanisms to validate data across different banks has led to a significant risk of fraud in transactions. SME trade finance through invoice discounting is a growing business that requires controls to avoid risk to lenders of duplicated invoices. It is an increasing concern as multiple banks might end up financing the same invoice, and fraudulent invoices may appear along the process, due to the lack of communication between these banks.

To address this challenge of fraud where duplicate invoices have been financed, Etisalat Digital announced a new platform in June 2019, called UAE Trade Connect (UTC). UTC brought together eight major banks in the UAE, including First Abu Dhabi Bank (FAB), RAKBANK, Emirates NBD, Commercial Bank of Dubai, National Bank of Fujairah, Mashreq Bank, Abu Dhabi Islamic Bank and Commercial Bank International.

About: Etisalat Digital

Headquartered in Abu Dhabi, Etisalat Group, founded in 1976, is one of the world's leading telecom groups in emerging markets. An international blue-chip organization, Etisalat Group provides innovative solutions and services to 148 million subscribers in 16 countries across the Middle East, Asia and Africa.

Etisalat Digital is the business unit of Etisalat, driving digital transformation by enabling enterprises and governments to become smarter in applying the latest technologies such as internet of things (IoT), artificial intelligence and blockchain. Etisalat Digital brings together digital experts from the industry, technologies and platforms to provide end-to-end digital vertical propositions to advantage digital

Explained: Invoice discounting

SMEs apply **invoice discounting** by using their unpaid accounts receivable as collateral for a loan, supporting their working capital.

Project goals

The founding members of the UTC network sought to apply blockchain as a verification layer to detect fraud in invoice financing by identifying duplicate invoices between a network of participant banks. The platform is aimed at driving digital transformation of trade and preventing the risk of fraud through a shared blockchain network, while maintaining confidentiality of each bank's client information. Additionally, the project was planned to form the first foundations of an active blockchain network of participating banks that could enable the development of a future blockchain application roadmap for collaboration on other use cases.

As the project continues through phases of implementation, the consortium expects the findings to continue through the full deployment of the platform and the adoption by founding members, as well as the growth from new members joining the consortium.

Implementation strategy

In June 2019, Etisalat Digital announced the formal launch of UAE Trade Connect (UTC) with eight banks. All founding members signed a memorandum of understanding (MoU) to work together on the definition and implementation of the platform. Etisalat Digital, as a neutral third party, is the governing body leading three individual tracks. The first track is dedicated to business features of the platform, the second track focuses on IT requirements of the solution, and the third track deals with regulatory frameworks applicable to the platform.

The platform is operated by a joint venture between founding members. This allows the aggregation of investment into a solutions development roadmap, in consultation with the bank user group. This approach allows consortia members to limit operational liabilities and risks. The current implementation focus on eliminating invoicing fraud is meant to be a foundational layer. With the bank network and governance structure established, the platform can be applied to other relevant use cases in relation to trade and banking operations and is also meant to connect with other trade finance and non-trade related blockchains to support future applications.

While blockchain underpins the platform, there are also convergences of other technologies. Applications include the use of artificial intelligence and machine learning to identify more sophisticated methods of fraud, such as document manipulation or forgery, and the detection of over and underpricing of invoiced items.

Traction and key metrics

To date, the consortium governance model behind the project has proven itself successful, validated by the high level of engagement from the eight founding UAE banks working together on various tracks of the platform. Traction is defined by the number of participating banks and deployment of the project, measured by metrics assessing the reduction of invoice fraud through duplicate invoice funding and identification of fraudulent invoices. This tackles an estimated 3.75 million fraudulent transactions in the UAE annually, representing US$435 million in potential losses.

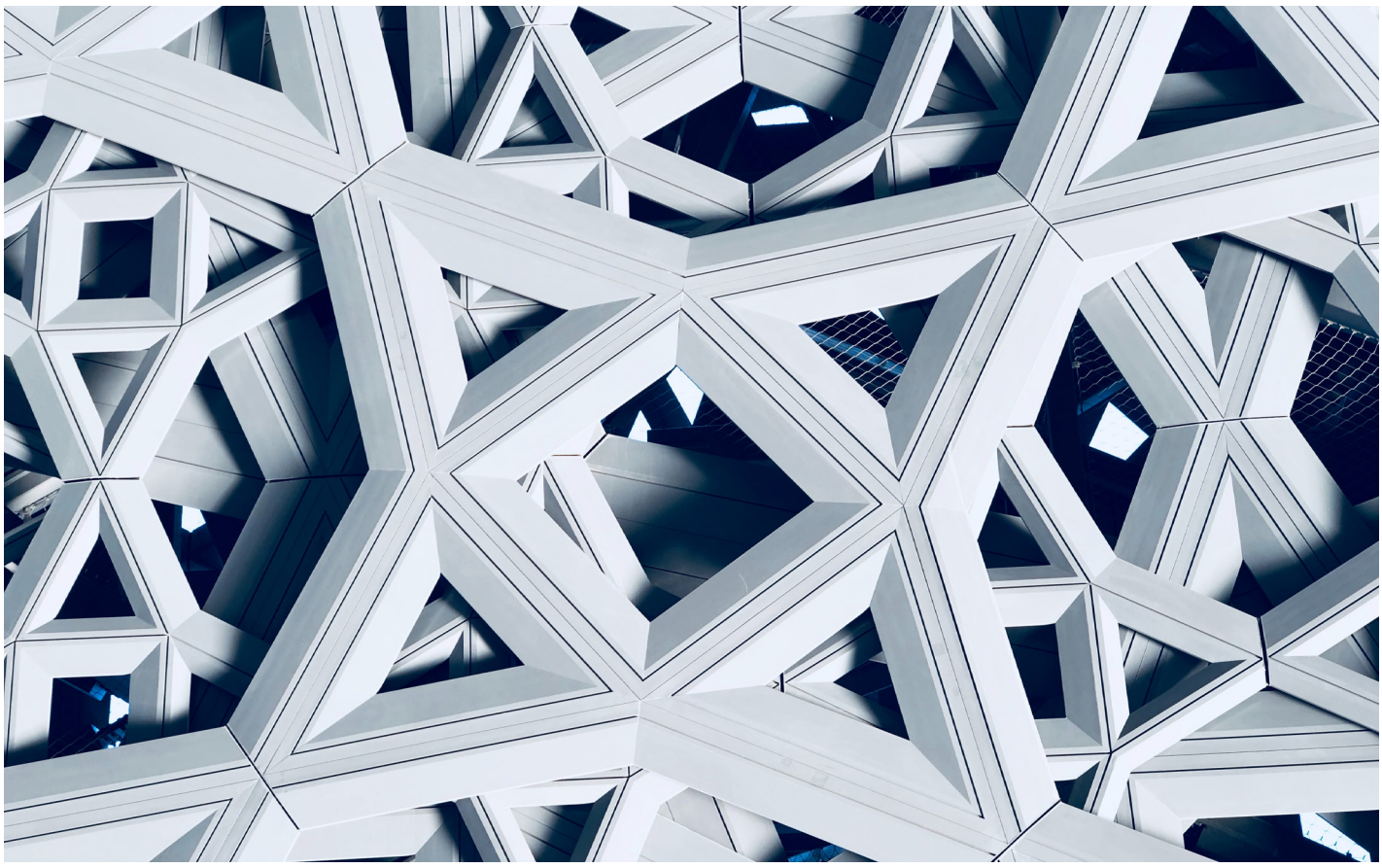
Key deployment challenges

1. **Coordinating among many stakeholders**
   Aligning the intentions and ambitions of different parties is a challenge and can be time-consuming, particularly when many large organizations with their own internal governance structures and decision-making processes are involved.
2. **Meeting requirements of all participating parties**
   In terms of integration requirements, security policies and IT frameworks for hybrid infrastructures, among other aspects, it is a challenge to manage requirements and maintain a clear focus to deliver a solution that satisfies every participating organization.

Key deployment success factors

1. **Ensuring an inclusive approach**
   Considering the diverse nature of network participants, the commitment to ensure an inclusive approach from the outset contributed significantly to the success of bringing major banks in the UAE to the table. By investing time and resources to pitch the project to various banks, onboard their teams and accommodate everybody's inputs, Etisalat Digital promoted a common vision and roadmap with stronger commitment and alignment among participating banks.
2. **External, independent third-party project lead**
   Etisalat Digital, as an ICT services provider under Etisalat Group, played an important role in orchestrating the consortium formation as a non-financial external provider and facilitator. This neutral position made it easier to approach, engage and onboard banks onto a single platform.

Public sector



Case 5: Abu Dhabi Digital Authority

Supporting secure data exchange

Case study overview

ADDA has been developing a government blockchain platform to enable and support a secure, trusted data-exchange mechanism between Abu Dhabi government entities and any other external organizations. The blockchain platform would enable a "data marketplace" for the government, allowing a value-driven data-exchange programme. The blockchain platform is being designed with a unique abstraction layer that acts as a connector to enable communication between various blockchains, while minimizing the underlying complexities of each individual system. It will enable system-level interoperability and provide the basis for all future blockchain projects. This layer is targeted to address the challenge of lack of interoperability between different ledgers with different blockchain solutions, while enabling secure data sharing.

About: Abu Dhabi Digital Authority

Abu Dhabi's Digital Authority (ADDA) works with a mission to enable, support and deliver a digital government that is proactive, personalized, collaborative and secure. ADDA is committed to applied intelligence to facilitate timely and reliable insights towards a proactive government.

The authority's tasks also include drafting technology policies, standards, strategic plans and initiatives, and providing operational support to achieve government integration of information and communication technologies, as well as enabling government authorities to manage their institutional and developmental tasks through innovative systems and legislation, which will help to improve government performance. The overall digital maturity of the government organizations is enhanced by managing compliance to the standards that cover data management, cybersecurity and enterprise architecture. Shared government services are provided by ADDA to enhance the quality of services for the government.

Project goals

The project is aimed at allowing government stakeholders to share and exchange data across government departments and with external private-sector participants, including individuals, to facilitate seamless transactions, and to enable efficient delivery of government services. It is planned to enable the government to demonstrate the ability to conduct transactions and manage data on a multi-blockchain platform. It would also support data value realization wherein stakeholders can complement and enrich their data sources, thereby realizing efficiencies and producing richer data streams. This would enable a more advanced, secure and precise data-sharing environment.

Implementation strategy

ADDA applied a multipronged strategy to the implementation of blockchain platforms and usage within Abu Dhabi government entities. At the foundation level, it raised awareness of blockchain and drove implementation through a top-down approach, identifying and developing high-impact use cases across government entities. The initial implementation is carried out on a government sandbox using multiple blockchains and a required abstraction layer for interoperability. The interoperability using the abstraction layer would be tested with the multiple blockchain use cases identified to deliver transactions in different government domains such as health, education, social support and so forth. A roadmap of initiatives has been developed for implementation spanning the next three years.

Traction and key metrics

The impact of the government sandbox is measured through the increase in the number of government entities onboarded on the platform, the number of private-sector entities sharing data through the abstraction layer with the government, and the services provided by the government-enabled blockchain platform. Throughout the project's progression, the workflow is expected to become more streamlined between the government entities and enhance relationships between them. ADDA sees blockchain's potential in improving government services (quality, efficiency), data-driven policies and economic incentives, enabling a thriving data marketplace.

Key deployment challenges

1. **Lack of clarity on standards, interoperability and other technical issues**
   To date, there is still a significant degree of uncertainty about the direction of emerging technical standards for blockchain, along with regulation, interoperability and other issues. These collective uncertainties add to the complexity of planning blockchain projects, which is a significant challenge to government organizations.
2. **Awareness and expertise across organizations**
   When considering a use case to be implemented, the level of awareness and capabilities with regards to blockchain is highly variable across involved organizations. Since blockchain entails collaboration by its nature, the project moves only as quickly as the slowest link in the chain. Therefore, ensuring a consistent level of understanding, expertise and engagement across participants is a significant challenge.

Key deployment success factors

1. **Identifying the core benefits of blockchain**
   Breaking down the speculated benefits of blockchain into their component parts has played a vital role in understanding how to apply and derive value from the technology. A clearer path forward could be outlined by elaborating on what the potential benefits such as transparency, security or efficiency truly mean, and how they are to be realized.
2. **Applying modularity for solution sustainability**
   Applying modularity where possible by clearly defining where blockchain elements are to be applied, and engineering new processes and applications that can be decoupled from the blockchain layer, has been valuable. This approach has initially proven successful in improving solution resilience by reducing vendor lock-in and reliance on a specific blockchain as underlying blockchain standards continue to evolve.

Case 6: Ministry of Health and Prevention

Improving and securing organ donation

Case study overview

As part of its objective to develop effective healthcare systems and continuously improve services, MOHAP identified organ donation allocation and transplants as a focus area while also aiming to prevent illegal organ trading in the UAE. As a result of this, Dhonor Healthtech was selected to develop UAE's "Hayat" donor registry for recording individuals' legal will as donors, using blockchain as a secure verification layer.

About: The Ministry of Health and Prevention

The Ministry of Health and Prevention (MOHAP) of the UAE is mandated to enhance community health by providing comprehensive, innovative and fair healthcare services as per international standards and by performing its role as a regulator and supervisor of the healthcare sector through a modern and integrated health legislative system. As part of its Innovation Strategy 2019–2021, the ministry is progressing with its smart healthcare developments by applying advanced technological systems to manage the healthcare system.

Project goals

The project focused on four vital areas aimed at improving the transplant process for donors and patients: improving access to organ transplant treatments; accelerating and securing the transplant process; improving transplants with advanced organ allocation; and organ provenance verification with regulations.

Implementation strategy

As the UAE has both federal and emirate-level health authorities, the project team was responsible for continuous alignment with all stakeholders to enable the timely delivery and launch of the programme. To minimize the complexity of this task, the project was developed through a phased approach with three core development phases. After initial planning, the proposed platform (underpinned by blockchain) was divided into modules and components targeting specific areas of the transplant process. This phased approach towards implementation ensured verification of the system and alignment of all participants at every stage.

The first phase focused on the development of the core Hayat donor registry. The second phase revolved around the creation of the patient's national waiting list. The final phase was divided into two components: the first component aimed at organ provenance verification based on regulations; and the second at an artificial intelligence (AI) allocation calculator to combine time to delivery with United Network for Organ Sharing (UNOS) organ-matching calculators.

Traction and key metrics

Since its initial launch in January 2019, thousands of registered donors have recorded their will on the Hayat blockchain-based application, and all hospitals permitted to conduct transplants have been participating in the national waiting list and allocation platform. The solution is expected to save MOHAP over $20 million in estimated dialysis costs per annum. In addition, it saves citizens the time and economic cost of driving to registry centres during working hours, through offering donor registration on the app or online.

Key deployment challenges

1. **Adopting smart contracts as legal digital contracts**
   Accepting a person's will as a legal binding agreement for donors on registry has been one of the main regulatory challenges in the project. Digital contracts are legal in the UAE. However, accepting a smart contract requires verifying the identity of the donor beyond doubt. This led to the necessity of developing an identity verification tool and integration with the Federal Authority for Identity and Citizenship to request further details from the person providing a digital ID.

2. **The cultural impact of smart contracts**
   Smart contracts are intended to be self-executing agreements upon meeting certain requirements. However, in the case of organ donation, other stakeholders such as family members may become involved and object to the organ donation. This has brought about multi-signature requirements to allow for family members to act as witnesses to the donor's will, making the process more complex and adding additional steps for onboarding and identity verification.

Key deployment success factors

1. **Applying a phased approach matching blockchain maturity**
   Where data privacy related to a registered donor's will is of critical importance, the project had to address this accordingly. As blockchain technology is continuously evolving, the phased approach ensured that the development and scale-up of the system could match the technology's advancement to support the highest data-privacy and security standards possible.

2. **Government strategy**
   Through the UAE's government strategies for embracing emerging technologies, ministries have continued to explore what is possible. Focusing on improving patient safety through continuous innovation has allowed the Ministry of Health to adopt a culture of being open to new opportunities, exploring new innovations and testing them within the organization.

Case 7: Smart Dubai

Addressing payment reconciliation and settlement

Case study overview

Since its launch in 2003, the Dubai Smart Government has managed Dubai Pay, a centralized payment gateway for government payment collection with more than 40 public and private entities. The system enables UAE citizens, residents, visitors and businesses to pay online for Dubai government smart services. In 2018, the system conducted more than 10.4 million transactions amounting to 16 billion dirhams (US $4.3 billion). However, each entity has its own books and records, leading to significant time and cost in cases where the bookkeeping process was largely manual.

About: Smart Dubai

Smart Dubai is the government office tasked with facilitating Dubai's citywide smart transformation, to encourage, deliver and promote an efficient, seamless, safe and impactful city experience for residents and visitors. Smart Dubai supports strategic partnerships with the public and private sectors and academia, with the goal being to design and implement efficient citizen services.

Project goals

One the most significant challenges that sparked Smart Dubai's interest in applying blockchain was the lengthy and costly manual reconciliation and settlement process, which took up to 45 days. Under the current platform, the Department of Finance and other participating stakeholders had limited visibility of funds, collections and transactions. As such, resulting disputes, claims and reversals continued to remain largely manual procedures. The Smart Dubai blockchain payment reconciliation and settlement project thus set out to create a more effective layer to address the limitations of the existing platform. The goals were as follows:

- Enable instant reconciliations and settlement between entities
- Immediate disputes and claims resolution
- Automation of financial procedures for operational efficiency
- Transparency and immutability of financial records

Implementation strategy

Considering that more than 48 organizations were part of Dubai Pay, Smart Dubai had to clearly explain what the project entailed and what the benefits were for each entity. First, Smart Dubai conducted a workshop with the Department of Finance to demonstrate the potential of the project. Upon reaching an agreement, they sent an official letter to all of the government and non-government entities, where they then conducted two sessions to explain blockchain technology and the proposed project in both group and one-on-one sessions.

Next, Smart Dubai launched a challenge to the international tech community to address this project under the Dubai Future Accelerators, a programme from the Dubai Future Foundation to connect cutting-edge start-ups to government entities. Under the programme and resulting proof of concept, Avanza, a blockchain solutions provider, signed an MoU for a pilot in February 2017.

Initially, Smart Dubai focused on a small-scale pilot with four entities: Dubai Electricity and Water Authority (DEWA), the Knowledge and Human Development Authority (KHDA), Emirates NBD and Network International. The approach was to start small with a mix of both smaller and larger entities by transaction volume to test solutions.

Upon successful completion of the pilot, live verification and official launch, Smart Dubai then engaged the remaining participating entities under the umbrella of the Dubai Blockchain Strategy in order to begin scaling up the project. The Dubai Blockchain Strategy and official mandate of the Department of Finance ensured that all involved stakeholders had a clear understanding of the project details and subsequent roadmap.

Traction and key metrics

As of November 2019, the majority of entities in the Dubai Pay platform have joined the blockchain platform, with onboarding of the remaining entities planned to be completed by 2020. With the implementation of the platform, reconciliation has been cut from a 45-day process to real-time resolutions, along with associated costs. The platform enables entities to see total revenue in real time and saves around 15 days of processing time per case.

Customer satisfaction has also increased, as entities are able to resolve customer payment issues proactively. Issues can be detected in real time and, as a result, entities can provide more effective services or issue transaction refunds. Additionally, distributed financial records have helped the network improve the transparency and trust of the financial data between banks and entities.

Key deployment challenges:

1. **Moving from centralized to decentralized deployment**
   Compared to a typical project with centralized deployment, blockchain projects require continuous engagement of several stakeholders across multiple organizations, which presents new technical and business challenges. Not only does implementation have to be managed across many sites, every government and corporate entity has its own security policies and internal infrastructure team. Therefore, Smart Dubai had to address the requirements of every participant.
2. **The technical and business costs of early adoption**
   Being an early adopter meant that the implementation team had to work within a nascent blockchain environment, both in terms of the maturity of the technology and stakeholder awareness. As such, there was a significant challenge surrounding the proper education of participants and developing a working platform as the underlying technology and standards evolved in the meantime, requiring constant education and iteration.

Key deployment success factors

1. **Identification of a clear pain point**
   The most important success factor of the project was the realization and outlining of a clear problem to be solved – in this case, the high cost and time associated with reconciliation. As there was clarity on the pain points and clear communication to stakeholders, it was relatively simple and quick to get the necessary buy-in and onboard participants to take part in the project.
2. **Continuous engagement with all stakeholders**
   On the business side, Smart Dubai ensured the formation of technology teams in every entity, with Smart Dubai's own team interacting with them: conducting sessions; demonstrating the value of the opportunity; security assessments; addressing open concerns and so forth. On the technical side, to respond to challenges in terms of maintaining and upgrading deployments in different organizations, a BaaS (Blockchain as a Service) platform was built to integrate all of the entities.

Conclusion

As concluded through this paper, learnings from cases in the UAE to date have shown that the main challenges to blockchain deployment remain tied to operational and regulatory questions, as opposed to technical factors. Government entities, corporations and service providers alike are unified in their concerns about getting blockchain projects off the ground. Challenges have primarily revolved around identifying the right applications of blockchain, ensuring proper education and awareness for stakeholders involved, and onboarding stakeholders with the right governance model and structure in place.

For the UAE, resolving some of the main challenges has come from the government playing an outsized role in embracing emerging technologies and emphasizing the value of innovation for advancing society, supporting both the private and public sectors in exploring, implementing and scaling new technologies. As such, the Dubai Blockchain Strategy and Emirates Blockchain Strategy played a significant role in the creation of a collaborative environment and put in place processes for the private and public sectors to work together to explore blockchain technology at scale.

These strategies have advanced the development of a thriving blockchain ecosystem within less than three years, contributing towards the nation's vision of becoming an innovation-driven economy. In the future, the UAE will continue to monitor the pulse of the global innovation network to understand, identify and apply emerging technologies.

This paper and its learnings will contribute to the upcoming World Economic Forum blockchain deployment toolkit to support decision-makers in asking the questions necessary for successful blockchain implementation. By employing an inclusive and nuanced approach, the toolkit,[2] to be launched in 2020, intends to resolve deployment problems and unlock opportunities to guarantee a holistic approach to the technology, and consider the needs of all players in the ecosystem. The UAE's seven cases will complement the toolkit by providing the reader with real-life examples of projects that tie in directly with the toolkit's narrative and governance model.

Contributors

The World Economic Forum's Centre for the Fourth Industrial Revolution Redesigning Trust: Blockchain for Supply Chain project is a global, multi-industry, multistakeholder endeavour aimed at co-designing and co-creating tools to guide inclusive and well-designed blockchain deployment. The project engages stakeholders from multiple industries and governments from around the world. This report is based on numerous discussions, workshops and research, and the combined opinions expressed herein may not necessary correspond with the individual conclusions of those involved with the project.

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Endnotes

1 Inclusive Deployment of Blockchain for Supply Chains: Part 1 – Introduction https://www.weforum.org/whitepapers/inclusive-deployment-of-blockchain-for-supply-chains-part-1-introduction
Part 2 – Trustworthy verification of digital identities https://www.weforum.org/whitepapers/inclusive-deployment-of-blockchain-for-supply-chains-part-2-trustworthy-verification-of-digital-identities
Part 3 – Public or Private Blockchains – Which One Is Right for You? https://www.weforum.org/whitepapers/inclusive-deployment-of-blockchain-for-supply-chains-part-3-public-or-private-blockchains-which-one-is-right-for-you
Part 4 – Protecting Your Data https://www.weforum.org/whitepapers/inclusive-deployment-of-blockchain-for-supply-chains-part-4-protecting-your-data
Part 5 - A Framework for Blockchain Cybersecurity https://www.weforum.org/whitepapers/inclusive-deployment-of-blockchain-for-supply-chains-part-5-a-framework-for-blockchain-cybersecurity

2 Contact Nadia.Hewett@weforum.org to learn more about the toolkit and how to get involved.

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