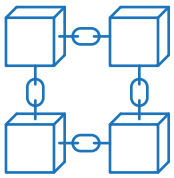
USE & LEARN: AN EXPLORATIVE APPROACH TO BLOCKCHAIN



BKM
BANKALARARASI
KART MERKEZİ

USE & LEARN: AN EXPLORATIVE APPROACH TO BLOCKCHAIN

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Prepared by BKM's Business Development team, this report shares BKM's blockchain technology vision and experiences. All information and opinions given in this report may change in time. Within this context, this report has no responsibilities or obligations against individuals reading its content or any third parties.

1. Introduction

BKM's vision is to "power the future of cashless payments". Realizing this vision requires us to look in to every new technology and assess its applicability in the world of payments. Technologies such as blockchain, AI, IoT & AR compel us to assess their potential use for payments. We believe the value of shared knowledge goes beyond the actual knowledge. For this reason, we share the results of our research and development on these new technologies with public. We use social media, blog posts, meetups, training sessions, and whitepapers, to share our findings, regardless of outcome of the R&D effort. The trust machine blockchain has been one of our focus areas. We have learned and reported about blockchain. Then we have explored various blockchain frameworks to conceptualize and pilot use cases. Finally, we have spearheaded the formation of a national blockchain ecosystem. We invite you to read BKM's blockchain story.

2. Meeting Blockchain

Everything started with an email of a report which covers the risks of virtual currencies published by European Central Bank on October 2012. One of the two virtual currencies reviewed in the report was bitcoin. After some research we found out that the enabler behind bitcoin was indeed blockchain technology. Even though blockchain was never in Satoshi's whitepaper, we were convinced that blockchain had the potential to bring a paradigm shift in the way businesses and processes are handled. So, we focused our research on the technology and started brainstorming blockchain use cases. We are thankful to bitcoin, because it introduced the blockchain technology to us.

3. Time to Share: What We Have Learned about Fundamentals of Blockchain

The word blockchain has increased its popularity through the progressing years of 2010s. It has become the symbol for distributed communication as well as decentralized organization. A lot attention has focused on the potential of blockchain, as a tool to combat consolidation of power in all types of centers. Interested parties came to realize the need to build ecosystems to realize the benefits of blockchain. Therefore, they have started building communities. As a result of this, blockchain technology transformed into a global sandbox that includes communities around the world exchanging ideas with one another. As BKM, having learned about the technology, we felt a responsibility to share our knowledge with Turkish audience as well. Therefore, we decided to publish a book about blockchain in Turkish to increase awareness and start forming an ecosystem. We have commissioned technology storyteller Ahmet Usta and the talented engineer Serkan Doğantekin, to coauthor "Blockchain 101", the very first publication available in Turkish on this subject. The book was released on May 2017, followed by its second edition on June 2018.

The book was just the beginning. We felt the need to interact with interested parties, via face to face courses, offered through Turkey's fintech platform "FinTech Istanbul". Powered by BKM, FinTech Istanbul has been providing the ecosystem an onsite FinTech 101 course program since 2016. Thus, addition of a Blockchain 101 course to the menu was inevitable. Since then FinTech Istanbul has organized 6 "Blockchain 101" classes that are hosted by BKM.

Recently in 2019, "5 Soruda Blokzinciri" (Blockchain explained in 5 questions) by Professor Cem Say and "Sorularla Blockchain" (Blockchain through questions) by Turan Sert publications has been released and sponsored by BKM.

4. Exploring: Create and Share the Blockchain Knowhow

Our research in to the technology has shown us that the blockchain trust machine can solve very old problems in a very different way. But what were those problems? Each industry has its own set of challenges and has developed their own way of working to address these challenges over many many years, sometimes over decades or centuries. We needed to convey the concepts of blockchain such as distributed record keeping, consensus building, immutability, etc. so that subject matter experts in each industry can understand and start thinking about how they can change the way they do business through this technology.

Even though we were sharing our understanding of the technology through a book, blog posts, classes, meetups, and the like., we realized that this approach had its limitations to convey the potential of the blockchain trust machine. We saw that we needed to get our hands dirty and create a live use case, so that we can

- **understand the difference between theory and practice, and then**
- **"show & tell" to all interested parties using a real life example.**

In order to assess the benefits and shortcomings of the technology we took a step further by conducting proof of concept studies.

We have conducted 2 blockchain proof of concept projects so far. The first one is BBN and the second one is belgem.io.

5. First use case: BBN; a Proof of Concept Application for Employee Loyalty

As a first step we tried to identify a meaningful use case that can be built on blockchain. Because of the technology's relative immaturity, we did not prefer to conduct a project related to BKM's core products and services. Instead, we devised an employee loyalty application as a use case to test blockchain concepts such as digital identity, distributed ledger, and smart contracts.

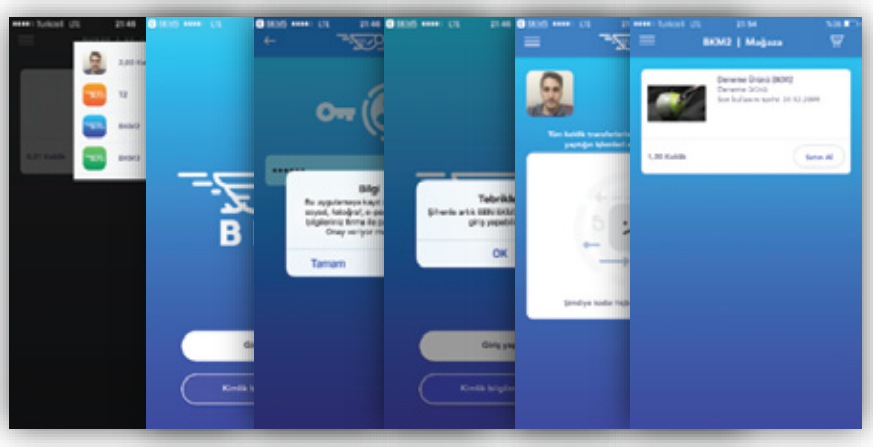
The next step was to determine how we would develop the project. BKM's business development approach values growing and learning through its ecosystem. Therefore, we sought a partner who was interested and experienced in the recently emerging technology. We opted for cooperating with T2, a software startup, for the development of the project.

We went live with our first blockchain application on January 2017. The application was named BBN standing for BKM's marketing slogan "Bye Bye Cash".

Besides being an employee loyalty tool, BBN provides us with the opportunity to test and learn blockchain. Our proof of concept goal was to test technological concepts such as digital identity, distributed ledger, smart contracts and consensus via BBN.

Through the BBN application, we enable employees to create their own digital identities on their mobile devices. These verified IDs are stored on blockchain. The employees share their ID's while registering on different business units' applications. Thus, employees and companies are able to complete user authentication process faster. Users can earn points for completing tasks given by business units, transfer these points to other users (P2P), and purchase products such as discount codes in the applications' stores by redeeming their points via smart contracts. With this set of operations, the concepts of distributed ledger and smart contracts, as well as digital identity have been incorporated.

During the design phase of the project we have learned the concept "private blockchain", which offers an eligible infrastructure for trusted nodes inside a closed loop network. Reports express that private blockchain concept is an opportunity for industries such as finance, medical, supply chain for which privacy and security are crucial. Therefore, we decided to utilize the private blockchain concept within BBN. Our live network consists of five nodes making up a permissioned private blockchain network built on Hyperledger Fabric. As described earlier one of our goals was to use this use case to showcase the potential of blockchain. Since we went live with BBN we have used it for live demos in many conferences, meetings with banks, regulators, local press and our ecosystem in general. Through very simple flows, BBN enabled us to explain to all interested parties how a digital ID is created and used across a network of peer nodes, how distributed ledger or a smart contract works and how a virtual asset may be transferred between users.



We published our observations on blockchain technology and our significant findings in a report called **Discover: The Secrets of Blockchain** in June 2018. BBN is still being used as a corporate loyalty platform by more than 150 BKM employees.

6. Second use case: belgem.io; a Blockchain Based Digital Certificate Platform

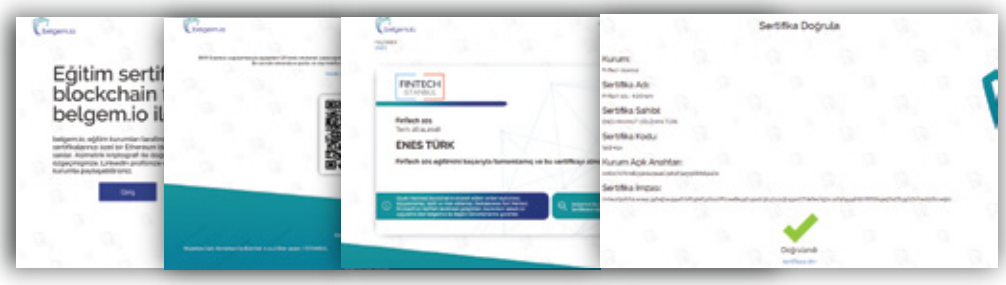
We believe that understanding blockchain is important, since it facilitates building trustbased business models around ecosystems, without intermediaries. In order to further study this fact, we wanted to conduct another proof of concept project.

Our second use case was inspired from a BKM platform named BayBayNakit Akademi, a training academy for BKM members. BayBayNakit Akademi offers classes on payment systems topics and issues paper based attendance certificates for all trainees. We decided to build a digital platform designed to store, view and share certificates on blockchain. The application is called "belgem" meaning "my record" in Turkish. This use case started to take form subsequently as we shared our thoughts with Microsoft Turkey and local softwarehouse VeriPark for partnership. Unlike our first use case BBN, belgem.io was to be open to users outside BKM. Therefore, we worked closely with Microsoft and Veripark during the analysis and design phases of the project to ensure the end product will be compliant with Turkish dataprivacy law. In the end, belgem.io users would be able to store digital certificates on an irrevocable blockchain platform and share their certificates with any organization they like. In addition, organizations would be positioned as nodes who would be in charge of automated governance on the blockchain.

Our solution is implemented on a private Ethereum in order to discover new platforms and leverage from variations between them. One of the main innovations of blockchain technology is Ethereum Virtual Machine (EVM) which is able to process code snippets called "smart contracts". Microsoft has invested in blockchain heavily and has several blockchain products on Azure Marketplace. We started to develop with a preview stage product called Ethereum Proof-of-Authority (PoA) Consortium. It gave us the ability to use PoA consensus algorithm that doesn't require mining and to design a governance model for our consortium.

One of the requirements of belgem.io is to verify the authenticity of each user and organi-zation. Thanks to BKM's digital wallet product, BKM Express users are one click away from being verified. Moreover, organizations were authorized via MetaMask which is an Ethereum wallet. Belgem platform architecture is open to implementation of other user verification methods such as bank wallets and digital/mobile signature in the future.

belgem.io



Belgem.io went live with three organizations on November 2018. BayBayNakit Akademi, FinTech Istanbul and BCTR (Blockchain Turkey Platform). Later on, TUSAYDER, TÜBİTAK BİLGEM and TSPB were added as permissioned peers to belgem.io network. The solution worked well for five months and over 150 certificates were issued digitally until a bug occurred on cloud products. The reason behind the error was the Parity version that Ethereum Proof-of-Authority Consortium was working with. Parity is an open source project which enables the usage of PoA consensus algorithm on Ethereum blockchain platform. We managed to fix the bug a couple of times, but it kept occurring and the application became unstable. Eventually we started to look for a new blockchain platform in order to migrate belgem.io. Microsoft suggested a new product called Azure Blockchain Service which was designed for enterprise use especially for private blockchains. J.P.Morgan's Quorum, an Ethereum fork customized for enterprise priorities was an option for belgem.io. In a couple of weeks, we successfully migrated whole blockchain data into the new chain and relaunched belgem.io as second phase on June 2019.

It is our intention to add more institutions (as blockchain nodes) and increase the issuance of certifications; so that we assess the scalability of the platform as well as we can use it to provide the experience of private blockchain to a larger audience.

Our findings of this project is documented in the report titled "Blockchain for Everyone" which was released on November 2018.

7. Ecosystem building: BCTR, A hub for Turkish blockchain community

BKM believes in the power of ecosystem and launched a number of initiatives to leverage it. Latest initiative is the formation of Blockchain Turkey Platform (BCTR), an initiative founded by the Turkish Informatics Foundation. BCTR aims at creating a sound blockchain ecosystem in the country.

> *Turkish Informatics Foundation was established in 1995 by one of Turkey's leading private groups; Eczacıbaşı Holding. The Foundation's main goals are to contribute to the development of the legal, technical and physical infrastructure required for Turkey's full transition to an information based society and to increase share of informatics investments in the general economy to the average level of European Union countries.*

As BKM we believe that blockchain technology will impact all industries. That is why it should be embraced by an industry agnostic organization. With this in mind we have approached Turkish Informatics Foundation; who we thought would be the appropriate organization to house an industry agnostic blockchain ecosystem formation initiative. The Foundation appreciated our belief in this regard and having reached a mutual understanding, we jointly launched BCTR in 2018.

Since its founding BCTR has been establishing a platform to build a sustainable blockchain ecosystem in Turkey. The idea to form a local ecosystem aims at removing all obstacles to new models of business with the vision of securing Turkey's regional leadership in a decentralized system. BCTR aims to expand both awareness and use of blockchain technology in Turkey, research its benefits and determine the strategic priorities by:

BLOCKCHAIN TÜRKİYE

BCTR is aiming to expand both awareness and use of blockchain technology in Turkey, research its benefits and determine the strategic priorities by:

- *organizing training programs (seminars, certificate programs, academic publications)*
- *hosting events (workshops, conferences, panel discussions)*
- *preparing publications (books, reports, magazines and supplements, bulletins)*
- *producing content (news, essays, guest speakers and writers, interviews, social media content)*
- *taking part in collaborative efforts (local and international; public institutions; universities; thinktanks; science, industry and technology academies; blockchain platforms and consortiums established in other countries and by other associations).*

As of February 2020, BCTR has 75 members from numerous industries such as finance, insurance, logistics, retail, technology providers and transportation. It also has 10 collaborations with public sector bodies such as universities, thinktanks, science, industry and technology academies.

BCTR also has 4 working groups which are:

- *Finance, Banking and Insurance*
- *Law, Regulations and Government Relations*
- *Manufacturing, Logistics and Transportation*
- *Social Impact and Training*

The main purpose of these groups is to determine the needs, priorities and areas of use in different verticals and horizontals, prepare inspirational reports, if possible, carry out pilot projects and draw up recommendations for the Steering Committee on what the priorities of public sector institutions, lawmakers and regulators should be with respect to the sector or issue in question. Up to now, each of these working group has published opinion reports. BKM's key contribution to these reports are as follows:

Finance, Banking & Insurance working group report on "Digital ID". BKM has shared with the working group, an internal 2018 study conducted with 9 of its member banks on the development of a decentralized Digital ID ecosystem. The findings of BKM's study; which conveyed the need for a federated Digital ID solution encouraged the working group to embrace the subject for further study. The working group, consisting of large industrial representation as well as a government research body, TUBİTAK, has built a strong opinion paper advocating building of a federated Digital ID ecosystem. The report was published on April 2019.

Please scan QR code below to access BCTR reports

•BKM's contributions on other reports are:

•Manufacturing, Logistics and Transportation working group's "Know Your Supplier Platform" report proposes a project model designed to address one of the basic needs of blockchain technology in the supply chain process. This model aims to connect buyers and suppliers on a blockchain platform that provides purchase history records for peers.

•Technology, Training and Events working group's "Blockchain Conceptual Architecture" report provides a blueprint for organizations who want to adopt blockchain technology.

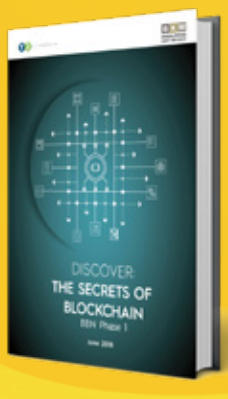
•Law, Regulations and Government Relations working group's "Open Data" report addresses the benefits, impacts, status and strategies of open data in the world. "Blockchain Regulations and Practical Examples in the World" report summarizes the worldwide regulations in a comprehensive study. "Terminology Study on Blockchain Technology" report provides explanations of concepts related to blockchain terminology and offers Turkish response sug-gestions.

Now, the target for the working groups is finding blockchain use cases that can be imple-mented into the real world.

8. Going Forward

This booklet demonstrated BKM's approach to blockchain technology. We believe that in the future blockchain's capabilities will provide brand new and innovative ways to look at many established business processes, regardless of industry. We will not be surprised at the discovery of new ways of solving very old trust issues with solutions based on blockchain. For this reason, BKM will continue to explore blockchain technology via launching new proof of concept studies. This way we will be monitoring the maturity of the technology and following and contributing to blockchain communities. We are confident the trust machine blockchain will one day mature to the level to implement a large scale payment system.

Follow us, we will be sharing every new chapter of our blockchain journey with the public at large.



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Blockchain Turkey Platform (BCTR) Publications

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