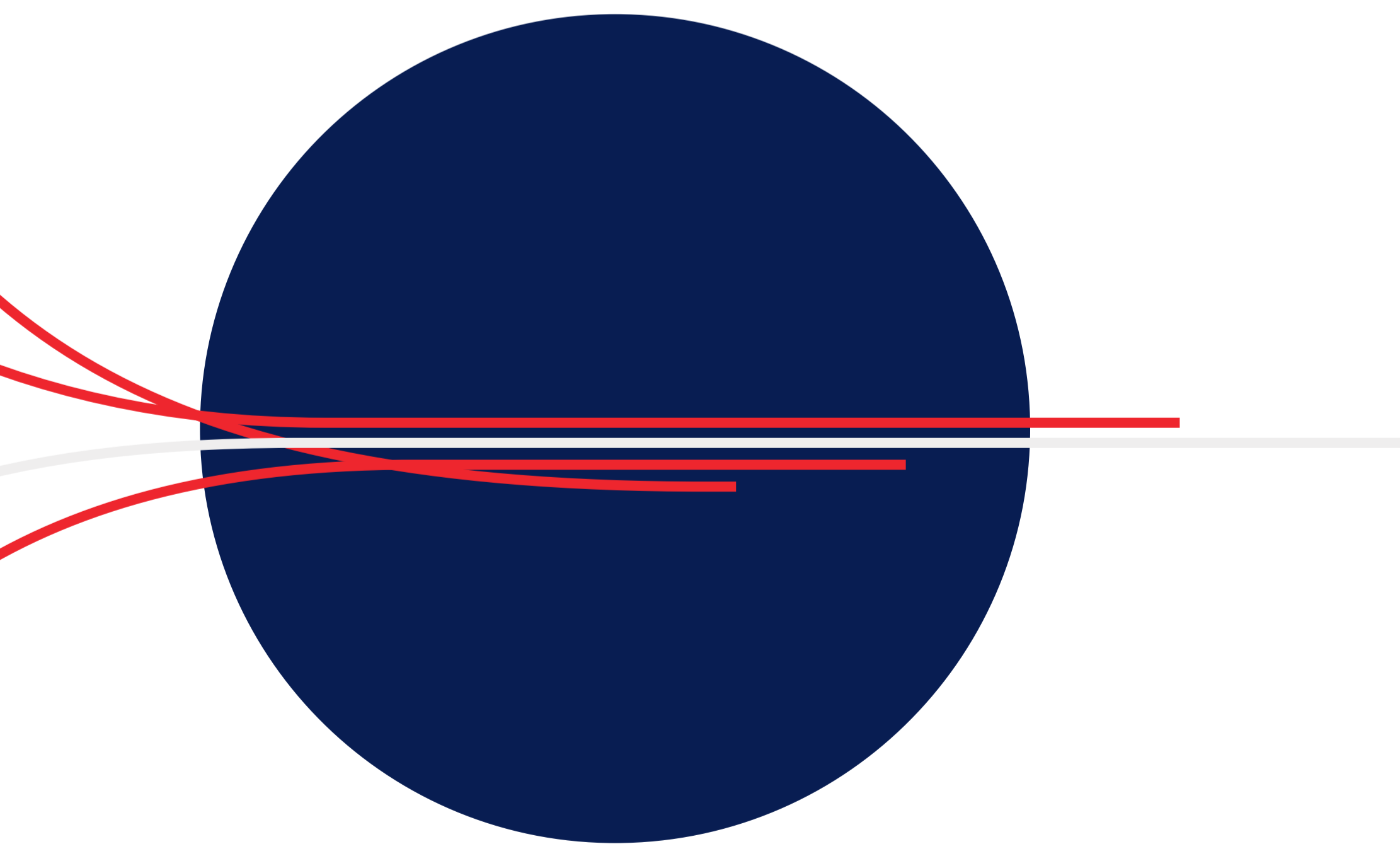




**Building the Infrastructure
of the Digital Economy**



Contents

- 1. Digital economy – towards a robust digital infrastructure**
- 2. Blockchain-backed digital economy: moving to the realm of the possible**
- 3. Vostok – a complex approach to integrating blockchain**
 - 3.1. Vostok Private Blockchain Platform**
 - 3.2. Vostok System Integrator**
- 4. Vostok project development**
- 5. References**

1. Digital economy – towards a robust digital infrastructure

About 2.5 billion people are connected to the internet today; there are projected to be about 4 billion users by 2020, or more than half the global population. Continuous access to information, commerce, communication and entertainment – among myriad other things – has become a daily fact of life for billions, and will soon become a reality for billions more. Great expectations are riding on the continued expansion of the digital economy, which already grows 12-25% per year, and is having a far-reaching social, political and economic impact [1]. As the internet makes its full weight felt in more high-impact areas such as healthcare, education and government services, access to digital services will only become more essential for everyone in the coming years.

The services enabled by digital technology are economic growth drivers, job creators, talent magnets and big sources of exports. The internet has created entirely new fields of commerce, and its impact extends deeply into traditional industries, enabling new capabilities, products and services. However, the potential of the digital economy can only be fully realized if digital infrastructure keeps pace.

A range of new technology solutions are being consolidated and applied to different and innovative uses with a promise to increase efficiency, transparency and the decentralization of information. New models challenge how organizations store and manage data transactions and enable internet-based companies and a wide range of institutions to develop new products and services.

Blockchain is among those new technology solutions that emerged with a promise to improve the delivery of goods and services at a speed and efficiency previously unimaginable. A significant transformation is about to happen as the technology matures and mainstream applications emerge. Under this new wave of technological change, the nature of intermediation is going through fundamental changes, opening opportunities for scaling some operations, and introducing new approaches to value creation and value capture [2].

The largest implementation of blockchain technology known to this day, Bitcoin, is often criticized for its inability to match the performance of existing payment networks or the requirements of the financial system and governments. However, it has proved to be extremely successful in solving the problem it was designed to solve – allowing a global network to securely transact and exchange value without the need for a costly intermediary.

Through a clever mix of game theory and cryptography, the blockchain network is able to reach consensus about the true state of its distributed ledger. This mix potentially enables new types of organizational logic that prioritize a decentralized nature while replicating the more complex forms of governance used in traditional structures in conventional sectors.

The benefits brought by the blockchain technology – security, efficiency, and speed – are said to be readily applicable to public sector organizations, which explains why so many nations are actively exploring its uses in the public sector. From almost zero three years ago, more than a dozen countries are now running pilot projects, tests, and trials examining the architecture’s broad utility as a basis for public services provision, and for the procurement and development of individual blockchain-based applications for internal use.

Public agencies are tasked with maintaining trusted information about individuals, organizations, assets, and activities. Agencies on all levels – local, regional, and national – are charged with keeping records about births and deaths, marital status, business licensing, property transfers, criminal activity, etc. Managing and using this data can be challenging, as some records exist in paper form, and if changes are to be made in some types of records, it always require citizens to visit registries in person. In this digital age that we live in, it is a hodgepodge way to do business, and blockchain technology offers a variety of opportunities to increase the efficiency and transparency of these operations.

Utilizing a distributed ledger, blockchain improves security, data transparency, recordkeeping, inspection rates, and the visibility of various types of transactions, potentially making public administration operations more efficient while also significantly increasing trust in the public sector.

Figure below illustrates the key characteristics which make blockchain technology a promising digital solution for the public sector.

Core characteristics

Shared data	Need for a structured repository of information
Multiple parties	More than one entity writes or reads the database. Access may be permissionless (‘public’), permissioned (‘consortium’) or private
Low trust	Less than complete trust between the entities (readers, writers, nodes, witnesses,etc.) in the ecosystem
Auditability	Transactions are immutable – once written they cannot be modified or deleted. Participants have digital identity on every transaction

Value-add characteristics

Disintermediation	No central gatekeeper to verify transactions; cost of intermediary may be reduced
Transaction interaction	Smart contract code runs on the ledger for interaction, dependency, or 'settlement' between transactions from different entities

Some might look at the blockchain technology as a foundation for cryptocurrencies, however, it might also be treated as a sort of timestamp that validates the exact time an action took place.

Blockchain has a significant potential for creating a “responsive open data”, meaning that blockchain-based solutions will give citizens the ability, without having to wait in line at the public agency, to automatically do a transaction with the government, yet still have the complete trust that the government certified the transaction. In the longer term the technology may even facilitate the creation of networked public services.

2. Blockchain-backed digital economy: moving to the realm of the possible

Regardless of many distinct advantages that make blockchain a go-to solution for public agencies, leveraging the technology is a complex task. The decision to integrate the technology has a potential to transform business models and processes, and reshape the set of stakeholders that are involved in these processes and their roles. However, there are still a lot of challenges, both technological and managerial, that need to be sorted out.

Since its introduction blockchain has undergone several iterations as many private corporations, financial institutions and public agencies sought to take advantages of its innovative infrastructure. Public blockchains appeared to be especially valuable due to the transparency inherent in the technology, allowing anyone to view and verify all the data recorded. On the other hand public blockchains provide little to no privacy for transactions, only supporting a weak notion of security. Besides, a substantial amount of computational power is needed to maintain a distributed ledger at a larger scale. This has imposed greater challenges for building secure and fast wide-scale blockchain networks for enterprises and the public sector and has spurred a wave of exploration of systems with a higher level of stability and security, and a tighter control over access permissions.

So far developing blockchain solutions for an enterprise has been a somewhat desynchronized process. There are a number of alliance and technology companies often offering open-source, free-to-use blockchain products. However, there are a number of aspects that require additional attention, including analysis of the legal aspects of blockchain and smart contracts deployment, core technology issues such as privacy, development of networking standards, and ensuring compatibility of different blockchain-based products and services.

The lack of harmonization across different sectors and levels might lead to inefficiencies in implementation of technology innovation. It is important to connect different stakeholders to form a foundation for next-generation infrastructure.

Besides, blockchain technology is relatively new – the first implementation is less than a decade old and most applications are not very mature. Because the technology is new it requires a new way of thinking at every stage of the development process – from establishing a business case, drafting, developing and testing approaches, building prototypes, improving accuracy and lowering processing costs, to actually integrating it into existing systems, conducting an internal audit and providing technical support and system maintenance services.

3. Vostok – a complex approach to integrating blockchain

Vostok builds a complex end-to-end solution to unlock the potential of the digital economy by enabling the blockchain innovation. Vostok is the private, decentralized and PoS-based blockchain built to leverage the latest advances which allow for higher security, privacy and greater scalability.

Vostok has been created to connect large-scale enterprises, public administration services, banks, registries and payment providers to form the foundation of next-generation infrastructure for certifying, registering and tracking the data.

3.1. Vostok Private Blockchain Platform

Vostok private blockchain platform is leveraging the latest advances in the blockchain technology to ensure greater network capacity, stability and speed when compared to other existing blockchain platforms.

Essentially, Vostok is running on the principles inspired by public blockchains, but represents a transition between permissioned systems and fully open decentralized ledgers. Asymptotically, as the number of network nodes increases, Vostok becomes indistinguishable from the open network.

Vostok blockchain is implementing Waves-NG, a next-generation technology and consensus algorithm designed and based on the Bitcoin-NG proposal by Cornell Computer Science Researchers Emin Gun Sirer and Ittay Eyal[3]. The technology increases the effective bandwidth and speed of block creation which is especially significant for business and public administration needs, as it allows for conducting microtransactions securely and without delays.

Vostok private blockchain is enabled by native crypto-tokens (Vostok System Tokens), which are at the core of its decentralized and incentives-driven nature typical for open blockchain networks. Possession of VST is imperative for the network consensus algorithm (Proof-of-Stake), as it unlocks access to certain network features.

Vostok network is maintained by nodes distributed worldwide, with access granted and regulated by a centralized committee. The network architecture offers the possibility to assign certain features to particular nodes located in different jurisdictions. Moreover, it becomes possible to create and maintain fully closed networks with controllable access which are fully-supported by the main network.

Permissioned nature of the network guarantees immutability, provides access control, and allows for high transaction speed through the optimization of network algorithms for the permissioned set-up.

3.2. Vostok System Integrator

To provide a clear path for the advantages of blockchain technology Vostok has introduced a dedicated System Integrator which is tasked with conducting concept design for the integration and incorporation of the blockchain-based platforms into business and public administration processes, including, but not limited to:

Taxation	Land registries	Entitlements management
Electronic voting	Distribution of benefits	Government tenders
Digital property rights	Business registration	State archival records
Supply chain traceability	Health care	Real estate transactions
Identity management	Corporate registry system	

Vostok System Integrator works with any technology stack, while prioritizing the development of working solutions based on the Vostok private blockchain platform.

Vostok System Integrator builds interfaces that make it easier for users to be able to interact with the government. The creation of this additional layer of transparency is expected to ensure mass adoption of the technology, further increasing people's trust in government and the services it provides.

4. Vostok project development

Vostok project is initiated and headed by Sasha Ivanov – one of the most prominent, respected and influential people in the blockchain space, who has been leading the Waves Platform and the community of its dedicated followers towards strong growth, international recognition and financial rewards in the last 2 years.

The project is supported by a dedicated team of experienced blockchain developers with a proven track record. There are many more who contribute research, software development, peer review, testing, documentation, design, and content creation.

5. References

- [1] **“Delivering Digital Infrastructure – Advancing the Internet Economy”**
report by The World Economic Forum, prepared in collaboration with The Boston Consulting Group
- [2] **“How Blockchain Technology Will Impact The Digital Economy”**
by Christian Catalini, Assistant Professor of Technological Innovation at the MIT Sloan School of Management
- [3] **“Bitcoin-NG: A Scalable Blockchain Protocol”**
research paper by Ittay Eyal, Adem Efe Gencer, Emin Gun Sirer, and Robbert van Renesse, Cornell University