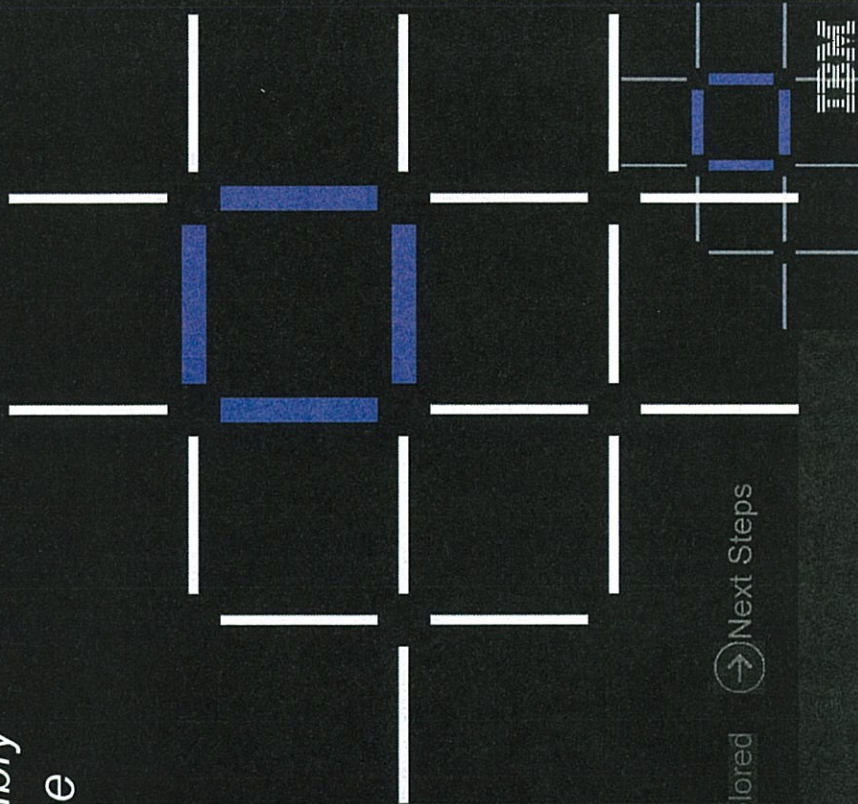APPENDIX

Exhibit

Prepared for the State of New Jersey Assembly Science, Innovation & Technology Committee

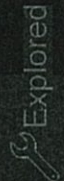## IBM **Blockchain**

IBM

IX

Three imperatives underpin the IBM vision for Blockchain in State and Local government

Open Government

As Government agencies increasingly **collaborate** with private sector and Non-Governmental Organizations to drive economic growth and vitality, the need for **transparency and trust** in data becomes all the more important.

Cyber Security and Privacy

As cyber attacks on Government agencies increase, security of **Government** systems and data becomes fundamental to the Governments ability to provide **safe communities** and protected **critical infrastructure.**

Regulations and Compliance

Governments need to **minimize regulations** to enhance **economic vitality** while at the same time ensure **regulatory compliance.** Governments will not only create but also need to manage the implementation of **policy changes at speed.**

How can Blockchain help?

- *Reduce information silos* and *increase data transparency* through shared ledgers
- *Secure data* through cryptography
- *Enforce consistency* through executable *smart contracts*
- *Decrease paperwork* and *reduce reconciliation* effort
- *Improve audits and verification*

Where and how companies derive Blockchain Return On Investment

B3i
Blockchain Insurance Industry

30% Productivity

The consensus amongst the companies is that a productivity gain of up to 30% is achievable.

MAERSK
Container Shipping

20% is admin.

Estimated that 20% of actual physical transportation costs is administrative effort.

Major Bank
Commercial Real Estate lending

25-40% Productivity

Lending today it is paper/labor intensive. Blockchain could eliminate 25% to 40% of the administrative staff costs.

B2B process efficiencies	Increased trust	New business opportunities	Capital Efficiency
• Target 20-30% productivity improvement	• More consumer & partner trust → more business	• Serve the un-served	• Optimise working capital
• Reduced delays & distribution costs	• Less fraud & error	• Join the dots in new ways	• Reduce risk exposure

3

Understanding different types of blockchains and different deployment models

Types of Blockchain

	Permissioned	Non-Permissioned/Permissionless
	• Identity • Creation & execution of smart contracts in controlled • Participate in consensus is restricted	• Anonymity • Creation & execution of smart contracts in controlled • Anyone can participate in consensus

Deployment Models

Private: an invitation is required to join

Public: anyone can participate

Examples: Type and Deployment

	Permissioned	Non-Permissioned
Public	Land titles, Provider registry	Bitcoin, Ethereum, other cryptocurrencies
Private	Child Support/Protection, Citizen Identity, Tax Records	Polls, Voting

IBM recommends a *Permissioned* Blockchain for most government and large scale industry use cases

4

https://www.forbes.com/sites/laurashin/2016/12/20/hackers-have-stolen-millions-of-dollars-in-bitcoin-using-only-phone-numbers/#2c4291a038ba

≡ Forbes
Digital Money   #AllThingsMobile

Hackers Have Stolen Millions Of Dollars In Bitcoin -- Using Only Phone Numbers

https://www.theguardian.com/technology/2018/mar/20/child-abuse-imagery-bitcoin-blockchain-illegal-content

Bitcoin

Child abuse imagery found within bitcoin's blockchain

Researchers discover illegal content within the distributed ledger, making possession of it potentially unlawful in many countries

https://www.coindesk.com/dao-attacked-code-issue-leads-60-million-ether-theft/

coindesk   Blockchain 101   Technology   Markets   Business   Data & Research   Conferences

The DAO Attacked: Code Issue Leads to $60 Million Ether Theft

New Jersey must move quickly if it wishes to be a leader in Blockchain innovation

Forbes

Why The Delaware Blockchain Initiative Matters To All Dealmakers

SEP 20, 2017 @ 09:55 AM   4,345 👁

≡ **Forbes**   Investing   #NewTech

FEB 21, 2018 @ 10:29 AM   10,233 👁

The Little Black Book of Billionaire Secrets

With Its First-Ever 'Blockchain Week,' New York City Aims To Become Global Epicenter Of Crypto

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JD SUPRA®

April 3, 2018

Wyoming Enacts Comprehensive Blockchain Legislation

D·IT

Illinois Department of
Innovation & Technology

Home

Blockchain in Illinois

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gt

CLOUD & COMPUTING

States Are Hesitant to Adopt Blockchain, but Colorado Might Become an Early Adopter

At a time when most government agencies are only vaguely aware of the technology, Colorado could become an early adopter.

BY LIZ FARMER, GOVERNING / FEBRUARY 7, 2018

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gt

West Virginia Becomes First State to Test Mobile Voting by Blockchain in a Federal Election

The state is performing a pilot test for military service members who can't vote in person.

BY BEN MILLER / MARCH 28, 2018

CRYPTOSLATE

REGULATION

State of Maryland Seeking to Usher In Blockchain Regulations

Government entities are discussing numerous blockchain use cases and legislation

BUSINESS

Smart Dubai close to rolling out 20 blockchain-based services
Dubai aiming to be blockchain capital of the world, says director general of Smart Dubai
Mahmoud Kassem
January 14, 2019

Digitizing Global Trade with Maersk and IBM

PORT TECHNOLOGY
19 Apr 2016 13:11pm
US Port Operator Adopts Maersk-IBM Blockchain Tech

Walmart, JD.com, IBM and Tsinghua University Launch a Blockchain Food Safety Alliance in China
Collaboration to apply blockchain technology for food traceability to support offline and online consumers

© 2018 IBM Corporation

Medical Credentials / Provider Registry

Child Support / Protection

Academic Credentials

Tourism & Economic Development

Voting

Property & Auto Titles

Food Safety (Supply Chain)

Marijuana Supply Chain

Electric Bike Registration

Tobacco Supply Chain, Taxation

UCC Financial Filings

State Comprehensive Annual Financial Reporting

Carbon Credits

State Vehicle Maintenance

Tax Credits

Laws related to Cryptocurrency & Crypto-Exchanges

Licensing:
Auditors (e.g., bank auditor); craft personnel; manufacturers, wholesalers, distributors and retailers (tobacco)

6

Choosing a blockchain use case is not always easy

What makes a good blockchain use case?

1. A **business problem** to be solved
   - That cannot be solved with more mature technologies
2. An identifiable **business network**
   - With Participants, Assets and Transactions
3. A need for **trust**
   - Consensus, Immutability, Finality or Provenance

What makes a good *first* blockchain use case?

1. A **limited scope**, but still solves a real business problem
   - Minimum Viable Product in a few weeks of effort
2. A smaller **business network**
   - Usually without requiring regulators and consortia
3. Allows for **scaling with more participants and scenarios**
   - Consider shadow chains to mitigate risks

IBM uses design thinking to identify value quickly
IBM uses agile techniques to develop blockchain solutions of value

7X

videos

Healthcare:

Here's How the Blockchain Is Disrupting Healthcare (4:30)

https://youtu.be/_ibaTpBj7D4

Blockchain in health care data management (3:34)

https://youtu.be/42Pbx9JYcFA

Government:

How blockchain can revolutionize government (2:39)

https://youtu.be/_o3OMDuWleo

IBM's Arvind Krishna: Can Blockchain End Corruption? (1:06)

https://youtu.be/ZouqkQko7hE

Education:

Sony and IBM team to secure education data with blockchain (2:02)

https://youtu.be/GawgL7YIW08

Forecasting Part 3: Blockchain in education (3:16)

https://youtu.be/1uH0khBVs_4
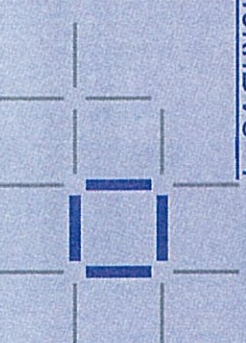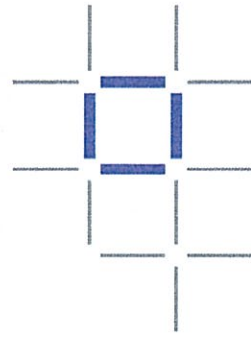
What is Blockchain?

Blockchain is a shared, replicated ledger that underpins technology such as Bitcoin, but blockchain has applications far beyond cryptocurrency. It is sets to provide the foundation for a new generation of transactional applications that establish trust and transparency, while streamlining business processes.

Introduction

As interest in blockchain grows, so does demand for a skilled technical workforce that can use the technology to bring networks into production. To help meet the increasing need for blockchain developers, consultants and architects, IBM has added blockchain to the Academic Initiative, a program that provides students and educators with training resources to develop market-ready skills.

Resources for Educators

Start your journey with the blockchain educator guide. You'll learn the basics of blockchain technology and the careers that you can propose to your students based on their interest in topics such as distributed computing, JavaScript or business operations. You'll also get an introduction to Hyperledger, an open source effort to advance cross-industry blockchain technologies, which is hosted by The Linux Foundation. Finally, you can use the e-book, videos, courses, and hands-on labs to enhance engagement in your classroom.

In addition to the publicly available courseware, software and tools, you can download hundreds of full-version resources at no charge from ibm.onthehub.com. These are the same tools IBM clients are using in their production environments. All you need to gain access is valid school credentials.
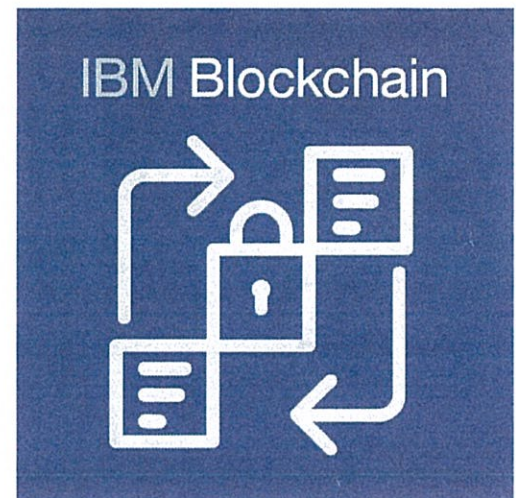
IBM Blockchain

Resources for Students

Students can use the IBM Blockchain Platform Starter Plan for free, without having to enter a credit card, while the plan is in Beta. Starter Plan lets you deploy a blockchain network with a few clicks and offers deployable sample applications and an easy-to-use UI that are ideal for those who are learning. Students at over 1,000 academic institutions are eligible to use the Beta at no risk of charge and additionally get a six-month trial of IBM cloud. To get the promo code, you just need to register with your school credentials.

Students can also start with the free Blockchain essentials course, which introduces the basics concepts behind blockchain for business. After you take the Essentials course, you can use the IBM Blockchain developer foundation course to start building your own blockchain network. If you are interested in developing locally before moving to cloud, or even experimenting with blockchain using just your browser, get started here for an overview of all the available environments and tools.

More information

See this blog post.

Additional Resources

Hyperledger Composer Playground is a browser-based interface that you can use to model a business network: the items of value (assets) to be exchanged, who participates (participants) in their exchange, how access is secured (access control), what business logic (transactions) is involved in the process, and more.

The IBM Blockchain Platform to simplify the developmental, governmental, and operational aspects of creating a blockchain solution.

Blockchain in academia: Training for students and educators

August 29, 2017 | Written by: Nikhil Gupta

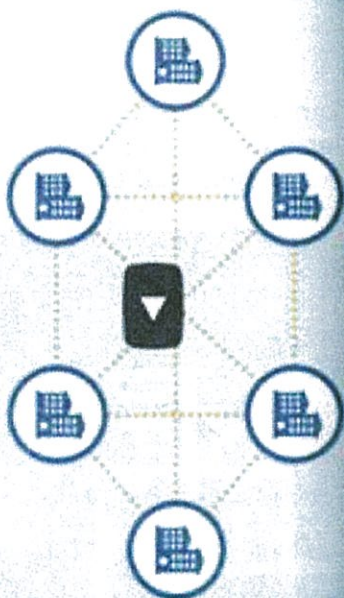Categorized: Announcement | Blockchain Developers | Blockchain Education

Share this post:

3 Reasons to Build with Blockchain

As interest in blockchain grows, so does demand for a skilled technical workforce that can use the technology to bring networks into production. To help meet the increasing need for blockchain developers, consultants and architects, IBM has added blockchain to the academic initiative, a program that provides students and educators with training resources to develop market-ready skills.

This blog post will help students and educators get started with blockchain and find resources and offers that are available to them. And if you still need a good reason (or three) for learning to build business networks with blockchain, watch this video:

Start building now with the
IBM Blockchain Platform

Learn about blockchain development, access easy-to-use tools and deploy game-changing applications for business.

→ Sign up now for the IBM Blockchain Platform starter plan

↓ Try our developer tools

Become a blockchain developer

Develop, test and deploy with ease

On the IBM Blockchain Platform, you'll develop in a quick, easy-to-use local environment created to help you build your blockchain skills. Our extensive, lightweight toolkit leverages open source Hyperledger tools and includes everything you need to code, test locally and then deploy on the IBM Cloud.

Get started at no charge

Start developing today at no charge for the first 30 days with our Starter Plan. Run demos, customize use cases and start driving value for your enterprise today.

→ Sign up for the Starter Plan