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Introduction

Good morning, Chairman Abraham, Chairwoman Comstock, Ranking Member Beyer, Ranking Member Lipinski and Members of the Subcommittees.

My name is Jerry Cuomo, and I’m the Vice President for Blockchain Technologies, at IBM.
Thank you very much for the opportunity to testify this morning.

We at IBM believe that blockchain is a revolutionary technology. With blockchain we can reimagine many of the world’s most fundamental business processes and open the door to new styles of digital interactions that we have yet to imagine.

You are wise to explore the science of blockchain technology – and its potential applications beyond cryptocurrency and financial technology – because blockchain has the potential to vastly reduce the cost and complexity of getting things done across industries and government.

Today, my testimony will share some key beliefs we hold at IBM based on our experience as an industry leader in blockchain. I’ll also share some concrete examples that illustrate the transformative power of blockchain. Finally, I will include some recommendations for Congress and the Trump Administration that could ultimately help U.S. competitiveness and our citizens by preparing, advancing and applying blockchain in new ways – as I believe we should.

IBM's Blockchain Beliefs

Most people who have heard of blockchain associate it with the cryptocurrency Bitcoin. While they are related, it is important to understand they are not the same thing. Bitcoin is merely one example of a use of blockchain technology. Bitcoin operates with a network of anonymous participants. However, blockchain can also be used as a trusted network, using permissioning, to handle interactions between known parties. As an analogy, the internet like blockchain is a transformational building block for many types of communication, Bitcoin and other forms of cryptocurrency are but one use of blockchain, just as social media is but one use of the internet.

We have engaged with clients in over 400 blockchain projects across supply chain, financial services, government, healthcare, travel and transportation, insurance, chemicals and petroleum, and more.

This experience has led us to develop three key beliefs that I'd like to share with you today:

1. Blockchain is a transformative technology.
2. Blockchain must be open.
3. Blockchain is ready for business and government use TODAY.

Blockchain Belief #1 – Blockchain is a transformative technology

First and foremost, blockchain is changing the game. In today's digitally networked world, no single institution works in isolation.

At the center of a blockchain is this notion of a shared immutable ledger. You see, members of a blockchain network each have an exact copy of the ledger. New entries in the ledger are propagated throughout the network. Therefore, all participants in an interaction have an up-to-date ledger that reflects the most recent transactions and these transactions, once entered, cannot be changed on the ledger.

Blockchain's power to transform is that it enables co-development of a shared copy of the truth. And with this, what a group can achieve together far exceeds what any individual member can achieve by themselves.

Now let me tell you how blockchain actually changes the game.

1. **Time** is saved because multi-party transactions can settle immediately avoiding exhaustive reconciliation that often takes days or even months.
2. **Cost** is reduced because business-to-business processing eliminates overhead caused by "middlemen".
3. **Risk** is mitigated because the ledger acts as an immutable audit trail greatly reducing the chances for tampering and collusion.

This leads to my first example, IBM and Maersk, the world's largest shipping company, recently announced our intention to form a joint venture to create an industry-wide trading platform for the ocean freight industry. This industry accounts for 90 percent of goods shipped in global trade. Currently, one shipment of goods between two ports can generate a sea of paper and information exchanges between 30 different public and private organizations. The joint venture will use blockchain to help track in real-time millions of shipping containers across the world by providing a trusted, tamper-proof, cross-border system for digitized trade documents. By having a shared blockchain ledger, companies can reduce the time spent resolving disputes, finding information, and verifying transactions, leading to quicker settlement. When adopted at scale, the solution has the potential to save billions of dollars. This is the transformative power of blockchain applied to the shipping industry.

And blockchain technology provides the springboard for an even broader spectrum of innovation. Let me just take a moment to tell you about a project from the IBM research lab. Uniquely identifying a physical asset such as a type of a diamond, petroleum, or a manufactured part as a corresponding digital asset in a blockchain network is an interesting challenge; verifying authenticity is important.

These physical products travel through many hands and companies before reaching their final destinations. At any point along the supply chain, a valuable physical asset could have been swapped with a counterfeit one. To help ensure provenance on the blockchain, at IBM Research, we invented a

smartphone-based artificial intelligence technology used to scan the high value item. Using light spectral analysis to capture the microscopic properties, viscosity and other identifiers creates a digital fingerprint that can be used to verify authenticity and avoid counterfeiting documents or fake substitute products.

Blockchain Belief #2 – Blockchain must be open

For blockchain to fulfill its potential, it must be based on non-proprietary technology. Doing so will encourage broad adoption and ensure the compatibility and interoperability of systems. Specifically, this enterprise-ready blockchain must be built using open source software, with a combination of flexible licensing terms and strict governance by an open community, meaning there is no one controlling organization that governs the direction of the project and no lock-in to one vendor. Much as we have seen with the internet, only with openness will blockchain be widely adopted and enable innovation.

For this reason, IBM is participating with over 180 industry players in the Hyperledger organization, led by the Linux Foundation. Hyperledger is a collaborative open-source, open-standards and open-governance effort created to advance cross-industry blockchain technologies for business and government.

For example, IBM is collaborating with companies like SecureKey and the Sovrin Foundation on blockchain-based digital identity. Together, we are working to create a global ecosystem of blockchain identity networks backed by global standards. These standards are defining mechanisms by which only the information that needs to be shared is shared with only those parties that need to know. With blockchain identity theft and fraud can be significantly reduced while at the same time increasing the effectiveness of Know-Your-Customer and Anti-Money Laundering efforts, doing so in a more cost-effective way. We can not only make it harder for criminals to impersonate someone, but in the event of a data breach, we can recover quickly. Unlike a social security number, blockchain-backed decentralized identifiers can easily be revoked and reissued if ever stolen or compromised.

Blockchain Belief #3 –Blockchain is ready for business and government use TODAY

Not all blockchain technology is created equal. For broad business and government use, enterprise blockchain technology is now available that solves four fundamental requirements: *accountability, privacy, scalability and security.*

Accountability means the participants transacting in a network, and the data they are transacting on, are both known and trusted. In an enterprise ready blockchain, participants are known and are identified by membership keys. The data can be trusted because transactions committed to the ledger are immutable – such that they cannot be removed or changed by the actions of a single party.

With this accountability the network is auditable allowing members to follow and adhere to existing government regulations like HIPAA and GDPR.

Even though participants are known, they must be able to transact with *privacy* on the network.

Businesses require that both their transaction data and the transactions themselves are confidential. An enterprise blockchain enables confidential communications when information is not desired to be shared with the entire network.

Computer systems and networks must be architected to have the *scalability* to handle an immense volume of transactions. Because trust in an enterprise blockchain network is not built through anonymous “mining” (as is done in Bitcoin), transaction performance has been demonstrated at levels needed for high volume throughput. A recently published research paper demonstrated one such enterprise blockchain performance at a best-of-class rate of more than 3500 transactions per second (<https://arxiv.org/abs/1801.10228>).

The need for *security* continues to be illuminated by breaches in the news every month. As much as everyone tries, it’s impossible to eliminate all people with malicious intent or sloppy actions. A enterprise blockchain network is fault tolerant, implementing algorithms like crash and byzantine fault tolerance that allow a network to continue to operate even in the presence of bad actors or carelessness.

These four requirements are delivered today in the Hyperledger Fabric, one of the popular blockchain frameworks from the Hyperledger project. It now serves as the basis for over 40 active blockchain networks that are running on the IBM Blockchain Platform.

For example, every year 400,000 people around the world die from foodborne illness. With the advent of global supply chains, it's very difficult to trace contaminated food back to the source, as we witnessed with the recent e. Coli outbreak that sickened 60 people and took 2 lives over a period of 6 weeks. IBM is working with twelve major food companies – including Walmart, Unilever, and Nestle – applying our enterprise blockchain to rapidly trace food as it moves from farm to table, showing how blockchain has the potential to help keep entire populations healthier. Blockchain makes it possible to quickly pinpoint the source of contamination, reduce the impact of food recalls and limit the number of people who get sick or die from foodborne illness.

Recommendations for Congress and Trump Administration

We are working with many government entities in activities for the adoption and use of blockchain technology: from U.S. agencies such as the FDA, CDC and OPM exploring how blockchain can reduce complexity to the Smart Dubai initiative to trusted digital identity projects in Canada. U.S. companies are leading in blockchain technology development while U.S. government agencies like NIST actively engage in blockchain standards exploration. While blockchain remains a team sport, there is an opportunity for the United States to build upon its momentum to lead blockchain by doing. I'd like to make a few recommendations to help Congress and the Trump Administration along this path.

First, we should focus our efforts on projects that can positively impact U.S. economic competitiveness, citizens and businesses. The Congressional Blockchain Caucus, led by Reps. Jared Polis and David Schweikert, has already begun this critical work. The Blockchain Caucus is working to collect information on blockchain projects that could help individuals securely establish their identity, make key payments -- such as tax payments – and revolutionize supply chains. This work should fuel initiatives that can make a meaningful difference in citizens lives like the digital identity, food safety, and transport supply chain examples we discussed as well as other potential uses cases like land registration, taxation and more. I recommend we explore blockchain adoption and use with these citizen and business-focused projects first. Then, use the knowledge gained to inform policy and regulation in different blockchain technology

implementations going forward. In the same spirit we commend the House for passage of the Perkins Act, that will facilitate government, academia, and private sector collaboration in order to advance skills building.

Second, thoughtfully inserting blockchain in appropriate projects already funded would help ensure we stay at the forefront of this transformative technology. Consider blockchain technology as an enabler to lower cost, time and risk in currently budgeted projects. In addition, look for opportunities to fuel innovation in the broader ecosystem of U.S. businesses by encouraging blockchain projects as part of the Small Business Innovation Research (SBIR) program that is part of existing research budgets in a number of agencies today.

Finally, and perhaps most importantly, recognize the difference between blockchain's use in new forms of currency from broader uses of blockchain when considering regulatory policy. Carefully evaluate policies established regarding cryptocurrencies to ensure that there will not be unintended consequences that stymie the innovation and development surrounding blockchain. A policy that has not been carefully vetted could risk inhibiting the U.S. leadership position.

Blockchain is ready for government, now let's get government ready for blockchain. We at IBM stand ready to help provide the analysis of any such policies and would be happy to work collaboratively with Congress to ensure the continued expansion and success of blockchain.

Conclusion

Thank you for the opportunity to discuss such an important topic for our present and our future.

In summary, at IBM we believe that:

1. Blockchain is a transformative technology: It enables the many to achieve more than is possible by the one.
2. Blockchain must be open: Only then will blockchain be widely adopted as a springboard for innovation.

3. Blockchain is ready for business and government use TODAY: it provides accountability, privacy, scalability and security.

At IBM, we are actively working to ensure businesses and governments are thoughtfully implementing this technology and we believe the United States has an opportunity to lead in this space.

I will look forward to answering your questions and continuing this discussion. Thank you.