Using blockchain technology to address worldwide food safety

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A group of the world's leading retailers and food companies are working with IBM to explore how blockchain technology can be used to make the food supply chain safer. Blockchain technology can be used to improve food traceability by providing trusted information on the origin and state of food. Pictured is a crate of oranges being scanned as part of a food safety blockchain. Credit: Connie Zhou for IBM

A group of leading companies across the global food supply chain today announced a major blockchain collaboration with IBM (NYSE: IBM) intended to further strengthen consumer confidence in the global food system. The consortium includes Dole, Driscoll's, Golden State Foods, Kroger, McCormick and Company, McLane Company, Nestlé, Tyson Foods, Unilever and Walmart, who will work with IBM to identify new areas where the global supply chain can benefit from blockchain.

Every year, one in 10 people fall ill - and 400,000 die - due to contaminated food. Many of the critical issues impacting food safety such as cross-contamination, the spread of food-borne illness, unnecessary waste and the economic burden of recalls are magnified by lack of access to information and traceability. It can take weeks to identify the precise point of contamination, causing further illness, lost revenue and wasted product. For example, it took more than two months to identify the farm source of contamination in a recent incidence of salmonella in papayas.

Blockchain is ideally suited to help address these challenges because it establishes a trusted environment for all transactions. In the case of the global food supply chain, all participants - growers, suppliers, processors, distributors, retailers, regulators and consumers - can gain permissioned access to known and trusted information regarding the origin and state of food for their transactions. This can enable food providers and other members of the ecosystem to use a blockchain network to trace contaminated product to its source in a short amount of time to ensure safe removal from store shelves and stem the spread of illnesses.

Dole, Driscoll's, Golden State Foods, Kroger, McCormick and Company, McLane Company, Nestlé, Tyson Foods, Unilever, Walmart and others are now coming together with IBM to further champion blockchain as an enabling technology for the food sector. Together they will help identify and prioritize new areas where blockchain can benefit

food ecosystems and inform new IBM solutions. This work will draw on multiple IBM pilots and production networks in related areas that successfully demonstrate ways in which blockchain can positively impact global food traceability.

"Unlike any technology before it, blockchain is transforming the way like-minded organizations come together and enabling a new level of trust based on a single view of the truth," said Marie Wieck, general manager, IBM Blockchain. "Our work with organizations across the food ecosystem, as well as IBM's new platform, will further unleash the vast potential of this exciting technology, making it faster for organizations of all sizes and in all industries to move from concept to production to improve the way business gets done."

New IBM Blockchain Platform

Beyond food supply chain applications, blockchains are now being used to transform processes and streamline transactions for everything from flowers, real estate and trade finance, to education, insurance and medical services.

To accelerate this adoption, IBM is introducing the first fully integrated, enterprise-grade production blockchain platform, as well as consulting services, that will allow more organizations to quickly activate their own business networks and access the vital capabilities needed to successfully develop, operate, govern and secure these networks. The IBM Blockchain Platform is available via the IBM Cloud.

The platform builds off of the successful blockchain work IBM has delivered to more than 400 organizations, incorporating insights gained as IBM has built blockchain networks across industries including financial services, supply chain and logistics, retail, government and health care.

Extensively tested and piloted, the platform addresses a wide range of enterprise pain points, including both business and technical requirements around security, performance, collaboration and privacy that no other blockchain platform delivers today. It includes innovation developed through open source collaboration in the Hyperledger community, including the newest Hyperledger Fabric v1.0 framework and Hyperledger Composer blockchain tool, both hosted by the Linux Foundation.

The integrated platform allows multiple parties to jointly develop, govern, operate and secure blockchain networks to help enterprises accelerate blockchain adoption.

Features of the IBM Blockchain Platform include:

- For developers, easy and flexible network tools designed to bring blockchain networks up to speed in minutes. The platform also includes the first commercial introduction of Hyperledger Composer a framework that helps developers focus on the business use case and more easily and quickly map it to the application code. Developers can create standard business language in JavaScript and the APIs help keep development work at the business level, rather than being highly technical, making it possible for most any programmer to be a blockchain developer. Additionally, a variety of IBM Developer Journeys for blockchain are available featuring free open source code, documentation, APIs, architecture diagrams and one-click deployment Git repositories to fast-track building.
- The platform offers all participating members a level of control, while preventing any one member from having exclusive control. A new class of democratic governance tools is designed to help improve productivity across the organizations using a voting process that collects signatures from members to govern member

invitation distribution of smart contracts and creation of transactions channels. By quickly onboarding participants, assigning roles and managing access, organizations can begin transacting via the blockchain.

- The platform is underpinned by an architecture that operates more than 55% of today's global transactional systems. It is the first offering available to allow updates to be made to the network while it is running without any downtime. Running in the IBM Cloud, it offers unique protection from insider credential abuse, protection from malware and hardware encryption key protection. IBM Blockchain Platform provides the highest-level commercially available tamper resistant FIPS140-2 level 4 protection for encryption keys.

In addition to food safety, IBM is advancing other blockchain supply chain initiatives using the IBM Blockchain Platform for an automated billing and invoicing system. Initial work to use blockchain for invoicing is underway starting with Lenovo. This will provide an audit-ready solution with full traceability of billing and operational data, and help speed on-boarding time for new vendors and new contract requirements.

To complement the new platform, IBM Global Business Services offers Blockchain Services, which brings deep industry expertise from its 1,600 blockchain consultants who have helped clients deploy and integrate active networks. These consultants can apply design thinking to help enterprises conceptualize and implement blockchain enabled business models to realize optimal value. For example, during recent blockchain projects with major shipping and retail organizations, IBM consultants have been able to improve food safety traceability by 99.9 percent and decrease trade document workflow by 97percent, potentially unlocking millions of dollars in cost savings and market capital.

The IBM Blockchain Platform offers a range of pricing options, starting

at $0.50 per hour, to support rapid adoption for networks of all sizes. To support blockchain ecosystems among different organizations, the cost of the network can be shared across all network members.

Strengthening Trust Across the Global Food Supply Ecosystem

In parallel trials in China and the U.S., IBM and Walmart recently demonstrated that blockchain can be used to track a product from the farm through every stage of the supply chain, right to the retail shelf, in seconds instead of days or weeks.

These trials also demonstrated that stakeholders throughout the global food supply chain view food safety as a collaborative issue, rather than a competitive one, and are willing to work together to improve the food system for everyone.

"As an advocate for greater transparency in the food system to benefit customers, Walmart looks forward to expanding on our initial work by collaborating with others to accelerate exploration on how this technology can be used as a more effective food traceability and food safety tool," said Frank Yiannas, vice president, food safety, Walmart. "Blockchain technology enables a new era of end-to-end transparency in the global food system – equivalent to shining a light on food ecosystem participants that will further promote responsible actions and behaviors. It also allows all participants to share information rapidly and with confidence across a strong trusted network. This is critical to ensuring that the global food system remains safe for all."

"IBM has deep experience and a commitment to business processing and security needs, which are exactly the skill sets needed to bring blockchain to full maturity for food safety and all associated

transactions," said Guilda Javaheri, chief technology officer. As a customer and partner with IBM for more than forty years, Golden State Foods is pleased to collaborate with IBM and this group of trusted food companies."

"Safety is a key value for Kroger, and our partnership with IBM positions us to explore and test blockchain technology as a solution for enhanced food safety across our business," said Howard Popoola, Kroger's vice president of Corporate Food Technology and Regulatory Compliance. "Food safety is a universal priority for food retailers and companies. It's not a competitive advantage; it benefits our customers to have greater transparency and traceability in the supply chain."

"We're excited about the possibilities that come with this technology and are glad to collaborate with IBM and others," said Scott Stillwell, Ph.D., senior vice president of food safety and quality assurance for Tyson Foods. "Producing safe food is critical to our business; it appears blockchain can help provide trust not only about the origin of food, but also about how that food moved through the supply chain."

Expanding the Blockchain Ecosystem Across Academia and the Start Up Community

To help meet the increasing demand for a skilled technical workforce trained in blockchain, IBM is making available a wide range of resources including software, training and professional partnerships free of charge to more than 1,000 universities in the IBM Academic Initiative. Offerings include six months of access to the IBM Cloud for use of the IBM Blockchain cloud sandbox to help students hone development skills.

IBM is also working with select universities including Baruch College/CUNY, Fordham University, University of Arkansas, University

at Buffalo and University of British Columbia to fund research grants, develop customized curricula and host workshops and hackathons. For technologists who want more in-depth guidance, IBM has refreshed its blockchain training and educational materials on developerWorks for Hyperledger Fabric 1.0.

As interest in Hyperledger Fabric continues to grow, IBM is also working with other companies such as Boldstart Ventures, to provide support and resources that broaden access. Boldstart Ventures has launched Fabric Foundry, the first accelerator dedicated to this framework, to foster adoption.

Provided by IBM