

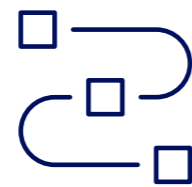


IBM Food Trust Solution Brief

An IBM Blockchain solution for food safety

Tracking food supply chains with a trusted, shared and immutable ledger

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IBM Food Trust with blockchain
IBM Food Trust solution
IBM Food Trust technology
Joining an IBM Food Trust network
Trace
Certificates
Network and data security
Why IBM?



Collaborate and seamlessly connect with your transaction partners to securely share permissioned data through a holistic food supply chain solution



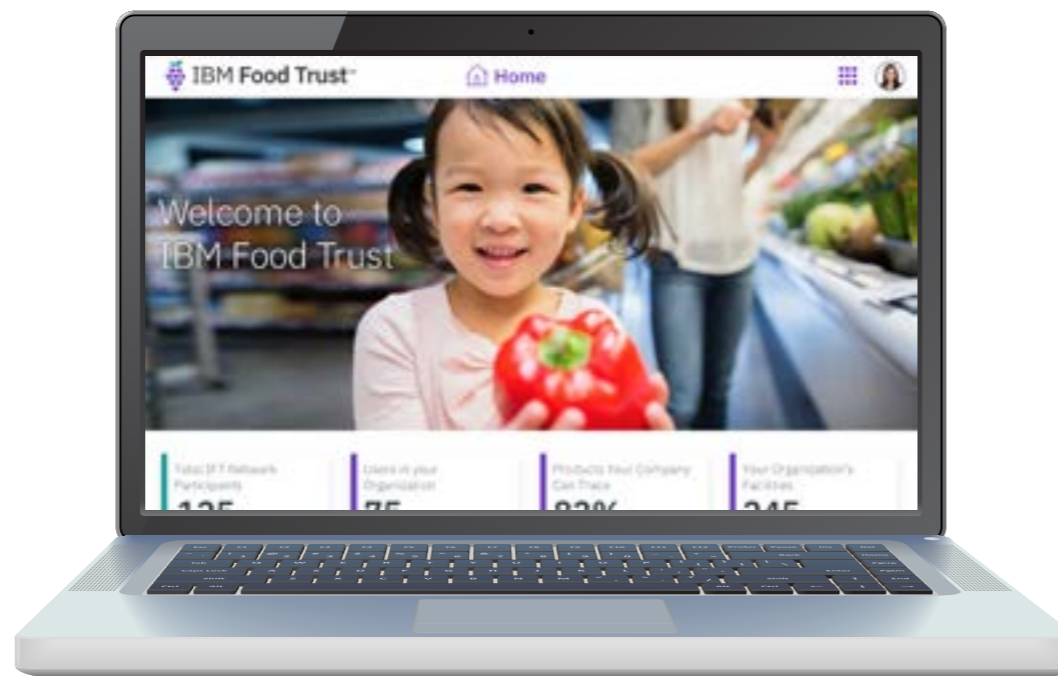
Respond quickly to recalls and other food safety issues to reduce foodborne illness



Publish and query data based on GS1 standards for powerful food trace and recall capabilities



Share and view inspection and quality certifications and registrations throughout your supply chain



Foodborne illness is a worldwide problem, and weeks, if not months, can be spent trying to identify, verify and isolate the source of an outbreak. Rising global production and trade has vastly expanded access to food and increased consumer options—but this trend has also lengthened and complicated supply chains.¹

The IBM® Food Trust™ solution increases the transparency into your complete supply chain and provides the capability to quickly and efficiently trace and recall products. The solution provides participants with a permission-based, shared view of food ecosystem information, from farm to store. The solution leverages widely-accepted GS1 data description standards, allowing convenient data publishing and controlled sharing of information. The system allows for a deeper understanding of the path that food products follow, so your business can react effectively to health risks with speed and precision.

¹ ["Food safety" \(Fact sheet\),](#) World Health Organization, October 2017.

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World Health Organization figures show that, worldwide, foodborne illnesses cause more than 400,000 deaths¹ and billions of dollars in healthcare costs annually, including USD93 billion in the US alone.² Efficient tracing of the complete history and real-time location of foods and food components minimizes outbreaks and is critical to the success of any participant within the food ecosystem.

Finding answers quickly on a global product supply chain requires transparency and efficient data sharing. To achieve this goal, the IBM Food Trust solution enables participants to enter and control access to their encrypted blockchain data. Their transaction partners can then see only the data they are permitted to view. The IBM Food Trust solution therefore provides users and stakeholders with real-time, instant access to business-critical information from which everyone benefits.

Onboarding your organization and users to an IBM Food Trust solution network is a straightforward process. GS1 registration is not required to use IBM Food Trust. However, for companies who have registered with GS1, IBM Food Trust supports continued use of existing enterprise IDs. Data connector application programming interfaces (APIs) are planned to allow enterprise IT teams to efficiently upload supply chain data from existing data stores (such as SAP) to their IBM Food Trust network for seamless integration of data from enterprise systems to an IBM Food Trust solution network. Smaller organizations can onboard data through an easy-to-use web experience.

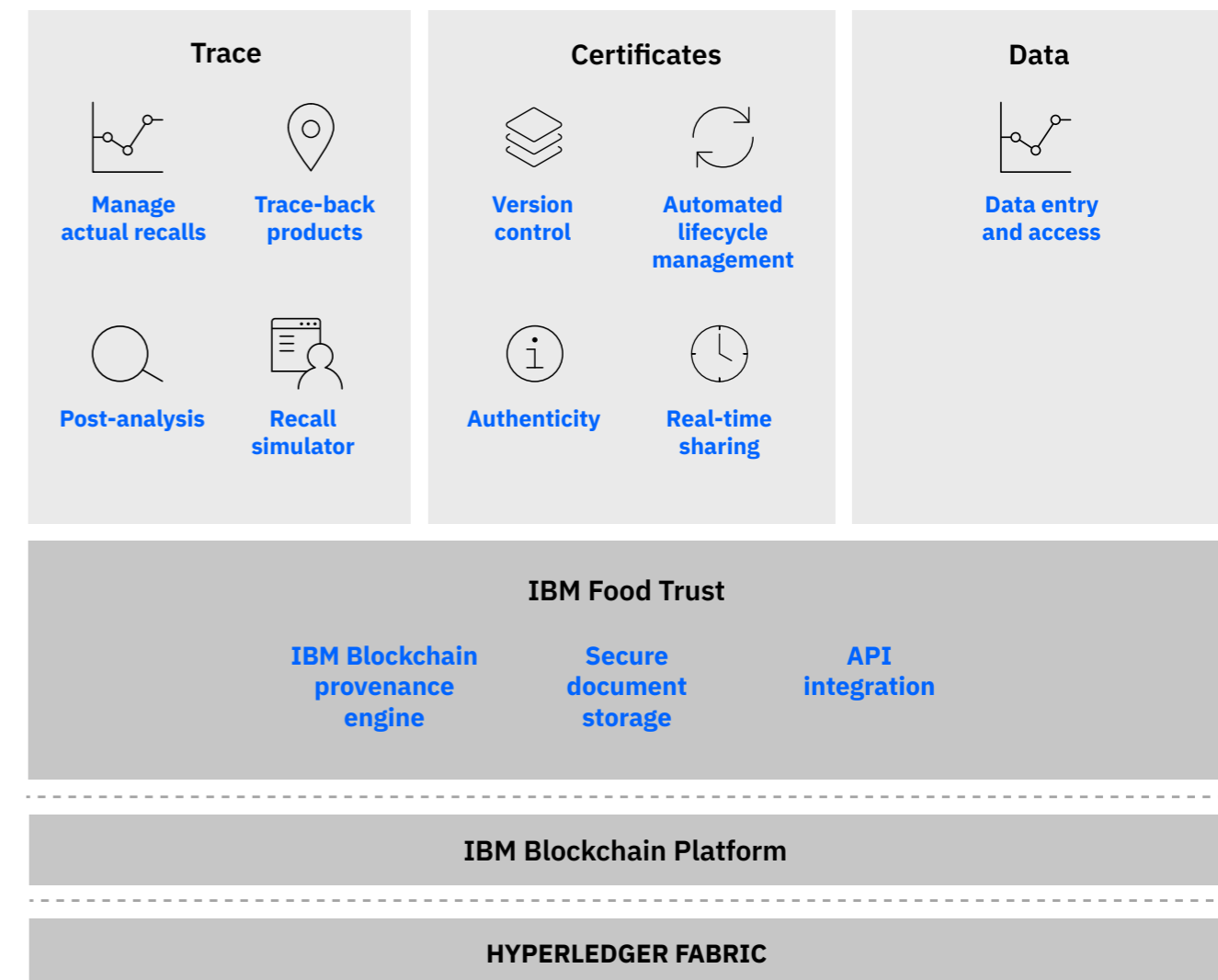
[Learn](#) more about IBM Food Trust.

Permissioned data access is an integral part of the core solution for clients needing to maintain control of private, confidential data; access controls ensure that the organization that owns and uploads the data maintains full control over who can access it on the network.

In the event of a food safety issue, IBM Food Trust solution users can quickly locate items from the supply chain, in real time, by querying food product identifiers such as Global Trade Item Number (GTIN) or Global Location Number (GLN), and by filtering on dates or facilities.

IBM Food Trust

IBM Blockchain



¹ [“Food safety” \(Fact sheet\),](#) World Health Organization, October 2017.

² [“High Cost of Foodborne Illness: New Study Provides State-by-State Breakdown,”](#) The Ohio State University, June 3, 2015.

IBM Food Trust—explained

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IBM Food Trust is a software-as-a-service (SaaS) solution that helps increase food safety for all network participants, including growers, processors, shippers, retailers and regulators. The IBM Food Trust network provides authorized users with immediate access to actionable food supply chain data, from farm to store. The complete history and current location of any individual food item, as well as its SKU, is readily available at the click of a button.

The solution features an integrated set of modules that work together, in concert with IBM Blockchain core components, to securely store and manage product supply chain content on the blockchain. The IBM Food Trust solution is designed to enhance the efficiency and efficacy of food product ecosystems. The solution leverages existing standards (such as GS1) to share data with any network participant authorized by the data owner. Network data meets global standards (such as GS1) and is shared only with need-to-know business partners in a secure and confidential environment. Product recalls are expedited through immediate access to end-to-end traceability data showing the provenance and real-time location and status of any food product with sufficient data on the blockchain. Inspection and certification documents are also shared on the network, providing an efficient, single source for required legal and regulatory documentation.

Why IBM Food Trust for food safety?



Consumer trust is the ultimate goal:

- Address quality problems quickly
- Reduce impact of food issues
- Improve health and safety
- Optimize internal processes

The IBM Food Trust solution combines supply chain-specific modules with blockchain core functions, built on top of IBM Blockchain Platform built on the open standard Hyperledger Fabric.

IBM Blockchain

[Learn](#) more about IBM Food Trust.



IBM Food Trust technology

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Each member organization owns its data on the blockchain network and maintains full control over who can access its data. All data is stored on blockchain ledgers, protected with strong encryption, and is made accessible only as participants grant permission to share relevant records.

For network administrators already managing complex information environments, the [IBM Food Trust Connector API](#) is designed to automate the integration of legacy system data

and network data. Solution software adapters can provide automated data import from existing data stores, such as SAP, to leverage existing business records including inventory lists, order records and supplier information.

Enterprises use the IBM Food Trust solution to upload or programmatically send four key data elements: supply chain events, transactions, master data and certificate data.

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IBM Blockchain



How to join the IBM Food Trust ecosystem

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Joining the [IBM Food Trust](#) ecosystem starts by enrolling in IBM Food Trust online. This step enables the onboarding of organizations to the IBM Food Trust network of authorized participants, including suppliers, distributors, retailers and consumers. Enrollment in a solution network includes the creation of accounts for both human users and systems of engagement (SOE) users. These users then upload food supply chain data, which creates shareable records in a standardized format.

Each human user account is assigned to one or more of three roles:

Account Administrator (creates and manages the organization's authorized solution users); **Certificate Manager** (uploads, modifies, shares and deletes regulatory and inspection certificates); and **Team Member** (uploads and queries data only). SOE users automatically upload transaction data to the solution network, based on the organization's data specifications.

Once an enterprise has joined and onboarded the IBM Food Trust solution, its user and SOE accounts can interact with the network in several ways:

- Employ user-friendly interfaces for desktop or mobile use
- Use the certificate management module to upload regulation and inspection documents for sharing with food supply chain partners
- Use the customized interface to view and manage data that has been shared by business partners

User roles and authority

 Account Administrator	 Certificate Manager	 Team Member
<ul style="list-style-type: none">• Can register human users and SOE users for their organization• Can assign roles to human users• Can manage and maintain a list of users in these roles• Can change user roles and unregister users	<ul style="list-style-type: none">• Can attach their organization's certificates to a facility• Can refresh their organization's certificates upon renewals• Can remove their organization's certificates if necessary• Can share certificates with other organizations	<ul style="list-style-type: none">• Can trace and simulate a recall of their organization's food products• Can view and share their organization's certificates• Can communicate with IBM Food Trust partners on their network channels

Using IBM Food Trust: Trace

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When a food safety issue arises, speed is paramount in controlling its impact—so is the accuracy of the information that the investigating team acts on. How widespread is the problem? Are there products that may have been purchased but not yet consumed? What is the source of the contamination? Was anything else contaminated? Speed and accuracy are also key to compliance with global regulations aimed at food safety and fraud, such as the US 2011 Food Safety Modernization Act (FSMA).

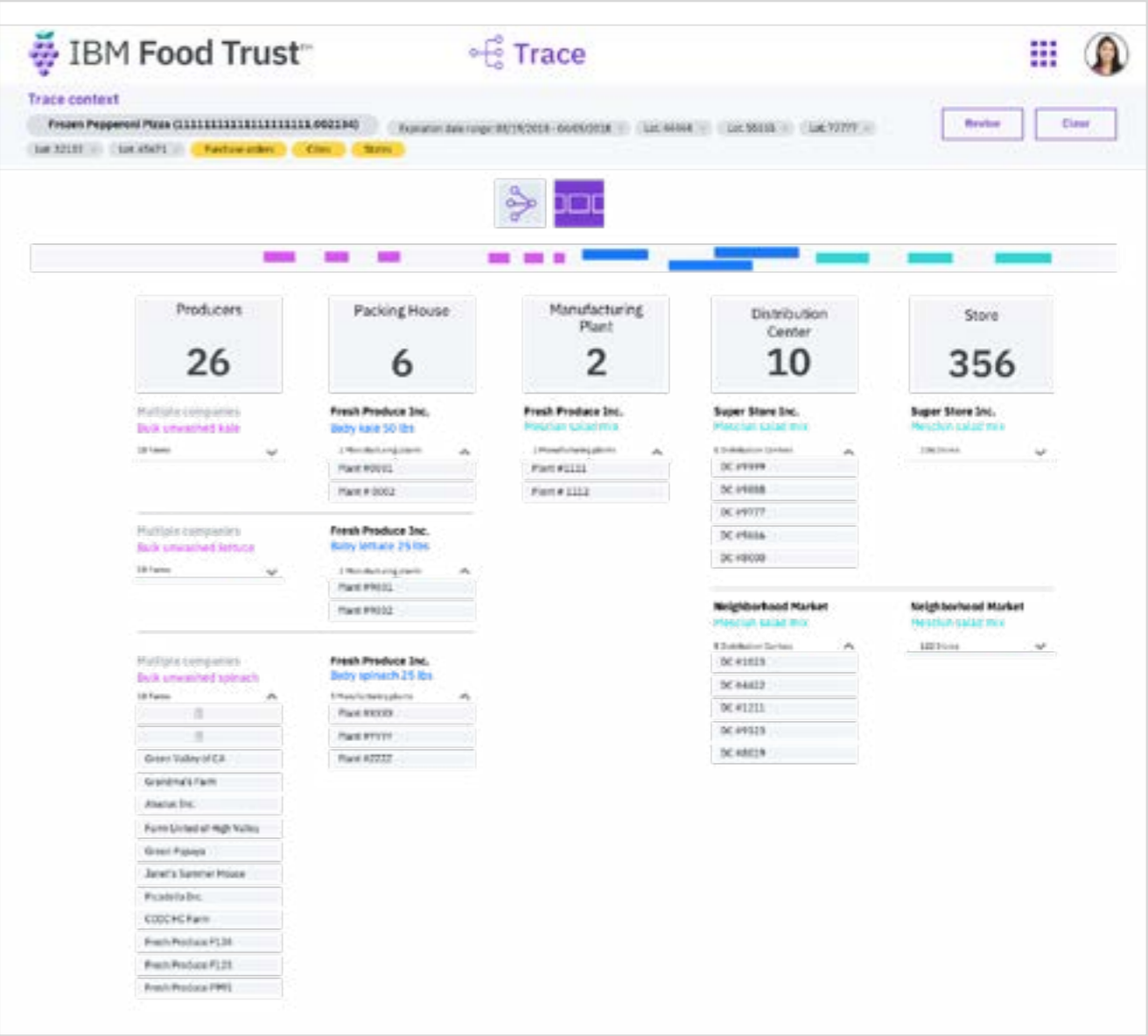
A prerequisite for using the IBM Food Trust solution to trace and recall food products is that data—on both food assets and participants—has been uploaded to the network. Once data is available, the trace and recall module allows a search to be conducted at any level of the network’s unified data pool. This enables food product data, including location and status across multiple points in time, to be queried and accessed by authorized users. Variables that users can search range from the general (region or country of origin, for example, or month of production) to the specific (such as the GTIN, batch or lot number of a particular food component).

Just as important as knowing that a given shipment may have contained tainted vegetables or spoiled meat is understanding which shipments are known to be safe to consume once they reach retailers, to both protect consumers and reduce wasted inventory. During a foodborne outbreak, your products may be considered affected until you can prove that they are not.

The Trace module enables member organizations to quickly and accurately determine the path that a given shipment has taken. Authorized participants can then determine the scope of the

[Learn](#) more about IBM Food Trust.

problem, block further contamination, and narrow the scope and impact of a recall. The end result is increased trust and safety for all participants in the food ecosystem, as a result of the IBM Food Trust solution.



IBM Food Trust allows users to quickly trace the path that food products or components have taken, from farm to store, in order to quickly address food safety issues.

Using IBM Food Trust: Certificates

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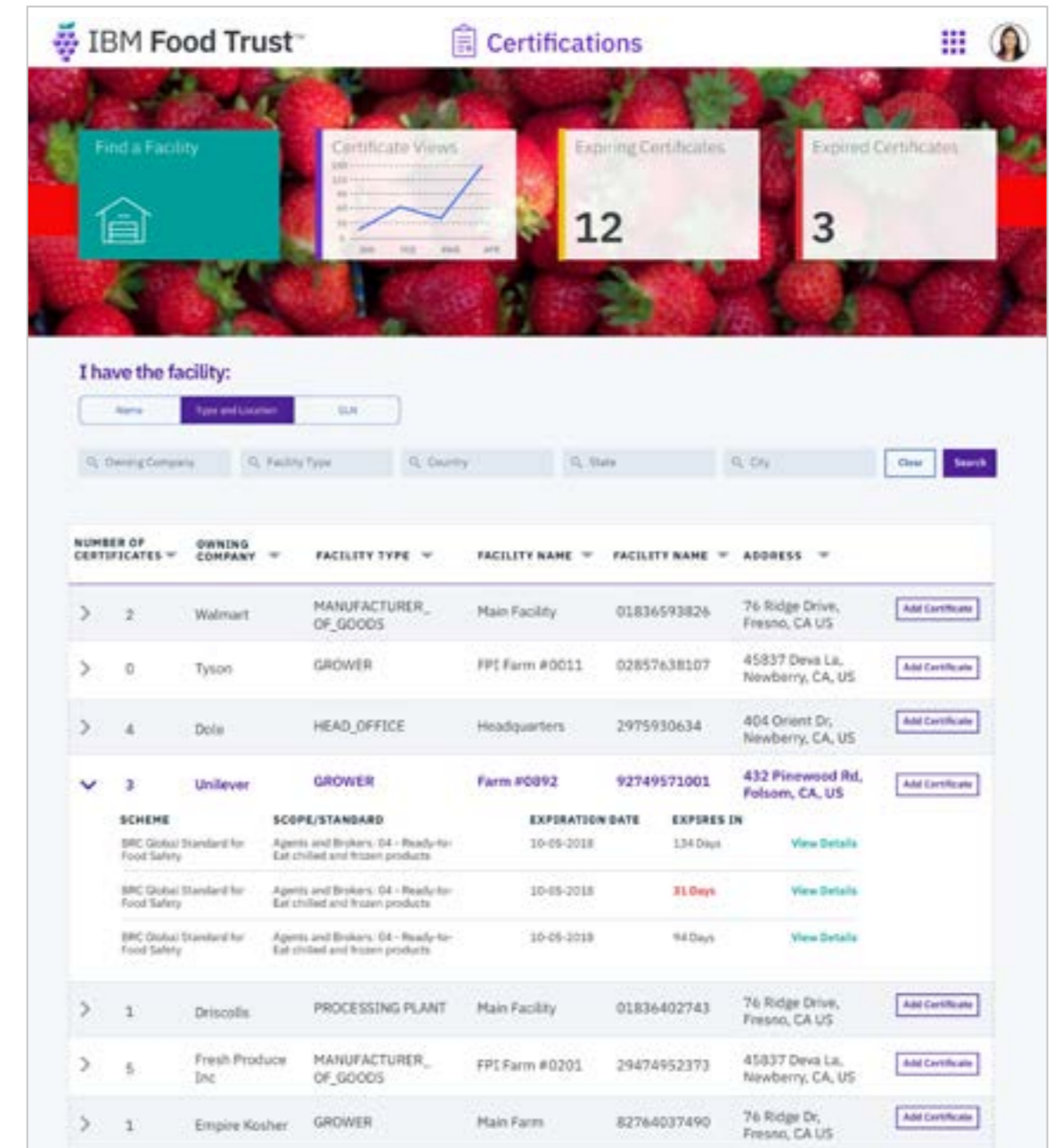
Food safety inspection and regulatory certificates can serve as investigative starting points. Was this batch of grain shipped through a warehouse with shoddy safety practices? Has this grower been inspected recently? Certificates and related documents can help establish that a facility is properly inspected, that livestock have been treated according to law, that a supplier is legally able to do business, and that a farm is certified as conforming to industry standards.

Certifications, however, can be issued by agencies or organizations with differing and overlapping authority, with different jurisdictions and with widely varying time windows of validity. Verifying that certificates are both valid and current—a challenge even for smaller companies—is complicated by their abundance, complexity and variety. To simplify this task, IBM Food Trust offers a holistic approach with a module for tracking certificates.

To use the Certificates module, a member organization must first designate at least one Certificate Manager; this human user is authorized to upload and manage the organization's facility certificates (relating to a physical site or location) as well as other business-enabling documents, such as authorizations, licenses and inspection results. A Certificate Manager uses the Certificates module to do one or more of the following: upload, share, review or manage relevant documents.

With the Certificates module, relevant certifications can be checked on a regular schedule, or as they are needed during a safety investigation. Conflicting or outdated certificates can

be easily flagged for review, which serves both suppliers who require certification to do business and buyers who want to know the certification status of a sourcing farm or factory.



The IBM Food Trust Certificates module network allows network participants to share and inspect relevant certifications.

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Network and data security

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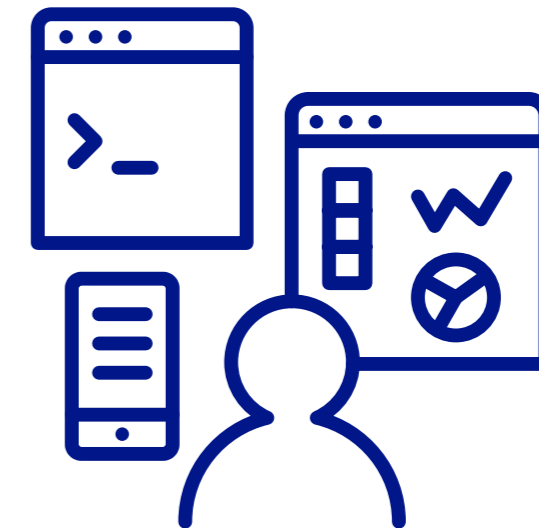
As with any distributed network that relies on encryption and controlled access for vital record-keeping, the answers to “How is security handled?” and “How is data handled?” make the difference between a system worth implementing and one that presents a danger to the enterprise. IBM Blockchain Platform and the Linux Foundation’s Hyperledger Fabric are the foundation that provides critical blockchain network services to the IBM Food Trust solution.

IBM Blockchain Platform employs the security benefits of the underlying Hyperledger Fabric blockchain implementation. Hyperledger Fabric requires no cryptocurrency or other processor-intensive computations to guarantee the legitimacy and permanence of network transactions, and features a thoroughly permissioned network. The owner of the data controls who can see it on a Hyperledger Fabric network. Every transaction on IBM Blockchain Platform can be accessible to: all on the network, only supply chain partners, only directly referenced supply chain partners (one hop), or only internal members of your organization. All transactions are directly traceable to a registered user, and anonymous transactions are not permitted.

IBM Food Trust provides the highest level of commercially-available, tamper-resistant protection for food transaction data, employing the security benefits of the underlying IBM Blockchain platform and Hyperledger Fabric.

A multi-step process can help IT personnel understand and prepare their environment for the IBM Food Trust solution:

- Identify relevant supply-chain processes
- Identify users—including automated users—of the solution
- Estimate and assign technical resources
- Assess the security needs of each user, including external stakeholders, and initiate security clearances and other security processes



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IBM **Blockchain**



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IBM is an enterprise technology company that has proven its resilience at scale and success in new technology, like blockchain.

IBM Food Trust is the first blockchain food safety solution that allows transaction partners to confidently and securely share food information for full supply chain transparency.

Key features of the IBM Food Trust solution include:

- Participant network built on trust
- Single source of the truth
- End-to-end traceability
- Interoperability
- Expandability

With blockchain technology, IBM is helping to create a more transparent, authentic and trustworthy global food supply chain.

For more information

To learn more about IBM Food Trust, contact your IBM representative or visit: ibm.com/food

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