



# Afilias Discovery Services: Enabling Whole Chain Traceability in Global Food Supply Chains

APRIL 2010

60% of consumers are concerned about the safety of food they purchase

## Introduction

Whole chain traceability is a growing requirement for many governments and private organizations today, particularly those impacted by product recalls, such as the recent recalls of peanut paste, meat products and pistachio nuts due to contamination. According to a recent survey in the US, 60% of consumers are concerned about the safety of food they purchase.

The resultant demand for increased responsiveness and accountability in the area of food safety has highlighted the need to quickly locate and respond to sources of contamination in the food supply chain in order to address public safety concerns essential for maintaining product quality and consumer confidence.

In addition to addressing food safety concerns and the desire of consumers for more transparency in the food production process, the ability to document both product origin and movement history through the supply chain is also being seen as a way for organizations to protect product brand, minimize liability, provide competitive differentiation, and increase business efficiencies.

Technology that exists today can solve the challenges in our increasingly global supply chain. These challenges include identifying and locating all supply chain participants as well as the management and sharing of tracking data for objects being handled. Achieving full traceability in the supply chain requires not only the ability to collect, store, query and analyze data, but also the ability to selectively and securely share data among all the various participants up and down the chain.

While there is no doubt that current “track and trace” applications can provide functionality that solves the aspect of traceability within the four walls of a facility, or establishing product origin. They do not solve the following challenges for secure and selective data sharing which needs to be resolved for true “end-to-end” visibility to occur:

- Complexity of Supply Chain
- Lack of interoperability
- Gaps in ability to view upstream and downstream partners
- Security of Shared Information

The globalization of the food supply poses further challenges as differences in international traceability mandates and technology solutions can impact the ability to achieve end-to-end traceability.

## Barriers to achieving Whole Chain Traceability:

### Complexity of Supply Chain

Today organizations face increased supply chain complexity, both in terms of numbers of participants as well as the numbers and types of products to be tracked. Farm-to-fork supply chains, involve farmers, meat, produce and poultry producers, distributors, food processors, wholesalers and retailers. As an example, an animal source (e.g. a beef cow) with a single identifier tag, may be processed into multiple products of animal origin (steaks, roasts), necessitating the ability to track all aggregated event changes in each product identifier (e.g. relabeling), packaging (e.g. pallet breakdown), location and movement (e.g. wholesaler to retailer), as well as the ability to track any individual product identifier back to its source. The globalization of the food supply poses further challenges as differences in international traceability mandates can impact the ability to achieve end-to-end traceability. Chinese wheat gluten and rice protein concentrate, which was adulterated with melamine, entered the US, and was processed and reprocessed more than thirty times before the problem became public.

The current trend of supply chain participants to deploy their own systems, based on non-standard software interfaces, limits the capacity to view and share data with other systems.

## Lack of Interoperability

Within a supply chain network, partners use their respective internal business applications to capture movement data for products and services as they occur in a business process. This stored data enables partners to make business decisions within their own organizations. However, to communicate effectively with one another to achieve traceability, supply chain members need a mechanism that enables them to share relevant data in a secure and selective manner.

Existing solutions for a large scale and multi-participant traceability system differ and will be different as time progresses. This raises issues of scalability, interoperability, security, and data access and visibility control. There is a need for a solution that can relate to these differing systems and it exists today.

Another key barrier to the achievement of end-to-end visibility in the supply chain today is the fact that most traceability solutions in a supply chain are based on proprietary technology. Whole chain traceability requires the use of standard interfaces, data models and identifiers to be utilized at every layer of the industry (e.g. product movement capture, storage, query, and discovery and exchange of information between all traceability repositories). The current trend of supply chain participants to deploy their own systems, based on non-standard software interfaces, limits the capacity to view and share data with other systems. These “data silos” would require a solution to employ standards which will enable traceability across disparate systems.

Full traceability should not imply that all members of a supply chain have full access to other members' sensitive data.

## Gaps in ability to view upstream and downstream partners

Each supply chain participant should, by law, know where a product was immediately before they took possession of it, potential transformations of the product and where it was shipped. This "track-forward" / "trace-back" approach is limiting in that they cannot locate or share data with partners that interacted with the product further up or further down the supply chain. This in turn means that the complete traceability information about any individual object would be held by multiple resources, and not visible to the supply chain. This adds dramatically to the public risk and cost of a recall.

The problem lies when something goes wrong within a product, due to damage, contamination, loss, or mishandling. Without more upstream and downstream visibility of event data, partners have no traceable audit trail and the process of investigating where and when a problem occurred can be time consuming and costly.

Another problem with relying on following the chain from the manufacturer to the current downstream custodian of the object is that there could be a broken link in the chain by just having one of the participants not providing an onward link.

## Security of Shared Information

Tracing data event movement across multiple supply chain participants and systems also raises questions of how to provide selective and secure access to information for authorized members of a supply chain.

Full traceability should not imply that all members of a supply chain have full access to other members' sensitive data (e.g. shipping patterns, customer lists), but should have policies to govern who may have access to it and what data is shared. It could be as simple as providing who, what, where and when for supply chain participants, but limit access to only those partners that have specific permission.



Discovery Services (DS) resolves the barriers to achieving true end-to-end traceability by making visible all sources of product observations.

Discovery Services is a “search engine” for objects or a common shared registry that will return a notification of information and links (or “referrals”) to providers of product information along a chain of custody.

## The Role of Discovery Services in Enabling Whole Chain Visibility

One of the key components for enabling whole chain traceability, missing from traceability solutions today, is the ability to securely and selectively share product movement data among authorized supply chain participants. Discovery Services (DS) resolves the barriers to achieving true end-to-end traceability by making visible all sources of product observations to authenticated and authorized users.

It does this by providing links to providers and sources of product information along one or more supply chains. This may include the original manufacturer or supplier of the object, as well as other organizations who have handled the product at some point in the past. It is a lightweight referral service, meaning that it doesn't serve as a detailed source of product information, but as a registry of links to the databases where this traceability information is located.

Another way to think of Discovery Services is as a “search engine” for objects or as a common shared registry that will return a notification of information and links (or “referrals”) to providers of product information along a chain of custody. Unlike a search engine, which is open and publicly accessible, DS is only available to authorized partners with whom the information provider has an established trust relationship.

The need to define requirements for a standard around Discovery Services has been recognized by standards bodies such as GS1 EPCglobal, who is leading the development of industry-driven standards for the Electronic Product Code™ (EPC). To date, standards exist for capturing, filtering, storing and querying information collected within each organization. Discovery Services is a proposed interface standard for the next step in facilitating visibility of this information: a secure lookup mechanism for organizations to find links to multiple sources of traceability information, as well as selectively register and share the URL to their own traceability database.

ADS provides a secure mechanism for companies to “track and trace” business event data, as well as selectively share information regardless of the underlying business application, so that competitive data remains secure.

## Addressing the Challenges: Afilias Discovery Services

Afilias Discovery Services (ADS) is a standards-based holder of thin-layer data. ADS enables whole chain traceability by providing links to all companies that contain product movement information/traceability information along one or more supply chains. This gives tracking and product lifecycle information systems the ability to gather complete information about a product or object’s movement through the supply chain. ADS provides a secure mechanism for companies to “track and trace” business event data, as well as selectively share information regardless of the underlying business application, so that competitive data remains secure.

ADS also features a hosted registry and lookup service that allows multiple supply chain partners with or without prior business relationships to register key records about an object’s movement events through the supply chain. It does this through a scalable, lightweight lookup and referral service that is able to provide links to relevant event repositories in the supply chain, as well as store changes of identifier mappings (e.g. upon aggregation, relabeling) based on standard protocols for data exchange and communication. Unlike existing solutions, it provides referral services between loosely coupled supply chain management systems using granular security that provides selective visibility. Afilias Discovery Services address the current gaps in achieving end-to-end visibility for supply chains.

ADS is designed to respect the security and privacy requirements of users of the services since value chain information is commercially sensitive

## How does Afilias Discovery Services work?

Afilias Discovery Services is queried in much the same way as a web search engine. A web search engine receives a query for a keyword and returns links to websites that have relevant information on that keyword. ADS would receive a query for a product identifier i.e., item lot code, date range, UPC code, and return links to companies that have event information about that particular product. Unlike public search engines, though, ADS is designed to respect the security and privacy requirements of users of the services since value chain information is commercially sensitive. Consequently, whole chain traceability information is gathered from each participant tracking the flow of goods across the supply or value chain. And, once all the event information is collected, then it can be consolidated to give whole chain traceability information.

Afilias Discovery Services enables the secure, selective, lookup of databases as a result of the following features and benefits:

### Features

- **Comprehensive** ability to link to all participants in an end-to-end supply chain. Provides pointers to the entire sequence of historical events associated with a product movement; allows dynamic real-time updates.
- **Secure** User/Role based permissions, secure connectivity, data transmission, certificate logging and built-in encryption, which can prohibit data mining of sensitive supply chain information. ADS allows for the creation of Access Control Lists (ACLs) for granular security.
- **Customizable** administrative interface to allow users to create and control their own supply chains. Security is also customizable and user configurable by such factors as event type, or even by supply chain partner, so that confidential and competitive data can only be seen by trusted parties.
- **Interoperable** ADS is platform and identifier type agnostic.
- **Scalable** and standards-based service-oriented architecture. Allows global intercommunication between chains of other Discovery Services.



## Benefits

- Enables performing surgical recall and enhances ability to notify supply chain partners.
- Standards-based approach allows for freedom to choose the data collection and storage systems with applications best suited for each participant's needs for track and trace.
- The benefit for participating supply chains is interoperability with existing frameworks, solutions.
- Using a common traceability protocol means reduced cost in traceability systems integration.
- The use of access control policies and encryption for guarding referral links and who, what, when, and where event data, provides a safe avenue for event tracking.
- Being identifier type and schema agnostic allows participants to leverage existing technology.
- The ability to provide more upstream and downstream visibility means that DS satisfactorily addresses the needs of supply chain regulations by providing a reliable audit trail and for meeting compliance or regulatory requirements. Increased visibility and efficiency in accomplishing regulatory requirements for reporting on the supply chain can result in reduced cost, time, and labor, for an enhanced Return on Investment.

AfiliasDiscoveryServices is the only open protocol data sharing solution that can effectively meet traceability requirements for scalability, data aggregation, and architectural flexibility, while at the same time addressing security and privacy needs.

## Conclusion

Achieving full traceability in the supply chain is a challenge that requires each participant to not only have the ability to collect and store the who, what, when and where data, but to query and share that data on a selective basis up and down the supply chain.

Discovery Services represents a critical piece in the creation of end-to-end, whole chain traceability, and with it, the ability to provide full visibility across a business's supply chain and accommodate new partners and products.

Afilias Discovery Services is the only open protocol data sharing solution that can effectively meet traceability requirements for scalability, data aggregation, and architectural flexibility, while at the same time addressing security and privacy needs. It is the most comprehensive approach to solving the traceability problem today and can put the food safety industry on the path to improving the precision, effectiveness and efficiency of recalls, trace backs and track forward.

Afilias' expertise and leadership in developing and implementing the Discovery Services protocol, as well as their early and continuing involvement in major organizations focused on DS standards make Afilias uniquely qualified to implement and support data sharing in complete traceability initiatives.



## About Afilias

Afilias is a global leader in advanced registry services and provides a wide range of capabilities essential to the smooth and efficient operation of any type of registry service.

Afilias launched its registry services in July 2001 with the launch of the top-level domain registry for .INFO the most successful of the seven new top-level domains (TLDs) selected by the Internet Corporation for Assigned Names and Numbers (ICANN). Today, Afilias provides registry services for .INFO, .ORG, .mobi (for the mobile Internet), .aero (for the aerospace industry), .asia (for the Asia Pacific region) and several country code TLDs (ccTLDs). Afilias supports over 15 million domain names.

Afilias has pioneered many advances in the area of Internet domain registry technology, and is now focused on the development of solutions and services for the Discovery Services layer of the RFID supply chain tracking vision. Afilias Discovery Services (ADS) is a DS solution that leverages the expertise Afilias has developed in global domain name systems as well as directory content and propagation.

In an effort to create a standard for discovery services, Afilias has also developed the Extensible Supply-chain Discovery Service (ESDS) Protocol based on the original EPCglobal discovery services vision. This depth of expertise, combined with unmatched experience in supporting community software development for mission critical applications, makes Afilias a Discovery Services leader and innovator.

For more information on Afilias Discovery Services:

**Please contact:**

Brian Cute - VP, Discovery Services

P: 1.215.385.4790

E: [briancute@afilias.info](mailto:briancute@afilias.info)

**Or visit us online:**

[www.afilias.info/ads](http://www.afilias.info/ads)