



MIT GEOSPATIAL DATA CENTER

# Provenance

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## Provenance

### The Problem

Do you know the provenance of the food in your refrigerator? Where was it harvested? What were the conditions? Who prepared/packaged the goods? What path did it travel? There are so many questions.

How can it be that we purchase and ingest food without access to provenance information? How can we eat something without knowing where it's been or where it came from?

More surprisingly, the supermarket does not know either. The recent salmonella problem is but the latest example. In today's marketplace, only 10% of goods can be effectively recalled. One only need visit [www.Recalls.gov](http://www.Recalls.gov) to get a sense of the unmet challenge. The difficulty is understandable; the combination of multi-party international supply chains with varying levels of information technology infrastructure, regulation, and transparency have led to increasingly obfuscated information.

The forefront of technology in identification and tracking of goods, Radio Frequency Identification (RFID), does not have a solution either. RFID tags certainly have the potential to surface the chains of custody. However, the implementation of RFID infrastructure requires tremendous investment. As a point of comparison, barcode technology, a comparatively low tech approach, took over 20 years to become pervasive.

### The Past

Provenance was not always so difficult to determine, in the not so distant past, consumers had a personal relationship with the food producers. Some of this still survives in developing countries, where the local market place has an important place in the social interactions of a community. However, in the developed world, the relationship and knowledge is no longer present.

### The Future

Undoubtedly the world has changed; however, there may be hope in the new tools of the digital age. An Internet application, coupled with social software, product listing, plus geospatial components perhaps contain the ingredients for a local virtual market. Potentially, a market where a town can build relationships, build community, and gain access to new consumer goods.

### Software Components

Social software has been very successful in fostering community building. Participants have mobilized to realize robust and sustainable social networks. Communities from Medicine to Tango dancers, and every shade in between, are thriving with thousands, and in some cases, millions of participants. It is important to note that the by-products are not just virtual. Increasingly, geospatial components are coupled with social software to aid in urban planning, conservation, and emergency relief.



Beyond social software, geospatial tools are building the three dimensions of the physical web: the what, the where, and the when. The "what" is derived from the mobile device identifying the individual or entity. The "where" is charted on internet mapping. The "when" is time stamped at the application event by the coordinating server. Internet mapping, mobile GPS, wireless Ethernet positioning, and cell tower location and are quickly adding a rich physical metadata layer to the Internet.

## State of technology

Though not without challenges, the technical infrastructure for a publically accessible provenance information layer exists today.

Google Maps and Bing Maps already offer sophisticated mapping platforms. Open Street Maps (OSM), the newcomer, is advancing rapidly and already has a thriving community and maturing set of tools.

The first generation of software will include mapping platforms, coupled with cloud data, front end phone apps, and a community engine.

## Transparent Food initiative

The **Transparent Food** platform is a web-based portal where restaurants specify their products' provenance geospatially; suppliers are able to show their inventory; and consumers have the tools to know where and how food is produced. The glue is the map.

The map is the key element of the platform. It is the foundation upon which data layers will be added; it is the interface that allows the user to visualize and understand the geospatial information. The map has three overlays:

1. **Business layer:** information about restaurants and suppliers including the type of restaurant or supplier, their location –represented by markers on the map- and a short definition.
2. **Supply Chain layer:** links between restaurants, suppliers, and the product supplied –name, quantity and price- visualized by red lines that connect markers.
3. **Inventory layer:** suppliers inventory, such as the type of products they sell and the price.

The goal of the application is to:

- Give consumers **supply chain transparency**, the 3 Ws:
  - The *What* – information about the good they are purchasing
  - The *Where* – the provenance, source of origin, of the good
  - The *When* – the time it was harvested/shipped/packed
- Visualize stock, enable an **open inventory**, enable a direct information channel
- **Increase visibility and aid in recall processes**



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Overall to give consumers **better supply chain information to enable** conscious decisions about future purchases.