ENHANCED BRAND LABEL VALIDATION

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Related U.S. Application Data
Provisional application No. 61/022,192, filed on Jan. 18, 2008, provisional application No. 61/085,711, filed on Aug. 1, 2008.

Abstract
Enhanced brand label validation, in which identification information uniquely identifying items that have moved through one or more nodes of a supply chain is received, and event data associated with the uniquely identified items is received from the one or more nodes, based on the received identification information. The process also includes performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks, and providing a result of the validation for each of the multiple discrete evaluation frameworks.
FIG. 4
RECEIVE IDENTIFICATION INFORMATION UNIQUELY IDENTIFYING AN ITEM THAT HAS MOVED THROUGH A NODE IN A SUPPLY CHAIN, THE ITEM BEING MARKED WITH A LABEL CLAIM

RECEIVE, FROM THE NODE, EVENT DATA ASSOCIATED WITH THE UNIQUELY IDENTIFIED ITEM

OUTPUT RECEIVED EVENT DATA THAT VALIDATES OR INVALIDATES THE LABEL CLAIM, IN REAL TIME OR NEAR REAL TIME TO RECEIVING THE IDENTIFICATION INFORMATION

FIG. 6
S701 START

S702 RECEIVE IDENTIFICATION INFORMATION UNIQUELY IDENTIFYING AN ITEM THAT HAS MOVED THROUGH A NODE IN A SUPPLY CHAIN

S704 RECEIVE, FROM THE NODE, EVENT DATA ASSOCIATED WITH THE UNIQUELY IDENTIFIED ITEM BASED ON RECEIVING THE IDENTIFICATION INFORMATION

S705 PERFORM A THIRD PARTY VALIDATION OF AN ASSOCIATED CHARACTERISTIC OF THE UNIQUELY IDENTIFIED ITEM BASED ON THE RECEIVED EVENT DATA

S706 PROVIDE A THIRD PARTY CERTIFICATION OF THE ASSOCIATED CHARACTERISTIC BASED ON PERFORMING THE THIRD-PARTY VALIDATION

S707 END

FIG. 7
S801 START

S802 RECEIVE IDENTIFICATION INFORMATION UNIQUELY IDENTIFYING ITEMS THAT HAVE MOVED THROUGH ONE OR MORE NODES OF A SUPPLY CHAIN

S804 RECEIVE, FROM THE ONE OR MORE NODES, EVENT DATA ASSOCIATED WITH THE UNIQUELY IDENTIFIED ITEMS BASED ON THE RECEIVED IDENTIFICATION INFORMATION

S805 PERFORM A VALIDATION OF A CHARACTERISTIC OF THE UNIQUELY IDENTIFIED ITEMS BASED ON APPLYING THE RECEIVED EVENT DATA TO MULTIPLE DISCRETE EVALUATION FRAMEWORKS

S806 PROVIDE A RESULT OF THE VALIDATION FOR EACH OF THE MULTIPLE DISCRETE EVALUATION FRAMEWORKS

S807 END

FIG. 8
Retail Meat Trackback from Shelf to Producer

Would you like to know where your SOUTH DAKOTA CERTIFIED Beef came from? We can use the tracking number from the package to tell you which licensed members produced this beef.

Please enter the Tracking Number from your SOUTH DAKOTA CERTIFIED Beef package:

History for Tracking Number: 1195612

Image

Image Not Available

Location

SDC0001

http://www.marshalljohnsbeef.com/

South Dakota Certified by Tracegains

FDA Certification Results Inconclusive

SDC0701

http://

FIG. 12
### AgriInfoLink Source and Age Verification Report

**Report Date:** 9/7/2007  
**TOTAL HEAD COUNT:** 8

The animals listed below are enrolled in the AgriInfoLink's USDA Approved Process Verified Program. If you have questions, contact AgriInfoLink at 800-282-8787 or pvp@agriinfo.li.com

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FIG. 16

Product History - Hamburger

Traceability History of Hamburger #307-16A
Ingredient #1: Cheese  Obtain Traceability History
Ingredient #2: Beef Patty  Obtain Traceability History
Ingredient #3: Hamburger Bun
Ingredient #4: Lettuce  Obtain Traceability History

Claim  ABC  FDA  Claim  ABC  FDA
Organic Vegetables  ?  ?  No Migrant Labor  ✓  ✓
Free-Range Beef  ✓  ✓  Source: USA  ✓  ✓
Kosher  ✓  ✓  No Pesticides (45%)  ✓  ✓
Halal  ?  ✓  Gluten Free  ?  ✓
Real California Cheese  ✓  ✓  Wisconsin Cheese  ✓  ✓

Product History - Cow

Traceability History of Cow #34703982
Source #1: Mother Cow  Obtain Traceability History
Certified Natural  ✓  No Growth Hormone  ✓
Free-Range Beef  ✓  Source: USA  ✓
Kosher  ✓  Kobe Beef  ✓
Halal  ?  South Dakota Certified  ✓
All Vaccinations (98%)  ✓  Milk Fed  ✓

Product History - Carcass

Traceability History of Carcass #A100-369
Source #1: Cow #34703982  Obtain Traceability History
Fresh Never Frozen  ✓  No Growth Hormone  ✓
Free-Range Beef  ✓  Source: USA  ✓
Kosher  ✓  Carbon Offset Transport  ✓
Halal  ?  South Dakota Certified  ✓
Aged 28 Days (75%)  ✓  USDA Prime  ✓
ENHANCED BRAND LABEL VALIDATION
CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Patent Application Nos. 61/022,192, filed Jan. 18, 2008, and 61/085,711, filed Aug. 1, 2008, which are each incorporated herein by reference.

FIELD

The present disclosure generally relates to the tracking of items in a supply chain.

BACKGROUND

In response to recent recalls of consumer products, such as food, toys, pet food, clothing and toothpaste, as well as scares relating to E. coli and bovine spongiform encephalopathy (“BSE,” or “mad cow”) contamination of beef, the average consumer has become acutely aware of a lack of transparency in product supply chains, particularly supply chains that cross international borders.

Even after being notified of a product recall or scare, a consumer has few options other than to discard all items that could potentially be affected, or to risk their own health and safety by continuing to consume or use the potentially affected items. Alternatively, a consumer may choose to blindly trust a particular brand, believing that brand to be sufficiently reputable to look after the consumer’s welfare. Thus, the concomitant ignorance that results from the lack of transparency in the supply chain often leads to misplaced confidence or to unnecessary, wasteful knee-jerk reactions.

In the case where a supplier has taken appropriate precautions to safeguard an item in their care, there is typically no mechanism for an end-user (or a vendor selling the supplier’s items under the vendor’s brand name) to verify these safeguards without performing an invasive or impractical on-site inspection, or an expensive audit. All of these factors may lead consumers and vendors to feel generally unsettled about the items they wish to purchase, potentially decreasing the price that a supplier may charge for a high-quality product, and thus presenting a barrier to trade and commerce.

SUMMARY

Vendors may purchase products from third party suppliers in batches or lots, to be sold or marketed under the brand name of the vendor. Thus, and according to one general implementation, in real time or near real time to receiving a batch or lot of products from a third party supplier, the vendor’s brand manager may validate the characteristics of the purchased products against multiple rule engines, including a rule engine tailored to the brand itself, to determine whether the products satisfy standards or acceptance thresholds. In this regard, purchased products that do not satisfy standards set by the brand may be individually or collectively flagged for refusal, remediation, or informed acceptance, even in the case where the products may indeed satisfy other standards (such as minimum standards) set by other certifying entities. In doing so, a vendor may ensure that the branded products they sell do not just meet basic or minimum standards, but that the products also satisfy additional tests which better assure that asserted characteristics are in fact valid and up to par.

According to another general implementation, a computer-implemented process includes receiving identification information uniquely identifying items that have moved through one or more nodes of a supply chain, and receiving, from one or more nodes, event data associated with the uniquely identified items based on the received identification information. The process also includes performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks, and providing a result of the validation for each of the multiple discrete evaluation frameworks.

Implementations may include one or more of the following features. For instance, the result of the validation may be provided in real time or near real time to receiving the identification information. The validation may be performed simultaneously using the multiple discrete evaluation frameworks. The multiple discrete evaluation frameworks may further include a first evaluation framework that evaluates a validity of the characteristic according to a first compliance standard, and a second evaluation framework that evaluates the validity of the characteristic according to a second compliance standard which is more stringent than the first compliance standard. The first compliance standard may be a minimum compliance standard, and the second standard may be an elevated standard predefined for a particular brand under which the items will be sold. The multiple discrete evaluation frameworks may include an internal evaluation framework performed on behalf of one of the nodes of the supply chain, and a third-party evaluation framework performed by a disinterested third party not involved in the supply chain. The third party validation may be an age and source verification.

In other examples, providing the result of the validation may further include providing indicia responsive to the validation, the indicia identifying, for each of the multiple discrete evaluation frameworks conforming and non-conforming items which do and do not validly satisfy the characteristic, respectively. The indicia may be expressed as a conforming percentage and a non-conforming percentage of the items which do and do not validly satisfy the characteristic, respectively, or the indicia may be expressed as a conforming list and a non-conforming list of the items listing the identification information of the items which do and do not validly satisfy the characteristic, respectively.

In further examples, providing the result of the validation may further include providing indicia responsive to the validation, the indicia identifying items evaluated as validly satisfying the characteristic by a first discrete evaluation framework and evaluated as not validly satisfying the characteristic by a second discrete evaluation framework. The process may also include determining reasons why the items were evaluated as both not validly satisfying the characteristic by the second discrete evaluation framework and as validly satisfying the characteristic by the first discrete evaluation framework, where the indicia may further include the determined reasons. The process may further include receiving, responsive to providing the result, a signal indicating that a user intends to accept, reject, or remediate at least a portion of the items evaluated by any of the multiple discrete evaluation frameworks as not validly satisfying the characteristic, and accepting, rejecting, or remediating the portion of the items based on the received signal. The identification information may further identify the characteristic to be validated.
In additional examples, performing the validation of the characteristic of the uniquely identified items may further include determining a role of a user requesting the validation, and applying the received event data to a set of rules associated with each of the multiple discrete evaluation frameworks, and tailored to the determined role. The result may be expressed as a statistical likelihood that one or more of the items validly satisfies the characteristic. The process may also include receiving a user selection of a trusted third party from among several trusted third parties to at least partially perform the validation, where performing the validation of the characteristic may further include applying the received event data to an evaluation framework associated with the selected trusted third party. The characteristic may be associated with a label claim.

In accordance with another general implementation a system includes one or more computers, and a computer-readable medium coupled to the one or more computers having instructions stored thereon. When executed by the one or more computers, the instructions cause the one or more computers to perform operations including receiving identification information uniquely identifying items that have moved through one or more nodes of a supply chain, and receiving, from the one or more nodes, event data associated with the uniquely identified items based on the received identification information. The operations also include performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks, and providing a result of the validation for each of the multiple discrete evaluation frameworks.

According to a further general implementation, a computer-readable medium is encoded with a computer program including instructions. When executed, the instructions operate to cause a computer to perform operations including receiving identification information uniquely identifying items that have moved through one or more nodes of a supply chain, and receiving, from the one or more nodes, event data associated with the uniquely identified items based on the received identification information. The operations further include performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks, and providing a result of the validation for each of the multiple discrete evaluation frameworks.

The details of one or more implementations are set forth in the accompanying drawings and the description, below. Other potential features and advantages of the disclosure will be apparent from the description and drawings, and from the claims.

Detailed Description

Vendors may purchase products from third party suppliers in batches or lots, to be sold or marketed under the brand name of the vendor. Thus, and according to one general implementation, in real time or near real time to receiving a batch or lot of products from a third party supplier, the vendor’s brand manager may validate the characteristics of the purchased products against multiple rule engines, including a rule engine tailored to the brand itself, to determine whether the products satisfy standards or acceptance thresholds. In this regard, purchased products that do not satisfy standards set by the brand may be individually or collectively flagged for refusal, remediation, or informed acceptance, even in the case where the products may indeed satisfy other standards (such as minimum standards) set by other certifying entities. In doing so, a vendor may ensure that the branded products they sell do not just meet basic or minimum standards, but that the products also satisfy additional tests which better assure that asserted characteristics are in fact valid and up to par.

Accordingly, and using the enhanced claim validation approach described herein, the supply chain history of a batch of items or products may be researched in real-time or near real-time, in order to detect false claims and make well-informed decisions regarding whether the items are worthy, safe, or appropriate for consumption, transportation or other use. For example, a company offering a particular brand of product may research the supply chain history of the product, to verify whether supply chain entities (e.g., wholesalers) conduct themselves in their interactions with the product in a manner so as to uphold standards established for the brand. By validating a product, a company may reduce the risk of liability which could occur if consumers consume or use items that are unfit or unsafe, that originate from suppliers that make inaccurate claims, or that do not otherwise comply with the standards established for the brand.

Specifically, information that uniquely identifies items in a batch of items may be received, for example by scanning items or by looking up item identifiers on a manifest based on a palette identifier. Based on the identifying information, nodes in a supply chain may be polled or queried for event data or other information regarding the items. Event data may be used by one or more validation entities to perform a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete validation engines. For example, the company and an external third party may perform validations. Both the com-
pany and the third party may use multiple validation engines. For example, a first validation engine may evaluate a validity of the characteristic using less stringent standards than those used by a second validation engine. A result of the validation may be provided for each of the multiple discrete evaluation frameworks. For example, a report or an output displayed on a user interface may indicate, for each of the multiple discrete validation engines, conforming and non-conforming items which do and do not validly satisfy the characteristic, respectively.

FIG. 1 is a conceptual diagram of exemplary systems for providing claim validation, such as a validation of a characteristic or “label claim.” Initially, according to one implementation, a “label claim” is intended to refer to a claim, or an assertion of something as a fact, associated with a “label” or “mark,” which is an affixed, impressed or otherwise associated device, symbol, inscription, etc., serving to give information, identify, indicate origin or ownership, attest to character, aspect, quality or comparative merit, or the like, as a trademark, of an item that has moved through at least a portion of a supply chain.

While such a claim may be included on a physical label attached to a physical item, the claim need not be physically embodied (e.g., may be a contract provision or a verbal claim), may not be attached to the item, and may be associated with an item that is also not itself physically embodied (e.g., a data file). Contract provisions, claims and provisions may be automatically or manually extracted from contract files stored on the system, or may be derived or inferred from past behavior between parties.

“Real time” and “near real time” refer to instantaneous or near instantaneous processing, where a user of the system perceives no delay or merely a short delay between the time information is requested and the time information is provided. Although near real time access to data may refer to access that occurs within a few seconds or minutes, for complex queries or using systems with limited computational resources, near real time access to data may take longer. In any case, near real time access is contrasted with systems that require a user to wait for extended periods of time, that require manual intervention, collation or analysis, that allow a user to perceive onerous or extended delays, or that require a user to participate in multiple computing sessions before results are output.

Although the automatic validation of claims is described in many examples herein as occurring in real time or near real time, in other examples longer (including much longer) time frames are contemplated. For instance, in other exemplary implementations the validation of a claim may invoke a manual processing operation which may cause the claim to be validated over the course of several days. Moreover, the claim validation result or certification may be “output” to the user on paper via postal mail or in person, in which the result may take days, weeks or months. Moreover, while many examples provided herein describe the validation of a label claim, other types of claims, assertions, obligations, rights, requirements, characteristics or qualities of an item or item may also be validated or invalidated using these enhanced techniques, by either the party requesting the certification, by third party trusted entities, or by other agents.

Naturally then, an “item” or “product” may refer to one or more tangible or intangible article or commodity, while a “supply chain” may refer to a sequence of processes or operations at one or more locations (e.g. nodes) involved in the production and distribution of the article or commodity. Within the supply chain, the item or article may undergo a series of state transformations, such as where the item is transformed from a living state to a non-living state, where the item is processed from a first product into a second product, where the item is divided into constituent parts or into multiple products, or where the item is combined with other items. The item may be a received material or finished good.

At various stages of the supply chain, items or groups of items, or different states of the same item, may be identified using one or more assigned, unique identifiers. Supply chain processes may assign new, modified or replacement identifiers to items that have undergone certain processing operations, even if the item that exits the process and the item that enters the process (i.e., the ‘origin’ of the item exiting the process) may at least outwardly be the same, whole, identical item.

In addition to the situation where a one-to-one correspondence exists between the item exiting the process and the origin of that item, supply chain processing may add further identification complexities where, for example, unique items are blended into new items, a single unique item is separated into multiple discrete items, or where multiple overlapping unique identifiers are assigned to an item or to group in which the item is a part. Put another way, processing may cause an item to have more than one origin, or more than one item to have the same origin, and may thus have more than one assigned, unique identifier.

By way of example, an item may be a consumer product such as food or components of food, a toy, a consumer electronic device, a living plant or animal (e.g. livestock or seafood), a fluid, a container, a fruit or vegetable, a pharmaceutical, a vehicle, or a group, batch, lot, cluster, or other plurality of items. Similarly, the item may represent an intangible item, such as an electronic mail message, a virtual item in a virtual universe, such as a virtual item like a weapon, a good, or land purchased in the SECOND LIFE® or WORLD OF WARCRAFT® virtual universes, a right, a title, or an obligation. A group of items includes one or more similar or dissimilar items.

Using fruit as an example, a claim, assertion or characteristic may be associated with a physical label that is affixed or attached to the fruit, or packaging for the fruit, a pallet or other container that holds multiple fruit packages, or a truck or warehouse that transports or stores the fruit. The claim may be associated with a label that is not physically affixed to the fruit, such as an advertising banner that hangs over a shelf of fruit, or a verbal assertion made by a fruit hawker. The claim and/or a unique identifier of the item may be stored in an identification device, such as an RFID tag, affixed to the item. The claim may be associated in other ways as well, such as where a television commercial describes or infers that a product line of items each share a particular characteristic (i.e. “organic”).

In any case, the label may make a claim that negatively or positively attributes to some characteristic of the item. The claim may attest to the organic character of the item (“Certified Organic,” “100% Organic,” “Natural,” “Guilt Free”); may address a warranty status (“Under Factory Warranty,” “50,000 miles remaining under warranty”); may attest to the natural origin of the item (“Farm Raised,” “No Artificial Colors Or Sweeteners,” “Ocean Caught”); may attest that the item was not treated with hormones (“No Growth Hormone,” “rBST negative”); may attest to the location of origin of the
item ("Made in the U.S.A.", "Real California Cheese," "Factory Authorized," "Under Warranty"); may attest to the ingredients of the item ("Peanut free," "Contains Phenylalanine"); may assert that the item is vegetarian or vegan friendly ("Does not contain milk or eggs;" "Flavored with soy-based simulated bacon"); may assert that the item is cruelty-free ("Product not tested on animals;" "Simulated fur"); may be a drug claim that asserts that the item alters the physiology or function of any part of the human body ("Prevents erythema caused by sunburn"); may be a cosmetic claim that does not describe a physiological effect of the body ("Fragrance Free;" "No Perfumes"); may address whether the item has ever been recalled; may assert that an animal that produced the item was not caged ("Cage-free;" "Free Range"); may provide a temporal reference ("Fresh Caught," "One-Day-Old Bagels," "Our Seafood Swam In The Ocean Last Night," "Expires Mar. 15, 2008"); may attest to a storage or processing condition ("Fresh, Never Frozen," "Cold Filtered," Guaranteed Shipped under 50°F"); or may assert that the item is in compliance with a standard or has been approved by a body ("UL Listed," "IEEE-1394 compliant," "Union Labor," "No Child Labor," "Authorized Transaction," "Good Housekeeping Seal Of Approval," "Oprah Book Club Selection," "Fair Trade," "Process Verified," "Source & Age Verified" "ISO-9000 /14000 compliant" "Lean Six Sigma"). In short, a claim can be any assertion about anything, and may be associated with an item in any number of ways.

[0039] Each item is associated with data (or a data structure) that describes, among other things, a unique identifier of the item, and event data which may be used to verify a characteristic of the item such as the known or possible origin or origins of the item. The data may be stored on a medium that is physically attached to the item, such as a Radio Frequency IDentification (RFID) tag attached to the item or to a container that includes the item, without requiring an RFID reader to call, query or write to a separate database. In another example, the data may be handwritten on sourcing papers or labels affixed to the item, such that a human reader of the sourcing papers may manually identify the origin of the item, and manually update the information (i.e. with a pen or other writing implement). Other media that may be physically attached to the item may include a cattle tag, or a bar-code. This information may also make a label claim.

[0040] As the item traverses through the supply chain, event data and identification data associated with the item may be updated as the item undergoes processing operations such as aggregation, sorting, transformation or commingling, and label claims may be added. For instance, if first and second items are combined to produce a third item, an RFID tag associated with the third item may be written with event data which uniquely identifies the first, second and third items, as well as origin information describing the first and second items as the origin of the third item. Alternatively, new papers may be generated for the third item on which this same identification and origin information, as well as claim information, is printed. It may be that an accurate label claim may become inaccurate, for example when an organic item is commingling with a non-organic item. In these cases, event data associated with the commingling event may be used to invalidate the inaccurate label claim, even if the label itself is not updated.

[0041] Alternatively, the data associated with the an item may be stored in a database that is cross-referenced with identifying information that uniquely identifies the item. For instance, a node in a supply chain may access or download, from an immediately preceding node in a supply chain, a database or table which includes identifying data (e.g. a stock keeping unit (SKU) plus another identifier, an item name or code number, or a vehicle identification number (VIN)) which uniquely identifies the item and possibly characteristics of the third item. In addition to the identifying data, the database or table may include event data describing past events that have occurred on each identified item, where the event data may be used to validate claims. In this regard, as the item passes through the supply chain, the amount of associated event data increases unless filtering or deletion of the event data occurs. For instance, a node may wish to hide the origin of the item or a price associated with a particular transaction between nodes, by deleting event data.

[0042] Starting with the upper left portion of FIG. 1, a palette 102 includes multiple items 104-116 (in this case, multiple containers of “ABC Organic Food Brand burritos”). Each of the items 104-116 has an associated item identifier (e.g., “ABC 100” to “ABC 107”, respectively). Although the items 104-116 are branded by ABC Organic, the palette 102 is purchased from a wholesaler (e.g., “Burrito Wholesalers”), representing the actual manufacturer of the items. The palette 102 itself has an associated identifier 118 (e.g., “BW 123”).

[0043] A manifest 120 may list the identifiers for the items 104-116 as well as the identifier for the palette 102. The identifiers for the items 104-116 and the identifier for the palette 102 may be input into a computer system. For example, individual items may be scanned and/or the manifest 120 may be scanned. In some instances, the identifiers for the items 104-116 may be retrieved from a database by querying for the identifier of the palette 102.

[0044] Item identifiers may be input into one or more validation entities. For example, item identifiers may be input into a brand validation entity 122 and into a third party validation entity 124. The brand validation entity 122 may be an entity internal to a company (e.g., where validations are performed on behalf of one of the nodes of the supply chain). The third party validation entity 124 may be an external entity such as a government agency or a non-profit organization. Validations performed using the third party entity 124 may be deemed more trustworthy because a third party may be deemed as being disinterested (e.g., having no incentive to commit fraud).

[0045] In addition to receiving item identifiers, a validation entity may receive an indication of a characteristic to be checked. For example, when a palette of items is scanned into a computer system, a characteristic (e.g., “organic”) may be stored in association with the item identifiers. Therefore, validation entities may test for the specified characteristic (as compared to simultaneously testing for multiple characteristics).

[0046] A validation entity (e.g., 122, 124) may query or poll nodes in a supply chain for event data or other information regarding the items. For example, a validation entity may query or poll a vehicle 134 that transported one or more of the items, a farm 136 that raised or harvested one or more of the items, a factory 138 that processed one or more of the items, or any other node. In addition to sending the unique identifiers to the nodes of the supply chain, the validation entity may determine a role of the user requesting the validation, and transmit or otherwise use this role information to adjust the
types of event data requested from the nodes, to thereby reduce the amount of information used during the validation process.

A validation entity may evaluate the validity of a characteristic for each item in a group of items using multiple rule-based validation engines. For example, the brand validation engine 122 may use a basic validation engine 126 and a brand validation engine 128. As another example, the third party validation engine 124 may use a basic validation engine 130 and a rigid validation engine 132. Different validation engines within a validation entity may, for example, use different thresholds and/or different criteria to evaluate the validity of a characteristic. For example, the brand validation engine 128 may evaluate the validity of a characteristic according to a compliance standard which is more stringent than a compliance standard used by the basic validation engine 126.

Alternatively, a first validation engine may be associated with a first user role (e.g., soil researcher) and may output results tailored to that first role (e.g., soil sample data or validations associated with soil samples), while the second validation engine may be associated with a second user role (e.g., buyer), and may output results tailored to that second role (e.g., price and availability results). In doing so, users requesting validations are less exposed to results that are may be irrelevant to them. Furthermore, computational expense is reduced, since validations that are not salient to a particular role are not necessarily performed.

Validations may be performed sequentially or in parallel. For example, a validation may first be performed by the brand validation entity 122 and afterward a validation may be performed by the third party validation entity 124. Alternatively, validations performed by the brand validation entity 122 and the third party validation entity 124 may be performed at the same time.

Within a validation entity, validations performed using different validation engines may be performed sequentially or in parallel. For example, the brand validation entity may first perform a validation using the basic validation engine 126, and if the first validation is deemed acceptable, a second validation may be performed using the brand validation engine 128. As another example, a more strict validation (e.g., performed using the brand validation engine 128) may be performed first, and if the more strict validation fails, a second, less strict validation (e.g., performed using the basic validation engine 126) may be performed, for example, to determine whether an acceptable number of items pass a less strict set of standards.

Validation results may be presented, for example, in a user interface 140. The user interface 140 displays summary results for validations performed using the brand validation entity 122 and the third party validation entity 124. A list 141 displays identifiers of items tested. The user interface 140 displays summary results 142-148 which each indicate a percentage of items which met compliance of a validation performed using a particular validation engine. For example, the result 142 indicates that 89% of the items in the list 141 met compliance for the validation performed by the basic validation engine 126. The result 144 indicates that 72% of the items in the list 141 met compliance for the validation performed by the brand validation engine 128. The illustrated compliance rates are merely exemplary.

The user interface 140 may display results from more than one validation entity. For example, the result 146 indicates that 74% of the items in the list 141 met compliance of a validation performed by the basic compliance engine 130 used by the third party validation entity 124. The result 148 indicates that 63% of the items in the list 141 met compliance of a validation performed by the rigid validation engine 132.

The user interface 140 may be selected to one or more controls 150-154 to initiate one or more actions regarding at least a portion of the items evaluated as not validly satisfying the tested characteristic. For example, the control 150 may be selected to accept items and the control 152 may be selected to reject items. For instance, although in some implementations, items may be automatically rejected if one or more of the results 142-148 are below a threshold, in other implementations, a manual accept or reject action may be performed using either the control 150 or the control 152. If items are accepted or rejected, a corresponding message may be sent to other internal or external systems, such as warehousing, manufacturing, shipping, delivery, etc.

The control 154 may be used to remediate some or all of the items evaluated as not validly satisfying the tested characteristic. For example, defective items may be repaired, such as by replacing a defective component. As another example, items may be flagged as scheduled to be returned to a supplier for fixing. Alternatively, a message may be sent to the supplier requesting that they remediate the item on-site within a certain timeframe, or risk rejection of the non-conforming item.

A control 156 may be selected to alter rules used by one or more validation engines. For example, if one validation entity (e.g., the third party validation entity 124) consistently produces lower acceptance rates than another validation entity (e.g., the brand validation entity 122), thresholds used by one or more validation engines may be adjusted to attempt to produce more equal results. For example, a third party validation engine may use proprietary, unknown thresholds, and results of an internal validation engine (e.g., the brand validation entity 124) may be monitored and thresholds may be occasionally adjusted in an attempt to have internal validation results more closely match third party validation results.

A control 158 may be selected to print a certificate. The certificate may be printed, for example, as an indicia of a successful validation performed by a third party. The certificate may be a physical certificate or a digital certificate. A physical certificate may be a paper certificate, or a label or “sticker” which may be physically affixed to an item. In one example, a digital certificate is sent as an email attachment to specified recipient parties, or the certificate is presented as a webpage which may be accessed by parties who are notified of its existence or who may navigate to it using a search engine. In another example, the certificate is a dynamically generated Portable Document Format (PDF) file.

A control 160 may be selected to display results details, such as in a user interface 162. The user interface 162...
indicates, for each item, which validations passed and which validations failed. For example, for an item 164, a basic internal validation passed and an internal brand validation, a third party basic validation, and a third party rigid validation failed. As another example, for an item 166, a basic internal validation and a third party rigid validation failed and an internal brand validation and a third party basic validation passed.

[0059] As shown in the user interface 162, yes/no symbols (e.g., “check mark”, “X” mark) may indicate whether an item passed a particular validation. In addition, a statistical likelihood may be displayed which indicates a level of certainty that an item validly satisfies a tested characteristic. For example, for an item 168, the user interface 162 indicates that the item 168 passed a basic internal validation with a 98% level of certainty and passed a basic third party validation with a 64% level of certainty.

[0060] The user interface 162 may provide further details if an item passes some but not all tests (e.g., if there are discrepancies between test results). That is, if test results are consistent (e.g., if an item either passes all tests or fails all tests), additional information may not be as useful as in situations where test results are inconsistent (e.g., additional information may be useful to research items which passed some validations but failed other validations).

[0061] For example, as mentioned, the item 164 passed a basic internal validation but failed a basic third party validation. The user interface may provide details such as a description of the reason for why the item failed the third party validation. The user interface 162 may include a simple textual description of a reason of failure, one or more rule codes or descriptions (e.g., of rules that failed), and/or event data used in the failed validation.

[0062] As an example, if a tested characteristic is “pesticide-free”, as a result of the failure of the basic third party validation, the user interface 162 may display a simple phrase such as “pesticide detected”, or may display one or more rule descriptions such as “pesticide used within the last three years”, or may display a message that includes event data, such as “pesticide treatment occurred on Jun. 1, 2008”.

[0063] As another example, a message such as “no data available” may be displayed. Different validation engines may handle a data unavailable situation differently. For example, the basic validation engine 126 may ignore a situation where data is unavailable (e.g., allow an item to pass), while the basic validation engine 130 may fail an item if data is unavailable. Therefore, the display of a “no data available” message may indicate a reason for a discrepancy between test results.

[0064] FIGS. 2 and 3 are conceptual diagrams of exemplary systems for providing third party certification using enhanced claim validation, such as a validation of a characteristic or “label claim.” Starting with the upper left portion of FIG. 2, a first entity user 230 (in this case, a farmer) who owns a group of items (in this case, a group of cows) enters a lot identifier 205 (“ABC123”) and a type of third party validation requested (“Source & Process Verified”) into a user interface 231. Other information or data may also be provided in the user interface 231. For example, a picture 232 of a representative item may be displayed within the user interface when the lot identifier 205 is input (e.g., to increase accuracy), or the user 230 may select a preferred trusted third party 233 from among several trusted third parties to perform the validation (e.g., to increase confidence in the validation, thereby increasing a selling price of the item).

[0065] The lot identifier 205, either alone or with other data such as the type of third party validation requested, is transmitted to a third party validation entity 234, which may be a selected third party, a preferred third party, or a third party associated with the type of validation requested. The third party validation entity 234 may be a trusted governmental or non-governmental entity that certifies compliance or characteristics of the item. The third party validation entity queries various nodes of a supply chain in real time or near real time to gather event data or other information stored at one or more nodes that relate to events associated with the submitted lot identifier 205.

[0066] In the illustrated example, the third party validation entity 234 may query or poll a vehicle 216 that transported one or more items in the lot, a farm 217 that raised or harvested one or more items in the lot, a factory 219 that processed one or more items in the lot, or any other node. In an alternate implementation, at least a portion of the event data may already be stored at the third party validation entity 234 prior to the commencement of the third party validation, such that no externally polling or querying is required (i.e., only an internal data lookup is required). For instance, the third party validation entity 234 may be a data warehouse where event data is initially stored when an item in the lot is traversing the supply chain. Specifically, the third party validation entity 234 may be a node in the supply chain, or may be associated with a node in the supply chain.

[0067] Using one or more rule-based validation engines (e.g., 215, 216), the third party validation entity validates a characteristic of the items in the lot, and provides an indica of the validation, such as one or more physical or digital certificates, which may be provided back to the user 230, a vendor 235 of the items, or to other entities. The type of indica to provide may be based on the role of the user requesting validation (such as a “consumer” role, an “inspector” role, a “butcher” role, a “transporter” role, etc.) The user 230 may view a certificate using user interface 236, which indicates that the “Source & Process Verified Basic Standard” and “Source & Process Verified Upgraded Standard” validations have been completed.

[0068] The vendor 235 may view a certificate using the user interface 237 and, as shown, may adjust the price of the item upwards accordingly. For example, an uncertified lot of items is priced less than a certified lot of items, which is in turn priced less than a lot of items with an improved certification. In one example, the certificate is sent as an email attachment to specified recipient parties, or the certificate is presented as a web page which may be accessed by parties who are notified of its existence or who may navigate to it using a search engine. In another example, the certificate is a dynamically generated Portable Document Format (PDF) file.

[0069] Upon selling the lot of items to a buyer 239, the vendor 235 may pass the lot, the filtered event data associated with the lot, and the certificate to the buyer 239. The buyer’s user interface 238 notes the receipt of the certificate, however the previous owner of the lot is shown as “undisclosed” since the vendor 235 filtered identification information which identified the user 230. In any regard, since the certificate has been validated by the third party validation entity 234 and not, for example, by the vendor 235 or the user 230, the buyer 239 need not trust parties involved in the transaction of the lot who
may have an adverse interest to the buyer 239, or who may be motivated to make false claims regarding the items in the lot. [0070] By filtering the event data while at the same time passing along the certificate to the buyer 239, the vendor 235 can provide an assurance to the buyer 239 that the items in the lot satisfy its claims without identifying the source or origin of the user 230. In hiding the user’s identity, the vendor 235 can prevent the buyer 239 from contacting the user 230 directly for other transactions, cutting the vendor 235 out of future deals.

[0071] FIG. 3 provides additional context to the approach of FIG. 2 by illustrating several specific, exemplary user interfaces which may be used by the owner 230, the vendor 235, or by other parties such as the buyer 239 in effecting a third party validation. As illustrated in FIG. 3, a label 301 affixed to the packaging of an item or to the item itself includes a claim 302 (in this case, a label claim), that asserts that the item is “Certified Organic.” To be certified as an organic food, generally it must be shown that use of synthetic chemical inputs (e.g. fertilizer, pesticides, antibiotics, food additives, etc) and genetically modified organisms has been avoided; that farmland has been used that has been free from chemicals for a number of years (often, three or more); that an audit trail of detailed written production and sales records has been established; that strict physical separation of organic products from non-certified products has been established and respected; and that periodic on-site inspections have occurred. Different user roles may want to see results of different validations. For example, certain roles may be more interested in viewing fertilizer event data or validation results, while others may be more interested in viewing antibiotic event data or validation results.

[0072] The qualities or characteristics that make a food item “organic” or, conversely, preclude a food item from being called “organic” may be encoded using rules, such that a condition that a food item whose supply chain event history satisfies or does not satisfy the rule may be validated or invalidated as an organic item, thereby validating or invalidating a claim. A rule that requires, for instance, that the farm be free of chemicals would be violated by first event data received from a first source in real time that indicates that a particular farm is the origin of the item, and second event data received from a second source in real time that indicates that the particular farm received pesticide treatment with a particular period of time.

[0073] While an owner or vendor of an item be motivated to falsely market a non-organic item as organic, a third party entity such as a consumer advocacy group or health food organization may have the competing motivation to expose suppliers who make these false claims. In this regard, in performing a claim validation, an end-user may benefit by placing their trust in the third party instead of the supplier, and may be likely to receive a more accurate (or at least more conservative) analysis. In any case, by providing the option of performing a third party validation in addition to an interested-party validation, the enhanced approach described herein gives the consumer additional choices, and allows the user to select an approach that they deem to be best for them.

[0074] In order for the user to validate the claim, the label 301 includes a validation resource 304 (such as a Uniform Resource Locator (URL) or a telephone number), as well as a unique identifier 305 (“0-918994-28-X”) that uniquely identifies the item or collection of items. The user may be a living or automated end-user of the product (such as a consumer), or the user may some other entity disposed at the origin or mid-point of the supply chain. Although the term “validation” is used herein throughout to generally refer to a process for determining whether a claim is accurate, the “validation” process may support an approval, an authentication, an authorization, a certification, a confirmation, a corroboration, endorsement, a legitimation, ratification, a sanction, a substantiation, or a verification.

[0075] Using a user interface 306, the user enters the unique identifier 305 into text box 307, and selects the type of claim that the user wishes to validate. For instance, the user checks “Certified Organic” checkbox 309 to verify the validity of the “Certified Organic” claim 302. Although the label does not explicitly make a “No Growth Hormone” or “Made In The USA” claim, the user could also select checkboxes 310 and 311, respectively, to verify whether those claims could be made for the item. Although the selection of a claim to validate is illustrated in this example as a manual process, in other arrangements the enhanced claim validation approach may automatically determine claims that may apply (or be “appropriate”) to a item, based on receiving the unique identifier 305, or appropriate unique identifiers of products may be automatically determined based on receiving a selection of a claim that is to be satisfied.

[0076] Using a help control 312, the user may seek automated assistance. In one example, the automated assistance function may access a database that stores a graphic that displays where the unique identifier 305 is located for various items, that stores a textual description of the location of the unique identifier 305, or that directs the user to a technical support specialist or a community of users, or initiates an on-line chat session. Once the unique identifier 305 is entered into the text box 307, the user can select a “display history” form submission control 314.

[0077] The user interface may also include controls (e.g., controls 328-330) which allow the user to select one or more entities to perform the claim validation. For instance, selection of the control 329 may cause a validation to be performed by TraceGains® (a private company), and selection of the control 330 may cause a validation to be performed by the Food and Drug Administration of the United States Government. Selection of the control 328 may cause an industry standard (e.g., a less strict) validation to be performed, for example by TraceGains®. Failure to select an entity to perform a claim validation may cause a validation to occur using an interested party, using a default, preferred or random entity, or using an entity associated with the type of claim validation requested. For instance, a query of look-up table may determine that a “halal” claim should be validated by a religious entity or charity as the trusted third party (as compared, for example, to a meatpacking council or an automobile association, who may have no interest in providing, or experience or knowledge to provide, an accurate validation).

[0078] Upon detecting that the form submission control 314 has been selected, a transaction database 315 (e.g. of the user, or of a third party or other validation entity) queries various nodes of a supply chain in real time or near real time to gather event data or other information stored at one or more nodes that relate to events associated with the submitted unique identifier 305. For instance, the transaction database 315 may query or poll a vehicle 316 that transported the item, a farm 317 that raised or harvested the item, a factory 319 that processed the item, a governmental or non-governmental entity that certifies compliance of the item, or any other node.
The transaction database 315 may operate under control of an interested party (such as a node of within the supply chain of the item), or under the control of a third party who may or may not be trusted or disinterested.

It may occur that the transaction database 315 queries all nodes in the supply chain, or the transaction database 315 may query a portion of the nodes in the supply chain based on the unique identifier entered. In addition, a trusted third party may select a subset of the nodes in the supply chain that the trusted third party itself deems to be trusted, and may filter out or ignore nodes that, for example, have historically provided inaccurate or conflicting data, or may select nodes or event data which is relevant to a role or job of the user requesting the validation (as specified, for example, in a look-up table). In an alternate implementation, at least a portion of the event data is stored at the third party validation entity 234 before the validation begins, such that no externally polling or querying is required (i.e. only an internal data lookup is required). For instance, the third party validation entity 234 may be a data warehouse where event data is initially stored when the item is traversing the supply chain, or a central data repository. Moreover, the third party validation entity 234 may be a node in the supply chain, or may be associated with a node in the supply chain.

Furthermore, it may occur that the transaction database 315 queries a first node or set of nodes in the supply chain, processes received data, and subsequently queries a second or further node or set of nodes. For example, if the first query receives event data identifying an origin of an item, a second, or subsequent query of a supply chain or non-supply chain node (such as a governmental node) may reveal information pertaining to the origin of the item. If the origin is a farm or a manufacturing facility, for example, these cascading queries could be used to determine if the origin is certified by a governmental agency or other certification body.

For each of the nodes that store event data relating to the item, event data 318 (or an indicia of the occurrence of non-occurrence of an event, or the occurrence or non-occurrence of an event 318), are transmitted from each node to the transaction database 315. Since the events may be stored in various data formats, the transaction database 315 reformats the data to a unified data format, such as a format based on Extensible Markup Language (XML), and transmits the reformatted event data to the user. Furthermore, it may automatically determined whether the item satisfies the claim 302, based on the received event data 318, or the user may be given the option of manually validating the received event data 318 itself. The events in the transaction database 315 may also be stored in a relational table format within an SQL database.

The reformatted event data is output on a user interface 321 to thereby validate or invalidate the claim. Specifically, based on the automatic determination, the user interface 321 includes indicia 322 that indicates that this item is certified as organic by the FDA but does not meet organic standards established by a private company (e.g., TraceGains®). For each validation entity, the indicia may include a "yes" or "no" type indicia that indicates that the claim is or is not validated by that entity, the indicia may display a probability that the claim is or is not validated by that entity, or raw event data or other data may be output.

The indicia may also be a physical or digital certificate or other mark of authenticity. For instance, selection of the control 331 may allow the user to print out a physical certificate validating the claim by a third party. Selection of the control 332 may bring up another menu which allows the user to transmit a digital certificate, or provide access to a digital certificate, as well as some or all of the event data received at the transaction database 316. The user can bring this certificate to the auction house to receive an additional premium on items identified as compliant.

"Yes" or "no" (binary) type indicia can be output if the claim is determined by a validation entity to be 100% valid or 100% invalid, or a threshold can be preset, set by a manufacturer or user, or automatically determined based on past use, where the threshold allows a claim to be validated or invalidated even if some event data is missing or contradicts the validation or invalidation. For instance, if event data indicates that only 5% of a farm has been sprayed for pesticides and a threshold of 90% certainty has been set by the user, the enhanced claim validation application may output an indicia that the item had not been sprayed for pesticides even though there is a small chance that the item has been sprayed. Such a threshold is helpful since it may be impossible or impractical to prove or disprove a claim with 100% certainty, while different users may desire different levels of confidence.

In addition to displaying event data for the item itself, the user interface 321 displays historical event data for each component, constituent part, ingredient, or previous state or phase of the item. For instance, the user interface 321 includes expanding regions 323, 324 and 325 that display or otherwise output event data for three ingredients of the item. The expanding region 323 displays production event data ("Produced: Apr. 7, 1998"); origin location event data ("Farms Without Fences"); governmental certification compliance event data ("FDA Organic Certification No. 1223-XX, Exp. 9/1999"); and pre-transformation event data ("Source: Bessie—ID # 16238").

Since "Ingredient #1," which is displayed in expanding region 323, is milk, the user may wish to view event data regarding the source of the milk or, more generally, the product that was transformed to produce the item or ingredient. Since the pre-transformation product is a cow ("Bessie") which also has a unique identifier ("16238"), the user may select a control 326 to see the event history of the cow. For instance, although the expanding region 323 indicates that the milk is certified organic based on governmental certification compliance event data, the user may effectively treat that event data as a claim, and may investigate the validity of that claim as well, in a similar manner as they investigated the end product.

In that regard, the user may investigate the supply chain of any uniquely identified items though an iterative, recursive, or retrospective process. Specifically, products, and then components or previous states or phases of those products, are validated from end-point to origin-point, notwithstanding the fact that the uniquely identified items may change their nature or state through supply chain processes, or that certain intermediate phases or states may be not uniquely identifiable or unidentifiable.

The expanding region 324 displays event data for the ingredient "cauliflower," which was used in the production of the uniquely identified item. Since event data relating to an FDA organic certification of the cauliflower was not found, the item is then not deemed to be certified organic based on the application of a rule or upon reviewing event data, and the claim 302 is thereby invalidated by this event data. As above, since the event data includes a unique identifi-
In summary, a user can enter information that uniquely identifies an item into a user interface, in order to validate a claim associated with the item, in real time or near real time. Based on the identifying information, nodes in a supply chain are polled or queried for event data or other information regarding the item, and the event data is appropriately reformatted, and automatically compared against the claim. In addition to outputting the raw event data itself, the user interface outputs indicia to validate or invalidate the claim, thereby rendering the supply chain for the uniquely identified item completely transparent. Such processing may occur using a disinterested, trusted third party, or interested parties in a transaction, or any combination thereof.

FIGS. 1 to 3, supra, and FIGS. 5 to 10, infra illustrate various user interfaces for validating claims, which are implemented using various controls or widgets, that each allow for different levels of interaction and functionality. In each case, it is noted that the particular controls used, and the particular functionalities allowed, are merely exemplary. For the sake of brevity, it is further noted that any user interface that allows for the input of identification information and the output of claim validation information may be used, and that the selection of particular components, controls, widgets or functionalities generally depends upon the intended user of the user interface, and the level of control desired.

FIG. 4 is a block diagram of an exemplary system 400 for validating a claim. Briefly, the system includes a user device 401, a transaction database server 402, and an other validation entity 402a connected to nodes of a supply chain 403 via a network 404. Using the system 400, a user may investigate the validity of a claim associated with an item that has been processed by the supply chain 403, thereby making the supply chain 403 increasingly transparent. From the perspective of suppliers in the supply chain, transparency in the supply chain, backed up by third party trust assurances, allow suppliers to increase prices of goods which have been processed under higher standards.

In more detail, and among other things, the user device 401 includes a user interface 405, such as a display or haptic device or a speaker, that outputs textual, touch, sound or graphical data to the user, including event data that validates the claim, or certifications of these validations provided by third parties. The user device also includes an input device 406, such as a mouse, a keypad, an RFID reader, a bar code scanner, a microphone, a telephone, a cell phone, a gaming system or console, personal digital assistant (PDA), digital picture frame, a device equipped with a camera, a gyroscope or accelerometer, or other input mechanism, that receives or accepts commands from the user or an automated system.

The transaction database server 402 includes a transaction database 407 that stores events associated with items in the supply chain, as well as addresses or identifiers of resources external to the transaction database server 402 that also store events. The transaction database server 402 may be under the control of a trusted third party.

In one example implementation, the events in the transaction database 407 are stored in a uniform event storage format, such as an XML-based format, while externally stored events may be stored in various event storage formats, including proprietary event storage formats. The transaction database 407 may also store indicia received from nodes of the supply chain 403 that indicate whether or not a particular item has or has not, or is likely to have had or not had, been processed at a particular node or within a particular supply chain. The transaction database 407 may re-format event data received from various nodes in the supply chain which exists in non-standard or proprietary formats. In another example, the events in the transaction database 407 are stored in a relational table format within a database management system that is accessible using a Structured Query Language (i.e. in an SQL database).

Furthermore, the transaction database server 402 includes a basic rules engine 408 and a brand validation engine 408a that allow the transaction database server 402 to automatically validate or invalidate claims based on applying rules to received event data. The brand validation engine 408a may apply different tests, or have stricter rules (e.g., different threshold values) than the basic rules engine 408. For instance, for the claim “Never Frozen” a rule may be included that requires all event data relating to a temperature reading event to be greater than 0°C (32° F.), as a temperature reading at or below that temperature would indicate that the item may have frozen. Similarly, “stored cold, never frozen” products may be associated with a rule that requires all event data relating to temperature readings be in a temperature range of greater than 0°C (32° F.), but less than room temperature.

Although rules may be used to validate claims, in other cases the event data itself may provide sufficient to validate or invalidate a claim. For instance, event data itself may indicate that an item is organic or not organic. Since event data is self-serving and may itself be manipulated or falsified, however, the enhanced validation process may choose to ignore conclusory event data, may afford this type of event data lesser value, or may choose to use this event data only in certain circumstances. For instance, the enhanced validation process may ignore event data that indicates that an item is organic, but may use similar event data that indicates than an item is not organic.

Table 1, below, illustrates sample rules used to aid the interpretation of event data and to thereby validate claims.

<table>
<thead>
<tr>
<th>Claim</th>
<th>Rule:</th>
</tr>
</thead>
</table>
| Real California Cheese | Event = Milk Extraction  
Event Data (Location) = California, and 
Event = Processing  
Event Data (Location) = California. |
| No Growth Hormone | Event = Vaccination  
Event Data (Type) = BGH, and 
Event Data (Type) = rBGH, and 
Event Data (Type) = BST, and 
Event Data (Type) = rBST. |
| Made In Japan | Event = Manufacture  
Event Data (Factory Country) = Japan or 
Event Data (Factory City) = Osaka. |
| Gluten Free | Event = Manufacture  
Event Data (Ingredient) = Gluten, or 
Event Data (Ingredient) = Glutenin. |
| Kosher | Event = Slaughter  
Event Data (Slaughter Facility ID) = <certified facility>, and 
Event Data (Slaughter Personnel) = <certified individual>. |
TABLE 1-continued

<table>
<thead>
<tr>
<th>Claim</th>
<th>Rule:</th>
</tr>
</thead>
<tbody>
<tr>
<td>unscented</td>
<td>Event = Storage Event Data (stored with) = milk. Event = Manufacture Event Data (Ingredient) = &quot;fragrance&quot; or &quot;perfume&quot;</td>
</tr>
</tbody>
</table>

[0098] The transaction database server 402 also includes a claim database 409 (or a claim engine, similar to the rules engine 408) that identifies item types based on input identification information, and that further determines appropriate claims to validate for identified item types. Where a user supplies identification information for an item but does not supply a claim to validate, the claim database may determine the type of item that the user is referring to based upon the content or format of the identification information, and may automatically or dynamically select one or more claims to validate without querying the user for additional information.

[0099] In addition to or instead of storing appropriate claims for identified items, the claim database 409 may also store known claims associated with specific items, or validation types or event data types typically requested by particular user roles. For instance, if a clothing retailer may proudly assert that none of their clothing is made using child labor, then the claim database 409 may automatically associate (or invoke rules which associate) a “no child labor” claim with all items manufactured or sold by the clothing retailer. As such, if, as so commonly happens, the retailer itself is not aware that its subcontractors are illegally using child labor, the enhanced claim validation application may assist with detecting this impropriety in every case that identification information for any of the retailer’s products is input. Alternatively, the claims database 409 (or claims engine) may be a database listing items (by their unique identifiers) that are compliant with certain claims.

[0100] The transaction database server 402 may also store user preferences/profiles 410, which include explicitly provided or inferentially determined information concerning the user using the enhanced claim validation application. For instance, a vegetarian or a person who practices a certain religion may explicitly indicate that they will not purchase items checked for meat content or, similarly, through continued selection of a “vegetarian” claim validation function, the enhanced claim validation application may infer (based on rules stored in the rules engine 408) that a particular user is a vegetarian and that a vegetarian claim validation function is always to be run for food items. As with other components of the transaction database server 402, the user preferences/profiles are optional and may be omitted.

[0101] The user preferences/profiles 410 may also describe an authorization level of a user to view certain event data. For instance, a generic consumer may be given an authorization to view an automatically determined claim validation result, while a wholesaler or middleman may be given an authorization to view more granular data, such as pricing or sales volume event data. Certain users may be assigned authorization levels which do not allow them to perform claim validations at all. The user preferences/profiles 410 may also specify trusted third parties who, by default, are to perform claim validations.

[0102] Other authorization levels may allow validations to be run, but for results to be output only if a claim is validated or invalidated. For instance, a company may effectively allow users to check the company’s internal processes by allowing them to run claim validations, but may output an error message to the user and deliver invalidating claim result to the company if a claim turns out to be invalid. This type of selective authorization may allow a company to time to get ahead of a potentially damaging story if, for circumstances outside of the company’s control, a customer would otherwise discover that an asserted claim or characteristic is invalid.

[0103] The transaction database server 402 may also include a certificate generator 418 for generating physical or digital certificates, as well as a third party selector 419 for selecting third parties for performing validations in the absence of an explicit user selection. The third party selector may include a look-up table which outputs a third party (or a hierarchy of third parties) based on various input factors, such as item SKU, type of validation requested, past accuracy, level of trust, and other information.

[0104] Validations may be performed by more than one validation entity. Validations performed by multiple entities may be performed sequentially or in parallel. Validation entities may communicate with one another, for example, to collate results. For example, the other validation entity 402a may communicate with the transaction database server 402 across the network 404. The other validation entity 402a may include the same internal components (e.g., 407-410, 418, 419) as the transaction database server 402.

[0105] The supply chain 403 includes any number of nodes, such as node 411a to 411n. Each node includes an event database, such as event databases 412a to 412n, that each store events associated with items in the supply chain 403. Furthermore, nodes may include input devices (such as bar code readers 414a to 414n). For instance, the node 411b may store events read by bar code reader 414b or other input devices associated with the node 411b, or the node 411b may store events read by other nodes, such as nodes 411a and/or 411n.

[0106] As items are transported through and processed by the supply chain 403, events are generated and stored, thereby providing a tracking history for each event. In one example, the supply chain 403 may be used to track items that do not undergo any state changes or transformations, such as a supply chain that receives a finished product, processes the finished product, and transfers out the finished product to outside of the supply chain 403. In another example, the supply chain 403 is used to track items that undergo state changes or transformations, such as a transformation that changes the item from a living state to a non-living state, or that changes the item from a first product to an Nth product (N being any integer) derived from the first product. In this latter example, the stored events can be used to trace the processing history of the Nth product through to the first product, for the purpose of validating a claim relating to the Nth product or the first product, and for other purposes.

[0107] As shown in FIG. 4, items 415 and 416 undergo several state or phase transformations within the supply chain. For instance, seeds 415a are processed at the node 411a, while a tree 415b that grows from seeds 415a is processed at the node 411b, a fruit 415c that grows on the tree 415b is processed at the node 411c, a container 415d of the fruit 415c is processed at the node 411d, and juice 415e made
with the fruit from the container 415d (including the fruit 415c) is processed at the node 411n. Since the validation of a label claim on the juice box that stores the juice 415s may benefit from or require event data from stored events associated with the seeds 415a, the juice 415s in the juice box and the seeds 415a are considered to be one "item," in various forms, phases or states. More particularly, the seeds 415a and the tree 415b are considered to be living forms or versions of the item 415, while the harvested fruit 415c and the juice 415s in the juice box are considered to be non-living forms or versions of the item 415. In each instance, supra and infra, where a particular item is mentioned, reference is also intended to be made to groups of similar or dissimilar items.

[0108] As long as the seeds 415a (or groups of seeds), the tree 415b (or groups of trees), the fruit 415c (or groups of fruit), the container 415d (or groups of containers), and the juice 415s (or multiple batches of juice) are each associated with a unique identification number (or a unique identifier can be inferred or estimated, for example, based on a grouping of an item under consideration), the item 415 can be iteratively tracked through its initial state, based on event data associated with later states. For instance, in accessing event data or validating a claim associated with the juice 415s, the user or enhanced claim validation application may determine that the juice was conveyed in a uniquely identifiable container 415d.

[0109] Based on the role of the user (i.e., transportation manager or truck driver), the validation framework may determine that transportation history event data should be obtained, or that a validation involving transportation history event data should be performed. In subsequently accessing the transportation history event data of the container 415d, the user or transactional database server may determine that the container 415d contains uniquely identifiable fruit 415c, which may be subsequently determined to come from a uniquely identifiable tree 415b, which was planted using uniquely identifiable seeds 415a. In another implementation, the item 415 can be iteratively tracked through its initial state even if an intermediate state is not identified or identifiable.

[0110] In this regard, the entire event history of the item is made transparent to a user, by linking together various subsequent phases or states of a product with previous uniquely identifiable phases or states. As such complex claim validation routines or processes may be performed on later states or phases of an item, to determine whether earlier states or phases of the item met certain conditions. Specifically, a user could enter a unique identifier associated with the juice 415s to determine whether, in violation of a claim, contract requirement, or personal ethos, the seeds 415a were planted using migrant farm workers.

[0111] Using the unique identifier, the transaction database server queries and accesses event data of the juice 415s to iteratively access the unique identification information of the container 415d, then the fruit 415c, then the tree 415b, then the seeds 415a. Then determine based planting event data queried based on the unique identifier of the seeds 415a, event information exposing the identity of the planter of the seeds 415a. Based on this accessed event information, the claim, contract requirement, or moral restriction could be manually or automatically validated by an interested or disinterested, trusted or non-trusted party.

[0112] If a middle phase or state of the item 415, such as the fruit 415c, does not have a unique identifier, it is still possible for the transaction database server to estimate the unique identifier of a previous phase or state of the item, and to make a guess regarding whether the claim is valid. If the validity of the claim is not ascertained with complete certainty, an indication as such may also be output to the user. Using the fruit example, the transaction database server may determine, based on the unique identity of the fruit 415c that the fruit 415c came from a uniquely identifiable farm that included uniquely identifiable trees, but the unique identification information of the tree that the fruit 415c was harvested from may be missing.

[0113] By querying nodes using the unique identifier of the farm itself, that is the unique identifier of the entity that encompasses or includes all possible trees, the transaction database server may determine a probability of each uniquely identifiable tree on the farm being the tree from which the fruit 415c was harvested and, consequently, the probability that particular, uniquely identifiable seeds that eventually grew into the identified trees were the source of the fruit 415c.

[0114] Further, the enhanced claim validation application may cohort the trees, by grouping together those trees that were grown from uniquely identifiable batches of seeds, and generate a likelihood or probability that the fruit 415c was harvested from a particular, uniquely identifiable seed batch based on the number and size of each tree cohort. Despite the fact that event data is gathered for multiple or various states or phases of the item 415, the event data for the earliest desired or available phase or state of the item 415 is gathered in real time to receiving the identification information for the latest phase or state of the item.

[0115] Referring ahead briefly, FIG. 5 provides several examples of how a characteristic, trait, condition, or quality of an item can be automatically determined or deduced when an earlier state, origin, or ingredient of the item is unavailable or unidentifiable. In a first scenario, a uniquely identifiable fruit 501 has been harvested from an unidentifiable tree 502, however event data indicates that the identifiable fruit 502 originated from identifiable farm 504 or that the unidentifiable tree 502 grew on the identifiable farm 504. Characteristics or traits of an item (the fruit 501) may still be determined if the item necessarily originated from another identifiable origin, source, state or item (the farm 504).

[0116] Ignoring for a moment any factual inconsistency resulting from a origin potentially having these two example characteristics, event data associated with the farm 504 indicates that the farm 504 is certified organic, and that half of the trees have been sprayed with pesticides. Despite the fact that the tree 502 is unidentifiable, it can still be automatically determined that the fruit 502 also is certified organic and that it has a 50% probability of pesticide application since it necessarily originated from the farm 504. This information may be displayed to a user via a user interface, or may be applied to a rule in the rule engine to validate a claim.

[0117] In a second scenario, a uniquely identifiable palette 505 packages unidentified cartons 506 and 507 of vegetables that came from one of two sources, farms 509 and 510. Although it is not possible to uniquely identify the cartons 506 and 507, it is possible to automatically determine characteristics (or probabilities of characteristics) of the palette 505 if the characteristics of all of the possible sources or origins are known. For instance, event data associated with the farm 509 indicates that the farm 509 is certified organic, and that the farm 510 (which is not certified organic) provides twice as many vegetables into the packaging process of the carton 507 as the farm 509.
From this information, it can automatically be determined that vegetables stored the carton 507 have a 33% chance of being from farm 509, and thus have a 33% chance of being certified organic. Since the palette 505 includes vegetable containers from a process that produced the carton 507 as well as an equal number of vegetable containers from a process that produced the carton 506 (which is known to originate from the farm 510), it can be automatically determined that the vegetable palette 505 includes vegetable cartons that have a 16.5% chance of coming from farm 509, and thus have a 16.5% chance of being certified organic.

Thus, despite the fact that the cartons 506 and 507 are unidentified, it can still be automatically determined that there is some probability that the palette 505 includes some organic vegetables. This information may be displayed to a user via a user interface, or may be applied to a rule in the rule engine to validate a claim. Since some claims, such as a “certified grown in the USA” label claim may require some affirmative event data to validate that claim, and since neither farms 509 or 510 include that characteristic, it may be definitively determined that the palette 510 does not include vegetables that carry that certification.

In a third scenario, a uniquely identified food product 511 is made from an unidentified bread product 512 includes ingredients (such as flour, yeast, sesame seeds, etc.) that come identifiable manufacturer 514 and multiple identifiable or unidentifiable sources 515a to 515n. Event data associated with the identifiable manufacturer 514 indicates that the manufacturer 514 adds artificial colors to all of its ingredients, and that its ingredients are not organic. From this event data alone, regardless of the characteristics of the sources 515a to 515n, it can be determined that the food product 511 includes at least some artificial color, and is not organic. This information may be displayed to a user via a user interface, or may be applied to the rule engine to validate a claim.

Referring back to FIG. 4, calf 416a is processed at the node 411a, while a cow 416b (representing the full-grown calf 416a) is processed at the node 411b. A carcass 416c of the cow 416b is processed at the node 411c, ground beef 416d derived from the carcass 416c is processed at the node 411d, and a hamburger 416f that is made from the ground beef 416d is processed at the node 411e. Since the validation of a claim on the hamburger 416f may benefit from or require data from stored events associated with the calf 416a, the hamburger 416f and the calf 416a are considered to be one “item,” in various forms, phases or states. The calf 416a and the cow 416b are considered to be living forms, states, phases or versions of the item 416, while the carcass 416c, the ground beef 416d, and the hamburger 416f are considered to be non-living forms, states, phases or versions of the item 415.

As long as the calf 416a, the cow 416b, the carcass 416c, the ground beef 416d, and the hamburger 416f are each associated with a unique identification number, the item 416 can be iteratively tracked through its initial state, based on event data associated with later states. For instance, in accessing event data or validating a claim associated with the hamburger 416f, the user or transactional database server may determine that the hamburger 416f was made with, among other things, the ground beef 416d. In subsequently accessing the event data of the ground beef 416d (in addition to or instead of accessing the event data of other ingredients or components of the hamburger 416f, such as the lettuce or the hamburger bun), the user or transactional database server itself may determine that the ground beef 416d came from the uniquely identifiable carcass 416c, which may be subsequently determined to come from a uniquely identifiable cow 416b, which grew from the uniquely identifiable calf 416a.

In this regard, the entire event history of the item is made transparent to a user or the third party, by linking together various subsequent phases or states of a product with previous uniquely identifiable phases or states. As above, complex claim validation routines or processes may be performed on later states or phases of an item, to determine whether earlier states or phases of the item met certain conditions. Specifically, a user could enter a unique identifier associated with the hamburger 416f to determine whether, in violation of a label claim, contract requirement, or moral restriction, the calf 416a was ever treated with growth hormones, even if the intermediate phases were not affected by growth hormones.

Since the calf 416a was likely birthed by a cow which was also uniquely identifiable and was also associated with event data, the entry of a unique identifier for the hamburger 416f end product could in practice result in detailed information relating to events that occurred on the calf 416a that was processed into the ground beef 416d, as well as events relating to ancestors of the calf 416a. So, in addition to determining whether growth hormones were used on the calf 416a, to an extent limited only by available event data, it is also possible to determine whether any ancestor cow of the calf 416a was ever treated with growth hormone, thereby improving the confidence of an end-user that the hamburger 416f is hormone-free, as claimed by a label.

In any regard, using the unique identifier of the hamburger 416f, the transaction database server could query and access event data of the hamburger 416f to iteratively access the unique identification information of the ground beef 416d, then the carcass 416c, then the cow 416b, then the calf 416a, then determine based on vaccination or medical event data queried based on the unique identifier of the calf 416a, whether the calf 416a was ever treated with growth hormones. Based on this accessed event information, the claim, contract requirement, or user's moral restriction could be manually or automatically validated.

If a middle phase or state of the item 416, such as the carcass 416c, does not have a unique identifier, it is still possible for the transaction database server to estimate the unique identifier of a previous phase or state of the missing state or phase of the item, and to make a guess or estimate regarding whether the claim is valid. If the validity of the claim is not ascertained with complete certainty, an indication as such may also be output to the user. Using the hamburger example, the transaction database server may determine, based on the unique identity of the carcass 416c that the carcass 416c came from a uniquely identifiable ranch that included uniquely identifiable cows, but the unique identification information of the cow became the carcass 416c may be missing.

By querying nodes using the unique identifier of the ranch itself, that is the unique identifier of the entity that encompasses or includes all possible cows, the transaction database server may determine a probability of each uniquely identifiable cow on the ranch being the cow from which the carcass 416c was harvested and, consequently, the probability that particular, uniquely identifiable cows that eventually grew into the identified cows were the source of the carcass 416c.
Further, the transaction database server cohorts the carcasses, by grouping together those cows that were butchered from the uniquely identifiable calves raised on the ranch, and generates a likelihood or probability that the carcass 416 was butchered from a particular, uniquely identifiable calf (or group of calves, such as a group of calves including a calf under consideration). Despite the fact that event data is gathered for multiple or various states or phases of the item 416, the event data for the earliest desired or available phase or state of the item 416 is gathered in real time to receiving the identification information for the latest phase or state of the item.

While FIG. 4 illustrates items 415 and 416 undergoing relatively consecutive processing steps with regard to time and location, thereby altering the form, phase, or state of the item, in other example implementations processing via the various nodes 411 may occur over long periods of time, and may cover great distances. For instance, nodes 411 may be fixed or mobile, may track an item through years or decades of processing, and may be sited on different continents. Furthermore, events may occur to the items that may not be stored by nodes 411 of the supply chain 403.

Although FIG. 4 describes the user device 401, the transaction database server 402, the other validation entity 402z, and the nodes 411 as separate devices, this description is merely exemplary. In other implementations, the user device 401, the transaction database server 402, the other validation entity 402z, and/or nodes 411 of the supply chain 403 may be combined into one, two or more unified devices, or their functionalities may be combined or blended. For instance, the transaction database 407 may be stored on the user device 401 itself, and the user device 401 may read, generate, or otherwise access data from items in the supply chain using its own bar code scanner, radio frequency identification device (RFID) reader, or other input device.

FIGS. 6 and 7 are flowcharts of processes for performing enhanced claim validation and third party certification. Briefly, in FIG. 6, a computer-implemented process includes receiving identification information uniquely identifying an item that has moved through a node in a supply chain, the item being marked with a claim, and receiving, from the node, event data associated with the uniquely identified item. The process also includes outputting received event data that validates or invalidates the claim, in real time or near real time to receiving the identification information.

As noted above, a user can enter information that uniquely identifies an item into a user interface, in order to validate a claim associated with the item, in real time or near real time. Based on the identifying information, nodes in a supply chain are polled or queried for event data or other information regarding the item (e.g. by the user, a node of the supply chain, or a third party validation entity), and the event data is appropriately reformatted, and automatically compared against the claim. In addition to outputting the raw event data itself, the user interface outputs indicia to validate or invalidate the claim, thereby rendering the supply chain for the uniquely identified item more completely transparent.

Using the enhanced approach described herein, it is possible for a consumer to investigate whether a claim is false or deceiving. For instance, using a handheld computing device, a user may enter information that uniquely identifies an item, and be presented with raw historical event data associated with the item or components of the item, or with an analysis, interpretation or indicia based on the historical event data. Through this presented information, the customer can determine on their own or be shown whether a claim associated with the item is accurate and/or valid. Through this determination, the customer can alter their purchasing habits, and avoid the unwanted consumption or use of products that do not satisfy their associated claims.

In further detail, when process 600 begins (S601), identification information uniquely identifying an item that has moved through a node in a supply chain is received, the item being marked with a label claim (S602). The claim may be an "organic" label claim, a "natural" claim, a "no hormone" claim, a point-of-origin claim, an ingredients claim, a vegetarian contents claim, a "cruelty free" claim, a drug claim, a cosmetic claim, a "cage-free" claim, a brand claim, a trademark claim, a compliance claim, or any other claim regarding the character, nature or origin of the item. In addition to validating claims, the enhanced approach described herein can be used to verify whether contract terms have been satisfied, such as a contract term that requires particular sourcing, freshness, or other characteristic of an item.

Identification information refers to human-readable (e.g. a series of visible characters) or machine-readable data (e.g. a bar code) that distinguishes one item, or collection of items from another. For instance, a Stock Keeping Unit (SKU), a Universal Product Code (UPC), an inter product identifier, a European Article Number (EAN), a Vehicle Identification Number (VIN), and a Global Trade Item Number (GTIN) are types of unique identifiers that are attached to an item, variant, product line, bundle, service or attachment. The identification information may be inscribed or incorporated onto the item itself, such as the case with a VIN, or the identification information may be located on packaging or an item label that is a part of the item.

The identification information need not be physically or tangibly manifested. For example, the user may obtain identification information for a product via a telephone call with a customer service representative, or using an online database. For instance, a manufacturer may wish to limit a consumer's access to the event data or the claim validation information, and may provide the uniquely identifying information to the user only if the user calls a customer service representative with a complaint or request for information, and provides a time, date and location of purchase of the item. As indicated above, however, in many cases the identification information will be physically affixed to the item or packaging of the item, and the claim may be physically affixed to the item or packaging of the item, such as on a label.

The identification information may be associated with a single product or a group of products, or multiple, discrete identifying information can be received to identify a group of products. For instance, the identification information may represent batch identification information identifying a pallet of items, or a container (such as a boxcar) of items, where the batch identification information may be mapped to or associated with the individual identification information identifying the individual items within the palette or container. Alternatively, the multiple individual identification information identifying individual items within a palette or container can be received instead of or in addition to the batch identification information that represents the group of individual items. Such functionality allows batches of items to be processed and validated at once.

More particularly, any process for arranging items into sets of items and, for example, creating and assigning
identifying data to the set of items that may be different from data identifying an item within the set may be generically referred to as an "aggregation" process. For example, at the end of a manufacturing transformation process, consumer goods may accumulate in a storage area and may be aggregated onto a palette, where the palette may be assigned an identifier that is different from any of the individual consumer goods.

[0139] Since the aggregation process may group items from different sources or potential sources, the aggregated item (e.g. the palette) is assigned data which links its with the known or potential sources of the component items (e.g. the items in the palette). The palette identifier is said to 'overlap' the individual item identifiers, because both exist at the same time and, while the item is palletized the item identifier may be used to track the palette, and the palette identifier may be used to track each item.

[0140] Referring ahead briefly, FIG. 9 provides a brief conceptual overview of a process for assigning a unique identifier to an item in a supply chain. An item, a group of items, or components of an item (collectively, "raw product") is received at a unique identifier assignment system (901). The unique identifier assignment system may or may not be within the supply chain itself, and thus may or may not perform processing functions aside from the assignment of the unique identifier.

[0141] Once received, the raw product is sorted, assigned a unique identification number, and in some cases, collectively sorted and stored (902). "Sorting" generally refers to any process for selecting or arranging products or items into a particular sequence or category. In one example, sorting may include ordering items of the same kind in some ordered sequence (e.g. largest to smallest), or categorizing items with similar properties together (e.g., products separated by size). The sorting process may be accomplished in several ways, including an automated mechanical sorting process, a manual sorting process or combinations thereof.

[0142] Items such as animals, food, fluids, consumer goods or intangible items may be randomly sorted; sorted by gender, disposition, physical or mental characteristic, type, size, shape, weight, color, ripeness, temperature, receipt or expiration date or time, priority; sorted by physical characteristic or property such as density; sorted by intangible characteristic such as appeal or consumer demand; sorted based on regulatory requirements; or sorted by any other definable or indefinable characteristic, aspect or quality.

[0143] Although sorting may refer to a process for improving the order or categorization of items, the sorting process may also encompass 'unsorting,' in which the order or categorization of items is actually made worse. For instance, sorting may include combining a sorted bin of like items with an unsorted bin of dissimilar items, or randomly arranging items that are arranged in a particular order.

[0144] Sorting may introduce variation, uncertainty, randomness or other types of entropy into a supply chain, particularly from the standpoint of traceability. For instance, a uniquely identified container of fruit input to a sorting process may be associated with a particular characteristic. If the fruit is sorted by size into smaller sorted batches, the sorted batches would otherwise no longer be associated with that particular characteristic once they are separated from the uniquely identified container.

[0145] The raw product may be collectively stored or commingled before the unique identifier is assigned, such as in the case of fruit sold by the carton, or the raw product may be collectively stored after the unique identifier is assigned, such as in the case of a consumer electronic item that is palletized after a serial number is assigned. In any case, once the unique identifier has been assigned and the raw product has been stored collectively, it is possible to determine which items are stored with each other, and what items are in each storage unit (904). Through such an approach, each item in each carton or pallet may be linked to the origin of manufacture of the item.

[0146] As described and exemplified more fully below, "commingling" refers to any mixing together of items or products derived from a single origin or from multiple origins. Mixing, accumulating, storing or combining together, or failing to prevent the natural occurrence of such mixing, are examples of ways to performing commingling. Once commingled, a randomly selected one (or unit) of the commingled items is indistinguishable from any other item, and thus the origin of the randomly selected item may be indiscernible with complete certainty.

[0147] C ommingling may occur in a variety of ways, including an automated mechanical commingling process, a manual labor commingling process, a process which commingles items without involvement of a human or machine, or by some combination thereof. Items, including living, inanimate, or intangible items, may be randomly commingled with other items, or may be commingled or commingle themselves with like or dissimilar items based on any quality, characteristic, aspect, preference, or lack thereof. In several examples, fluids may be commingling by pouring two different fluids into a mixing vat; consumer products may be commingled by batching products from separate origins together prior to further processing; and animals may commingle themselves by wandering into separate pens.

[0148] In any regard, the unique identifier assignment process itself may generate event data that is associated with the item and stored. For instance, a unique identifier assignment event may include event data that describes the origin of the item, components of the item, the time or date when the unique identifier was assigned, unique identifiers that are stored or "collected" with the uniquely identified items, the unit of storage, the destination of the item after the occurrence of the unique identifier assignment event, or other data. Table 2, below, provides exemplary event data associated with a particular identifier and an exemplary unique identifier assignment event.

<table>
<thead>
<tr>
<th>TABLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Data Associated With A Particular Unique Identifier</td>
</tr>
<tr>
<td>Event Name</td>
</tr>
<tr>
<td>IDENTIFIER ASSIGNMENT DATE</td>
</tr>
<tr>
<td>ORIGIN</td>
</tr>
<tr>
<td>BATCH NUMBER</td>
</tr>
<tr>
<td>DESTINATION</td>
</tr>
<tr>
<td>DEPARTURE DATE</td>
</tr>
<tr>
<td>DEPARTURE TIME</td>
</tr>
<tr>
<td>ASSIGNED CARTON</td>
</tr>
<tr>
<td>ASSIGNED PALLET</td>
</tr>
<tr>
<td>ITEM TYPE</td>
</tr>
</tbody>
</table>

[0149] Receiving the identification information may further include generating a user interface, and receiving the identification information from a user via the generated user interface. FIGS. 10 and 11 illustrate exemplary user inter-
faces 1000 and 1100, respectively, for entering identification information and outputting event information.

[0150] The user interface 1000 includes a search type control 1001, which in this case is a drop-down control, that allows a user to select the type of identifier to search by. The user interface 1000 also includes a search term control 1002, which in this case is a text field, that allows the user to select which of the selected types they would like to view, as well as a search button control that executes the search. In FIG. 10, for example, by selecting the search button control 1003, the user indicates that they wish to search by pallet identifier, and that they wish to view those pallets identified by the number “144329.”

[0151] The results of the search are shown in the results window 1004. Upon selecting identification information for a particular result and then selecting the “Get Traceability Report” button 1005, event data matching the selected identification information is output in a window 1006. In FIG. 10, for example, the event data output in the window 1006 indicates the carton numbers (column 1007) that match the selected pallet identification number (column 1009).

[0152] As discussed in more detail below, the event data output in the window 1006 may be automatically or manually analyzed to determine whether a claim is valid or accurate, in real time or near real time. For instance, if a produce wholesaler receives the pallet of oranges identified by identification number “144329” and searches for associated event data using the user interface 1000, the information in column 1010 may be used to refute a claim (or a contract requirement) that the oranges were packaged within the last three days.

[0153] As another example, the user may select one or more of the controls 1020-1024 to perform a validation using an industry standard, internal (e.g., TraceGains®), or third party (e.g., FDA) validation entity, respectively. If a validation is performed, validation results may be displayed in a summary area 1030. In this example, the summary area 1030 indicates that an industry standard validation and an internal validation passed, but that a validation performed by the FDA failed. Further, the internal validation passed with a 48% level of certainty.

[0154] The information in column 1011, which identifies a source ranch of the items contained in the selected pallet, may be used by a user to refute a claim (or a contract requirement) that the oranges were grown or otherwise sourced at a particular farm, or a particular lot of a farm. The identification information for a carton of oranges can thus be used by a web-based system to obtain the traceability information on the exact product SKU, every pallet that the carton has ever been placed upon, and every ranch block number that provided one or more oranges contained within the carton.

[0155] In any regard, since the user interface 1000 uses codes to identify various data elements, and displays data fields that a typical consumer may not be interested in viewing, it may be that the exemplary user interface 1000 may be of the kind that is best suited for a sophisticated user, such as a wholesaler or commercial client. As described in more detail herein, other user interfaces (such as user interfaces 306 and 321) may be designed to provide more focused event data, to offer fewer options, or to provide an automatic analysis of the claim, and may thus be better suited for a consumer or other end user.

[0156] FIG. 11 illustrates a user interface 1100 which, unlike user interface 1000, performs a traceability search on an item based on a unique carton identifier, instead of a unique pallet identifier. The user interface 1100 includes a search type control 1101, which in this case is a drop-down control, that allows a user to select the type of identifier to search by. The user interface 1100 also includes a text field search term control 1102 that allows the user to select which of the selected types they would like to view, as well as a search button control that executes the search. In FIG. 11, for example, by selecting the search button control 1103, the user indicates that they wish to search by carton identifier, and that they wish to view those cartons identified by the number “B0442185.”

[0157] The results of the search are shown in the results window 1104. Upon selecting identification information for a particular result in the results window 1104 and then selecting the “Get Traceability Report” button 1105, event data matching the selected identification information is output in a window 1106. In FIG. 11, for example, the event data output in the window 1106 indicates the identified carton number (column 1107), and a pallet identifier that identifies a pallet upon which the identified carton was packed (column 1109).

[0158] The event data output in the window 1106 may be automatically or manually analyzed to determine whether a claim is valid or accurate, in real time or near real time to entering the identifier into the user interface. For instance, if a produce wholesaler receives the carton of oranges identified by identification number “B0442185” and searches for associated event data using the user interface 1100, the information in column 1110 may be used to refute a claim (or a contract requirement) that the oranges were packaged within the last three days, and the information in column 1111, which identifies a source ranch of the items contained in the selected pallet, may be used by a user to refute a claim (or a contract requirement) that the oranges were grown or otherwise sourced at a particular farm, or a particular lot of a farm.

[0159] Automatic validations may also be performed. For example, a user may select one or more of the controls 1120-1124 to perform a validation using an industry standard, internal (e.g., TraceGains®), or third party (e.g., FDA) validation entity, respectively. If a validation is performed, validation results may be displayed in a summary area 1130.

[0160] The identification information may be received manually, such as by using a keyboard, mouse, or voice input, or automatically using a radio frequency identification device (RFID) reader, a barcode scanner, or any other mechanisms that effects the efficient input of identification information.

[0161] Returning now to FIG. 6, event data associated with the uniquely identified item is received from the node (SN604). The unique identification number is used as the basis for a query of the nodes in the supply chain, in order to receive all or a portion of the event data relating to events experienced by the identified item during its processing and movement through the supply chain. In a simple example, a query is sent to all nodes that are in communication with a transaction database server, requesting that all event databases be searched for information relating to the entered identification information. The event data may be received at a transaction database controlled by the user, or by a selected or default trusted third party entity.

[0162] Based on receiving this query, the nodes may access the event databases using a look-up table, index, or other mechanism, and output event data associated with the identification information. This output event data is then sent back to the transaction database server for reformating, collation, processing, analysis, and/or further transmission or output.
Event data associated with the uniquely identified item may be received from a second, third, or Nth node, and the event data received from the nodes may be reformatted.

In additional implementations, the transaction database server may store information indicating that the item has definitely passed through, or definitely not passed through certain nodes. This would apply in a situation where, upon processing an item, a node sends a message to the transaction database server that particular items have been processed and that event data has been stored at the node, or has not yet been processed and that event data is not yet stored.

In this situation, the transaction database server may not query each node with which the server is in communication, but may rather automatically determine which servers are known to store event data, or which servers are known to store event data relevant to the claim validation, and query selected nodes based on this automatic determination. For instance, if the transaction database server stores information that indicates that a certain farm stores information for a produce item relating to a seed planting event and a produce harvesting event, the transaction database may query or poll nodes associated with that farm to determine the source or origin of the produce item, and may not query or poll nodes associated with other farms in an effort to receive event data relating to seed planting and produce harvesting events. If a trusted third party entity is performing the validation, the trusted third party may choose to only query those nodes which the trusted third party entity considers to be trusted.

In an additional example, the transaction database server may store information for each node relating to the types of hardware or software used by the nodes, and may format queries appropriately, or may generate queries that will cause the nodes to format data according to a preferred format of the transaction database server. As it is expected that event data will be stored on a large variety of systems, including systems that implement legacy, obsolete, or proprietary query engines, the ability to effectively communicate with these systems and to gather event data across multiple systems is beneficial. In this regard, a data collection interface is established between the node and a transaction database, the data collection interface allowing the transaction database to receive the event data associated with the uniquely identified item.

In a further example, the transaction database server may itself store event data, such as the case where nodes send indicia to the transaction database server that an item has been processed, such that the identification information is received before or after the event data is received from the node. This may also be the case where the transaction database server itself exists within a node of the supply chain. In these instances, the transaction database server may avoid querying the individual nodes, to avoid the duplication of event data and to reduce computational expense.

If no response is received by the query, the transaction database may default to a condition in which it is assumed that no event data is stored at the queried node, or the node may be re-queried. A historical query response rate may be used to aid this determination, such that a node that affirmatively responds to a majority of queries, including queries that result in an indication that no event data is stored, may be re-queried if no response is received to an initial query.

In an additional example, the transaction database server may merely poll those nodes in the supply chain, or types of nodes in the supply chain, that would be relevant to the claim validation. For instance, if the claim associated with processed meat relates to process that the animal was slaughtered, such as a "Kosher" or a "Halal" claim, the transaction database server may merely poll nodes associated with slaughterhouses for event data relating to the identified processed meat item. In this regard, the transaction database server may choose to not query other nodes, such as nodes that store birthing, vaccination, or transportation event data but not slaughtering event data that would confirm or otherwise validate the "Kosher" or "Halal" claim.

The event data received from the queried nodes may relate to any event data stored at the node, to event data relating to the identified item only, to a movement of or a particular supply chain processing of the uniquely identified item at the node, to event data that was generated within a particular time period, only to event data that is relevant to the validation of the claim, or the event data may relate to other factors.

The event data itself may represent an event identification number attribute, a type attribute, a nomenclature attribute, a quantity attribute, a unit-of-measurement attribute, a parent event identification number attribute, or a child event identification number attribute, and may be associated with a vaccination event, a harvesting event, a birthing event, or a transportation event, a treatment event, a planting event, a location event, a containing event, or a coexisting event.

Received event data that validates or invalidates the claim is output in real time or near real time to receiving the identification information (S605), and the process 300 ends (S606). As illustrated above with respect to FIGS. 10 and 11, the received event data that validates or invalidates the claim may include all of the event data that was received at the transaction database server from the queried nodes, or a subset of all of the received event data.

Continuing with the example described above, for instance, if the claim is a "kosher" or "halal" claim on processed meat and the transaction database server receives event data from numerous nodes including nodes that store event data unrelated to the slaughtering process, the transaction database server may filter the received event data, and merely output germane event data, such as event data received from a slaughterhouse node, or event data that specifically validates or invalidates the label claim.

As the transaction database server is configured, adapted, or is operable to receive data from multiple nodes or data sources that may each use their own language, specification or data format, the transaction database server may effect the output of received event data received from the various nodes by establishing a data conversion interface between the output device and the transaction database, the data conversion interface allowing the output of the received event data from the transaction database using the output device.

Instead of or in addition to outputting received event data that validates or invalidates the claim, the transaction database server may automatically validate or invalidate the claim itself, and output an indicia of the validity or invalidity of the claim itself. The indicia may include an explicit statement on a printed certificate, such as "The Label Claim Has Been Validated," or "The Item Has Been Made In the U.S.A."

Alternatively, the claim may be validated inferentially, such as where information or indicia is only provided when the claim is valid or invalid, or where the probability
that the claim is valid or invalid exceeds or does not exceed a threshold. If certification (such as third party certification) occurs as part of a business process flow, the act of certification may merely involve setting a binary flag associated with a unique identifier from one state (a non-certified state) to another state (a certified state), thereby allowing the remainder of the process flow to occur.

[0176] In any case, a user may input the claim to validate manually, or the transaction database server may automatically determine which claims to automatically validate or invalidate. For instance, the transaction database server may determine the type of item associated with the unique identifier, and validate all or some of the claims that are associated with that type of item.

[0177] Specifically, the transaction database server may determine that a first item is a package of ground beef, and automatically determine whether the beef is “Hormone Free” and “Halal” based on the identification information of the first item and the received event data associated with the identification information, but not attempt to automatically determine that the beef is “Perfume-free,” “Certified Child-Labor Free,” or “Not Tested On Animals.”

[0178] Similarly, the transaction database server may automatically determine that a second item is a consumer electronic, and automatically determine whether the consumer electronic is “Made in the U.S.A.” or “UL Listed” based on the identification information of the second item and the received event data associated with the identification, but not attempt to automatically determine that the consumer electronic is “free range.”

[0179] Such a determination may be performed by storing a look-up table, database, or other mechanisms at the transaction database server that associates identification information with item types, and associates item types with appropriate claims. Table 3 illustrates one such exemplary table, where “#” represents any number, and “A” represents any alphabetical character.

<table>
<thead>
<tr>
<th>Identification Information Format</th>
<th>Item Type</th>
<th>Appropriate Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-##### (Range: 0-99999)</td>
<td>Food, Ground Beef</td>
<td>No Hormone, Kosher, Vegetarian</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Montana-Raised, Fresh Never Frozen, No Hormone</td>
</tr>
<tr>
<td>A-##### (Range: 5000-9999)</td>
<td>Food, Ground Turkey</td>
<td>Kosher, Vegetarian, Cage-Free</td>
</tr>
<tr>
<td>AAA-AA-AAAA</td>
<td>Consumer Electronics</td>
<td>No Child Labor, UL Listed</td>
</tr>
<tr>
<td>#A-###-AAA</td>
<td>Clothing</td>
<td>Made In China, No Perfume Or Dye, No Child Labor</td>
</tr>
<tr>
<td>AA11111111</td>
<td>Pharmaceutical</td>
<td>Not Tested On Animals, Natural Ingredients, Gender</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Made In The U.S.A.</td>
</tr>
</tbody>
</table>

[0180] Additionally, the transaction database server may automatically validate or invalidate a claim based upon user preferences, based upon user profile, or based on common or historical validation patterns determined through time. For instance, if the user is vegetarian, the transaction database server may automatically check all items, or all food items, to determine whether they are vegetarian, based on the user indicating a preference for this type of validation to occur for all validations, or for validations of food products. Such an approach would save the user from having to input that they wished to check for meat content on each and every validation where the item is a food product.

[0181] Similarly, based on accessing a user profile, the transaction database server may determine that the user fits into a class, category or type of user that would be interested in running particular validations for all items, or types of items, with or without an explicit claim. Using this user profile information, the transaction database server may access a database that associates the class, category or type of user with validation preferences with that class, category or type of user.

[0182] For instance, a user profile may determine that the user practices a certain religion that exercises dietary restrictions, where all food items are automatically validated to determine whether the dietary restriction is satisfied, based on received event data. Using this approach, even if an item claims to be in compliance with the dietary restriction, a user may achieve peace-of-mind by quickly determining, based on viewing the actual event data associated with the identified item, whether their personal commitments and moral obligations have been met.

[0183] In the case where multiple identification is received, or where batch identification information is received representing a multitude of items (such as a container of uniquely identifiable items), a claim may be invalidated for the batch as a whole, or for each individual item within the batch. The automatic validation may express the validity of a particular claim for each item within a batch individually, or the claim validity may be expressed as a percentage of items within the batch for which the claim is valid or invalid, for instance describing a compliance percentage. Furthermore, the automatic validation may output those items within the batch for which the claim is valid or invalid.

[0184] Identification information uniquely identifying a component of the uniquely identified item may be received based on outputting the received event data. Component event data associated with the component may be received from a second node on the supply chain, and received component event data that validates or invalidates the claim may be output, in real time or near real time to receiving the identification information uniquely identifying the component.

[0185] The item may be transformed from a first product to a second product at the node, and the output received event data that validates the claim may further include event data associated with the first product and event data associated with the second product. The first product may be a living product, such as a living animal, fruit or vegetable, where the second product is a non-living product, such as a meat product or a harvested fruit or vegetable.

[0186] Furthermore, and as illustrated in FIG. 7, the polling of event data from the nodes of the supply chain and/or the validation or invalidation of the claim may be performed by a third party certification entity, such as a government agency.
The results of the validation may be provided to an end-user, to the owner of the item, or to a vendor selling the item, for example to justify an increased selling price of the item. Briefly, this process includes receiving identification information uniquely identifying an item that has moved through a node in a supply chain, and receiving, from the node, event data associated with the uniquely identified item based on receiving the identification information. The process also includes performing a third party validation of an associated characteristic of the uniquely identified item based on the received event data, and providing a third party certification of the associated characteristic based on performing the third party validation.

In more detail, when the process begins (S701), identification information uniquely identifying an item that has moved through a node in a supply chain is received (S702). The identification information may be received over a network from any node in the supply chain using a user interface similar to user interfaces or interfaces, which may be generated as part of the validation process. In addition to supplying the identification information, the characteristic or claim to be validated, as well as a third party to perform the validation, may also be supplied by the user.

Event data associated with the uniquely identified item is received from the node based on receiving the identification information (S704), and a third party validation of an associated characteristic of the uniquely identified item based on the received event data (S705). The third party validation may be performed in real time or near real time to receiving the identification information, and may be any type of validation, including a process verification, an age verification, an ownership verification, a shelf-life or expiry date verification, or a source verification. If the identification information identifies a group of items including the item, and the third party validation may be performed for each item of the group.

A third party certification of the associated characteristic is provided based on performing the third party validation (S706), and the process ends (S707). Providing the third party certification may further include providing a physical or digital certificate identifying the item and indicating that a third party has validated the associated characteristic. The certificate may be provided to an owner, a potential purchaser, or a seller of the item.

In the case where multiple items are identified and only a portion of the items satisfy the certification criteria, providing the third party certification may further include identifying a non-conforming item of the group whose associated characteristic is invalidated, and identifying a conforming item of the group whose associated characteristic is validated.

Performing the third party validation may include applying a rule to the received event data, and identifying (or certifying) a statistical likelihood that the associated characteristic is valid. Performing the third party validation may further include performing a recursive validation, in which a component of the uniquely identified item is identified using the received event data, and the third party validation is performed on the identified component.

FIG. 8 is a flowchart illustrating a computer-implemented process. Briefly, the computer-implemented process includes receiving identification information uniquely identifying items that have moved through one or more nodes of a supply chain; receiving, based on the received identification information, event data associated with the uniquely identified items from the one or more nodes; performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks; and providing a result of the validation for each of the multiple discrete evaluation frameworks.

In further detail, when the process begins (S801), identification information uniquely identifying items that have moved through one or more nodes of a supply chain is received (S802). For example, identification information can be received by scanning items, by looking up item identifiers on a manifest based on a palette identifier, or by lookup item identifiers in a database based on a lot identifier, to name a few examples. In addition to receiving the identification information, the characteristic or claim to be validated may also be received.

Based on the received identification information, event data associated with the uniquely identified items is received from the one or more nodes (S804). For example, nodes in a supply chain may be polled or queried for event data or other information regarding the items. The identification information may be used as the basis for a query of the nodes in the supply chain, in order to receive all or a portion of the event data relating to events experienced by the identified items during their processing and movement through the supply chain. In a simple example, a query is sent to all nodes that are in communication with a validation entity, requesting that all event databases be searched for information relating to the received identification information.

A validation of a characteristic of the uniquely identified items is performed based on applying the received event data to multiple discrete evaluation frameworks (S805). A validation may involve applying received event data to a set of rules associated with each of the multiple evaluation frameworks. The validation may be performed simultaneously by each evaluation framework, or validations may be performed sequentially. Some of the evaluation frameworks may be internal (e.g., performed on behalf of one of the nodes of the supply chain) and some may be external (e.g., disinterested third parties).

Evaluation frameworks may use different compliance standards. For example, a first evaluation framework may use a compliance standard which is more stringent than a compliance standard used by a second evaluation framework. A more stringent compliance standard may be used as an elevated standard pre-defined for a particular brand under which the items will be sold.

After a validation has been performed, a result of the validation is provided for each of the multiple discrete evaluation frameworks (S806), thereby ending the process (S807). The result may be provided in real time or near real time to the receiving of the identification information. The result may be presented in a user interface and may include indicia, for each evaluation framework, showing conforming and non-conforming items which do not satisfy the evaluated characteristic, respectively. A percentage of conforming and/or of non-conforming items may be shown. As another example, a list of conforming items and a list of non-conforming items may be displayed. For some or all items, a statistical likelihood may be displayed, which indicates the likelihood that a respective item satisfies the characteristic.
The result may provide further details for items evaluated as validly satisfying the characteristic by a first evaluation framework and evaluated as not validly satisfying the characteristic by a second evaluation framework. The result may provide details such as a description of the reason for why the item did not validly satisfy the characteristic. For example, the result may include a simple textual description of a reason of failure, one or more rule codes or descriptions (e.g., of rules that failed), and/or event data used in the failed validation.

[0200] FIGS. 12 to 16 illustrate exemplary user interfaces for entering identification information and outputting event information that validates a claim. Briefly, FIG. 12 shows a web-based user interface 1200 that, by providing fewer options and by outputting event data in a user friendly manner, is oriented for an end-user or consumer. Furthermore, FIGS. 13 and 14 and 15 show web-based user interfaces 1300, 1400 and 1550 for validating source and age of cattle, and FIG. 16 illustrates user interfaces 1601 to 1603, which automatically and iteratively or recursively validates claims for an item in a supply chain through a multiphase or states.

[0201] In FIG. 12, the user interface 1200 includes a text region 1201 that describes the purpose or goal of the claim validation, and instructs the user how to use the enhanced claim validation application. In particular, the text region 1201 tells the user that the user interface 1200 can be used to confirm that a beef product is truly "South Dakota Certified™ Beef".

[0202] In confirming that the beef purchased by the consumer satisfies this certification, the enhanced claim validation application does not merely access a local lookup table to cross-reference an input identifier of the beef; rather, the application actively queries or polls at least one node within the supply chain of the identified beef item, retrieves event data associated with the beef item, applies rules against the retrieved event data, and displays the event data or an interpretation of the event data to the user in real time or near real time to receiving the identification information based on applying the rules. In doing so, the text region 1201 also instructs the user to enter a tracking number, or unique identification number, of a beef item into text field 1202.

[0203] The user may locate the tracking number from the packaging, sales literature, advertising or other documentation associated with the beef item, or verbally from a sales person or customer service personnel. Upon entering the tracking number ("1193912") into the text field and selecting the submit form control 1204, the enhanced claim validation application queries nodes in a supply chain for event data, using the entered tracking number, receives event data associated with the tracking number, and prepares the event data for output to the user. Output event data may be displayed by completely refreshing a web page that includes user interface 1200, or the user interface 1200 may include Asynchronous Java and XML (AJAX) or other controls that allow the user interface 1200 to be updated without refreshing the web page.

[0204] In this example, the event data accessed at the transaction database in response to the tracking number query indicates that the beef item identified with tracking number 1193912 was processed in at least two source nodes, "SDC0001," and "SDC0701," which a lookup table or other mechanism on the transaction database server can automatically identify as "Marshall John Beef," and another unidentified ranch. Since user interface 1200 is intended for use by a customer, it may be designed only to provide sufficient information to validate the claim, and may not be designed, for example, to output all received event data, or to allow the user to recursively or iteratively track the event history of previous phases or states, or components of the item.

[0205] In this regard, in event data output window 1205, the user interface 1200 displays the identifier 1206 of the first source node of the item and a URL 1207 of the first source node. Since the received event data from this first source node includes a picture or image 1209 of the actual cattle that was eventually processed into the beef item, the image 1209 is also displayed in the user interface 1200. Similarly, the user interface 1200 displays the identifier 1210 of the second source node of the item, but does not display a URL or an image because that information is not available, not identifiable, or superfluous.

[0206] Using event data or interpreted event data output in the user interface 1200, the user may manually validate the claim that the beef item is "South Dakota Certified™ Beef" by selecting the URL 1207, and determining that "Marshall John Beef" sells beef that satisfies this certification. Furthermore, one or more validation entities can use rules to automatically validate this claim by cross-referencing the identifier 1206 against a database of sources of "South Dakota Certified™ Beef," or by cross-referencing the address of the first source node to determine if it is located in South Dakota, and output an interpretation or indicia of this validation.

[0207] In user interface 1200, for example, indicia 1212 indicates that the first source node satisfies the "South Dakota Certified™ Beef" certification as validated by an internal validation entity (e.g., TraceGain®) but that certification results from a third party FDA validation entity are inconclusive. The output of the indicia 1212 occurs in real time or near real time to the selection of the submit form control 1204. Each meat item has a placed on it that can be traced back to the animal from which it came, for example by querying the carcass information. A consumer can access a web-based lookup system to query the animal movement system, to identify all of the previous owners of that animal.

[0208] User interfaces 1300 and 1400 and 1550 in FIGS. 13 and 14 and 15, respectively, are used in a similar manner to validate or verify the source and age of cattle. FIG. 13 illustrates a lookup site relating to an exemplary USDA-approved Process Verified Program. Packing plants will pay a premium price for Process Verified animals, so people selling these animals can receive those premiums at the time of sale if they have a certificate that can be authenticated by the buyer. Thus the lookup site may be a public web site where the buyer can drop in a list of unique animal identifiers.

[0209] In more detail, animal RFID numbers that uniquely identify cattle are entered into open interconnection element 1301, one or more validation entities (e.g., an internal entity such as "AgInfoLink" and/or a third party entity such as the FDA) are selected using controls 1302, and a form submission control 1303 is selected. Based on the selection of this control, the selected validation entity or entities query nodes of a supply chain that processes the animals identified by the input RFID numbers, and outputs via user interface 1400 the animal RFID numbers (column 1401) and the birth date of the identified animals (column 1402). In this example, since on user interface 1300 the AgInfoLink and FDA validation entities are selected, the user interface 1400 outputs indicia (columns 1404a and 1404b) that indicate validation results for each animal for validations performed by AgInfoLink and the FDA, respectively. For an animal 1406 with RFID
98200062508222, test results differ between the two validation entities. A summary area 1408 indicates that eight out of eight animals passed the internal AgInfolink validation, but that seven out of eight animals passed the third party FDA validation.

[0210] In order for an animal to comply with the age and source information, each animal must have auditable information on both its age, and where the animal originated. Knowing the animal's age is very important for purposes of beef export, knowing the animal's source is important for purposes of disease traceability, etc. Interested parties can use a public on-line web site to enter the unique identifier on the animal, and get a United States Department of Agriculture approved certificate that certifies the animal is of a specific age, and that there is an auditable record of where that animal originated. The third party validation is evidenced by a seal 1405 on the certificate, assuring end-users of the product of the integrity of the validation. By printing out user interface 1400, the user has generated a certificate evidencing a third party validation that can be brought to an auction house to receive an addition premium on identified animals.

[0211] FIG. 15 illustrates a user interface 1550 showing, among other things, animal identifiers and information indicating whether the shown animals comply with a certain claim. The user interface 1550 may be presented, for example, as a result of running an internal validation (e.g., by selecting an internal validation entity on the user interface 1300). An internal validation entity may query nodes of a supply chain that processed the animals identified by the input RFID numbers, and output via user interface 1550 an indicia (column 1551) of whether particular animals conform to a claim, as well as event data supporting the validation such as age data (column 1552).

[0212] The user interface 1550 also includes a region 1553 for identifying animals which do not conform to the claim. Furthermore, the user may generate a certificate (in this case, an electronic .PDF certificate) by selecting control 1555. By generating this certificate, the user can present evidence to an entity downstream in the supply chain that they have complied with particular safeguards or have conformed their practices to particular standards, raising the value of the item and generally increasing supply chain transparency.

[0213] The user may select a control 1560 to run a third party validation. The user may be presented with an interface which allows them to select a third party from among several trusted third parties to perform the validation. The selected third party may query nodes of a supply chain that processed the animals identified by the RFID numbers displayed in the user interface 1550, and the user interface 1550 may be replaced with a similar user interface which shows the third party validation results.

[0214] As noted above, FIG. 16 illustrates user interfaces 1601 to 1603, that automatically and iteratively or recursively validates claims for an item in a supply chain through a multiple phases or states. Using user interfaces 1601 to 1603, claims to validate are automatically selected based on the type of item being checked.

[0215] In more detail, user interface 1601 is generated and output as a result of a user entering identification information ("307-16A") for a hamburger, and further as a result of two validation entities (e.g., ABC Certification and the FDA) simultaneously or sequentially querying nodes of a supply chain for historical event data relating to the hamburger and/or components of the hamburger. Such identification information may be found, for example, on the packaging of a frozen hamburger, or on the packaging or receipt of a freshly cooked hamburger. Notably, the user is not required to indicate which claims they would like to validate or verify.

[0216] Based on received event data, the user interface 1601 displays the components or ingredients of the hamburger, including cheese, beef patty, hamburger bun, and lettuce. As described in further detail below, since the received event information indicates that the cheese, beef patty, and lettuce (but not the hamburger bun) are each associated with a unique identifier, controls 1605 to 1607 are displayed in conjunction with the cheese, beef patty, and lettuce, respectively, to allow a user to validate claims against these items as well.

[0217] Region 1611 of the user interface 1601 displays certification results. The user interface also includes controls, in this case buttons 1612 and 1614, which allow a user to generate a physical or digital certificate evidencing the third party validation.

[0218] Having determined that the components of the hamburger item include cheese, a beef patty, a hamburger bun, and lettuce, the transaction database server accesses a database that associates item types with appropriate claims, and generates a list of claims that match, or would be appropriate for, the components of the hamburger item, as well as the hamburger item as a whole. For instance, appropriate claims for the cheese component include “Real California Cheese” or “Wisconsin Cheese,” claims for the beef patty component include “Free-Range Beef,” claims for the hamburger bun component include “Gluten Free,” and claims for the lettuce component include “No Pesticides” and “Organic Vegetables.”

[0219] Furthermore, claims for the hamburger item as a whole include “Kosher,” “Halal,” “No Migrant Labor,” and “Source: USA,” since the result of a claim verification for these claims should depend on the results of individual claim verifications for each component. Since space is limited on the user interface 1601, the transaction database server may select, if a large number of claims are determined to be appropriate, random claims, a certain number of claims per each component, a user’s explicitly or implicitly-determined preferred claims, or claims based on any number of other factors. Where the enhanced claim validation application determines a probability (versus a certainty or near certainty) that the claim is valid or invalid, the probability is shown within the user interface as a percentage. These probabilities may also be presented on the certifications provided by the third party, if applicable.

[0220] The ABC Certification and FDA validation entities each perform an automatic claim validation for each of the claims based on receiving event data in real time or in near real time to entering the identification information for the hamburger item, and output indicia 1609a-b (in the form of a check mark, an 'X,' or a question mark) indicating the validity of each appropriate claim for each performed validation. Notably, the “Source: USA” label claim is considered invalid if any of the components of the hamburger item, such as the lettuce, are sourced from outside the United States. Using simplified output indicia, and by avoiding the output of raw event data itself, the user interface 1601 is easily interpretable and navigable by even the most novice computer user.

[0221] Having reviewed the traceability history of the hamburger item as a whole, the user may wish to review the traceability history of the carcass that produced the beef patty
itself, using the identification information ("A100-369") of the carcass. This can be accomplished by selecting control 1606. In one implementation, the transaction database server pre-fetches event information for all generations of all components of an item being reviewed, while in another implementation only historical event data for an item being viewed is received upon the receipt of identification information, or historical event data is received for an item and N previous states or phases of an item.

[0222] Upon detecting the selection of the control 1606, for example, the transaction database server may actively query nodes for event data that relates to a uniquely identified carcass that produced the beef patty, or the transaction database server may merely access the transaction database to locate event data that has already been queried based on the claim validation of the hamburger item. Similarly, the transaction database server may determine appropriate claims to validate, and may even proceed to validate those appropriate claims, prior to the selection of a component or previous state or phase of an item.

[0223] In any case, as above, the transaction database server dynamically or automatically determines appropriate claims to validate based on a detected or determined type of the beef carcass item. For instance, the user interface 1602 now includes other beef-related claims, such as a "Fresh Never Frozen" claim, or a "Carbon Offset Transportation" claim which purports to have offset the carbon involved in the transportation of the carcass. Since the user is specifically requesting the validation of a claim relating to beef, the user interface 1602 does not reference claims that are not associated with beef, such as "Organic Vegetables," or "Real California Cheese." As above, the enhanced claim validation application validates the automatically selected claims, and places determinative indicia adjacent to the claims.

[0224] Notably, although user interface 1601 indicates that the label claim "Source: USA" is invalid, the user interface 1601 indicates that this same label claim is valid. This inconsistency may occur because the validation of the label claim in user interface 1601 takes all of the components of an item into effect to validate the label claim of the item as a whole, while the user interface 1602 validates the label claim of the selected component alone. In other words, if the lettuce component may serve to invalidate a "Source: USA" label claim for the hamburger item as a whole in user interface 1601, while this same label claim can be validated with respect to the carcass alone in user interface 1601 because the lettuce is not a component of the carcass itself.

[0225] Since the carcass is sourced from a uniquely identifiable cow ("34703982"), the user may select control 1610 to view the traceability history of the cow and to validate label claims associated therewith. Similar to above, the enhanced claim validation application selects appropriate claims to validate, and performs a validation of the claims with respect to the uniquely identifiable cow by querying nodes of a supply chain or accessing event data stored as a result of a previously issued query. As shown in user interface 1603, since the event data of the uniquely identifiable cow includes a unique identifier of a parent cow of the uniquely identifiable cow, the user may continue to recursively or iteratively investigate claims up through the supply chain.

[0226] FIG. 17 depicts the exterior appearance of an exemplary system including a user device and transaction database server. Briefly, the system 1700 includes a user device 1701 and a transaction database server 1702 that includes a transaction database. As described in further detail, below, the system 1700 includes, inter alia, an interface that receives identification information uniquely identifying an item that has moved through a node in a supply chain, the item being marked with a claim, that receives, from the node, event data associated with the uniquely identified item, and that outputs received event data that validates or invalidates the claim, in real time or near real time to receiving the identification information.

[0227] More specifically, the system 1700 may include one or more computers, and a computer-readable medium coupled to the one or more computers having instructions stored thereon which, when executed by the one or more computers, cause the one or more computers to perform operations. The operations include receiving identification information uniquely identifying an item that has moved through a node in a supply chain, and receiving, from the node, event data associated with the uniquely identified item based on receiving the identification information. The operations also include performing a third party validation of an associated characteristic of the uniquely identified item based on the received event data, and providing a third party certification of the associated characteristic based on performing the third party validation.

[0228] Alternatively, when executed by the one or more computers, the instructions cause the one or more computers to perform operations including receiving identification information uniquely identifying items that have moved through one or more nodes of a supply chain, and receiving, from the one or more nodes, event data associated with the uniquely identified items based on the received identification information. The operations also include performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks, and providing a result of the validation for each of the multiple discrete evaluation frameworks.

[0229] In more detail, the hardware environment of the user device 1701 includes a display monitor 1708 for displaying text and images to a user, a keyboard 1709 for entering text data and user commands into the user device 1701, a mouse 1710 for pointing, selecting and adjusting objects displayed on the display monitor 1708, a fixed disk drive 1711, a removable disk drive 1712, a tape drive 1714, a hard copy output device 1715, a computer network connection 1716, and a reader 1717.

[0230] The display monitor 1708 displays graphics, images, and text that makes up the display for the software applications used by the user device 1701, as well as for the operating system programs necessary to operate the user device 1701. A user uses the keyboard 1709 to enter commands and data to operate and control the computer operating system programs, the web browser, and/or the enhanced claim validation application. The user uses the mouse 1710 to select and adjust graphics and text objects displayed on the display monitor 1708 as part of the interaction with and control of the user device 1701 and applications running on the user device 1701. The mouse 1710 is any type of pointing device, and may be a joystick, a trackball, a touch-pad, or other pointing device.

[0231] The reader 1717 allows the user device 1701 to automatically capture identification information, and may be a RFID reader, a bar code scanner, a digital camera, a digital video camera, a microphone or other digital input device. Software used to provide for the enhanced claim validation application is stored locally or on computer readable memory media, such as the fixed disk drive 1711.

[0232] In a further implementation, the display monitor 1708 includes a number of physical drive units, such as a redundant array of independent disks ("RAID"), or may
be a disk drive farm or a disk array that is physically located in a separate computing unit. Such computer readable memory media allow the user device 1701 to access computer-executable process steps, application programs and the like, stored on removable and non-removable memory media.

[0233] The wireless or wireline computer network connection 1715 may be a modem connection, a local-area network ("LAN") connection including the Ethernet, or a broadband wide-area network ("WAN") connection such as a digital subscriber line ("DSL"), cable high-speed internet connection, dial-up connection, T-1 line, T-3 line, fiber optic connection, or satellite connection. The network 1106 may be one or more of a LAN network, a corporate or government WAN network, the Internet, or other network.

[0234] The computer network connection 1716 uses a wireline or wireless connection. Example wireless connectors include, for example, an INFRARED DATA ASSOCIATION® ("IrDA®") wireless connector, an optical wireless connector, an INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS® ("IEEE®") Standard 802.11 wireless connector, a BLUETOOTH® wireless connector, a near field communications ("NFC") connector, an orthogonal frequency division multiplexing ("OFDM") ultra wide band ("UWB") wireless connector, a time-modulated wide band ("TM-UWB") wireless connector, or other wireless connector. Example wireline connectors include, for example, a IEEE-1394 FIREWIRE® connector, a Universal Serial Bus ("USB") connector, a serial port connector, a parallel port connector, or other wireline connector.

[0235] The removable disk drive 1712 is a removable storage device that is used to off-load data from the user device 1701 or upload data onto the user device 1701. The removable disk drive 1712 may be a floppy disk drive, an IOMEGA® ZIP® drive, a compact disk-read only memory ("CD-ROM") drive, a CD-Recordable drive ("CD-R"), a CD-Rewritable drive ("CD-RW"), flash memory, a USB flash drive, an external hard disk drive, thumb drive, pen drive, key drive, a High-Density Digital Versatile Disc ("HD-DVD") optical disc drive, a Blu-Ray optical disc drive, a Holographic Digital Data Storage ("HDDS") optical disc drive, or any one of the various recordable or rewritable digital versatile disc ("DVD") drives such as the DVD-Recordable ("DVD-R" or "DVD+R"), DVD-Rewritable ("DVD-RW" or "DVD+RW"), or DVD-RAM. Operating system programs, applications, and various data files, are stored on disks, which are stored on the fixed disk drive 1711 or on removable media for the removable disk drive 1712.

[0236] The tape drive 1714 is a tape storage device that is used to off-load data from the user device 1701 or to upload data onto the user device 1701. The tape drive 1714 may be a quarter-inch cartridge ("QIC"), 4 mm digital audio tape ("DAT"), 8 mm digital linear tape ("DLT") drive, or other type of tape.

[0237] The hardcopy output device 1715 provides an output function for the operating system programs and applications. The hardcopy output device 1715 may be a printer or any output device that produces tangible output objects, including textual or image data or graphical representations of textual or image data. While the hardcopy output device 1715 is depicted as being directly connected to the user device 1701, it need not be. For instance, the hardcopy output device 1715 may be connected to device 1701 via a network interface, such as a wireline or wireless network.

[0238] Furthermore, although the user device 1701 is illustrated in Fig. 17 as a desktop PC, in further implementations the user device 1701 may be a laptop, a workstation, a midrange computer, a mainframe, a set top box, an embedded system, telephone, a handheld or tablet computer, a PDA, an iPod, a digital picture frame, or other type of computer.

[0239] FIG. 18 illustrates the internal architecture of the user device of FIG. 17. The computing environment includes a computer central processing unit ("CPU") 1801 where the computer instructions that make up an operating system or an application are processed; a display interface 1802 which provides a communication interface and processing functions for rendering graphics, images, and texts on the display monitor 1708; a keyboard interface 1804 which provides a communication interface to the keyboard 1709; a pointing device interface 1805 which provides a communication interface to the mouse 1710 or an equivalent pointing device; a reader interface 1806 which provides a communication interface to the reader 1717; a hardcopy output device interface 1808 which provides a communication interface to the hardcopy output device 1715; a random access memory ("RAM") 1710 where computer instructions and data are stored in a volatile memory device for processing by the computer CPU 1801; a read-only memory ("ROM") 1811 where invariant low-level systems code or data for basic system functions such as basic input and output ("I/O"), startup, or reception of keystrokes from the keyboard 1709 are stored in a non-volatile memory device; a storage 1820 or other suitable type of memory (e.g. such as random-access memory ("RAM"), read-only memory ("ROM"), programmable read-only memory ("PROM"), erasable programmable read-only memory ("EPROM"), electrically erasable programmable read-only memory ("EEPROM"), magnetic disks, optical disks, floppy disks, hard disks, removable cartridges, flash drives), where the files that make up an operating system 1821, application programs 1822 (including web browser application 1823, enhanced claim validation application 1824, and other applications 1825 as necessary) and data files 1826 are stored; and a computer network interface 1816 which provides a communication interface to the network 1706 over the computer network connection 1716. The constituent devices and the computer CPU 1801 communicate with each other over the computer bus 1827.

[0240] Briefly, a computer program product is encoded or tangibly embodied in disk 1820, a machine-readable storage medium. The computer program product includes instructions that, when read by a machine, operate to cause a data processing apparatus to receive identification information uniquely identifying an item that has moved through a node in a supply chain, the item being marked with a claim, to receive, from the node, event data associated with the uniquely identified item, and to output received event data that validates or invalidates the claim, in real time or near real time to receiving the identification information.

[0241] Alternatively, the disk is encoded with a computer program comprising instructions that, when executed, operate to cause the computer to perform any of the operations described above. For example, when executed, the instructions may operate to cause a computer to perform operations including receiving identification information uniquely identifying items that have moved through one or more nodes of a supply chain, and receiving, from the one or more nodes, event data associated with the uniquely identified items based on the received identification information. The operations further include performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks, and providing a result of the validation for each of the multiple discrete evaluation frameworks.

[0242] Furthermore, the disk 1820 may be encoded with a computer program including instructions that, when
executed, operate to cause a computer to perform operations including receiving identification information uniquely identifying an item that has moved through a node in a supply chain, and receiving, from the node, event data associated with the uniquely identified item based on receiving the identification information. The operations also include performing a third party validation of an associated characteristic of the uniquely identified item based on the received event data, and providing a third party certification of the associated characteristic based on performing the third party validation.

[0243] The RAM 1810 interfaces with the computer bus 1827 so as to provide quick RAM storage to the computer CPU 1801 during the execution of software programs such as the operating system application programs, and device drivers. More specifically, the computer CPU 1801 loads computer-executable process steps from the fixed disk drive 1711 or other media into a field of the RAM 1810 in order to execute software programs. Data stored in the RAM 1810, where the data is accessed by the computer CPU 1801 during execution.

[0244] Also shown in FIG. 18, the user device 1701 stores computer-executable code for a operating system 1821, and application programs 1822 such as word processing, spreadsheet, presentation, gaming, web browsing, JavaScript engine, or other applications. Although it is possible to provide for the enhanced claim validation application using the above-described implementation, it is also possible to implement the function according to the present disclosure as a dynamic link library (“DLL”), or as a plug-in to other application programs such as an Internet web-browser such as the APPLER® SAFARI® web browser or the MICROSOFT® INTERNET EXPLORER® web browser.

[0245] The computer CPU 1801 is one of a number of high-performance computer processors, including an INTEL® or AMD® processor, a POWERPC® processor, a MIPS® reduced instruction set computer (“RISC”) processor, a SPARC® processor, an ACORN® RISC Machine (“ARM®”) architecture processor, a HP ALPHASERVER® processor or a proprietary computer processor for a mainframe. In an additional arrangement, the computer CPU 1801 is more than one processing unit, including a multiple CPU configuration found in high-performance workstations and servers, or a multiple scalable processing unit found in mainframes.

[0246] The operating system 1821 may be APPLE® MAC OS X® for INTEL® and POWERPC® based workstations and servers; MICROSOFT® WINDOWS NT®/WINDOWS® 2000/WINDOWS® XP Workstation; MICROSOFT® WINDOWS VISTA®/WINDOWS NT®/WINDOWS® 2000/WINDOWS® XP Server; a variety of UNIX®-flavored operating systems, including AIX® for IBM® workstations and servers, SUNOS® for SUN® workstations and servers, LINUX® for INTEL® CPU-based workstations and servers, HP UX WORKLOAD MANAGER® for HP® workstations and servers, IRIX® for SG1® workstations and servers, VAX/VMS® for Digital Equipment Corporation computers, OPENVMS® for HP ALPHASERVER®-based computers; SUN MACHINES® Newton®, IPD®, WINDOWS MOBILE® or WINDOWS CE®, PALM®, NOKIA® OS (“"NOS"), OS/9®, or EPICS® for mobile devices, or a proprietary operating system for computers or embedded systems. The application development platform or framework for the operating system 1821 may be: BINARY RUNTIME ENVIRONMENT FOR WIRELESS® (“BREW®”); Java Platform, Micro Edition (“Java ME”) or Java 2 Platform, Micro Edition (“J2ME®”), PYTHON®, FLASH LITE®, or MICROSOFT®.NET Compact.

[0247] FIG. 19 is a block diagram of a computing devices 1900 that may be used to implement the systems and methods described in this document, as either a client or as a server or plurality of servers. Computing device 1900 is intended to represent various forms of digital computers, such as laptops, desktops, workstations, personal digital assistants, servers, blade servers, terminals, and other appropriate computers. The computing device 1900 may represent various forms of mobile devices, such as personal digital assistants, cellular telephones, smartphones, and other similar computing devices. The components shown here, their connections and relationships, and their functions, are meant to be exemplary only, and are not meant to limit implementations described and/or claimed in this document.

[0248] Computing device 1900 includes a processor 1902, memory 1904, a storage device 1906, a high-speed interface 1908 connecting to memory 1904 and high-speed expansion ports, and a low-speed interface connecting to low-speed bus and storage device 1906. Each of the components, are interconnected using various busses, and may be mounted on a common motherboard or in other manners as appropriate. The processor 1902 may process instructions for execution within the computing device 1900, including instructions stored in the memory 1904 or on the storage device 1906 to display graphical information for a GUI on an external input/output device, such as display 1916 coupled to the high-speed interface. In other implementations, multiple processors and/or multiple busses may be used, as appropriate, along with multiple memories and types of memory. Also, multiple computing devices 1900 may be connected, with each device providing portions of the necessary operations (e.g., as a server bank, a group of blade servers, or a multi-processor system).

[0249] The memory 1904 stores information within the computing device 1900. In one implementation, the memory 1904 is a computer-readable medium. In one implementation, the memory 1904 is a volatile memory unit or units. In another implementation, the memory 1904 is a non-volatile memory unit or units.

[0250] The storage device 1906 is capable of providing mass storage for the computing device 1900. In one implementation, the storage device 1906 is a computer-readable medium. In various different implementations, the storage device 1906 may be a floppy disk device, a hard disk device, an optical disk device, or a tape device, a flash memory or other similar solid state memory device, or an array of devices, including devices in a storage area network or other configurations. In one implementation, a computer program product is tangibly embodied in an information carrier. The computer program product contains instructions that, when executed, perform one or more methods, such as those described above. The information carrier is a computer- or machine-readable medium, such as the memory 1904, the storage device 1906, or memory on processor 1902.

[0251] The high speed controller manages bandwidth-intensive operations for the computing device 1900, while the low speed controller manages lower bandwidth-intensive operations. Such allocation of duties is exemplary only. In one implementation, the high-speed controller 1908 is coupled to memory 1904, display 1916 (e.g., through a graphics processor or accelerator), and to high-speed expansion ports, which may accept various expansion cards (not shown). In the implementation, low-speed controller is coupled to storage device 1906 and low-speed expansion port. The low-speed expansion port, which may include various communication ports (e.g., USB, Bluetooth, Ethernet, wireless Ethernet) may be coupled to one or more input/
output devices, such as a keyboard, a pointing device, a scanner, or a networking device such as a switch or router, e.g., through a network adapter.

[0252] The computing device 1900 may be implemented in a number of different forms, as shown in the figure. For example, it may be implemented as a standard server 1920, or multiple times in a group of such servers. It may also be implemented as part of a rack server system 1924. In addition, it may be implemented in a personal computer such as a laptop computer 1922. Alternatively, components from computing device 1900 may be combined with other components in a mobile device. Each of such devices may contain one or more of computing device 1900, and an entire system may be made up of multiple computing devices 1900 communicating with each other. The computing device 1900 may include one or more sensors (not shown), such as gyroscopes, cameras or GPS (Global Positioning Satellite) trackers, configured to detect or sense motion or position of the computing device 1900.

[0253] Various implementations of the systems and techniques described here may be realized in digital electronic circuitry, integrated circuitry, specially designed ASICs (application specific integrated circuits), computer hardware, firmware, software, and/or combinations thereof. These various implementations may include implementation in one or more computer programs that are executable and/or interpretable on a programmable system including at least one programmable processor, which may be special or general purpose, coupled to receive data and instructions from, and to transmit data and instructions to, a storage system, at least one input device, and at least one output device.

[0254] These computer programs (also known as programs, software, software applications or code) include machine instructions for a programmable processor, and may be implemented in a high-level procedural and/or object-oriented programming language, and/or in assembly/machine language. As used herein, the terms “machine-readable medium” “computer-readable medium” refers to any computer program product, apparatus and/or device (e.g., magnetic discs, optical disks, memory, Programmable Logic Devices (PLDs)) used to provide machine instructions and/or data to a programmable processor, including a machine-readable medium that receives machine instructions.

[0255] To provide for interaction with a user, the systems and techniques described herein may be implemented on a computer having a display device (e.g., a CRT (cathode ray tube) or LCD (liquid crystal display) monitor) for displaying information to the user and a keyboard and a pointing device (e.g., a mouse or a trackball) by which the user may provide input to the computer. Other kinds of devices may be used to provide for interaction with a user as well; for example, feedback provided to the user may be any form of sensory feedback (e.g., visual feedback, auditory feedback, or tactile feedback); and input from the user may be received in any form, including acoustic, speech, or tactile input.

[0256] The systems and techniques described herein may be implemented in a computing system that includes a back-end component (e.g., as a data server), or that includes a middleware component (e.g., an application server), or that includes a front-end component (e.g., a client computer having a graphical user interface or a Web browser through which a user may interact with an implementation of the systems and techniques described here), or any combination of such back-end, middleware, or front-end components. The components of the system may be interconnected by any form or medium of digital data communication (e.g., a communication network). Examples of communication networks include a local area network (“LAN”), a wide area network (“WAN”), and the internet.

[0257] The computing system may include clients and servers. A client and server are generally remote from each other and typically interact through a communication network. The relationship of client and server arises by virtue of computer programs running on the respective computers and having a client-server relationship to each other.

[0258] While FIGS. 17 and 19 illustrate various exemplary implementations of a computing system that executes program code, or program or process steps, configured to effectuate the enhanced validation of a claim, other types of computers may also be used as well.

[0259] As to formal matters, while the term “user” has been consistently used to describe an entity that interacts with these processes, such a generalization is also intended to describe multiple related or unrelated, living or automated entities or beings that interact with these processes at various different, overlapping or non-overlapping states. In a similar vein, the term “selection” is intended to denote throughout a manual selection by a human, an automatic selection by a non-human, or some combination thereof. Finally, it is noted that, for the sake of brevity, the term “JavaScript” is intended to reference the SUN MICROSYSTEMS® JAVA® programming language, and the term “XML” is intended to reference eXtensible Markup Language” throughout.

[0260] Finally, while the approach described herein refers to transactional data which is generated, shared, recorded, stored, filtered or otherwise accessed as “event data,” any other type of proprietary or non-proprietary, formatted or free-form data (such as attribute data, data collected and shared as a transaction between systems, or data input by a user and accepted by a system), data structure, or information that is accessed in any supply chain process or transaction may be used with or instead of “event data” to support the validation. This transactional data may be, for example, industry standard data, including data that is not processed by the AginfloLink® Pony Express® framework.

[0261] A number of implementations have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the disclosure. Accordingly, other implementations are within the scope of the following claims.

What is claimed is:

1. A computer-implemented method comprising:
   receiving identification information uniquely identifying items that have moved through one or more nodes of a supply chain;
   receiving, from the one or more nodes, event data associated with the uniquely identified items based on the received identification information;
   performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks; and
   providing a result of the validation for each of the multiple discrete evaluation frameworks.

2. The method of claim 1, wherein the result of the validation is provided in real time or near real time to receiving the identification information.

3. The method of claim 1, wherein the validation is performed simultaneously using the multiple discrete evaluation frameworks.

4. The method of claim 1, wherein the multiple discrete evaluation frameworks further comprise a first evaluation framework that evaluates a validity of the characteristic
according to a first compliance standard, and a second evaluation framework that evaluates the validity of the characteristic according to a second compliance standard which is more stringent that the first compliance standard.

5. The method of claim 1, wherein the first compliance standard comprises a minimum compliance standard, and the second standard comprises an elevated standard predefined for a particular brand under which the items will be sold.

6. The method of claim 1, wherein the multiple discrete evaluation frameworks further comprise an internal evaluation framework performed on behalf of one of the nodes of the supply chain, and a third-party evaluation framework performed by a disinterested third party not involved in the supply chain.

7. The method of claim 1, wherein the third party validation comprises an age and source verification.

8. The method of claim 1, wherein providing the result of the validation further comprises providing indicia responsive to the validation, the indicia identifying, for each of the multiple discrete evaluation frameworks:
   conforming and non-conforming items which do and do not validly satisfy the characteristic, respectively.

9. The method of claim 8, wherein the indicia comprises a conforming percentage and a non-conforming percentage of the items which do and do not satisfy the characteristic, respectively.

10. The method of claim 8, wherein the indicia comprises a conforming list and a non-conforming list of the items listing the identification information of the items which do and do not validly satisfy the characteristic, respectively.

11. The method of claim 1, wherein providing the result of the validation further comprises providing indicia responsive to the validation, the indicia identifying items evaluated as validly satisfying the characteristic by a first discrete evaluation framework and evaluated as not validly satisfying the characteristic by a second discrete evaluation framework.

12. The method of claim 11, further comprising determining reasons why the items were evaluated as both not validly satisfying the characteristic by the second discrete evaluation framework and as validly satisfying the characteristic by the first discrete evaluation framework, wherein the indicia further comprises the determined reasons.

13. The method of claim 1, further comprising:
   receiving, responsive to providing the result, a signal indicating that a user intends to accept, reject, or remediate at least a portion of the items evaluated by any of the multiple discrete evaluation frameworks as not validly satisfying the characteristic, and
   accepting, rejecting, or remediating the portion of the items based on the received signal.

14. The method of claim 1, wherein the identification information further identifies the characteristic to be validated.

15. The method of claim 1, wherein performing the validation of the characteristic of the uniquely identified items further comprises:
   determining a role of a user requesting the validation;
   applying the received event data to a set of rules associated with each of the multiple discrete evaluation frameworks, and tailored to the determined role.

16. The method of claim 1, wherein the result includes a statistical likelihood that one or more of the items validly satisfies the characteristic.

17. The method of claim 1, further comprising:
   receiving a user selection of a trusted third party from among several trusted third parties to at least partially perform the validation, wherein performing the validation of the characteristic further comprises applying the received event data to an evaluation framework associated with the selected trusted third party.

18. The method of claim 1, wherein the characteristic is associated with a label claim.

19. A system comprising:
   one or more computers; and
   a computer-readable medium coupled to the one or more computers having instructions stored thereon which, when executed by the one or more computers, cause the one or more computers to perform operations comprising:
   receiving identification information uniquely identifying items that have moved through one or more nodes of a supply chain, receiving, from the one or more nodes, event data associated with the uniquely identified items based on the received identification information, performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks, and providing a result of the validation for each of the multiple discrete evaluation frameworks.

20. A computer-readable medium encoded with a computer program comprising instructions that, when executed, operate to cause a computer to perform operations comprising:
   receiving identification information uniquely identifying items that have moved through one or more nodes of a supply chain;
   receiving, from the one or more nodes, event data associated with the uniquely identified items based on the received identification information;
   performing a validation of a characteristic of the uniquely identified items based on applying the received event data to multiple discrete evaluation frameworks; and providing a result of the validation for each of the multiple discrete evaluation frameworks.

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