producers provide supply chain-related data to their business customers, they typically must create separate data sets for each customer to ensure that each customer gets secure access to only its data and not data that is associated with other customers. Thus, while CRM systems may be secure in that they maintain a particular entity's data behind a firewall, they cannot sufficiently enable certain aspects of the data to be shared, nor can they make connections of appeal between suppliers and customers while maintaining reasonable privacy of the customer or business that is associated with the data.

[0005] For example, United States Patent Application Publication No. 2021/0012281, filed July 9, 2019 and published January 14, 2021, discloses a method for electronic commerce order management in which merchants use multiple channels ~~to~~ can maintain online storefronts. The system uses an inventory database with inventory information for multiple channels or locations. However, systems such as these require each channel manager to distinctly define the products in its inventory. While this maintains security of each channel manager's inventory data, it slows the data ingestion process; it requires a large amount of storage capacity to create multiple, channel-specific profile records for products that multiple channels may carry; and it does not allow the system or users to leverage non-sensitive information that could be shared across multiple channels.

[0006] Further, in an era in which government regulations, health reasons (such as pandemics) and safety issues may limit consumers' ability to physically browse a product inventory, technical solutions are needed to help suppliers identify products to recommend to consumers, especially where the inventory is large and cannot practically be retained in the memory of an individual human who is working to fulfill a consumer's order.

[0007] This document describes improved inventory management and CRM methods and systems that are directed to addressing at least the technical problems described above.

SUMMARY

[0008] In various embodiments, an inventory management system is disclosed. The system includes a processor and a computer readable memory device containing a product information data store. The product information data store includes inventory information for various products, each of which is associated with one or more channels. The system also includes a computer-readable memory device containing a consumer profile data store. The consumer profile data store holds consumer-product interaction records, each of which comprises consumer purchase or other interaction event information and product rating information for one or more of the products, and each of which is associated with one of the channels~~channel~~. The system also includes a computer-readable memory device containing programming instructions that are configured to cause the processor to generate and output, on a display device, a channel manager user interface via which the system will: (i) receive, from a channel manager user for a first channel, an identifier for a consumer; (ii) access the consumer profile data store and retrieve secure profile data for the consumer, wherein the secure profile data comprises purchase records that are associated with a token for the first channel and does not include any product interaction records that are associated with tokens for any other channel; (iii) access the product information data store to identify products that are in an inventory of the first channel; (iv) use the consumer profile data, including both the secure profile data and profile data that is associated with tokens for one or more other channels, to generate one or more product recommendations for the consumer, wherein the one or more product recommendations are for one or more products in the inventory; and (v) output the one or more product recommendations on the display device.

[0009] In some embodiments, the programming instructions to output the secure profile data on the display device comprise instructions to display information for a plurality of products that are in the product interaction records for the consumer. For each product for

which the consumer profile data store holds a rating received from the consumer, the system may display the rating with the information for that product. For any product for which the consumer profile data store does not hold a rating received from the consumer, the system may generate a proxy rating for the unrated product and display the proxy rating with the information for the unrated product.

[0010] To generate the proxy rating, the system may use a function of a number of times that the consumer purchased the unrated product to generate the proxy rating. In addition or alternatively, to generate the proxy rating the system may use a function of a date on which the consumer purchased the unrated product. In addition or alternatively, to generate the proxy rating the system may access the product information data store, retrieve characteristic values for the unrated product, and determine whether the retrieved characteristic values for the product correspond to one or more indicators of preference in a preference model for the consumer, wherein the preference model represents associations between the person's ratings of products and a plurality of product characteristics. In addition or alternatively, to generate the proxy rating the system may receive, from the supplier, one or more indicia (i.e., digital signals) corresponding to a non-purchase interaction by the customer with the unrated product. Upon determining that the consumer interacted with the unrated product, the system may assign a favorable proxy rating to that product.

[0011] In some embodiments, the system may include additional programming instructions that are configured to cause the processor to generate and output, on a display device, a channel creation user interface. Through the channel creation user interface, the system will receive, from a user, product information for various inventoried products. For each inventoried product for which the system receives product information, the system may determine whether the inventoried product is already in the product information data store. If the inventoried product is not already in the product information data store, the system may

including both the secure profile data and profile data that is associated with tokens for one or more other channels, to generate one or more product recommendations for the consumer. The product recommendations will be for products that are in the inventory and that meet the screening criteria. The system may then automatically generate a message that includes the product recommendations for the consumer, and it may transmit the message to the consumer.

[0014] In some embodiments, the system may include additional programming instructions that are configured to cause the processor to generate and output a customer selection manager. Through the customer selection manager, the system may receive, via the user interface, a selection of a product, and it may access and~~the~~ use the consumer profile data to identify one or more consumers who are associated with the channel. For each of the identified consumers, the system may generate a predicted rating for the product. The system may select, from the identified consumers, a group of consumers whose predicted rating exceeds a threshold. The system may then automatically generate a message about the identified product for the group of consumers; and it may transmit the message to the group of consumers.

[0015] In some embodiments, when the system generates one or more product recommendations for the consumer, the system may determine that the consumer has requested a product of a first product category. The system may then identify a second product category, and it may use one or more attributes of the requested product and the secure profile data to select, from the inventory, one or more products of the second product category. The system may then include the selected one or more products in the one or more product recommendations.

[0016] In some embodiments, when accessing the product information data store to identify products that are in the inventory of the first channel, the system may identify a channel ID for the first channel. The system may then extract, from the product information

data store, product data records that are associated with the channel ID and not any product data records that are associated with any other channel ID.

[0017] Optionally, to identify products that are in the inventory of the first channel, the system may identify a channel ID for the first channel and extract, from the product information data store, product data records that are associated with the channel ID and not any product data records that are associated with any other channel ID.

[0018] Optionally, the channel manager user interface may include a channel collection user interface that comprises one or more actuators by which the system will receive, from a user, for first channel, a definition for the first channel, wherein the definition for the channel comprises one or more retail locations. The system also may receive a definition for a collection of products that are available from the channel, wherein the definition for the collection comprises product description information received from a product description fields, along with one or more access restrictions for the collection.

[0019] Optionally, the system also may receive, via a data feed from each of multiple ~~of~~ suppliers, inventory information for products that the suppliers carry. The system may extract, from each data feed, the inventory information for each of the suppliers. The system may update the product information data store to include the extracted inventory information for each product that is associated with the supplier in the product information data store. To extract the inventory information from each data feed, the system may, for each data feed, use semantic synonyms to map each of a plurality of data fields in the data feed to a pre-defined field mapping that matches a system field in the data store. The system may then extract the data from each of the mapped data fields, and save the data to a matched system field.

[0020] In other embodiments, an inventory management system includes a processor, and a computer readable memory device containing a product information data store with inventory information for multiple products, wherein each product is associated with one or

system may use semantic synonyms to map each of a plurality of data fields in the data feed to a pre-defined field mapping that matches a system field in the data store. The system may then extract the data from each of the mapped data fields and save the data to a matched system field.

[0023] In other embodiments, an inventory management system for consumable items, includes a processor, and a computer readable memory device containing a product information data store. The product information data store includes inventory information for various products, and each product is associated with one or more channels. The system also includes a computer-readable memory device containing a consumer profile data store, wherein the consumer profile data store holds data for consumer-product interaction events, which comprises consumer purchase or other product interaction records and product rating information for one or more of the products, and each of which is associated with one of the channels. This embodiment of the system also includes a computer-readable memory device containing programming instructions that are configured to cause the processor to generate and output, on a display device, a channel manager user interface. The channel manager interface will be an interface via which the system will receive, for a first channel, data for a new product listing for a first consumable item. The system will search the product information data store for candidate products having associated data that semantically matches the data for the new product listing. Upon identifying a candidate product having associated data that semantically matches the data for the new product listing, the system may automatically populate the new product listing with data for the candidate product. When the system receives an acceptance or a correction of the new product listing, it will save the data to the product information data store. The saved data will include a platform ID from the associated data for the candidate and a channel ID for the first channel. Then, when the system receives~~,~~ an identifier for a consumer from a channel manager user for the first

[0032] FIG. 9 illustrates a second element of an example campaign manager user interface.

[0033] FIG. 10 illustrates an example communication manager user interface.

[0034] FIG. 11 illustrates product information that may be extracted from a supplier inventory data feed and stored in a structured data set.

[0035] FIG. 12 describes an optional feature of a channel creation process in which image recognition is~~use~~ used to update an inventory and/or identify an inventoried product.

[0036] FIG. 13 illustrates example hardware that may be incorporated into various elements of the system.

DETAILED DESCRIPTION

[0037] As used in this document, the singular forms “a,” “an,” and “the” include plural references unless the context clearly dictates otherwise. Unless defined otherwise, all technical and scientific terms used herein have the same meanings as commonly understood by one of ordinary skill in the art. As used in this document, the term “comprising” (or “comprises”) means “including (or includes), but not limited to.” When used in this document, the term “exemplary” is intended to mean “by way of example” and is not intended to indicate that a particular exemplary item is preferred or required.

[0038] In this document, when terms such “first” and “second” are used to modify a noun, such use is simply intended to distinguish one item from another, and is not intended to require a sequential order unless specifically stated. The term “approximately,” when used in connection with a numeric value, is intended to include values that are close to, but not exactly, the number. For example, in some embodiments, the term “approximately” may include values that are within +/- 10 percent of the value.

product attributes to their respective fields (e.g., product name, website URL, etc.). The data streams for multiple suppliers may use the mapping ID value “20” to represent their independent unique identifiers, even though those products may share the same product attributes. In some situations, certain suppliers may have a shared unique identifier which can be mapped to a specific mapping ID. In the example shown in FIG. 3, the supplier of channel “2” has a unique product name attribute field, which the system associates with mapping ID value “400”, which is shared with other suppliers as a shared unique ID. In this way, when the system receives data for another supplier that also uses the shared unique ID mapped to mapping ID value “400”, the product matching for supplier of channel “2” can automatically match the products for suppliers who utilize that unique ID. In FIG. 3, channel “714”, the mapping ID value “20” indicates that the unique IDs used by the system for the supplier of that channel should only be used by that supplier. Other data element fields for each channel’s data stream may be associated with different mapping IDs so that the system can relate each data element of the data stream to an appropriate system data field or fields.

[0073] Similarly, the use~~user~~ of channel IDs **309** allows the system to, upon identifying a channel ID to which a particular user subscribes, access the product information data store and generate a data set of product listings that are in that channel and give the user to that information, but not any information for other channels to which the user is not a subscriber. The use of platform IDs **308** enable the operator of the system to use a product ID to search for and retrieve all of the data that is associated with a particular product, which may include multiple entries for the product from multiple suppliers and/or for multiple channels.

[0074] Using semantic synonyms, a supplier can map its designated fields (columns) to one of the system’s pre-defined field mappings relevant to the applicable data category. For example, a supplier can establish in its data feed setup that the supplier field named “customer email” is equal to the system’s data mapping ID “203”, which is “merchant_user_email”. By

[0096] Therefore, various embodiments may include an inventory management system that includes a processor and a computer readable memory device containing a product information data store. The product information data store includes inventory information for various products, each of which is associated with one or more channels. The system also includes a computer-readable memory device containing a consumer profile data store. The consumer profile data store holds consumer-product interaction records, each of which comprises consumer purchase or other interaction event information and product rating information for one or more of the products, and each of which is associated with one of the channels~~channel~~. The system also includes a computer-readable memory device containing programming instructions that are configured to cause the processor to generate and output, on a display device, a channel manager user interface via which the system will: (i) receive, from a channel manager user for a first channel, an identifier for a consumer; (ii) access the consumer profile data store and retrieve secure profile data for the consumer, wherein the secure profile data comprises purchase records that are associated with a token for the first channel and does not include any product interaction records that are associated with tokens for any other channel; (iii) access the product information data store to identify products that are in an inventory of the first channel; (iv) use the consumer profile data, including both the secure profile data and profile data that is associated with tokens for one or more other channels, to generate one or more product recommendations for the consumer, wherein the one or more product recommendations are for one or more products in the inventory; and (v) output the one or more product recommendations on the display device.

[0097] Other embodiments may include a system for securely managing inventory data, in which the system includes a processor and a computer readable memory device containing a product information data store. The product information data store comprises inventory information for a plurality of products. Each product in the data store is associated

with one or more secure channels in which the inventory information for each product includes mapping IDs for each channel with which the product is associated. The mapping IDs associate data elements in the record to data element fields in the data store to enable secure intake of new product data and secure retrieval of data that is associated with a particular channel. The system also includes a computer-readable memory device containing a consumer profile data store. The consumer profile data store holds consumer-product interaction records, each of which comprises consumer-product interaction event information and rating information for one or more of the products, and each of which is associated with one of the channels. The system also includes a computer-readable memory device containing programming instructions that are configured to cause the processor to generate and output, on a display device, a channel manager user interface via which the system will: (i) receive, from a channel manager user for a first channel, an identifier for a consumer; (ii) access the consumer profile data store and retrieve secure profile data for the consumer, wherein the retrieving accesses only consumer-product interaction records that are associated with a token for the first channel and excludes any consumer-product interaction records that are associated with tokens for any other channel; (iii) access the product information data store to identify products that are in an inventory of the first channel; (iv) use the consumer profile data, including both the secure profile data and profile data that is associated with tokens for one or more other channels, to generate one or more product recommendations for the consumer, wherein the one or more product recommendations are for one or more products in the inventory; and (v~~iv~~) output the one or more product recommendations on the display device.

[0098] Optionally, the programming instructions to receive the product information for a plurality of inventoried products and determine whether the inventoried product is in the product information data store may comprise instructions to, for at least a first product of the inventoried products, cause a high definition camera to capture an image that includes the first

product and associate the inventoried product with the first channel may comprise instructions to add a record for the inventoried~~inventory~~ product to the data store by identifying a channel ID for the first channel and using a mapping ID for the record to associate data elements in the record to data element fields for the first channel in the product information data store. The system also may include programming instructions that are configured to cause the processor to associate the inventoried product with an address for a landing page for the inventoried product on a website of the first channel.

[00103] Optionally, the system may include additional programming instructions that are configured to cause the processor to generate and output a customer selection manager via which the system may: (i) receive, via the channel manager user interface, a selection of a consumer; (ii) receive, via the channel manager user interface, one or more product screening criteria; (iii) use the consumer profile data, including both the secure profile data and profile data that is associated with tokens for one or more other channels, to generate one or more product recommendations for the consumer, wherein the product recommendations are for products in the inventory that meet the screening criteria; (iv) automatically generate a message that includes the product recommendations; and (v) transmit the message to the consumer.

[00104] Optionally, the system may include additional programming instructions that are configured to cause the processor to generate and output a customer selection manager via which the system may: (i) receive, via the channel manager user interface, a selection of a product; (ii) access the consumer profile data to identify one or more consumers who are associated with the channel; (iii) for each of the identified consumers, generate a predicted rating for the product; (iv) select, from the identified consumers, a group of consumers whose predicted rating exceeds a threshold; (v) automatically generate a message that includes information about the identified product; and (vi) transmit the message to the group of consumers.

CLAIMS

1. AnA system for securely managing inventory managementdata, the system, comprising:

a processor: (1305):

a computer readable memory device containing a product information data store, (103), wherein the product information data store comprises inventory information for a plurality of products, and wherein each product is associated with one or more channels; secure channels (161a…161n) in which the inventory information for each product includes:

mapping IDs (307) for each channel with which the product is associated,

wherein the mapping IDs associate data elements in the record to data element fields in the data store to enable secure intake of new product data and secure retrieval of data that is associated with a particular channel;

a computer-readable memory device containing a consumer profile data store, (102), wherein the consumer profile data store holds consumer-product interaction records, (441, 442, 443), each of which comprises consumer-product interaction event information and rating information for one or more of the products, and each of which is associated with one of the one or more channels; and

a computer-readable memory device containing programming instructions that are configured to cause the processor to generate and output, on a display device, a channel manager user interface (601) via which the system will:

receive, from a channel manager user for a first channel, an identifier for a consumer,

access the consumer profile data store and retrieve secure profile data for the consumer, wherein the retrieving accesses only consumer-product interaction records

that are associated with a token for the first channel and excludes any consumer-product interaction records that are associated with tokens for any other channel,

access the product information data store to identify products that are in an inventory of the first channel,

use the consumer profile data, including both the secure profile data and profile data that is associated with tokens for one or more other channels, to generate one or more product recommendations for the consumer, wherein the one or more product recommendations are for one or more products in the inventory, and

output the one or more product recommendations ~~(611)~~ on the display device.

~~2. The system of claim 1, wherein the programming instructions to receive the product information for a plurality of inventoried products and determine whether the inventoried product is in the product information data store comprise instructions to, for at least a first product of the inventoried products:~~

~~cause a high definition camera (1320) to capture an image that includes the first product, wherein the capturing includes defining a bounding box around section of the first product that contains product indicia;~~

~~apply a recognition model to the image to extract the product of indicia from a section of the image that is within the bounding box; and~~

~~use a classifier to determine whether the product information data store includes an inventoried product with identifying information that is a likely match for the product indicia.~~

~~3. The system of claim 1, wherein the instructions to access the product information data store to identify products that are in the inventory of the first channel comprise instructions to:~~

~~identify a channel ID for the first channel; and~~

~~maintain data security by extracting, from the product information data store, product data records that are associated with the channel ID and not any product data records that are associated with any other channel ID.~~

~~4. The system of claim 1, wherein the channel manager user interface comprises a channel collection user interface that comprises one or more actuators by which the system will receive, from the channel manager user, for the first channel:~~

~~a definition for the first channel, wherein the definition for the first channel comprises a subgroup to which the channel relates; and~~

~~a definition for a collection of products that are available from the first channel, wherein the definition for the collection comprises:~~

~~product description information received from a product description field, and~~

~~one or more access restrictions for the collection.~~

2~~5~~. The system of claim 1, wherein the programming instructions to output the secure profile data on the display device comprise instructions to:

display information for a plurality of products that are in the consumer-product interaction records for the consumer;

for each product for which the consumer profile data store holds a rating received from the consumer, display the rating with the information for that product; and

for an unrated product for which the consumer profile data store does not hold a rating received from the consumer, generate a proxy rating for the unrated product and display the proxy rating with the information for the unrated product.

36. The system of claim 25, wherein the programming instructions to generate the proxy rating comprise instructions to use one or more of the following to generate the proxy rating:

a function of a number of times that the consumer purchased the unrated product; or

a date on which the consumer purchased of the unrated product.

47. The system of claim 25, wherein the programming instructions to generate the proxy rating comprise instructions to:

access the product information data store and retrieve a plurality of characteristic values for the unrated product; and

determine whether the retrieved characteristic values for the product correspond to one or more indicators of preference in a preference model for the consumer, wherein the preference model represents associations between the consumer's ratings of products and a plurality of product characteristics.

58. The system of claim 25, wherein the programming instructions to generate the proxy rating comprise instructions to:

receive, from the supplier, indicia of a non-purchase interaction by the consumer with the unrated product; and

upon determining that indicia indicate that the consumer interacted with the unrated product, assign a favorable proxy rating to that product.

69. The system of claim 1, further comprising additional programming instructions that are configured to cause the processor to generate and output, on a display device, a channel creation user interface via which the system will:

receive, from a user, product information for a plurality of inventoried products;

for each inventoried product for which product information is received, determine whether the inventoried product is already in the product information data store;

if the inventoried product is not already in the product information data store, add the product information for the inventoried product to the product information data store;

if the inventoried product is already in the product information data store, present additional product information from the product information data store to the user to accept or modify; and

upon receiving confirmation from the user, update the product information data store to include the product information for the inventoried product and associate the inventoried product with the first channel.

7~~10~~. The system of claim 6~~9~~, wherein the programming instructions to update the product information data store to include the product information for the inventoried product and associate the inventoried product with the first channel comprise instructions to add a record for the inventory product to the product information data store in which the record includes~~by~~:

~~identifying~~ a channel ID for the first channel; and

~~using a~~ mapping IDs~~ID~~ for a supplier that is associated with the first channel, in which the mapping IDs ~~the record to~~ associate data elements in the record to data element fields ~~for the first channel~~ in the product information data store.

8~~11~~. The system of claim 6~~9~~, further comprising programming instructions that are configured to cause the processor to associate the inventoried product with an address for a landing page for the inventoried product on a website of the first channel.

9. The system of claim 1, wherein the programming instructions to receive the product information for a plurality of inventoried products and determine whether the inventoried product is in the product information data store comprise instructions to, for at least a first product of the inventoried products:

cause a high definition camera to capture an image that includes the first product, wherein the capturing includes defining a bounding box around a section of the first product that contains product indicia;

apply a recognition model to the image to extract the product indicia from a section of the image that is within the bounding box; and

use a classifier to determine whether the product information data store includes an inventoried product with identifying information that is a likely match for the product indicia.

10~~12~~. The system of claim 1, further comprising additional programming instructions that are configured to cause the processor to generate and output a customer selection manager via which the system may:

~~receive, via the channel manager user interface, a selection of a consumer;~~

receive, via the channel manager user interface, one or more product screening criteria;

use the consumer profile data, including both the secure profile data and profile data that is associated with tokens for one or more other channels, to generate the one or more product recommendations for the consumer, wherein the one or more product recommendations are for products in the inventory that meet the one or more product screening criteria;

automatically generate a message that includes the one or more product recommendations; and

transmit the message to the consumer.

1113. The system of claim 1, further comprising additional programming instructions that are configured to cause the processor to generate and output a customer selection manager via which the system may:

receive, via the channel manager user interface, a selection of a product;

access the consumer profile data to identify one or more consumers who are associated with the first channel;

for each of the identified one or more consumers, generate a predicted rating for the product;

select, from the identified one or more consumers, a group of consumers whose predicted rating exceeds a threshold;

automatically generate a message that includes information about the selectedidentified product; and

transmit the message to the group of consumers.

1214. The system of claim 1, wherein the programming instructions to generate the one or more product recommendations for the consumer comprise instructions to:

determine that the consumer has requested a product of a first product category;

identify a second product category;

use one or more attributes of the requested product and the secure profile data to select, from the inventory, one or more products of the second product category; and

include the selected one or more products in the one or more product recommendations.

13. The system of claim 1, wherein the instructions to access the product information data store to identify products that are in the inventory of the first channel comprise instructions to:

identify a channel ID for the first channel; and

extract, from the product information data store, product data records that are associated with the channel ID and not any product data records that are associated with any other channel ID.

14. The system of claim 1, wherein the channel manager user interface comprises a channel collection user interface that comprises one or more actuators by which the system will receive, from the channel manager user, for the first channel:

a definition for the first channel, wherein the definition for the first channel comprises a subgroup to which the first channel relates; and

a definition for a collection of products that are available from the first channel, wherein the definition for the collection comprises:

product description information received from a product description field, and

one or more access restrictions for the collection.

15. The system of claim 1, further comprising additional programming instructions that are configured to cause the processor to:

receive, via a data feed from each of a plurality of suppliers, inventory information for a plurality of products;

extract, from each data feed, the inventory information for each of the plurality of suppliers; and ~~by:~~

~~using semantic synonyms to map each of a plurality of data fields in the data feed to a pre-defined field mapping that matches a system field in the data store; and~~

~~extracting the data from each of the mapped data fields, and save the extracted data to a matched system field; and~~

update the product information data store to include the extracted inventory information for each product that is associated with the supplier in the product information data store.

16. The system of claim 15, wherein the programming instructions to extract the inventory information from each data feed comprise instructions to, for each data feed:

use semantic synonyms to map each of a plurality of data fields in the data feed to a pre-defined field mapping that matches a system field in the data store; and

extract data from each of the mapped data fields, and save the extracted data to a matched system field.