



US 20150058313A1

(19) **United States**

(12) **Patent Application Publication**
Walker et al.

(10) **Pub. No.: US 2015/0058313 A1**

(43) **Pub. Date: Feb. 26, 2015**

(54) **DYNAMIC SUSTAINABILITY SEARCH ENGINE**

(71) Applicant: **ROCKWELL AUTOMATION TECHNOLOGIES, INC.**, Mayfield Heights, OH (US)

(72) Inventors: **Marcia Elaine Walker**, Durham, NC (US); **Philip John Kaufman**, Milwaukee, WI (US)

(21) Appl. No.: **14/532,673**

(22) Filed: **Nov. 4, 2014**

Related U.S. Application Data

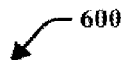
(63) Continuation of application No. 12/429,830, filed on Apr. 24, 2009, now Pat. No. 8,892,540.

Publication Classification

(51) **Int. Cl.**
G06F 17/30 (2006.01)
G06Q 30/02 (2006.01)
(52) **U.S. Cl.**
CPC *G06F 17/3053* (2013.01); *G06F 17/30864* (2013.01); *G06F 17/30398* (2013.01); *G06Q 30/02* (2013.01)
USPC **707/706**

(57) **ABSTRACT**

The innovation relates to systems and/or methodologies for facilitating dynamic sustainability searches. A sustainability search component executes a query, and returns one or more results that satisfy a set of search criteria and a set of sustainability factors. The search criteria can include keywords, such as product types, process types, and additional features related to the keywords, such as price, location, brand, and so forth. The sustainability factors are alternative cost measures for a given process, product, or plant element. The sustainability search component can analyze the returned results, and rank the results based on sustainability.



SUSTAINABILITY SEARCH ENGINE

SEARCH

CRITERIA ▼SELECT WEIGHT %

SUSTAINABILITY SEARCH RESULTS

Rank	Product	% Recycled	Child Labor	% Clean Energy
1	Product A	90	No	65
2	Product C	75	No	90
3	Product R	72	No	75
4	Product M	68	No	20
5	Product S	54	No	60
6	Product W	50	No	63
7	Product B	45	No	15

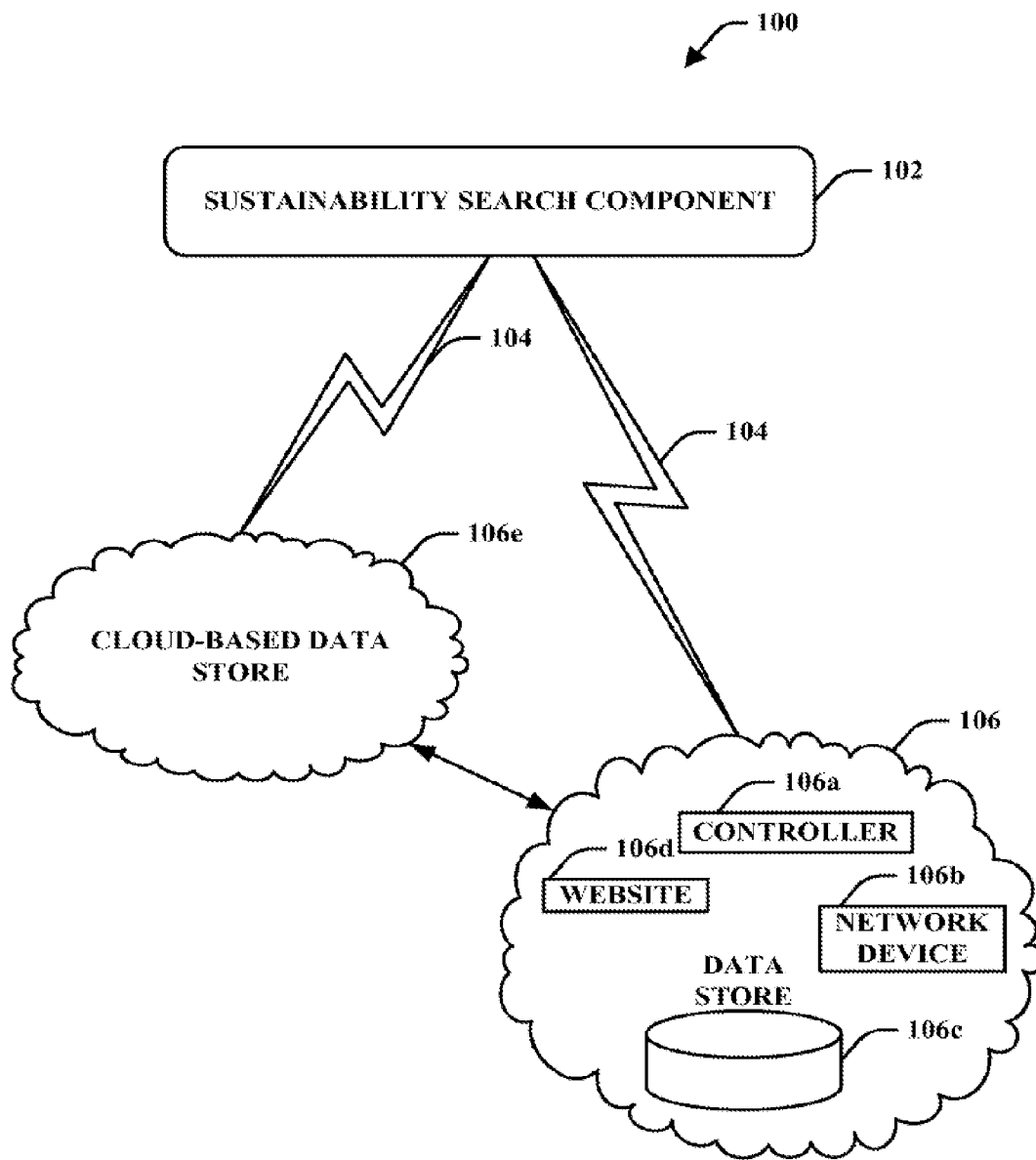


FIG. 1

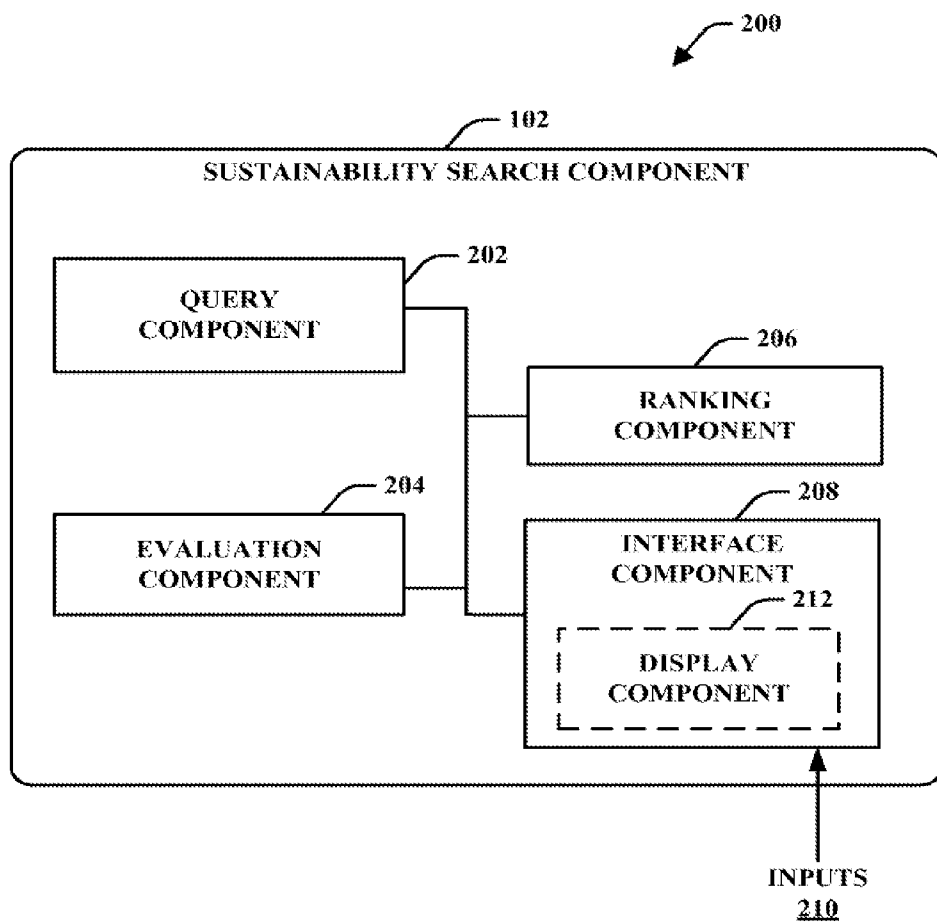


FIG. 2

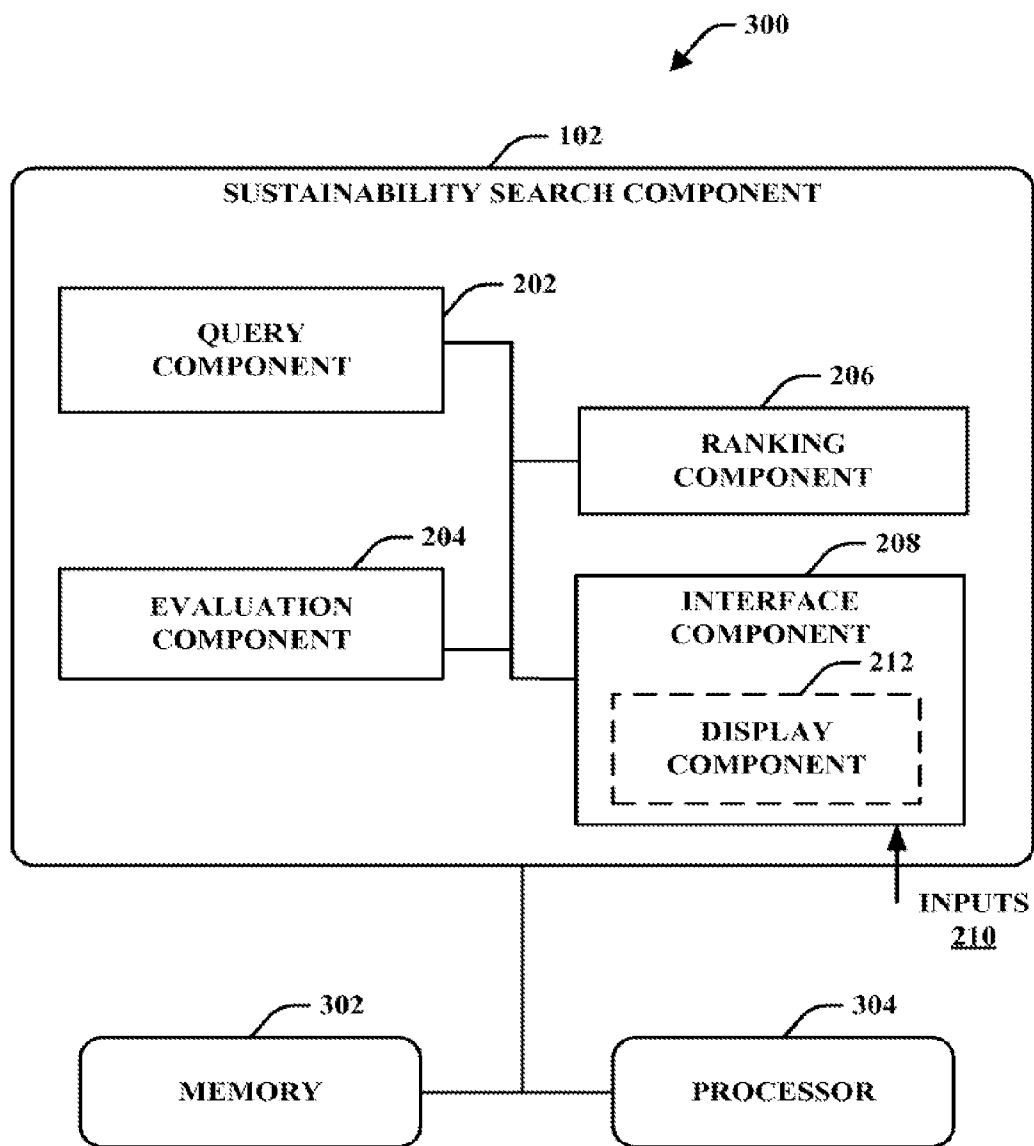


FIG. 3

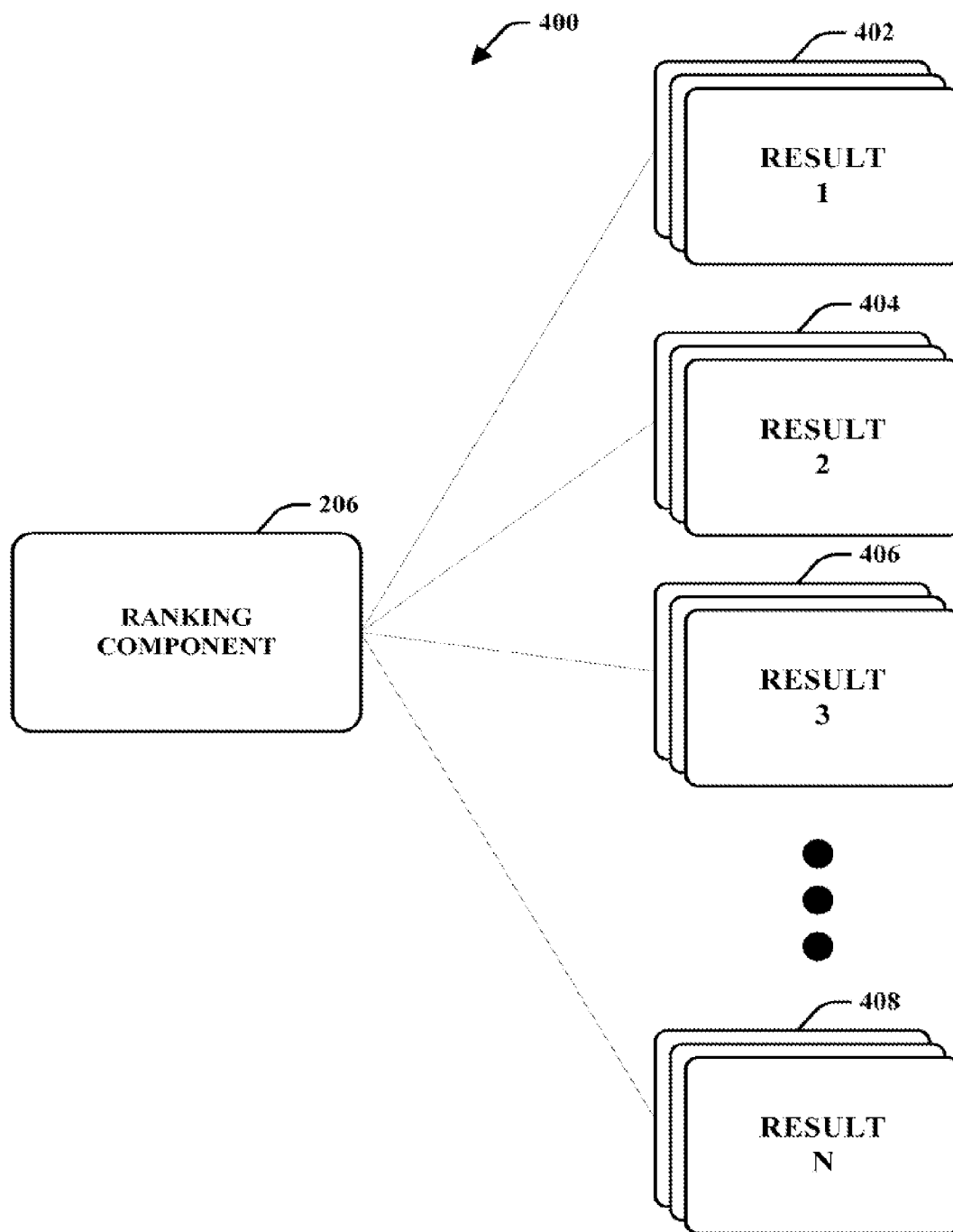


FIG. 4

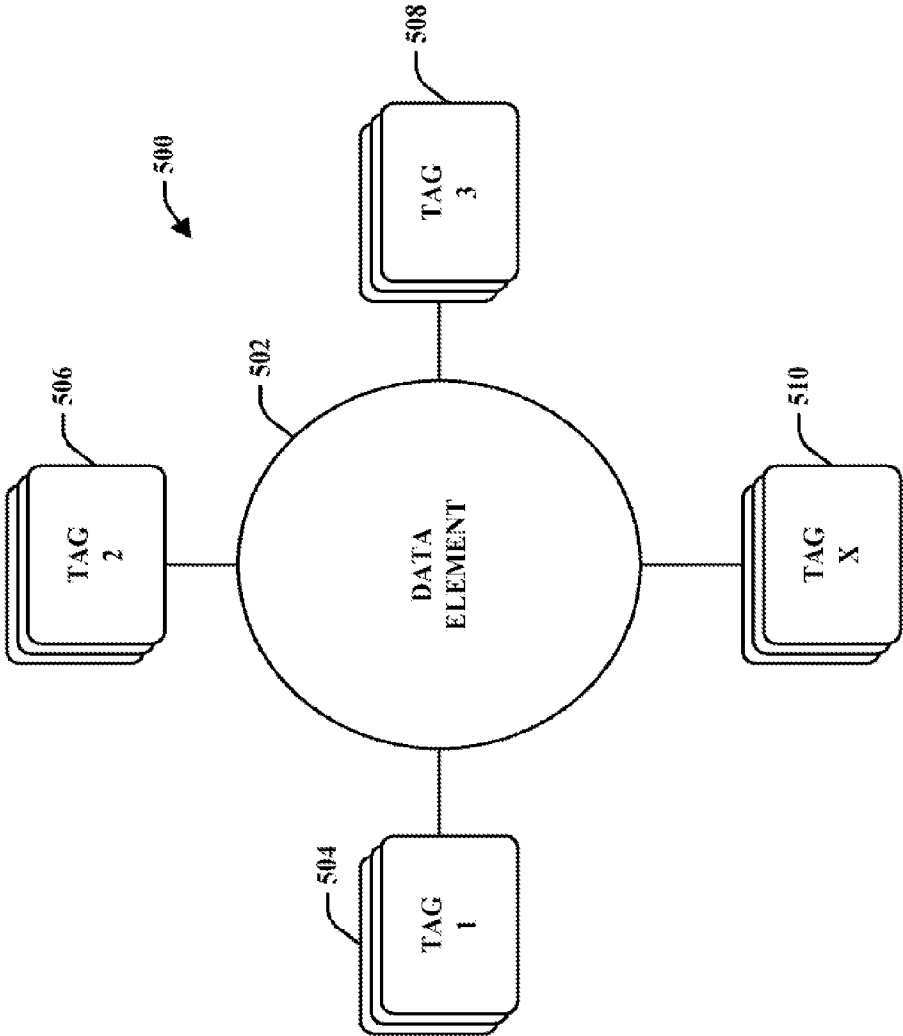


FIG. 5

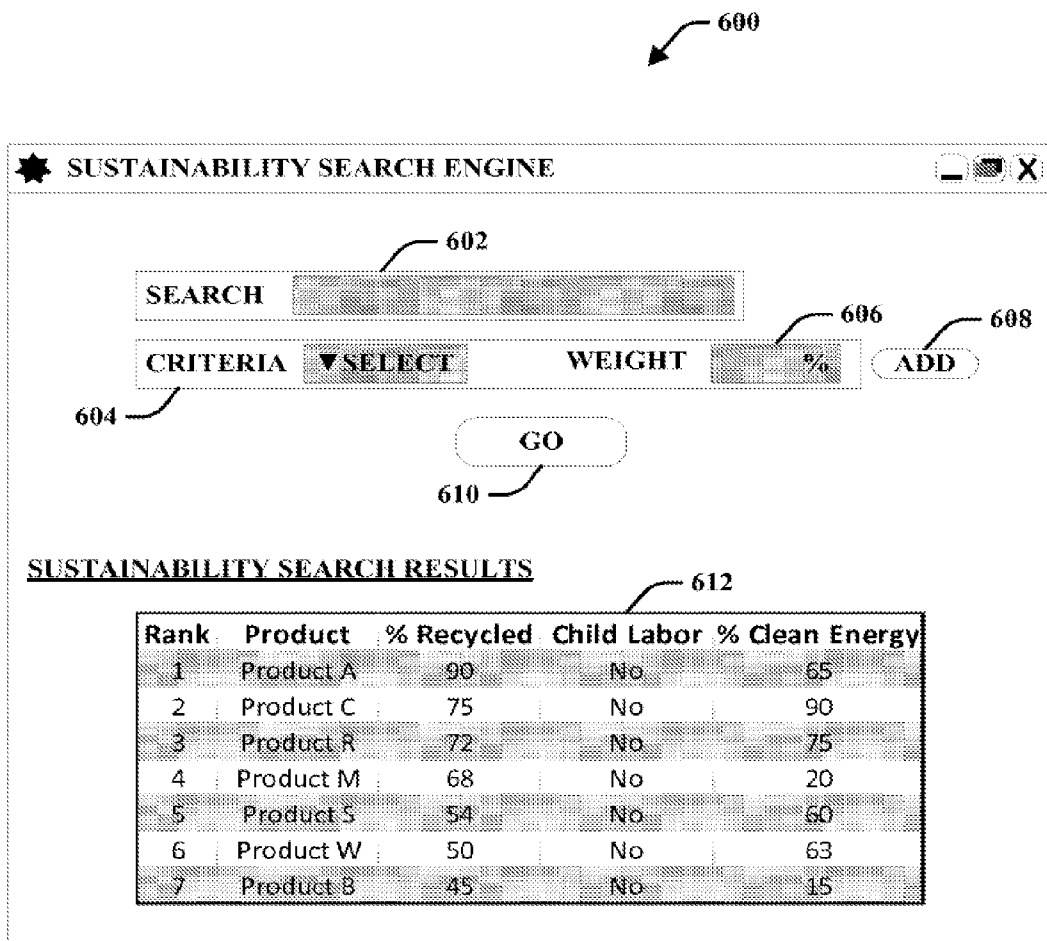


FIG. 6

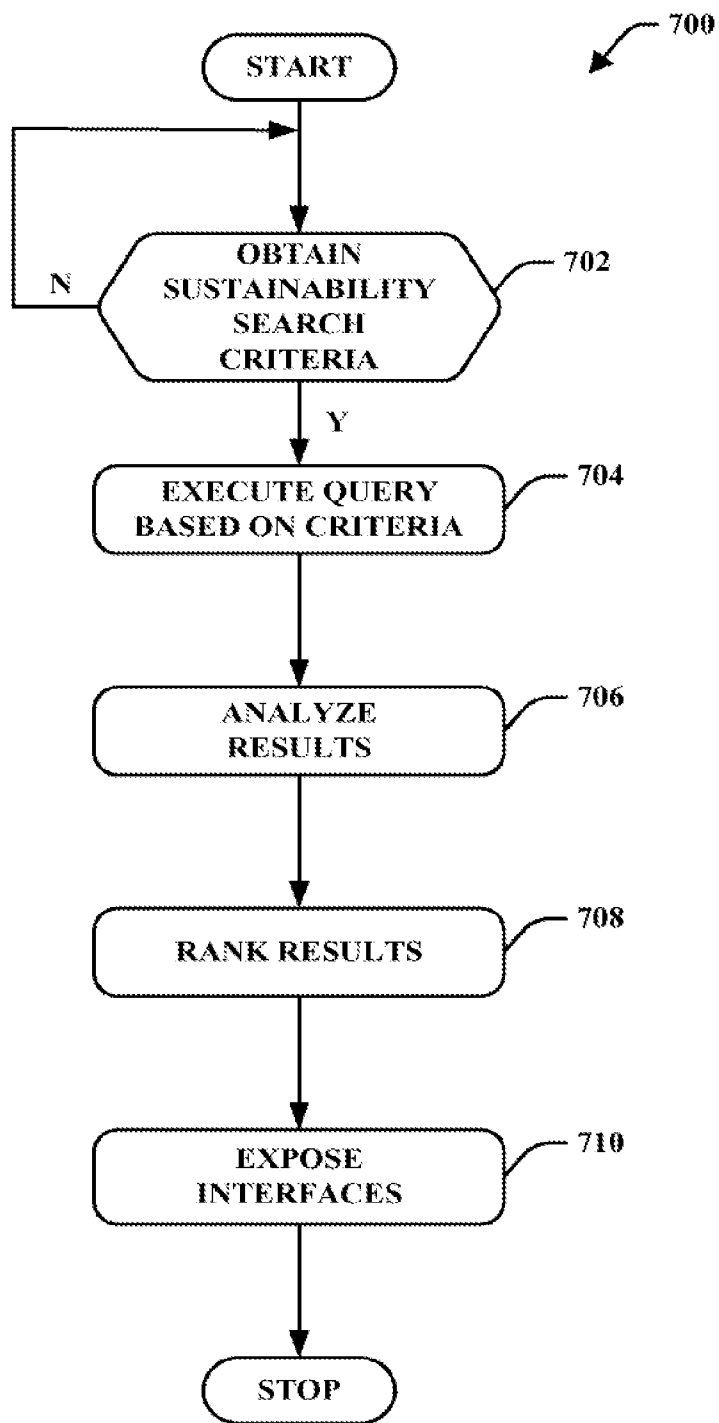


FIG. 7

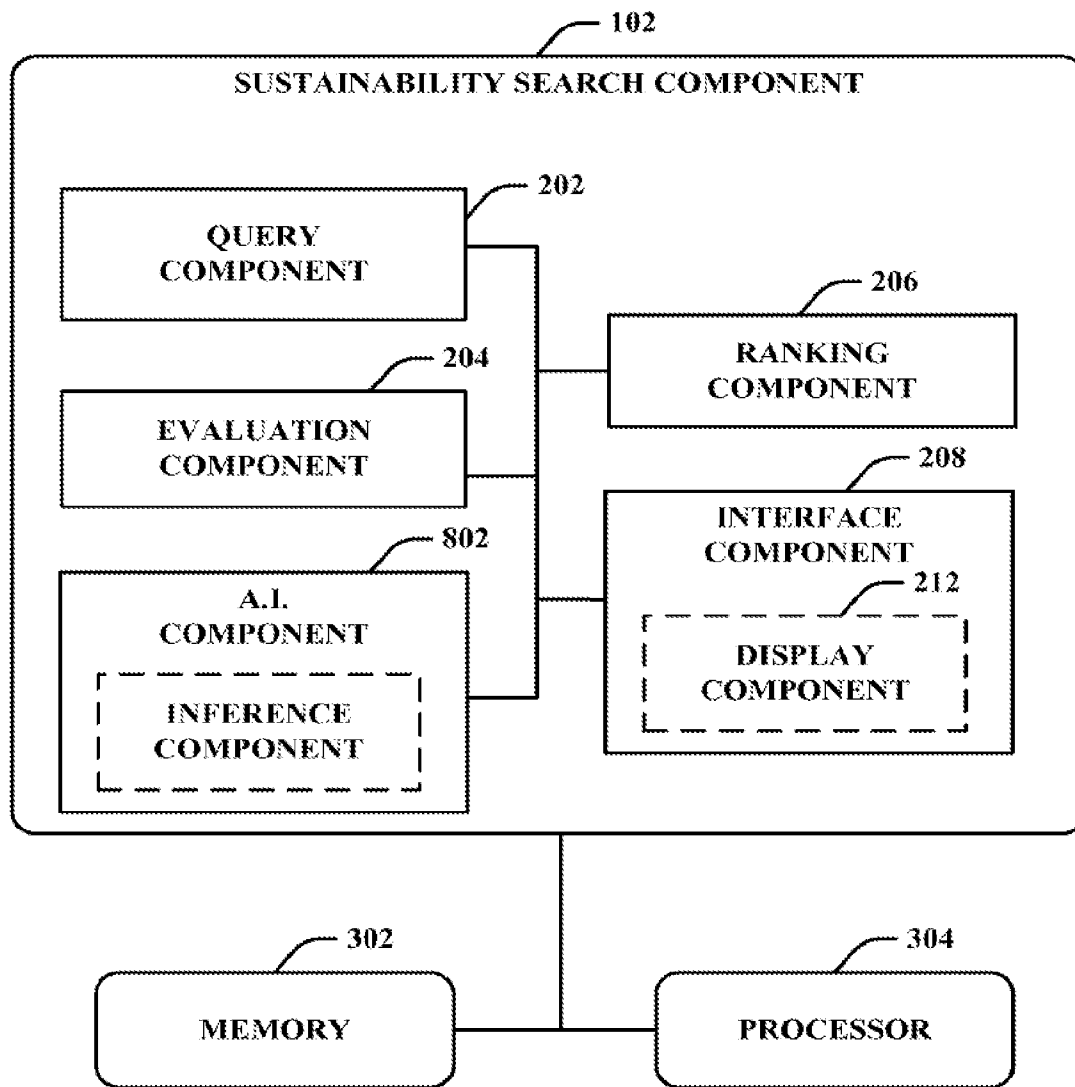


FIG. 8

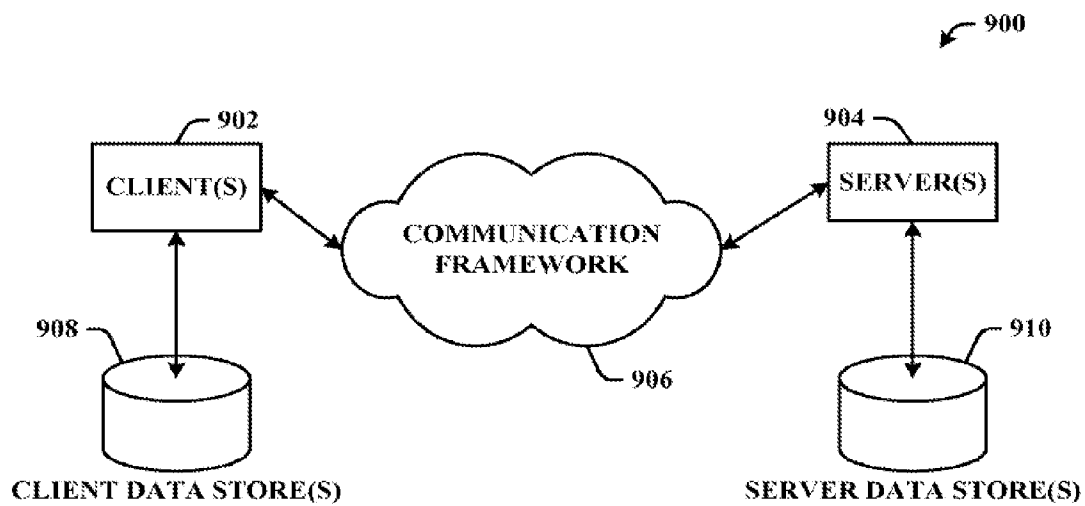


FIG. 9

DYNAMIC SUSTAINABILITY SEARCH ENGINE

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation of U.S. patent application Ser. No. 12/429,830, which was filed on Apr. 24, 2009, entitled “DYNAMIC SUSTAINABILITY SEARCH ENGINE”, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The subject innovation relates generally to sustainability enhancements, and more particularly to systems and/or methodologies for a dynamic sustainability search engine.

BACKGROUND

[0003] Consumers, manufacturers, and retailers are becoming increasingly interested in environmental and socio-environmental concerns, such as recycling, child labor practices, reducing greenhouse gas emissions, improving energy demand, and so forth. In addition, the current economic climate is making “green” solutions ever more attractive, particularly those with the potential to decrease cost or increase profitability. However, access to information regarding a number of these issues can be difficult to locate, assuming that said information is even readily available.

[0004] A variety of current approaches focus on broadly defining products or processes as “green”, conflict-free, environmentally friendly, etc. For example, a number of products are marked with seals that intend to confer to prospective purchasers that the products are somehow more ecologically friendly than comparable products. Similarly, a number of certifications are available in various areas, typically at an expense to the party seeking the certification. The merit of these seals and certifications can be difficult to ascertain, because details of what they intend to convey is often unknown or unclear.

[0005] The current approaches are often only vague or ambiguous indicators of a products actual environmental or socio-environmental impact. In addition, the rating or certification systems may ignore or give undesirable weight to any number of factors that are important to different people and groups. Consequently, it would be desirable to have a dynamic technique for determining the sustainability of products, and efficiently locating information regarding said sustainability.

SUMMARY

[0006] The following presents a simplified summary in order to provide a basic understanding of some aspects of the disclosed embodiments. This summary is not an extensive overview and is intended to neither identify key or critical elements nor delineate the scope of such embodiments. Its purpose is to present some concepts of the described embodiments in a simplified form as a prelude to the more detailed description that is presented later.

[0007] Systems and methods are provided for facilitating dynamic sustainability searches. A sustainability search component executes a query, and returns one or more results that satisfy a set of search criteria and a set of sustainability factors. The search criteria can include keywords, such as product types, process types, and additional features related

to the keywords, such as price, location, brand, and so forth. The sustainability factors are alternative cost measures for a given process, product, or plant element. The sustainability search component can analyze the returned data elements, and rank the data elements according to sustainability.

[0008] The sustainability can be determined based on a predetermined sustainability score, or can be determined based on weights assigned to one or more sustainability factors. The weights assigned to the sustainability factors can be predetermined, or can be determined based on one or more user preferences. The query results and rankings can be used to influence consumer purchasing, for management of industrial production, for regulatory oversight, for supply chain management, and product design. In addition, one or more interfaces can be provided to facilitate user interaction with the sustainability search component.

[0009] To the accomplishment of the foregoing and related ends, one or more embodiments comprise the features hereinafter fully described and particularly pointed out in the claims. The following description and the annexed drawings set forth in detail certain illustrative aspects and are indicative of but a few of the various ways in which the principles of the embodiments may be employed. Other advantages and novel features will become apparent from the following detailed description when considered in conjunction with the drawings and the disclosed embodiments are intended to include all such aspects and their equivalents.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is an example general component block diagram illustrating a dynamic sustainability search system in accordance with an aspect of the present specification.

[0011] FIG. 2 is an example general component block diagram illustrating an example sustainability search component in accordance with an aspect of the present specification.

[0012] FIG. 3 illustrates an example system facilitating dynamic sustainability search in accordance with an aspect of the present specification.

[0013] FIG. 4 illustrates an example block diagram of a ranking component in accordance with an aspect of the present specification.

[0014] FIG. 5 illustrates an example data element in accordance with an aspect of the present specification.

[0015] FIG. 6 is an example graphical user interface in accordance with an aspect of the present specification.

[0016] FIG. 7 illustrates an example methodology for dynamic sustainability searches in accordance with an aspect of the present specification.

[0017] FIG. 8 illustrates a system that employs an artificial intelligence component which facilitates automating one or more features in accordance with the subject specification.

[0018] FIG. 9 is a schematic block diagram of a sample-computing environment with which the subject specification can interact.

DETAILED DESCRIPTION

[0019] The subject matter is now described with reference to the drawings, wherein like reference numerals are used to refer to like elements throughout. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the subject matter. It may be evident, however, that subject matter embodiments may be practiced without these specific

details. In other instances, well-known structures and devices are illustrated in block diagram form in order to facilitate describing the embodiments.

[0020] As used in this application, the terms “component,” “system,” “object,” “model,” “policy,” and the like are intended to refer to a computer-related entity, either hardware, a combination of hardware and software, software, or software in execution. For example, a component may be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and/or a computer. By way of illustration, both an application running on a server and the server can be a component. One or more components may reside within a process and/or thread of execution and a component may be localized on one computer and/or distributed between two or more computers. Also, these components can execute from various computer readable media having various data structures stored thereon. The components may communicate via local and/or remote processes such as in accordance with a signal having one or more data packets (e.g., data from one component interacting with another component in a local system, distributed system, and/or across a network such as the Internet with other systems via the signal).

[0021] FIG. 1 is an example general component block diagram illustrating a dynamic sustainability search system **100** in accordance with an aspect of the present innovation. The system **100** includes a sustainability search component **102** that queries one or more targets **106** (e.g., **106a-e**) for data elements (e.g., results) satisfying a set of search criteria and sustainability factors via a communication link **104**. The data elements can be product or process identifiers having one or more tags (e.g., metadata, notations, etc.) relating to the search criteria and/or sustainability factors (discussed infra). Additionally or alternatively, the data elements can be websites, articles, database entries, bills of materials (B.O.M), specifications, and so forth. The targets **106** can include but are not limited to controllers **106a**, network devices **106b**, data stores **106c**, websites **106d**, and so forth. Data elements can be locally stored by the targets **106**, or remotely stored, such as in a server, distributed network of data stores, and so forth.

[0022] Additionally or alternatively, the targets **106** can include a cloud-based data store **106e**. The cloud-based data store **106e** (e.g., cloud) is illustrative of a computing infrastructure having a plurality of devices capable of communicating data and/or virtualized resources across the communication infrastructure **104** (e.g., such as the Internet). It is to be appreciated that user devices (e.g., sustainability search component **102**) obtaining data or resources from the cloud **106e** do not need to have knowledge of, expertise in, or control over the technology infrastructure contributing to or contained in the cloud **106e**. Furthermore, the communication link **104** can include public networks such as the Internet, Intranets, and automation networks such as Control and Information Protocol (CIP) networks including DeviceNet and ControlNet. Other networks include Ethernet, DH/DH+, Remote I/O, Fieldbus, Modbus, Profibus, wireless networks, serial protocols, and so forth.

[0023] In operation, the sustainability search component **102** queries one or more of the targets **106** for data elements satisfying a set of search criteria and a set of sustainability factors (e.g., sustainability criteria, sustainability metrics, etc.). The search criteria can include search terms (e.g., keywords), such as product types, process types, and so forth. For

example, the sustainability search component **102** can execute a query for “motors.” In addition, the search criteria can include additional features of or related to the search terms, including but not limited to price, brand, location, etc. Continuing with the previous example, the search component **102** can execute a query for “motors” that have a price of less than or equal to five thousand dollars (\$5000.00).

[0024] The term “sustainability factors” is intended to assess alternative cost measures for a given process, product, or plant element. The sustainability factors can be organized into categories or subgroups. For instance, the sustainability factors can be organized into at least three categories: planet, human, and financial sustainability. The planet sustainability factors can include resource consumption, such as water, air, gas, electricity, and steam (e.g., WAGES). In addition, the planet sustainability factors can include carbon emissions, recyclability (e.g., component, packaging, etc.), waste factor (e.g., product and/or process), and most any other factor that relates to the environmental impact of a product or process. The human sustainability factors, can include diversity factors (e.g., employment of minorities) for employers, training scores (e.g., skilled versus unskilled labor), union labor scores (e.g., use of union vs. non-union labor), fair labor practices, lost work day case rate (e.g., LWDCR, work related injuries and illnesses that result in the employee not being able to perform work), recordable case rate (e.g., RCR, work related injury or illness requiring attention beyond first aid), or most any other factor that relates to the safety performance of a product, machine, organization, and so forth. The financial sustainability factors can include utilities cost (e.g., energy demand, demand charges, etc.), marketing appeal (e.g., package design A tested better than package design B and is expected to be more profitable), or most any financial measurement impacting the cost or profitability of a product or process. Returning to a prior example, the sustainability search component **102** can query the targets **106** for motors costing less than or equal to \$5000 (e.g., search criteria), and that were manufactured without child labor (e.g., human sustainability factor). The sustainability search component **102** obtains, retrieves, or otherwise acquires one or more results that satisfy one or more of the search criteria (e.g., motors, >=\$5000), and sustainability factors (e.g., no child labor).

[0025] In addition, the sustainability search component **102** can analyze the resulting data elements (e.g., results). For example, the analysis can include locating a predetermined sustainability score contained in or associated with a data element. Additionally or alternatively, the sustainability search component **102** can determine the sustainability score based on one or more associated sustainability factors. Users can assign weights or prioritization values to the sustainability factors based on their personal or business preferences. For example, some users value human sustainability factors more than planet sustainability factors and others may place the most emphasis on a particular sustainability factor such as energy consumption. Furthermore, the sustainability search component **102** can rank the results based on their sustainability scores (discussed infra). The sustainability search component **102** can also base the results ranking on additional factors, such as relevance, user preferences, and so forth. It is to be appreciated that a user can be a human being, or an application or process (e.g., external or integrated).

[0026] Most any of the targets **106**, such as the controller **106a**, network device **106b**, data store **106c**, or website **106d** can be initially responsible for measuring or acquiring mea-

surements for the sustainability factors. As used herein, the term controller or PLC can include functionality that can be shared across multiple components, systems, or networks. For example, one or more controllers **106a** can communicate and cooperate with various network devices **106b** via the communication link **104**. This can include substantially any type of control, communications module, computer, I/O device, sensors, Human Machine Interface (HMI) that communicate via the network that includes control, automation, or public networks. The controller **106a** can also communicate to and control various other devices such as Input/output modules including Analog, Digital, Programmed/Intelligent I/O modules, other programmable controllers, communications modules, sensors, output devices, and the like. It is to be appreciated that the foregoing example is illustrated for brevity and clarity of explanation; a plurality of additional embodiments may be possible within the scope and spirit of the subject innovation.

[0027] FIG. 2 illustrates an example sustainability search component **102** in accordance with an aspect of the subject innovation. The sustainability search component **102** includes a query component **202**, an evaluation component **204**, and a ranking component **206**. The query component **202** searches, scans or otherwise inspects one or more targets for data elements satisfying a set of search criteria and sustainability factors. Data elements can include virtually all data types, such as product or process identifiers having one or more tags (e.g., metadata, notations, etc.) relating to the search criteria and/or sustainability factors. Additionally or alternatively, the data elements can include websites, articles, database entries, bills of materials (B.O.M.), specifications, computer readable instructions, and most any data capable of conveying or communicating relevant information regarding an object or set of objects for which a query is being executed (e.g., query object). The search criteria can include words (e.g., keywords), parts of words, acronyms, and so forth that identify one or more query objects. For example, the search criteria can include products, processes, etc. In addition, the search criteria can include one or more properties of the query object, including but not limited to manufacturer, cost, life cycle, etc. As mentioned above, sustainability factors are metrics that assess alternative cost measures for the query objects. For example, the sustainability factors can include a sustainability score, a set of planet sustainability factors, a set of human sustainability factors, and/or a set of financial sustainability factors.

[0028] The evaluation component **204** examines, rates, or otherwise analyzes the data elements and associated tags obtained by the query component **202**. Analysis of the data elements can include determining sustainability scores for the data elements. The sustainability scores can be predetermined values that are associated with the data elements. For example, a query can return a data element for the product Y, where the product Y has a predetermined sustainability score of X. Additionally or alternatively, the evaluation component can determine the sustainability score for the data elements by weighting one or more sustainability factors of the data elements. For instance, users of the system **200** may have different sustainability needs, and therefore can assign (discussed infra) different weights to sustainability factors. Continuing with the example, a data element for a bottle of wine may have a plurality of sustainability factors associated with it, including a safety performance score (e.g., human sustainability factor) that has a value ranging for 0 to 10, a water

consumption factor (e.g., planet sustainability factor) expressed in the number of gallons used in manufacture of the bottle of wine, and a true or false recyclable packaging factor (e.g., true=1, false=0). A first user may prioritize the human sustainability factor (e.g., safety performance) above the planet sustainability factors (e.g., water consumption, and recyclable packaging), and the first user can assign a weight of thirty (30) to the safety performance factor, a weight of twenty (20) to the water consumption factor, and a weight of ten (10) to the recyclable packaging factor. Therefore, the evaluation component can determine the first user's sustainability score for a bottle of wine using the following equation:

$$SS_1=(30*spf)+(20*wcf)+(10*rpf)$$

where SS is the sustainability score, spf is the safety performance factor, wcf is the water consumption factor, and rpf is the recyclable packaging factor. Conversely, a second user, from a drought prone area, perhaps, can prioritize water consumption above the other factors. For instance, the second user can assign a weight of ten (10) to the safety performance factor, a weight of thirty (30) to the water consumption factor, and a weight of twenty (20) to the recyclable packaging factor. The evaluation component **204** can determine the second user's sustainability score for a bottle of wine using the following equation:

$$SS_2=(10*spf)+(30*wcf)+(20*rpf)$$

The evaluation component **204** can determine different sustainability scores for query objects based on the weighting of one or more sustainability factors. It is to be appreciated the data elements can have additional un-weighted sustainability factors, wherein the evaluation component **204** can assign a default weight to those factors, or not use the factors in determining the sustainability score.

[0029] The ranking component **206** organizes the data elements based on the sustainability score determined by the evaluation component. For instance, the ranking component **206** can organize the bottles of wine from the previous example, in a list order from most desirable sustainability score to least desirable sustainability score. In addition, the ranking component **206** can restrict the list to data elements having sustainability scores above or below a threshold, or can restrict the list to a predetermined number of data elements. For example, the ranking component **206** may only include data elements having a sustainability score below (500) on the list, or can restrict the list to the ten (10) data elements having the most desirable sustainability scores. Furthermore, the ranking component **206** can use additional factors in organizing the data elements, including but not limited to relevance, user preferences, and so forth. It is to be appreciated that the ranking component **206** can organize the data elements in a plurality of ways and is not limited to a list. For example, the ranking component **206** can organize the data elements in tables, charts, graphs, matrices, and virtually any manner suitable for conveying the intended information.

[0030] The sustainability search component **102** can further include an interface component **208**, which provides various adapters, connectors, channels, communication paths, etc. to integrate the sustainability search component **102** into virtually any operating and/or database system(s). In addition, the interface component **208** can provide various adapters, connectors, channels, communication paths, etc., that provide for interaction with the sustainability search component **102**. For instance, the interface component **208** can enable interaction with the sustainability search compo-

nent **102** via a set of inputs **210**, where the inputs **210** can include explicit user inputs (e.g., configuration selections, question/answer) such as from mouse selections, keyboard selections, speech, and so forth. The inputs **210** can also include data uploads, wherein a data upload is the transfer of data from the user or a third party source (e.g. computer or a computer readable medium), to the system **200**. In particular, the interface component **208** can receive any data relating to search criteria, sustainability factors, sustainability factor weighting, etc.

[0031] It is to be appreciated that although the interface component **208** is illustrated as being incorporated into the sustainability search component **102**, such implementation is not so limited. For instance, the interface component **208** can be a stand-alone component to receive or transmit data in relation to the sustainability search component **102**. In addition, the interface component **208** can include a display component **212** that facilitates displaying search criteria, sustainability factors, sustainability factor weighting, data elements, organization of data elements, and so forth.

[0032] Additionally or alternatively, the query results and/or rankings can be communicated, transmitted, or otherwise provided to an external application via a communication network (discussed above). For example, the results and rankings can be provided to an advertising application that obtains the results, and uses the results and ranking to implement a targeted advertising campaign to perspective consumers exhibiting sustainability concerns close to the sustainability scores of the query results. As an additional example, the results and rankings can be provided to a design application that can use the results to enhance or optimize a manufacturing design.

[0033] Turning now to FIG. 3, an example system **300** facilitating dynamic sustainability search is illustrated in accordance with an aspect of the subject innovation. The system **300** includes a sustainability search component **102** that executes a query in one or more targets for data elements satisfying a set of search criteria and sustainability factors. In addition, the sustainability search component **102** can locate a predetermined sustainability score for the data elements, or dynamically determining a sustainability score based on one or more sustainability factors. For instance, a user can assign weight values to one or more sustainability factors, and the sustainability search component can determine the sustainability score factoring in the user defined weight values. Moreover, the data elements can be organized (e.g., ranked) based on the sustainability scores.

[0034] System **300** can additionally comprise memory **302** that is operatively coupled to the sustainability search component **102** and that stores search criteria, sustainability factors, weights, user preferences, data elements, and so forth or information related to the data elements, search criteria, sustainability factors, weights, user preferences, and any other suitable information related to facilitating dynamic sustainability searches. A processor **304** can be operatively connected to the sustainability search component **102** (and/or memory **302**) to facilitate storing and/or communicating content and the like. It is to be appreciated that processor **304** can be a processor dedicated to executing queries, analyzing results, ranking results and/or interfacing with the sustainability search component, a processor that controls one or more components of system **300**, and/or a processor that obtains, analyzes, and ranks results, generates interfaces, and controls one or more components of system **300**.

[0035] FIG. 4 illustrates an example block diagram of a ranking component **206** in accordance with an aspect of the subject innovation. As previously discussed, the ranking component **206** can order the analyzed data elements (e.g., results) based on sustainability scores and additional factors, such as relevance, user preferences, and so forth. For example, the ranking component **206** can organize N results from lowest sustainability score to highest sustainability score, where N is an integer. For instance, as in a previous example, a sustainability search can be executed for bottles of wine, where a user assigns a weight of ten (10) to a safety performance factor, a weight of thirty (30) to a water consumption factor, and a weight of twenty (20) to a recyclable packaging factor. A first result **402** (e.g., result 1) is for a Chablis having a safety performance factor (e.g., recordable case rate) of 3, a water consumption factor of 20 (e.g., gallons to produce), and a recyclable package factor of 1 (e.g., recyclable). Therefore, the first result **402** has a determined sustainability score of **650** (e.g., $10*3+30*20+20*1$). A second result **404** is for a Chardonnay that has a safety performance factor of 1.4, a water consumption factor of 40, and a recyclable package factor of 0 (e.g., not recyclable). Therefore, the second result has a determined sustainability score of 1214 (e.g., $10*1.4+30*40+20*0$). A third result **406** (e.g., result 2) is for a Pinot Noir that has a safety performance factor of 4, a water consumption factor of 50, and a recyclable package factor of 0 (e.g., not recyclable). Therefore, the third result has a determined sustainability score of 1540 (e.g., $10*4+30*50+20*0$). Similarly, an N^{th} result **408** having a sustainability score greater than the sustainability score of an $N^{th}-1$ result can be ranked as well. It is to be appreciated that this is but a single example, and any number of sustainability factors can be accounted for, and additional factors can be considered by the ranking component as well.

[0036] FIG. 5 illustrates an example data element in accordance with an aspect of the subject innovation. The data element **502** can be most any data type capable of conveying or containing relevant information regarding an object or set of objects for which a query is being executed (e.g., query object). For instance, the data element **502** can include information relating to products, processes, components of manufacturer, and so forth having one or more tags (e.g., **504-510**, metadata, notations, etc.) relating to the search criteria and/or sustainability factors. By way of example, and not limitation, the data element **502** can be a three phase motor data element, wherein a first tag **504** (e.g., tag 1) indicates the brand of the motor, a second tag **506** (e.g., tag 2) contains data relating to one or more human sustainability factors, a third tag **508** contains data relating to one or more financial sustainability factors, and a X^{th} tag **510** that can contain virtually any data related to the data element **502**, including search criteria and/or sustainability factors. The data element **502** can be retrieved during a sustainability search for “three phase motors”, and a sustainability score can be determined based the associated sustainability data (e.g., second tag **506**, third tag **508**). Additionally or alternatively, the data element **502** can include websites, articles, database entries, bills of materials, computer readable instructions, specifications, and so forth, wherein the associated data (e.g., sustainability factors, search criteria, etc.) can be determined or inferred from the content of the data element **502**, as well as any associated tags **504-510**.

[0037] In additional embodiments, the data element **502** can be a sustainability factor, or sustainability score. For

example, a sustainability search can be executed for a product Y in a data store containing a plurality of data associated with product Y. The data element 502 can be retrieved as part of the results of the search, wherein the data element 502 contains a predetermined sustainability score. It is to be appreciated that the foregoing represents but a few examples of possible data structures, and a plurality of additional data structures are possible within the scope and spirit of the subject application.

[0038] Referring to FIG. 6, an example graphical user interface 600 is illustrated in accordance with an aspect of the subject innovation. The graphical user interface (GUI) 600 includes a search field 602. The search field 602 enables users to input one or more search terms. As discussed previously, the search terms can be words, acronyms, parts of words, numbers, letters, and/or symbols that define the object of a query (e.g., product, process, article of manufacture, etc.).

[0039] The GUI 600 also includes a criteria field 604 that enables users to input additional search criteria and/or sustainability criteria. For instance, a user may desire to search for a product specified in the search field 602, based on a particular sustainability criteria. The criteria field 604 is illustrated as being a dropdown menu, but the implementation is not so limited, and it could include most any type of input field (e.g., field, text area, etc.). In addition, a weight field 606 associated with the criteria field is provided. As discussed previously, users can assign weights to the sustainability criteria based on their personal preferences, and the sustainability score of a query object can be determined based on the user assigned weights. An add button 608 is provided that allows users to add up to W criteria and associated weight fields, where W is an integer. For example, a user may desire to search for a given product based on five sustainability factors, and the user can add five criteria fields to select the desired sustainability factors.

[0040] A go button 610 is provided that users can select when they desire to execute the specified query. As discussed previously, the sustainability search engine executes the specified query against a set of targets, analyses the results, and can rank them based on the sustainability scores. An example set of search results 612 are shown, wherein the results are ranked according to sustainability score, and related sustainability factors (e.g., percentage recycled, child labor, percentage using clean energy) are shown as well.

[0041] In view of the example systems described supra, methodologies that may be implemented in accordance with the disclosed subject matter will be better appreciated with reference to the flow chart of FIG. 7. While for purposes of simplicity of explanation, the methodologies are shown and described as a series of blocks, it is to be understood and appreciated that the claimed subject matter is not limited by the order of the blocks, as some blocks may occur in different orders and/or concurrently with other blocks from what is depicted and described herein. Moreover, not all illustrated blocks may be required to implement the methodologies described hereinafter.

[0042] Turning now to FIG. 7, an example methodology for dynamic sustainability searches is illustrated in accordance with an aspect of the present innovation. At 702, a set of search criteria including sustainability factors is obtained. The search criteria can include words (e.g., keywords), parts of words, acronyms, and so forth that identify one or more query objects. For example, the search criteria can include products, processes, articles of manufacturer, etc. In addition, the search criteria can include one or more properties of the

query object, including but not limited to manufacturer, cost, life cycle, etc. As mentioned above, sustainability factors are metrics that assess alternative cost measures for the query objects. For example, the sustainability factors can include a sustainability score, a set of planet sustainability factors, a set of human sustainability factors, and/or a set of financial sustainability factors.

[0043] At 704, a set of targets are searched, scanned or otherwise queried for one or more data satisfying the search criteria and sustainability factors. The targets can include data stores, controllers, network devices, websites, cloud-based data stores, and so forth. At 706, the results (e.g., data returned from the query) of the query are analyzed. The analysis includes locating a predetermined sustainability score, or determining a sustainability score based on sustainability factors associated with the results. As discussed previously, users can assign weights or prioritization values to one or more sustainability factors, and the sustainability score can be calculated based on the user assigned weights.

[0044] At 708, the results are organized, ordered, or otherwise ranked according to their sustainability scores. For example, the results can be ranked from lowest sustainability score (e.g., more desirable) to highest sustainability score (e.g., least desirable). In addition, the rankings can be restricted to the results having sustainability scores below a threshold. At 710, one or more interfaces can be exposed to display the search criteria, sustainability criteria, weights, results, sustainability scores, rankings, or any combination thereof. Additionally or alternatively, the results can be transmitted, sent or otherwise communicated to another application or process. For example, an advertising application can obtain the results, and use them to provide targeted advertising services.

[0045] FIG. 8 illustrates a system 800 that employs an artificial intelligence (AI) component 802 which facilitates automating one or more features in accordance with the subject innovation. The subject innovation (e.g., in connection with inferring) can employ various AI-based schemes for carrying out various aspects thereof. For example, a process for weighting sustainability factors, determining a set of targets, analyzing search results, or ranking search results can be facilitated via an automatic classifier system and process.

[0046] As used herein, the term “inference” refers generally to the process of reasoning about or inferring states of the system, environment, and/or user from a set of observations as captured via events and/or data. Inference can be employed to identify a specific context or action, or can generate a probability distribution over states, for example. The inference can be probabilistic—that is, the computation of a probability distribution over states of interest based on a consideration of data and events. Inference can also refer to techniques employed for composing higher-level events from a set of events and/or data. Such inference results in the construction of new events or actions from a set of observed events and/or stored event data, whether or not the events are correlated in close temporal proximity, and whether the events and data come from one or several event and data sources. Furthermore, inference can be based upon logical models or rules, whereby relationships between components or data are determined by an analysis of the data and drawing conclusions there from. For instance, by observing that one user interacts with a subset of other users over a network, it may be determined or inferred that this subset of users

belongs to a desired social network of interest for the one user as opposed to a plurality of other users who are never or rarely interacted with.

[0047] Directed and undirected model classification approaches including, for example, naïve Bayes, Bayesian networks, decision trees, neural networks, fuzzy logic models, and probabilistic classification models providing different patterns of independence can be employed. Classification as used herein also is inclusive of statistical regression that is utilized to develop models of priority.

[0048] As will be readily appreciated from the subject specification, the subject innovation can employ classifiers that are explicitly trained (e.g., via a generic training data) as well as implicitly trained (e.g., via observing user behavior, receiving extrinsic information). Thus, the classifier(s) can be used to automatically learn and perform a number of functions, including but not limited to determining according to a predetermined criteria when to update or refine the previously inferred schema, tighten the criteria on the inferring algorithm based upon the kind of data being processed (e.g., financial versus non-financial, personal versus non-personal, . . .), and at what time of day to implement tighter criteria controls (e.g., in the evening when system performance would be less impacted).

[0049] Referring now to FIG. 9, there is illustrated a schematic block diagram of an example computing environment 900 in accordance with the subject innovation. The system 900 includes one or more client(s) 902. The client(s) 902 can be hardware and/or software (e.g., threads, processes, computing devices). The client(s) 902 can house cookie(s) and/or associated contextual information by employing the innovation, for example.

[0050] The system 900 also includes one or more server(s) 904. The server(s) 904 can also be hardware and/or software (e.g., threads, processes, computing devices). The servers 904 can house threads to perform transformations by employing the innovation, for example. One possible communication between a client 902 and a server 904 can be in the form of a data packet adapted to be transmitted between two or more computer processes. The data packet may include a cookie and/or associated contextual information, for example. The system 900 includes a communication framework 906 (e.g., a global communication network such as the Internet) that can be employed to facilitate communications between the client(s) 902 and the server(s) 904.

[0051] Communications can be facilitated via a wired (including optical fiber) and/or wireless technology. The client(s) 902 are operatively connected to one or more client data store(s) 908 that can be employed to store information local to the client(s) 902 (e.g., cookie(s) and/or associated contextual information). Similarly, the server(s) 904 are operatively connected to one or more server data store(s) 910 that can be employed to store information local to the servers 904.

[0052] What has been described above includes examples of the innovation. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the subject innovation, but one of ordinary skill in the art may recognize that many further combinations and permutations of the innovation are possible. Accordingly, the innovation is intended to embrace all such alterations, modifications and variations that fall within the spirit and scope of the appended claims. Furthermore, to the extent that the term “includes” is used in either the detailed description or the claims, such term is intended to be

inclusive in a manner similar to the term “comprising” as “comprising” is interpreted when employed as a transitional word in a claim.

What is claimed is:

1. A sustainability search system, comprising:

at least one processor coupled to memory retaining instructions for:

a query component that searches at least one target for data elements, wherein the query component is configured to:

receive a set of search criteria and a set of sustainability factors, wherein the set of search criteria comprises a process, a product made by the process, an article of manufacture of the process, a plant element carrying out the process, or any combination thereof, and wherein the set of sustainability factors comprises one or more measurements of an environmental impact, a socio-environmental impact, or any combination thereof, for the process, the product made by the process, the article of manufacture of the process, the plant element carrying out the process, or any combination thereof; and

identify one or more data elements based on the set of search criteria and the set of sustainability factors, wherein the one or more data elements comprise data associated with the process, the product made by the process, the article of manufacture of the process, the plant element carrying out the process, or any combination thereof; and

an evaluation component configured to analyze the one or more data elements identified by the query component based on a sustainability score associated with each of the one or more data elements, wherein the sustainability score is a quantitative metric of the sustainability of the data elements and is based at least in part on the set of sustainability factors associated with the data elements.

2. The sustainability search system of claim 1, wherein the at least one target comprises a controller, a network device, a website, a data store, a cloud-based data store, or any combination thereof.

3. The sustainability search system of claim 1, wherein each of the one or more data elements comprises the sustainability score.

4. The sustainability search system of claim 1, wherein the evaluation component is configured to determine the sustainability score for each of the one or more data elements.

5. The sustainability search system of claim 1, wherein the at least one target is configured to determine the measurements of the environmental impact, the socio-environmental impact, or any combination thereof, for the process, the product made by the process, the article of manufacture of the process, the plant element carrying out the process, or any combination thereof.

6. The sustainability search system of claim 1, wherein the query component is configured to receive the one or more measurements of the environmental impact, the socio-environmental impact, or any combination thereof for the process, the product made by the process, the article of manufacture of the process, the plant element carrying out the process, or any combination thereof from the at least one target.

7. The sustainability search system of claim 1, wherein the one or more data elements comprise a process identifier, a product identifier, or any combination thereof, wherein the process identifier and the product identifier comprises one or

more tags relating to the set of search criteria, the set of sustainability factors, or any combination thereof.

8. The sustainability search system of claim 1, comprising a ranking component configured to organize the one or more data elements identified by the query component into a list, a table, a chart, a graph, a matrix, or any combination thereof based on the sustainability scores associated with the one or more data elements.

9. The sustainability search system of claim 1, comprising an interface component comprising an adapter, a connector, a channel, a communication path, or any combination thereof, wherein the interface component is configured to integrate the sustainability search system into an operating system, a database system, or any combination thereof.

10. The sustainability search system of claim 1, wherein the set of sustainability factors comprises the sustainability score for at least one of the one or more data elements.

11. The sustainability search system of claim 1, comprising an artificial intelligence component configured to determine the at least one target via an automatic classifier system and process configured to use an inference approach to determine the at least one target based on an analysis of previous queries.

12. A controller, comprising:
memory; and
a processor operatively coupled to the memory and configured to:
receive a set of search criteria, wherein the set of search criteria comprises a process, a product made by the process, an article of manufacture of the process, a plant element carrying out the process, or any combination thereof;
receive a set of sustainability factors comprising one or more measurements of an environmental impact, a socio-environmental impact, or any combination thereof for the respective process, the respective product made by the process, the respective article of manufacture of the process, the respective plant element carrying out the process, or the respective combination thereof;
search at least one target for one or more data elements based on the set of search criteria and the set of sustainability factors, wherein the one or more data elements comprise data associated with the process, the product made by the process, the article of manufacture of the process, the plant element carrying out the process, or any combination thereof; and
generate query results comprising the one or more data elements.

13. The controller of claim 12, wherein the processor is configured to analyze the one or more data elements based on a sustainability score associated with each of the one or more data elements, wherein the sustainability score is a quantitative metric of the sustainability of the data elements and is based at least in part on the set of sustainability factors associated with the data elements.

14. The controller of claim 12, wherein the processor is configured to analyze the one or more data elements by deter-

mining a sustainability score for each of the one or more elements based at least in part on the set of sustainability factors associated with each data element, and wherein the sustainability score is a quantitative metric of the sustainability of the respective data element.

15. The controller of claim 12, wherein the at least one target comprises of a controller, a network device, a website, a data store, a cloud-based data store, or any combination thereof.

16. The controller of claim 12, wherein the processor is configured to receive the one or more measurements of the environmental impact, the socio-environmental impact, or any combination thereof, for the process, the product made by the process, the article of manufacture of the process, the plant element carrying out the process, or any combination thereof.

17. A system, comprising:
a sustainability search system configured to:
receive a set of search criteria, wherein the set of search criteria comprises a process, a product made by the process, an article of manufacture of the process, a plant element carrying out the process, or any combination thereof;
receive a set of sustainability factors, wherein the set of sustainability factors comprises one or more measurements of an environmental impact, a socio-environmental impact, or any combination thereof, for the process, the product made by the process, the article of manufacture of the process, the plant element carrying out the process, or any combination thereof; and
search at least one target for one or more data elements based on the set of search criteria and the set of sustainability factors, wherein the one or more data elements comprise data associated with the process, the product made by the process, the article of manufacture of the process, the plant element carrying out the process, or any combination thereof; and
generate query results comprising the one or more data elements; and
an interface component configured to integrate the sustainability search system into an operating system, a database system, or any combination thereof.

18. The system of claim 17, wherein the interface component comprises an adapter, a connector, a channel, a communication path, or any combination thereof.

19. The system of claim 17, wherein the sustainability search system is configured to analyze the one or more data elements based on a sustainability score associated with each of the one or more data elements, wherein the sustainability score is a quantitative metric of the sustainability of each data element and is based at least in part on the set of sustainability factors associated with each data element.

20. The system of claim 19, wherein the sustainability search system is configured to rank the query results based on the sustainability scores associated with each of the one or more data elements.

* * * * *