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(54) **PATIENT PORTAL**

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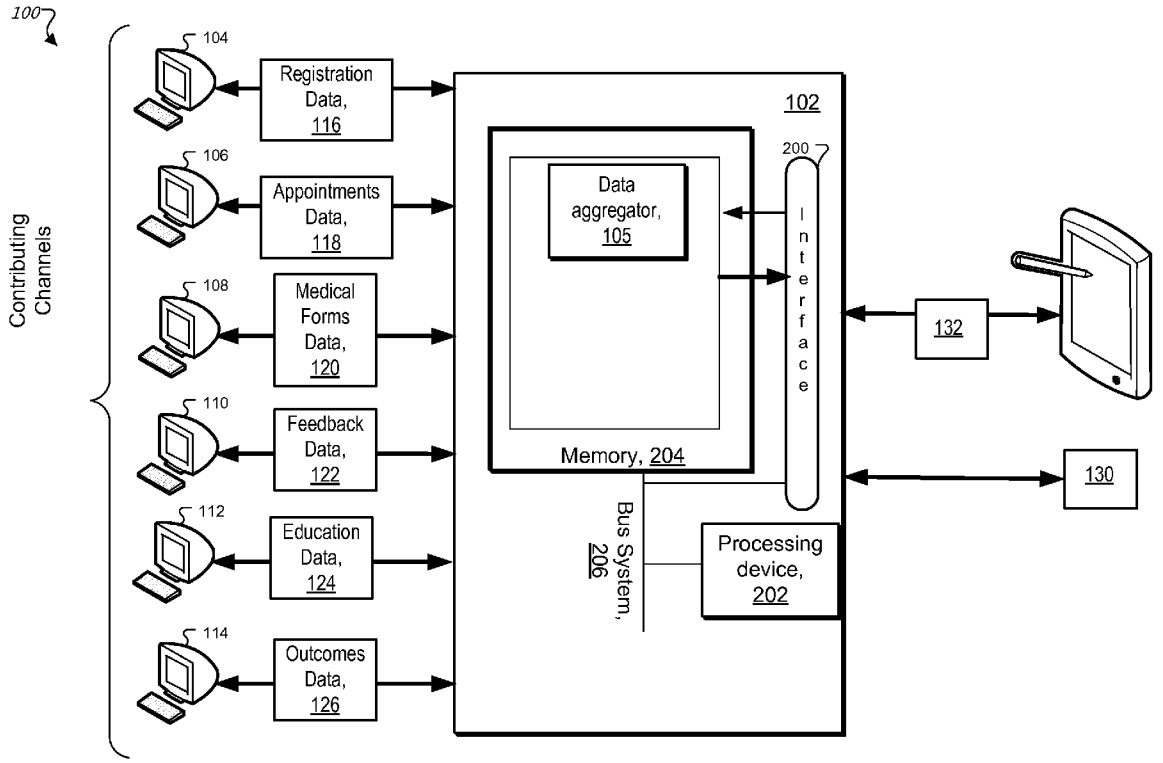
(57) **ABSTRACT**

A computer-implemented includes receiving, from one or more contributing channels, medical data; assigning the received medical data to one or more data silos; and generating a graphical user interface that when rendered on a display device renders a visual representation of a patient portal, with the patient portal including: one or more visual representations of the one or more data silos for data associated with a user that requested the patient portal.



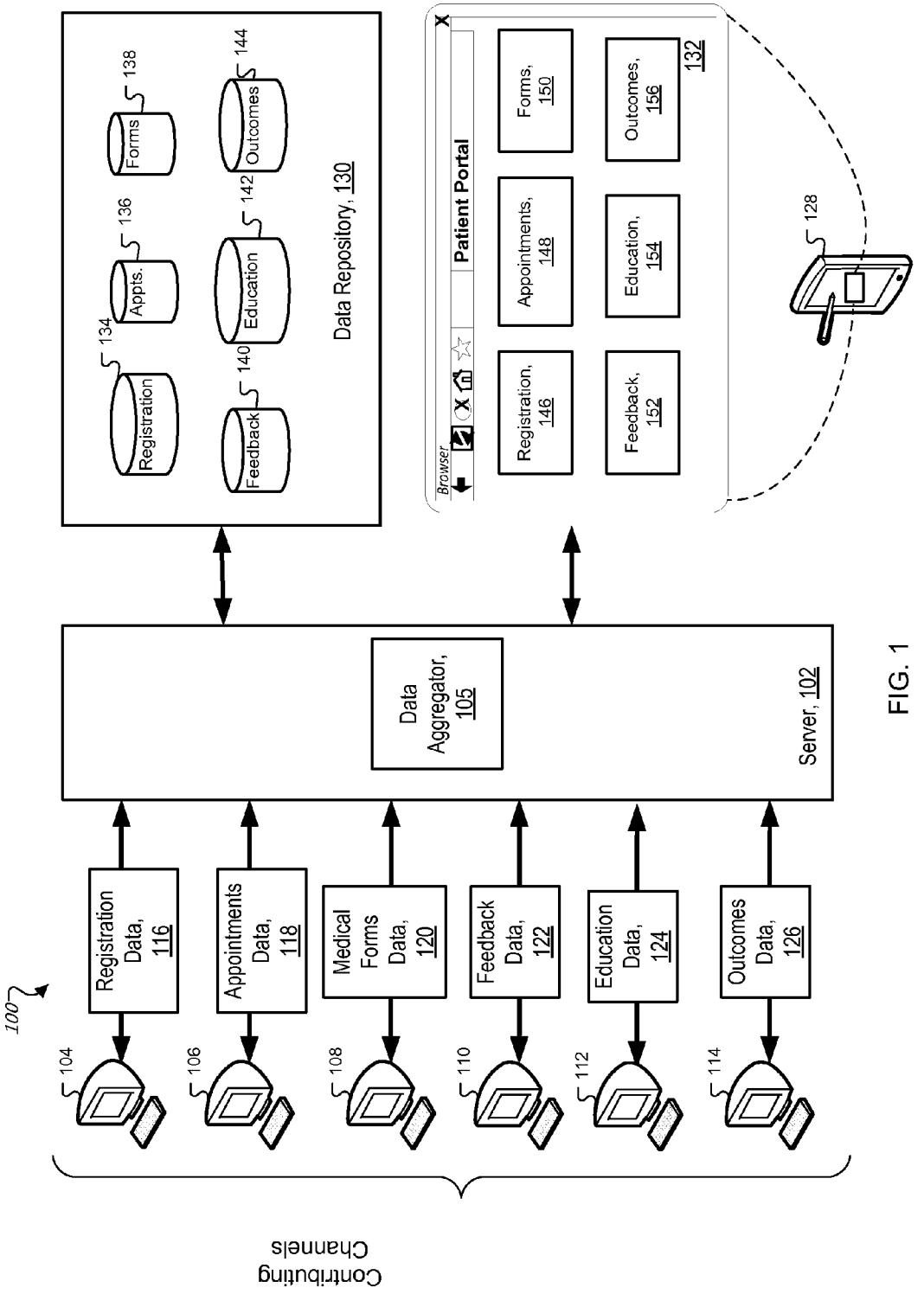

100
Contributing Channels
104
106
108
110
112
114
Registration Data, 116
Appointments Data, 118
Medical Forms Data, 120
Feedback Data, 122
Education Data, 124
Outcomes Data, 126
Server, 102
Data Aggregator, 105
Data Repository, 130
Registration 134
Appts. 136
Forms 138
Feedback 140
Education 142
Outcomes 144
Browser
Patient Portal
Registration, 146
Appointments, 148
Forms, 150
Feedback, 152
Education, 154
Outcomes, 156
132
128

FIG. 1

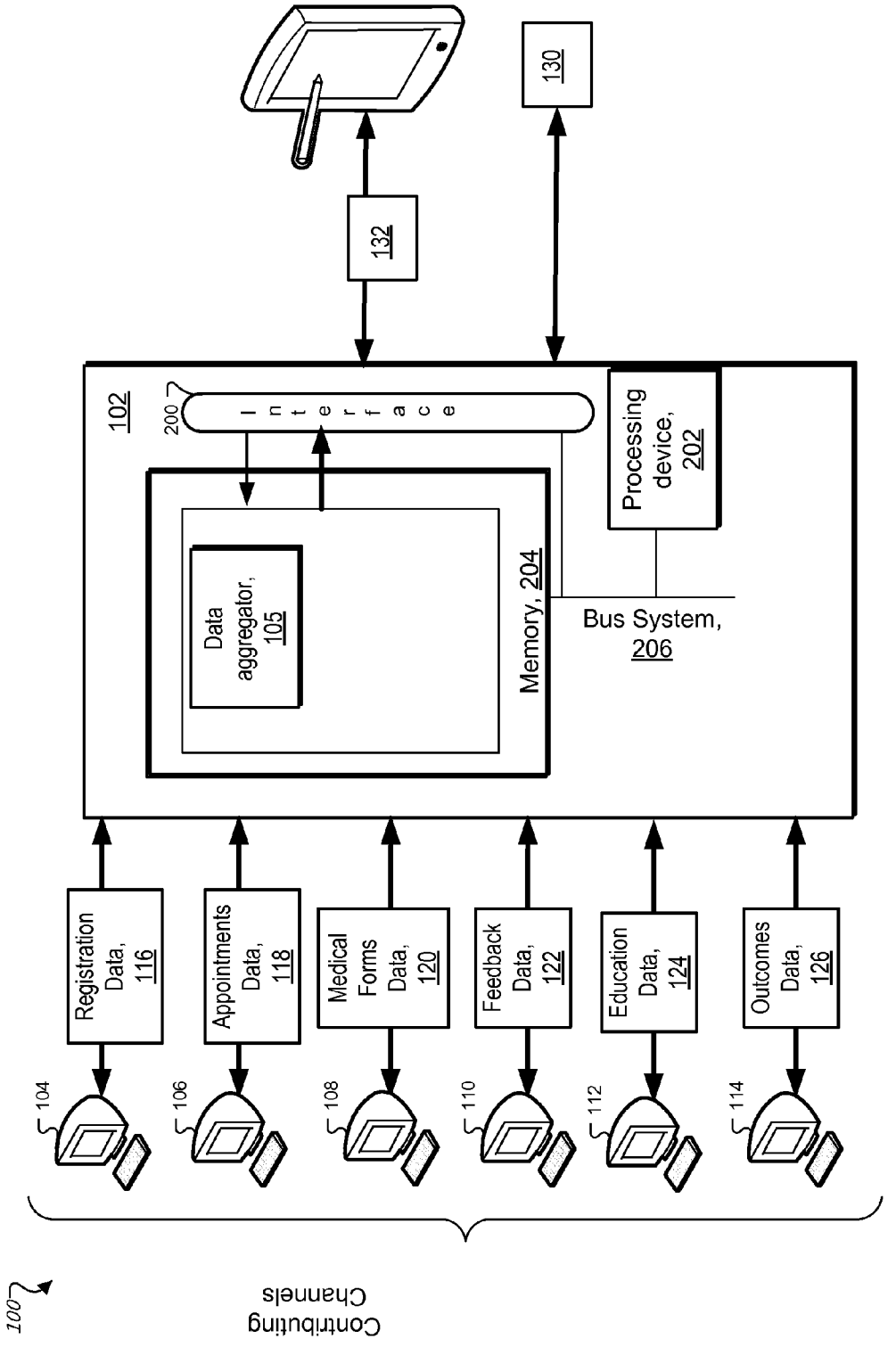

100
Contributing Channels
104
106
108
110
112
114
Registration Data, 116
Appointments Data, 118
Medical Forms Data, 120
Feedback Data, 122
Education Data, 124
Outcomes Data, 126
102
200
Interface
Data aggregator, 105
Memory, 204
Processing device, 202
Bus System, 206
132
130

FIG. 2

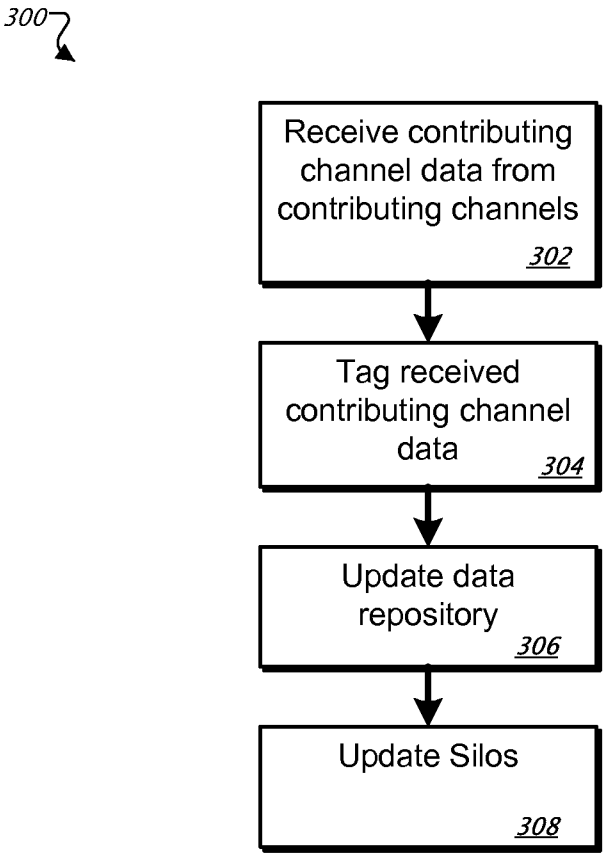

300
Receive contributing channel data from contributing channels
302
Tag received contributing channel data
304
Update data repository
306
Update Silos
308

FIG. 3A

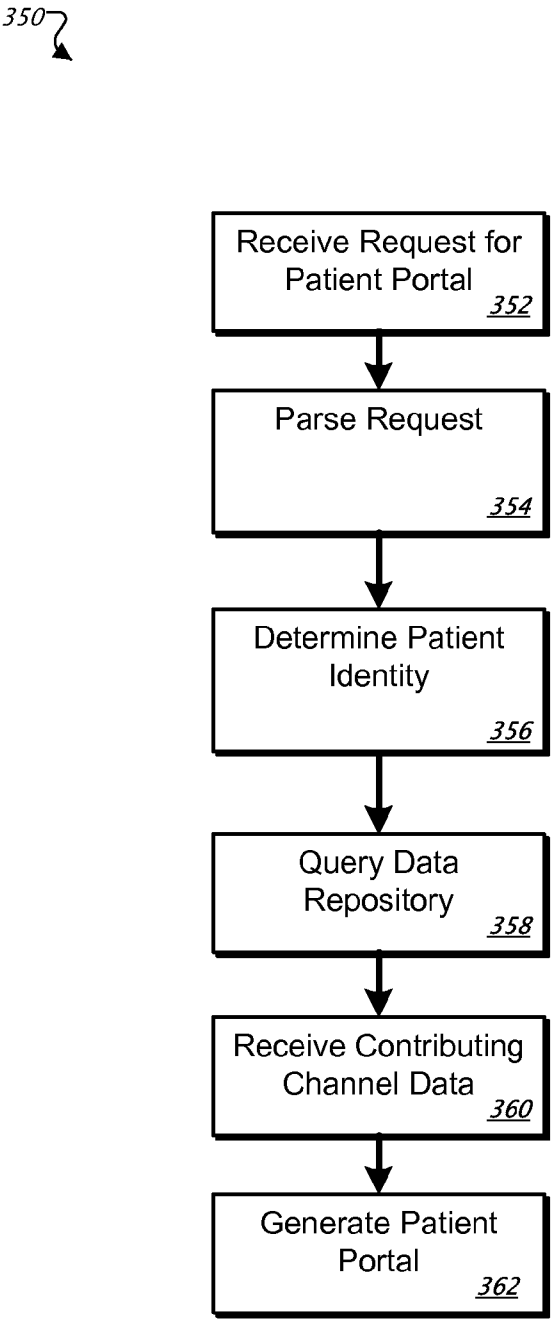

350
Receive Request for Patient Portal
352
Parse Request
354
Determine Patient Identity
356
Query Data Repository
358
Receive Contributing Channel Data
360
Generate Patient Portal
362

FIG. 3B

FIG. 4

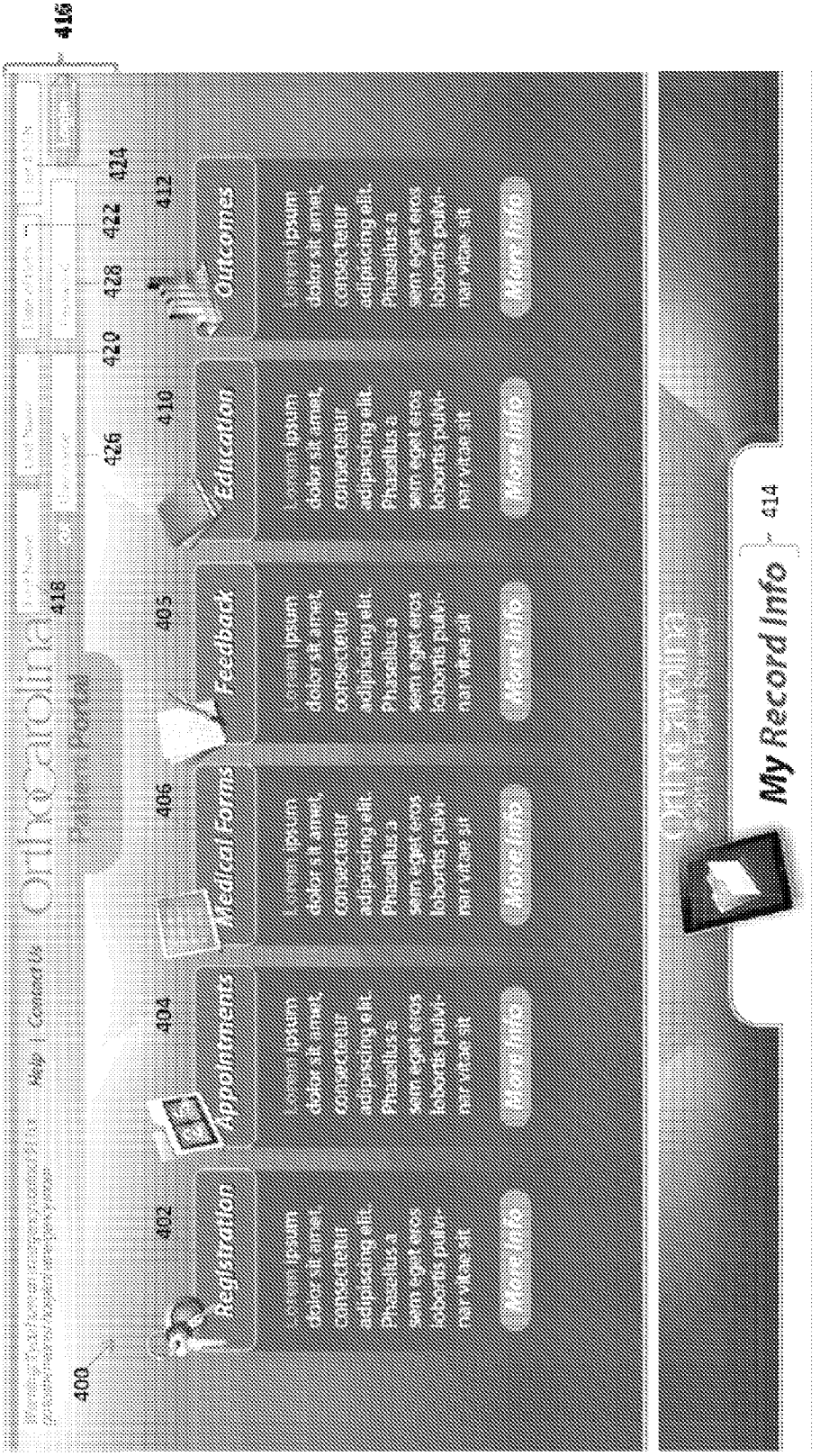

400
402
404
406
408
410
412
414
416
418
420
422
424
426
428
Registration
Appointments
Medical Forms
Feedback
Education
Outcomes
My Record Info

FIG. 5

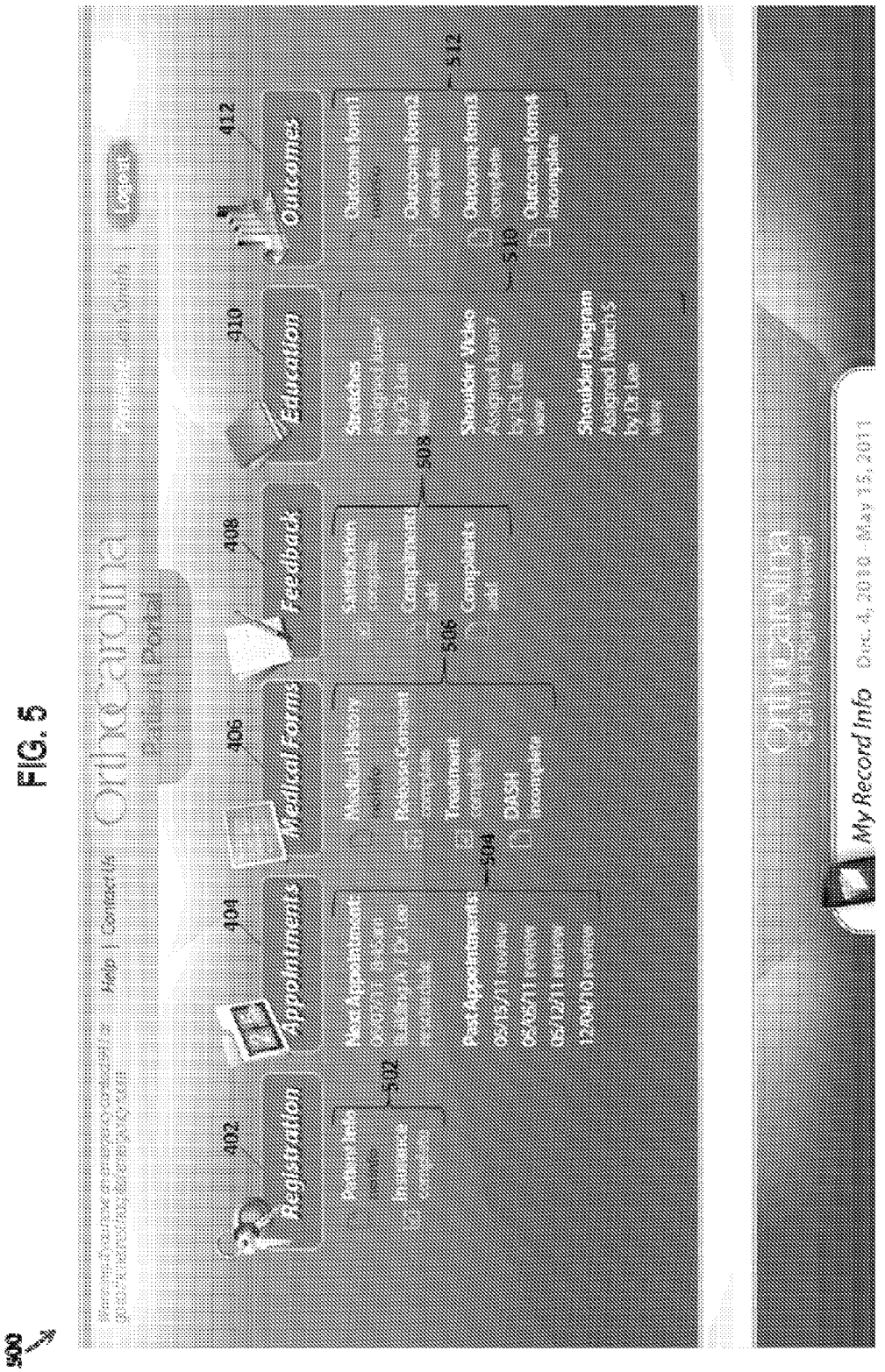

500
402
404
406
408
410
412
502
504
506
508
510
512
Registration
Appointments
Medical Forms
Questionnaires
Education
Outcomes
My Record Info

FIG. 6

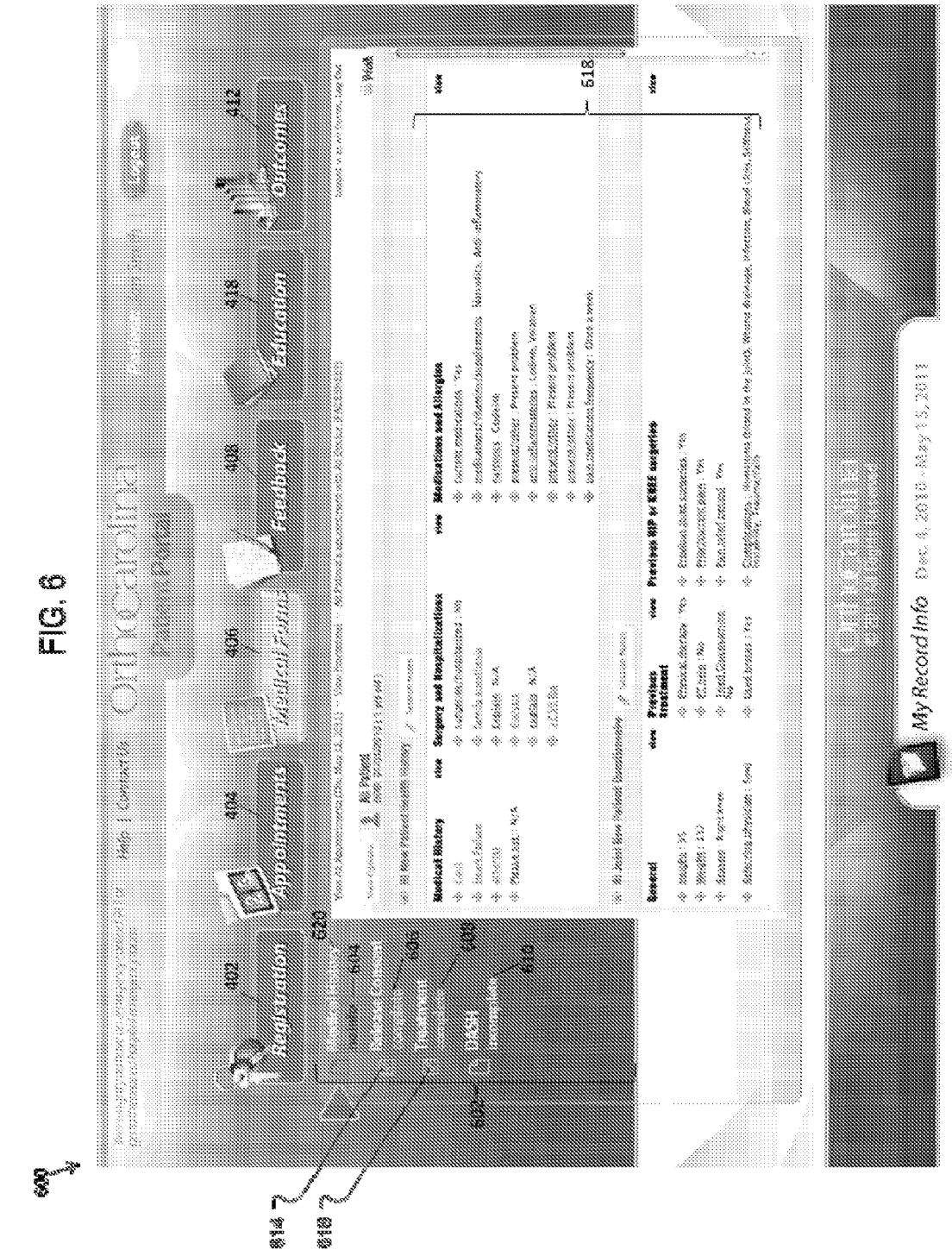

600
614
610
402
404
406
408
410
412
Registration
Appointments
Medical Forms
Feedback
Education
Outcomes
620
618
My Record Info

FIG. 7

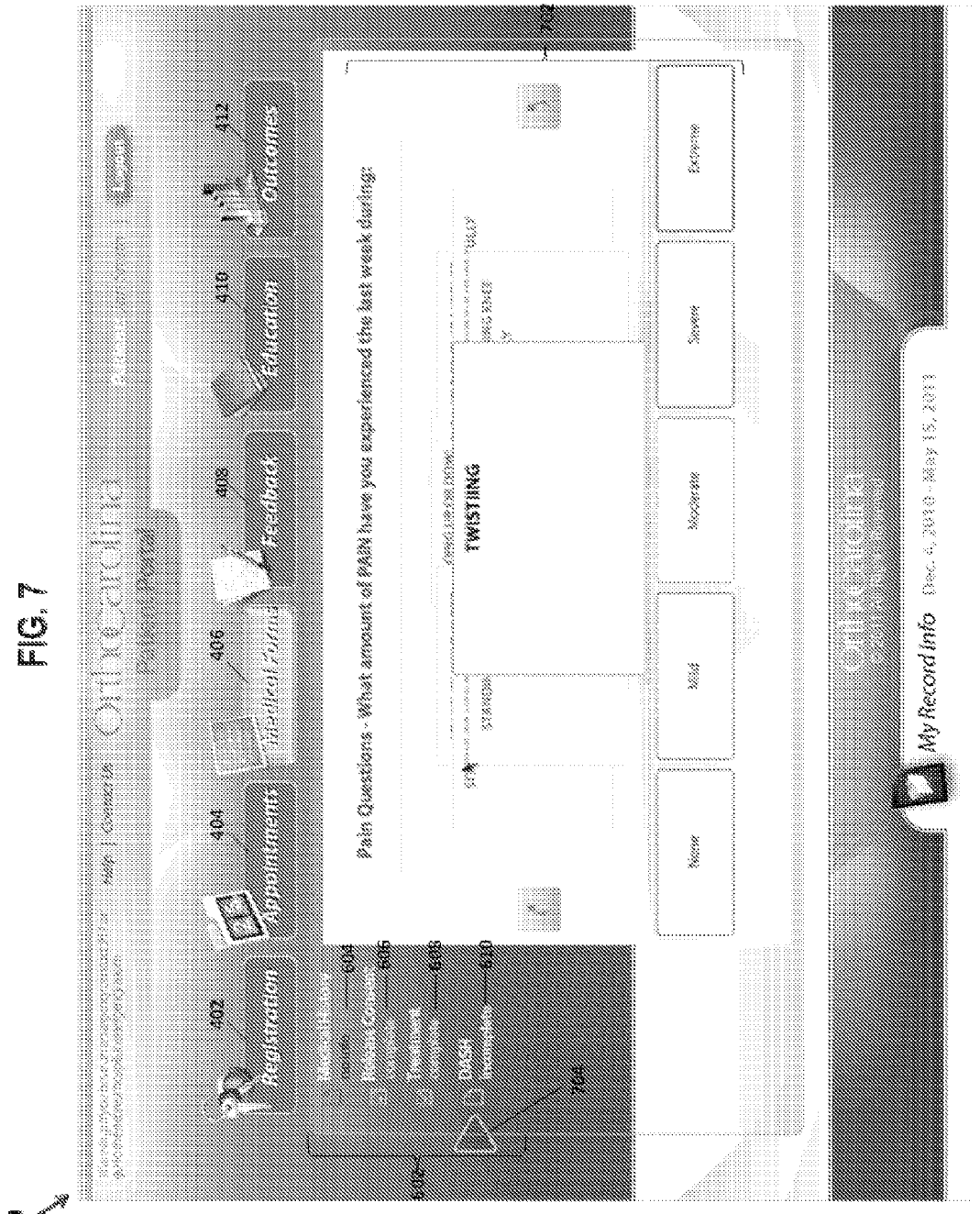
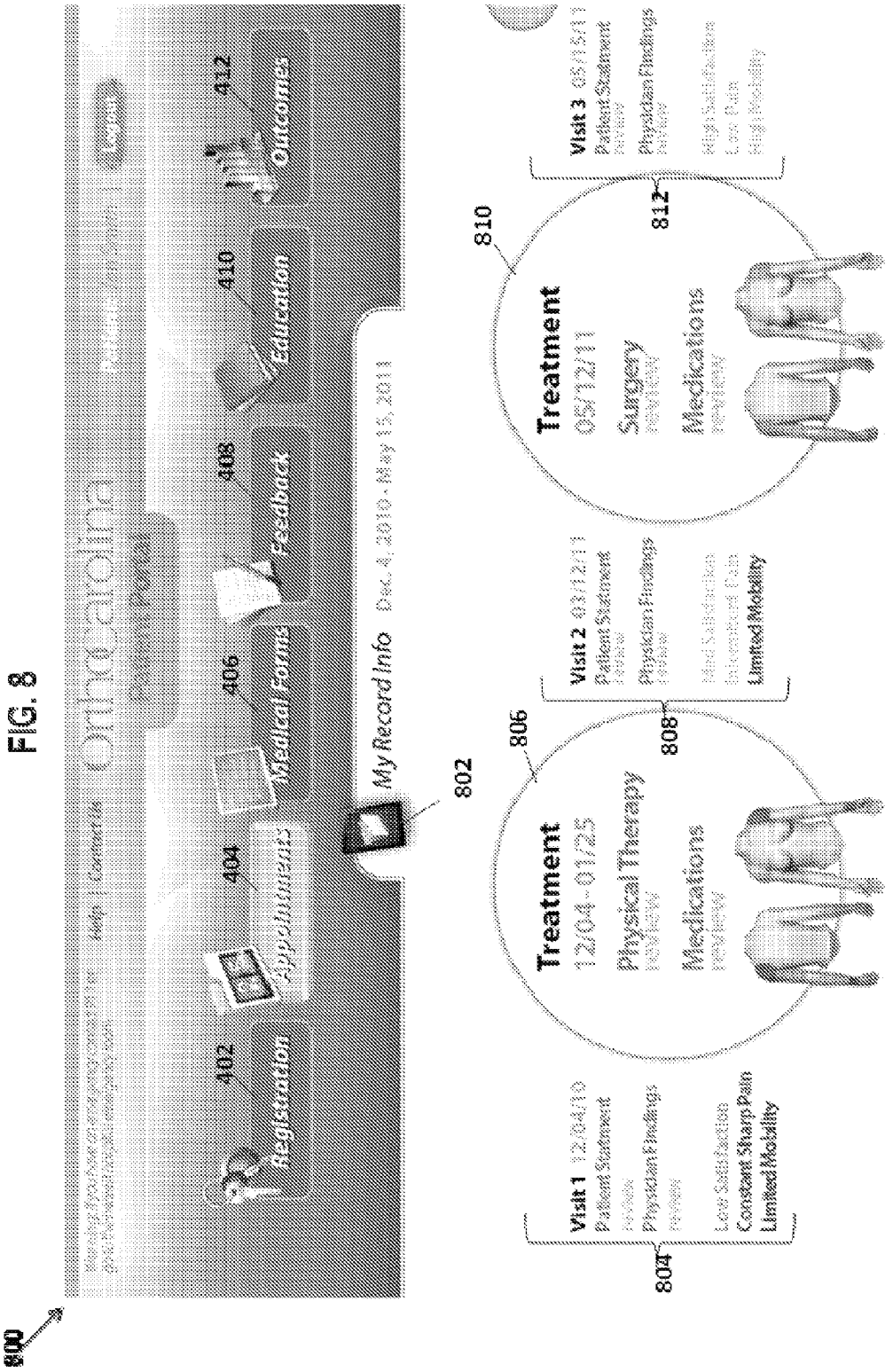

700
402
Registration
404
Appointments
406
Medical Forms
408
Feedback
410
Education
412
Outcomes
Pain Questions - What amount of PAIN have you experienced the last week during:
TWISTING
None
Mild
Moderate
Severe
Extreme
My Record Info

FIG. 8


900
802
My Record Info
Dec. 4, 2010 - May 15, 2011
402
Registration
404
Appointments
406
Medical Forms
408
Feedback
410
Education
412
Outcomes
804
Visit 1 12/04/10
Patient Statement
Physician Findings
Low Satisfaction
Constant Sharp Pain
Limited Mobility
806
Treatment
12/04 - 01/25
Physical Therapy
Medications
808
Visit 2 03/12/11
Patient Statement
Physician Findings
Limited Mobility
810
Treatment
05/12/11
Surgery
Medications
812
Visit 3 05/18/11
Patient Statement
Physician Findings

PATIENT PORTAL

CLAIM OF PRIORITY

[0001] This application is a continuation of and claims priority under 35 U.S.C. §120 to U.S. application Ser. No. 14/104,349, which was filed Dec. 12, 2013, which is a continuation of and claims priority under 35 U.S.C. §120 to U.S. application Ser. No. 13/181,461, which was filed Jul. 12, 2011, the entire contents of each of which are hereby incorporated by reference.

BACKGROUND

[0002] An electronic medical record ("EMR") is a computerized medical record created in an organization that delivers care, such as a hospital and/or a doctor's office. EMRs may be a part of a local stand-alone health data system that allows storage, retrieval and modification of records.

SUMMARY

[0003] In one aspect of the present disclosure, a computer-implemented method includes receiving, from one or more contributing channels, medical data; assigning the received medical data to one or more data silos; and generating a graphical user interface that when rendered on a display device renders a visual representation of a patient portal, with the patient portal including: one or more visual representations of the one or more data silos for data associated with a user that requested the patient portal.

[0004] Implementations of the disclosure may include one or more of the following features. In some implementations, the method includes receiving a request for the patient portal; and identifying, from the request, an identity of the user requesting the patient portal. In other implementations, the method includes querying, at least partly based on the identity of the user, the one or more data silos for medical data associated with the user. In still other implementations, the method includes receiving, based on querying, data associated with the user that requested the patient portal, and wherein the one or more visual representations of the one or more data silos include one or more visual representations of the received data.

[0005] In some implementations, the one or more data silos are configured to store a particular type of medical data for a plurality of users. In still implementations, the method includes parsing the received medical data; identifying, based on parsing, one or more types of medical data in the received medical data; for at least one of the identified types of medical data, determining a data silo configured to store the identified type of medical data; and assigning to the determined data silo the at least one identified type of medical data. In still other implementations, the graphical user interface dynamically displays the data silos and is generated in real-time. In some implementations, the method includes performing one or more pre-processing operations on the received medical data, wherein the one or more pre-processing operations include one or more of: using the received medical data in generating one or more discrete data elements; or indexing the received medical data in a search engine.

[0006] In another aspect of the disclosure, one or more machine-readable media are configured to store instructions that are executable by one or more processing devices to perform operations including receiving, from one or more contributing channels, medical data; assigning the received medical data to one or more data silos; and generating a graphical user interface that when rendered on a display device renders a visual representation of a patient portal, with the patient portal including: one or more visual representations of the one or more data silos for data associated with a user that requested the patient portal. Implementations of this aspect of the present disclosure can include one or more of the foregoing features.

[0007] In still another aspect of the disclosure, an electronic system includes one or more processing devices; and one or more machine-readable media configured to store instructions that are executable by the one or more processing devices to perform operations including: receiving, from one or more contributing channels, medical data; assigning the received medical data to one or more data silos; and generating a graphical user interface that when rendered on a display device renders a visual representation of a patient portal, with the patient portal including: one or more visual representations of the one or more data silos for data associated with a user that requested the patient portal. Implementations of this aspect of the present disclosure can include one or more of the foregoing features.

[0008] All or part of the foregoing may be implemented as a computer program product including instructions that are stored on one or more non-transitory machine-readable storage media, and that are executable on one or more processing devices. All or part of the foregoing may be implemented as an apparatus, method, or electronic system that may include one or more processing devices and memory to store executable instructions to implement the stated functions.

[0009] The details of one or more implementations are set forth in the accompanying drawings and the description below. Other features, objects, and advantages will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE FIGURES

[0010] FIG. **1** is a conceptual diagram of a system for generating a patient portal.

[0011] FIG. **2** is a block diagram of components of the system for generating a patient portal.

[0012] FIG. **3**A is a flow chart of a process for updating a data repository with contributing channel data.

[0013] FIG. **3**B is a flow chart of a process for generating a patient portal.

[0014] FIGS. **4-8** are example graphical user interfaces included in a patient portal. Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

[0015] Described herein is a system for generating a patient portal to allow a patient to access different types of medical data that is related to the patient. Generally, a patient portal includes a graphical user interface that when rendered on a display device allows a patient (and/or any other user of the system) to access and to view data. For example, though the patient portal, the patient may access registration data, appointment data, medical form data, feedback data, education data, and outcome data. The system receives the various types of medical data related to the patient from different data sources, entities and/or channels that contribute medical data to the system. These numerous, different data sources, enti-

ties and/or channels are collectively referred to herein as "contributing channels," without limitation, for purposes of convenience.

[0016] FIG. **1** illustrates a particular exemplary embodiment describe herein. In particular, FIG. **1** is a conceptual diagram of system **100** for generating a patient portal. System **100** includes server **102**. Server **102** includes data aggregator **105**. In the illustrative example of FIG. **1**, data aggregator is configured to receive contributing channel data from numerous contributing channels. In an example, contributing channel data includes, without limitation, registration data **116**, appointment data **118**, medical forms data **120**, feedback data **122**, education data **124**, and outcome data **126**.

[0017] In the illustrative example of FIG. **1**, contributing channels include client devices **104**, **106**, **108**, **110**, **112**, **114**. In an exemplary embodiment, client device **104** is a device that sends registration data **116** to data aggregator **105**. In this example registration data may include data pertaining to a patient's registration within a healthcare facility, a hospital, a clinic, and so forth. In the example of FIG. **1**, registration data **116** does not have to be for a particular patient. Rather registration data **116** could be for a number of patients. That is, registration data **116** could be a stream of data that is received by data aggregator **105**. Data aggregator **105** receives registration data **116** and parses registration data **116** to associate registration data **116** with various patients.

[0018] In an exemplary embodiment described herein, another contributing channel sends appointment data **118** to data aggregator **105**. In particular, appointment data **118** may be sent by client device **106** which may include a computing device configured to store data pertaining to medical appointments. As described above with regard to registration data **116**, appointment data **118** may pertain to a single patient or may pertain to a number of patients. In particular, appointment data **118** may be a stream of data combining medical appointment data for a plurality of patients.

[0019] Another contributing channel sends medical forms data **120**. In the illustrative example of FIG. **1**, medical forms data **120** is sent to data aggregator **105** by client device **108**. In this example, client device **108** may be a device that is configured to store medical forms, for example, as described in U.S. application Ser. No. 12/699,522, the entire contents of which are incorporated herein by reference. Another contributing channel sends feedback data **122**. In this example, feedback data **122** may be sent to data aggregator **105** by user device **110**. In this example, user device **110** is a device that is configured to collect from a patient feedback data, for example, as described in U.S. application Ser. No. 13/069,353, the entire contents of which are incorporated herein by reference. For example, feedback data is indicative of patient satisfaction with a medical procedure, a medical facility with a particular doctor and/or with particular medical staff.

[0020] Another type of contributing channel sends education data **124**. In the illustrative example of FIG. **1**, education data **124** is sent from the client device **112** to data aggregator **105**. In this example, education data **124** includes data that is meant to educate a patient about a particular medical condition, a particular medical procedure, symptoms of a particular medical condition, allergic reactions, particular types of medication, and so forth.

[0021] Another type of contributing channel data that is received by data aggregator **105** is outcome data **126**. In the illustrative example of FIG. **1**, outcome data **126** is sent by client device **114** to data aggregator **105**. In this example, client device **114** may include a system that is configured to receive data indicative of an outcome of a medical procedure, of medication and/or of a medical study as described in U.S. application Ser. No. 13/046,028, the entire contents of which are incorporated herein by reference. In the illustrative example of FIG. **1**, data aggregator **105** receives outcome data **126** and stores outcome data **126**.

[0022] Still referring to FIG. **1**, data aggregator **105** receives contributing channel data from the various contributing channels **104**, **106**, **108**, **110**, **112**, **114**. Data aggregator **105** stores the contributing channel data that is received from the various contributing channels **104**, **106**, **108**, **110**, **112**, **114**. In an example, data aggregator **105** stores the contributing channel data in a manner that is compliant with the Health Insurance Portability and Accountability Act ("HIPPA"), secure, encrypted, and protected (e.g., protected health information ("PHI")). Data aggregator **105** may be configured to store the contributing channel data received from the contributing channels **104**, **106**, **108**, **110**, **112**, **114** by a type of contributing channel data. For example, registration data **116** may be stored with other registration data. Appointment data **118** may be stored with other appointment data. Medical forms data **120** may be stored with other medical forms data and so forth.

[0023] In another example, data aggregator **105** may be configured to receive the contributing channel data from the various contributing channels **104**, **106**, **108**, **110**, **112**, **114**, parse the data to identify associations between portions of the data and various patient, and tag the data with information identifying which portions of the data are associated with which patients. Generally, a tag includes a data container in which data is stored in accordance with a pre-defined standard. The process of associating data with a tag is commonly referred to as "tagging."

[0024] For example, registration data **116** may include data for two patients, namely, John Johnson and Sally Hayes. Appointment data **118** may also include data for these patients, John Johnson and Sally Hayes. In this example, data aggregator **105** is configured to parse registration data **116** to identify the portion of registration data **116** that is for John Johnson and to also identify the other portion of registration data **116** that is for Sally Hayes.

[0025] Once data aggregator **105** has identified the portions of registration data **116** that are for John Johnson and Sally Hayes, respectively, data aggregator **105** is configured to tag this data accordingly such that the tag identifies an identity of the patient associated with the portions of registration data **116**. For example, the portion of registration data **116** that is for John Johnson is tagged with data specifying a patient identity of John Johnson. Similarly, the portion of registration data **116** that is tagged for Sally Hayes is associated with data specifying that this portion of registration data **116** is for Sally Hayes.

[0026] In another exemplary embodiment described herein, data aggregator **105** may also be configured to store numerous different types of contributing channel data on a per patient basis. For example, the contributing channel data for John Johnson may be collected and correlated together and stored in a portion of data repository **130** that is specific for John Johnson. Similarly, the contributing channel data for Sally Hayes may be collected and correlated together in an area of database **130** that is designated for Sally Hayes.

[0027] Still referring to FIG. **1**, data repository **130** is configured to store contributing channel data received from the

various contributing channels **104**, **106**, **108**, **110**, **112**, **114** including, for example, registration data **116**, appointment data **118**, medical forms data **120**, feedback data **122**, education data **124**, and outcome data **126**.

[0028] In an example, data repository **130** is configured to store contributing channel data in various data structures, including, e.g., silo data structures ("silos"). Generally, a silo includes a data structure that provides storage and/or access to a particular type of data. Data repository **130** includes numerous silos including, for example, silo **134**, silo **136**, silo **138**, silo **140**, silo **142**, silo **144**. In this example, data repository **130** includes a silo for each type of contributing channel. That is, data repository **130** includes a correspondence between a silo and a type of contributing channel. Accordingly, in the exemplary embodiment of FIG. **1**, silo **134** stores registration data **116**. Similarly, silo **136** stores appointments data **118**. Silo **138** stores medical forms data **120**. Silo **140** stores feedback data **122**. Silo **142** stores education data **124**. Silo **144** stores outcome data **126**.

[0029] In the illustrative example of FIG. **1**, silos **134**, **136**, **138**, **140**, **142**, **144** may be configured to store medical data for a plurality of patients. For example, silo **134** may be configured to store registration data **116** for both John Johnson and Sally Hayes. In a variation of FIG. **1**, data repository **130** may include silos that are specific for particular patients and/or for particular types of contributing channel data. For example, data repository **130** may include a silo (not shown) for registration data **116** for John Johnson. Data repository **130** may also include different silo (not shown) for registration data **116** for Sally Hayes.

[0030] In still another variation of FIG. **1**, data repository **130** may be configured to store silos including numerous, different types of contributing channel data for a patient. For example, data repository **130** may include a silo that includes registration data **116**, appointment data **118**, medical forms data **120**, feedback data **122**, education data **124**, and outcome data **126** for John Johnson. Data repository **130** may include another different silo that includes registration data **116**, appointment data **118**, medical forms data **120**, feedback data **122**, education data **124**, and outcome data **126** for Sally Hayes.

[0031] Still referring to FIG. **1**, system **100** includes another client device, namely, client device **128**. In this example, client device **128** is used by a patient to access patient portal **132**. As illustrated in FIG. **1**, data aggregator **105** generates patient portal **132** which may be, for example, a graphical user interface that when rendered on client device **128** renders visual representations of silos **134**, **136**, **138**, **140**, **142**, **144**. In particular, visual representations of the foregoing silos may be represented as virtual silos, including, for example, virtual silo **146**, virtual silo **148**, virtual silo **150**, virtual silo **152**, virtual silo **154**, and virtual silo **156**.

[0032] In the illustrative example of FIG. **1**, virtual silo **146** pertains to registration data **116** and provides the user with a visual representation of silo **134**. That is, virtual silo **146** corresponds to silo **134**. Similarly, virtual silo **148** pertains to appointment data **118** and provides the user with a visual representation of silo **136**. Virtual silos **150**, **152**, **154** and **156** each provide a user with visual representations of their respective silos in data repository **130**.

[0033] In the illustrative example of FIG. **1**, graphical user interface **132** displays data that is for a particular patient. That is, virtual silos **146**, **148**, **150**, **152**, **154**, **156** display data that is particular to a specific patient. In this example, silos **134**, **136**, **138**, **140**, **142**, **144** are silos that include contributing channel data for numerous patients including, for example, John Johnson and Sally Hayes in the foregoing example. Because silos **134**, **136**, **138**, **140**, **142**, **144** include a particular type of contributing channel data for numerous patients, data aggregator **105** is configured to query each of these silos **134**, **136**, **138**, **140**, **142**, **144** to obtain data that corresponds to the patient that is requesting patient portal **132**.

[0034] For example, the user of client device **128** may be John Johnson. In this example, John Johnson accesses patient portal **132**. To provide John Johnson access to patient portal **132**, data aggregator **105** generates a graphical user interface that renders a visual representation of patient portal **132**. In generating virtual silos **146**, **148**, **150**, **152**, **154**, **156**, data aggregator **105** queries silos **134**, **136**, **138**, **140**, **142**, **144** for data associated and/or tagged with data specifying a patient name of John Johnson. Once data aggregator **105** has identified this data in the various silos **134**, **136**, **138**, **140**, **142**, **144**, data aggregator **105** is able to select this data from the various silos **134**, **136**, **138**, **140**, **142**, **144** and make this data accessible through virtual silos **146**, **148**, **150**, **152**, **154**, **156** in patient portal **132**.

[0035] FIG. **2** illustrates a particular exemplary embodiment describe herein. FIG. **2** is a block diagram of components of system **100** for generating a patient portal.

[0036] Client devices **104**, **106**, **108**, **110**, **112**, **114**, **128** can be any sort of computing devices capable of taking input from a user and communicating over a network (not shown) with server **102** and/or with other client devices. For example, client devices **104**, **106**, **108**, **110**, **112**, **114**, **128** can be mobile devices, desktop computers, laptops, cell phones, personal digital assistants ("PDAs"), servers, embedded computing systems, and so forth.

[0037] In the exemplary embodiment of FIG. **2**, server **102** can be any of a variety of computing devices capable of receiving data, such as a server, a distributed computing system, a desktop computer, a laptop, a cell phone, a rack-mounted server, and so forth. Server **102** may be a single server or a group of servers that are at a same location or at different locations.

[0038] The illustrated server **102** can receive data from client devices **104**, **106**, **108**, **110**, **112**, **114**, **128** via input/output ("I/O") interface **200**. I/O interface **200** can be any type of interface capable of receiving data over a network, such as an Ethernet interface, a wireless networking interface, a fiber-optic networking interface, a modem, and so forth. Server **102** also includes a processing device **202** and memory **204**. A bus system **206**, including, for example, a data bus and a mother-board, can be used to establish and to control data communication between the components of server **102**.

[0039] The illustrated processing device **202** may include one or more microprocessors. Generally, processing device **202** may include any appropriate processor and/or logic that is capable of receiving and storing data, and of communicating over a network (not shown). Memory **204** can include a hard drive and a random access memory storage device, such as a dynamic random access memory, or other types of non-transitory machine-readable storage devices. As shown in FIG. **2**, memory **204** stores computer programs that are executable by processing device **202**. Among these computer programs is data aggregator **105**.

[0040] Memory **204** is also configured to execute a processing engine (not shown). The processing engine is configured to perform pre-processing operations to prepare contributing

channel data for processing by data aggregator **105** and/or to prepare data for processing and generating as cross-channel data, e.g., which is described in U.S. Ser. No. 13/159,155, the contents of which are incorporated herein by reference. As described in further detail below, the pre-processing operations include search engine indexing operations and generation of discrete data elements operations.

[0041] In another example, the processing engine may execute on client devices **104**, **106**, **108**, **110**, **112**, **114**, e.g., rather than or in addition to executing on server **110**. In this example, a client device executes the processing engine to prepare contributing channel data for transfer to server **110**. The processing engine uses data stored on the client device and/or retrieved by the client device and generates discrete data elements that may be transferred to server **110**. That is, after the processing engine of the client device has generated the discrete data elements, the processing engine may contribute (e.g., transfer) the discrete data elements to data aggregator **105**.

[0042] In an example, the processing engine receives data and generates discrete data elements by using a data filter to format data from a first data format to a second data format, for example, as described in U.S. Ser. No. 12/774,694, the entire contents of which are incorporated herein by reference. In still another example, the processing engine generates the discrete data elements by performing optical character recognition ("OCR") on the contributing channel data.

[0043] In still another example, the processing engine (e.g., executing on a client device and/or on server **110**) includes a search component (e.g., a search engine). The search component indexes the contributing channel data, e.g., that is stored in data repository **130**, for example using indexing techniques that are well known in the art. In this example, the search component includes a spider (e.g., a web traversal portion of a search engine) that collects contributing channel data (e.g., discrete data elements) for indexing in data repository **130**, e.g., as is commonly known in the art.

[0044] Through the search component, a user may search data repository **130** for a particular type of data (e.g., discrete data elements) and/or for data received from a particular type of contributing entity and/or for historic, live data, and so forth. In an example, a user may access the search component to search for patients having particular conditions. In another example, the user may access the search component to search for patients associated with particular medical codes and/or medical forms. In still another example, data aggregator **105** performs OCR on the received contributing channel data. In this example, the user may perform word searches in identifying different types of data.

[0045] FIG. **3**A illustrates a particular exemplary embodiment describe herein. In particular, FIG. **3**A is a flow chart of process **300** for updating data repository **130** with contributing channel data **116**, **118**, **120**, **122**, **124**, **126**. In operation, data aggregator **105** receives contributing channel data **116**, **118**, **120**, **122**, **124**, **126** from contributing channels **104**, **106**, **108**, **110**, **112**, **114**. Data aggregator **105** tags (**304**) the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126** with a patient identifier identifying the patient associated with the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126**.

[0046] For example, portions of the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126** include patient identifying information. Data aggregator **105** parses the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126** to identify the patient identifying information and to identify which portions of the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126** are associated with which portions of the patient identifying information. Using the correspondence between portion of the patient identifying information and other portions of the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126**, data aggregator **105** tags the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126** with information specifying a correspondence between portions of the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126** and various patients.

[0047] Still referring to FIG. **3**A, data aggregator **105** updates (**306**) data repository **130** with the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126**. In the illustrative example of FIG. **1**, where the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126** is stored in silos **134**, **136**, **138**, **140**, **142**, **144**, data aggregator **105** updates (**308**) silos **134**, **136**, **138**, **140**, **142** and **144** with the received contributing channel data **116**, **118**, **120**, **122**, **124**, **126**, which may be tagged as described in the foregoing example. For example, data aggregator **105** may determine which silo corresponds to a particular type of contributing channel data and update that silo by storing the received contributing channel data for that particular type in the appropriate silo. For example, received registration data **116** is stored (e.g., in real-time and automatically) in an appropriate silo, namely, silo **134**, at least because silo **134** is configured to store registration data **116**.

[0048] FIG. **3**B illustrates a particular exemplary embodiment describe herein. In particular, FIG. **3**B is a flow chart of process **350** for generating patient portal **132**. In operation, data aggregator **105** receives (**352**) a request for patient portal **132**, for example, by a user accessing a website that is associated with the patient portal and/or logging into a website that is associated with the patient portal. In response, data aggregator **105** parses (**354**) the request for patient portal **132**. Using the results of parsing, data aggregator **105** determines (**356**) the patient identity of the patient that has requested the patient portal, for example, based on the user name and password information that the user used to log into the website. Data aggregator **105** queries (**358**) data repository **130** for contributing channel data associated with the identified patient. In particular, the data aggregator **105** may query silos **134**, **136**, **138**, **140**, **142**, **144** for data associated with the patient that has requested patient portal **132**.

[0049] In this example, data aggregator **105** determines from the request the name of the patient that has requested patient portal **132**. Data aggregator **105** queries silos **134**, **136**, **138**, **140**, **142**, **144** for data associated with the same patient name that was included in the request. In this example, silos **134**, **136**, **138**, **140**, **142**, **144** may include tables of data with a portion of the table including the contributing channel data and with the other portion of the table associating the contributing channel data with a patient identifier, for example, the name of the patient. In this example, data aggregator **105** submits to silos **134**, **136**, **138**, **140**, **142**, **144** the patient identifier. Using the patient identifier, data repository **130** determines contributing channel data that is tagged with information corresponding to the patient identifier and/or contributing channel data that is otherwise associated with the patient identifier (e.g., through the foregoing table).

[0050] Still referring to FIG. **3**B, data aggregator **105** receives (**360**) from data repository **130** appropriate contributing channel data for the user requesting patient portal **132**.

Using the received contributing channel data, data aggregator **105** generates (**362**) patient portal **132**, as described herein, for example, by generating virtual silos for each type of received contributing channel data (e.g., virtual silos **146**, **148**, **150**, **152**, **154**, **156**).

[0051] FIG. **4** illustrates a particular exemplary embodiment describe herein. In particular, FIG. **4** is an example of graphical user interface **400** included in patient portal **132**. In the illustrative example of FIG. **4**, data aggregator **105** generates virtual silos **402**, **404**, **406**, **408**, **410**, **412**, including, e.g., visual representations of silos **134**, **136**, **138**, **140**, **142**, **144**. In an example, data aggregator **105** is configured to dynamically and in real-time update visual representations of silos **134**, **136**, **138**, **140**, **142**, **144**, for example, based on newly received contributing channel data.

[0052] In the illustrative example of FIG. **4**, virtual silo **402** providers a user with registration data **116**, including, e.g., names of medical facilities with which the user is currently registered, forms that may be used by the user to register at additional medical facilities, and so forth. Virtual silo **404** provides the user with appointment data **118**, including, e.g., medical appointments that the user has scheduled and/or needs to schedule. Virtual silo **406** provides the user with medical forms data **120**, including, e.g., medical questionnaires for the user to fill out prior to an appointment with a physician, medical assessment forms for the user to fill out assist a physician and/or automated medical assessment system in diagnosing an ailment of the user, and so forth.

[0053] Virtual silo **408** provides the user with feedback data **122**, including, e.g., online forms through which the user can submit feedback for a particular medical professional, medical facility, medical procedure, and so forth. Virtual silo **410** provides the user with education data **124**, including, e.g., data pertaining to a physical ailment of the patient, data describing medical conditions, data describing various side-effects of a medication, and so forth. Virtual silo **412** provides the user with outcome data **126**, including, e.g., data indicative of the outcome a medical procedure, such as whether the procedure was a success and/or a failure.

[0054] Graphical user interface **400** also includes portion **414** through which a user may access and view additional data that is specific to the user. In this illustrative example of FIG. **4**, portion **414** includes a selectable link, selection of which causes data aggregator **105** to display the data that is specific to the user. Graphical user interface **400** also includes portion **416** for a user to login into patient portal **132**. In an example, the user may log into the patient portal by entering into text boxes **418**, **420**, **422**, **424** data identifying the user, including, e.g., first name data, last name data, date of birth data, and social security data. The user may also log into patient portal **132** via a user account that uniquely identifies the user. In the illustrative example of FIG. **4**, the user enters the user account data into text boxes **426**, **428**.

[0055] FIG. **5** illustrates a particular exemplary embodiment describe herein. In particular, FIG. **5** is an example of graphical user interface **500** included in the patient portal. In the illustrative example of FIG. **5**, graphical user interface **500** is generated by data aggregator **105** after the user logs into the patient portal. After the user logs into the patient portal, data aggregator **105** retrieves contributing channel data **502**, **504**, **506**, **508**, **510**, **512** (e.g., from silos **134**, **136**, **138**, **140**, **142**, **144**) that is associated with the user.

[0056] In an example, data aggregator **105** is configured to retrieve contributing channel data **502**, **504**, **506**, **508**, **510**, **512** in real-time from silos **134**, **136**, **138**, **140**, **142**, **144**. In this example, data aggregator **105** sends real-time requests to data repository **130** for contributing channel data **502**, **504**, **506**, **508**, **510**, **512**, for example, when the user log into patient portal **132**. In this example, data aggregator **105** sends the user's login information to data repository **130** to promote an ability of data repository **130** to identify contributing channel data that is specific to the user (e.g., by identifying contributing channel data that is tagged with data corresponding to the login information) and to send this contributing channel data to data aggregator **105**.

[0057] In the illustrative example of FIG. **5**, at least a portion of contributing channel data **502**, **504**, **506**, **508**, **510**, **512** includes selectable data, selection of which allows the user to view and to access a particular item of contributing channel data. In an example, a particular item of contributing channel data is juxtaposed to a link, selection of which allows the user to view the particular item of contributing channel data. Generally, juxtaposition includes a placement of an item of data in proximity to another item of data. In another example, virtual silos **402**, **404**, **406**, **408**, **410**, **412** includes selectable areas, selection of which enables a user to view data included in the selected silo.

[0058] FIG. **6** illustrates a particular exemplary embodiment describe herein. In particular, FIG. **6** is an example of graphical user interface **600** included in patient portal. In the illustrative example of FIG. **6**, the user has selected virtual silo **406** to view medical forms that are associated with the user.

[0059] In the illustrative example of FIG. **6**, graphical user interface **600** includes menu area **602** that displays for the user the different types of medical forms that are associated with the user. Menu area **602** also includes data indicative of a completion status for each of the forms. In the illustrative example of FIG. **6**, menu area **602** includes completion status indicators **604**, **606**, **608**, **610**. Completion status indicators **604**, **606**, **608**, **610** provide the user with data specifying a status of a particular medical form, including, e.g., whether the medical form is complete, incomplete, and/or if no data has been provided for the medical form. In an example, visual representations **614**, **616** are juxtaposed to completion status indicators **604**, **606**, **608**, **610**. Visual representations **614**, **616** provide the user with a visual indicator (e.g., a check mark or other visual indicator) that a particular medical form has been completed by the user.

[0060] Graphical user interface **600** also includes portion **618** that provides the user with the contents of a selected form. In the illustrative example of FIG. **6**, the user has selected medical history link **620**. Accordingly, portion **618** is populated with data indicative of the medical history of the user.

[0061] FIG. **7** illustrates a particular exemplary embodiment describe herein. In particular, FIG. **7** is an example of graphical user interface **7** included in the patient portal. In FIG. **7**, the user has selected another link in virtual silo **406**. In the illustrative example of FIG. **7**, the user has selected to view the dash form **704**. In this example, selected medical form is incomplete, e.g., as indicated by completion status indicator **610**. Accordingly, portion **702** is populated with contents of dash form **704** to assist the user in completing the form.

[0062] FIG. **8** illustrates a particular exemplary embodiment describe herein. In particular, FIG. **8** is an example of graphical user interface **800** included in patient portal **132**. In the exemplary embodiment of FIG. **8**, data aggregator **105**

enables the patient to view physical notes and progress data, via, graphical user interface **800**. In the illustrative example of FIG. **8**, graphical user interface **800** includes virtual silos **402**, **404**, **406**, **408**, **410**, **412**. In the illustrative example of FIG. **8**, the patient has selected area **802** to view the patient's personal records. The patient's personal record includes visual representation **804**. Visual representation **804** includes a representation of the patient's first visit to a physician (and/or a medical facility), including a patient statement, the physician's findings, and the satisfaction level that has been indicated by the patient. Graphical user interface **800** also includes visual representation **806** which includes a visual representation of the dates of treatment for the patient (e.g., associated with the first visit) and an illustrative diagram of the areas of the patient's body in which the patient has received treatment.

[0063] Graphical user interface **800** also includes visual representation **808** that includes data indicative of a patient's second visit to the physician. Graphical user interface **800** also includes visual representation **810** including an additional visual representation of the treatment that the patient has received on a different date. Graphical user interface **800** also includes visual representation **812** including data indicative a patient's third visit to the physician.

[0064] In a variation of FIG. **8**, a visual representation of trends over visits may be shown. Generally, trends over visits include information indicative of trends and/or progressions in patient health over a period of time and/or over a number of office visits. For example, if a patient has cholesterol measured each time the patient visits the physician, data aggregator **105** may be configured to generate a visual representation of the patient's cholesterol measurements over a period of time (e.g., for each of the office visits).

[0065] In still another configuration, data aggregator **105** is configured to identify stale data (e.g., in the silos) and to generate alerts to notify users of the stale data. Generally, stale data refers to data that is older than a predefined period of time. In an example, when a graphical user interface includes a visual representation of a silo, and that silo includes stale data, data aggregator **105** is configured to generate an alert to notify a viewer of the graphical user interface that at least a portion of the data is stale.

[0066] Data aggregator **105** is also configured to generate reminders (e.g., automated reminders) to notify users of the patient portal of upcoming appointments, of forms that need to be filled out and other tasks to be performed. In an example, users may set reminder dates for certain tasks and/or functionality that is provided through the patient portal.

[0067] Data aggregator **105** is also configured to provide semantic highlighting and semantic color coding for contributing channel data. For example, a particular type of contributing channel data may assigned a particular color (e.g., purple) and a different type of contributing channel data may be assigned another, different color (e.g., blue). The contributing channel is displayed in a graphical user interface in accordance with the assigned semantic color coding, e.g., to promote an ability of a user to visually identify certain types of contributing channel, e.g., based on the semantic color coding.

[0068] Embodiments can be implemented in digital electronic circuitry, or in computer hardware, firmware, software, or in combinations thereof. An apparatus can be implemented in a computer program product tangibly embodied or stored in a machine-readable storage device for execution by a programmable processor; and method actions can be performed by a programmable processor executing a program of instructions to perform functions by operating on input data and generating output. The embodiments described herein, and other embodiments of the invention, can be implemented advantageously in one or more computer programs that are executable on a programmable system including at least one programmable processor coupled to receive data and instructions from, and to transmit data and instructions to, a data storage system, at least one input device, and at least one output device. Each computer program can be implemented in a high-level procedural or object oriented programming language, or in assembly or machine language if desired; and in any case, the language can be a compiled or interpreted language.

[0069] Processors suitable for the execution of a computer program include, by way of example, both general and special purpose microprocessors, and any one or more processors of any kind of digital computer. Generally, a processor will receive instructions and data from a read-only memory or a random-access memory or both. The essential elements of a computer are a processor for executing instructions and one or more memory devices for storing instructions and data. Generally, a computer will also include, or be operatively coupled to receive data from or transfer data to, or both, one or more mass storage devices for storing data, e.g., magnetic, magneto optical disks, or optical disks. Computer readable media for embodying computer program instructions and data include all forms of non-volatile memory, including by way of example semiconductor memory devices, e.g., EPROM, EEPROM, and flash memory devices; magnetic disks, e.g., internal hard disks or removable disks; magneto optical disks; and CD ROM and DVD-ROM disks. The processor and the memory can be supplemented by, or incorporated in special purpose logic circuitry. Any of the foregoing can be supplemented by, or incorporated in, ASICs (application-specific integrated circuits).

[0070] To provide for interaction with a user, embodiments can be implemented on a computer having a display device, e.g., a LCD (liquid crystal display) monitor, for displaying data to the user and a keyboard and a pointing device, e.g., a mouse or a trackball, by which the user can provide input to the computer. Other kinds of devices can be used to provide for interaction with a user as well; for example, feedback provided to the user can be any form of sensory feedback, e.g., visual feedback, auditory feedback, or tactile feedback; and input from the user can be received in any form, including acoustic, speech, or tactile input.

[0071] Embodiments can 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 can interact with an implementation of embodiments, or any combination of such back end, middleware, or front end components. The components of the system can 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) and a wide area network (WAN), e.g., the Internet.

[0072] The system and method or parts thereof may use the "World Wide Web" (Web or WWW), which is that collection of servers on the Internet that utilize the Hypertext Transfer Protocol (HTTP). HTTP is a known application protocol that

provides users access to resources, which may be data in different formats such as text, graphics, images, sound, video, Hypertext Markup Language (HTML), as well as programs. Upon specification of a link by the user, the client computer makes a TCP/IP request to a Web server and receives data, which may be another Web page that is formatted according to HTML. Users can also access other pages on the same or other servers by following instructions on the screen, entering certain data, or clicking on selected icons. It should also be noted that any type of selection device known to those skilled in the art, such as check boxes, drop-down boxes, and the like, may be used for embodiments using web pages to allow a user to select options for a given component. Servers run on a variety of platforms, including UNIX machines, although other platforms, such as Windows 2000/2003, Windows NT, Sun, Linux, and Macintosh may also be used. Computer users can view data available on servers or networks on the Web through the use of browsing software, such as Firefox, Netscape Navigator, Microsoft Internet Explorer, or Mosaic browsers. The computing system can 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.

[0073] Other embodiments are within the scope and spirit of the description claims. Additionally, due to the nature of software, functions described above can be implemented using software, hardware, firmware, hardwiring, or combinations of any of these. Features implementing functions may also be physically located at various positions, including being distributed such that portions of functions are implemented at different physical locations. The use of the term "a" herein and throughout the application is not used in a limiting manner and therefore is not meant to exclude a multiple meaning or a "one or more" meaning for the term "a." Additionally, to the extent priority is claimed to a provisional patent application, it should be understood that the provisional patent application is not limiting but includes examples of how the techniques described herein may be implemented.

[0074] A number of exemplary embodiments of the invention have been described. Nevertheless, it will be understood by one of ordinary skill in the art that various modifications may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A computer-implemented method comprising:

receiving, from a first plurality of contributing organizations, medical form data for a patient;

receiving, from a second plurality of contribution organizations, medical education data;

aggregating the medical form data received from the first plurality of contributing organizations;

aggregating the medical education data received from the second plurality of contributing organizations; and

generating data for a graphical user interface that when rendered on a display device comprises:

a first portion that specifies that the aggregated medical form data for the patient is viewable, with selection of the first portion causing a display of the aggregated medical form data when the aggregated medical form data is available; or

a second portion that specifies that the aggregated medical education data for the patient is viewable, with selection of the second portion causing a display of the aggregated medical education data when the aggregated medical education data is available.

2. The computer-implemented method of claim **1**, wherein the aggregated medical form data comprises medical summary data for the patient.

3. The computer-implemented method of claim **1**, wherein at least one of the first plurality of contributing organizations differs from at least one of the second plurality of contributing organizations

4. The computer-implemented method of claim **1**, wherein the graphical user interface comprises a first graphical user interface and wherein the method further comprises:

generating data for a second graphical user interface that when displayed on the display device displays data indicative of a clinical visit summary that chronicles one or more visits of the patient over a period of time.

5. The computer-implemented method of claim **4**, wherein the clinical visit summary comprises one or more visual representations of one or more dates of patient visits for the patient.

6. The computer-implemented method of claim **4**, wherein the clinical visit summary further comprises a diagram of one or more areas of a body of the patient in which the patient has received treatment.

7. The computer-implemented method of claim **1**, further comprising:

receiving a request for the graphical user interface; and

identifying, from the request, an identity of the patient.

8. The computer-implemented method of claim **7**, wherein a user who submits the request differs from the patient.

9. The computer-implemented method of claim **7**, further comprising:

querying, at least partly based on the identity of the user, a data repository for medical data associated with the patient.

10. The computer-implemented method of claim **1**, wherein the data for the graphical user interface is generated in real-time.

11. A computer-implemented method comprising:

retrieving, from a data repository, aggregated medical form data for a patient and aggregated medical education data for the patient;

wherein the aggregated medical form data for the patient is based on medical data from a first plurality of contributing organizations that is aggregated and the aggregated medical education data for the patient is based on medical data from a second plurality of contributing organizations that is aggregated; and

generating data for a graphical user interface that when rendered on a display device comprises:

a first portion that specifies that the aggregated medical form data for the patient is viewable, with selection of the first portion causing a display of the aggregated medical form data when the aggregated medical form data is available; and

a second portion that specifies that the aggregated medical education data for the patient is viewable, with selection of the second portion causing a display of the aggregated medical education data when the aggregated medical education data is available.

12. The computer-implemented method of claim **11**, wherein at least one of the first plurality of contributing orga-

nizations is a same contributing organization as at least one of the second plurality of contributing organizations.

13. The computer-implemented method of claim **11**, wherein at least one of the first plurality of contributing organizations differs from at least one of the second plurality of contributing organizations.

14. The computer-implemented method of claim **11**, wherein the graphical user interface comprises a first graphical user interface and wherein the method further comprises:

generating data for a second graphical user interface that when displayed on the display device displays data indicative of a clinical visit summary that chronicles one or more visits of the patient over a period of time.

15. The computer-implemented method of claim **14**, wherein the clinical visit summary comprises one or more visual representations of one or more dates of patient visits for the patient.

16. The computer-implemented method of claim **14**, wherein the clinical visit summary further comprises a diagram of one or more areas of a body of the patient in which the patient has received treatment.

17. An electronic system comprising:

one or more processors;

one or more machine-readable hardware storage devices storing instructions that are executable to cause the one or more processors to perform operations comprising:

retrieving, from a data repository, aggregated medical form data for a patient and aggregated medical education data for the patient;

wherein the aggregated medical form data for the patient is based on medical data from a first plurality of contributing organizations that is aggregated and the aggregated medical education data for the patient is based on medical data from a second plurality of contributing organizations that is aggregated; and

generating data for a graphical user interface that when rendered on a display device comprises:

a first portion that specifies that the aggregated medical form data for the patient is viewable, with selection of the first portion causing a display of the aggregated medical form data when the aggregated medical form data is available; and

a second portion that specifies that the aggregated medical education data for the patient is viewable, with selection of the second portion causing a display of the aggregated medical education data when the aggregated medical education data is available.

18. The electronic system of claim **17**, wherein at least one of the first plurality of contributing organizations is a same contributing organization as at least one of the second plurality of contributing organizations.

19. The electronic system of claim **17**, wherein at least one of the first plurality of contributing organizations differs from at least one of the second plurality of contributing organizations.

20. The electronic system of claim **17**, wherein the graphical user interface comprises a first graphical user interface and wherein the method further comprises:

generating data for a second graphical user interface that when displayed on the display device displays data indicative of a clinical visit summary that chronicles one or more visits of the patient over a period of time.

21. The electronic system of claim **20**, wherein the clinical visit summary comprises one or more visual representations of one or more dates of patient visits for the patient.

22. One or more machine-readable hardware storage devices storing instructions that are executable to cause one or more processors to perform operations comprising:

retrieving, from a data repository, aggregated medical form data for a patient and aggregated medical education data for the patient;

wherein the aggregated medical form data for the patient is based on medical data from a first plurality of contributing organizations that is aggregated and the aggregated medical education data for the patient is based on medical data from a second plurality of contributing organizations that is aggregated; and

generating data for a graphical user interface that when rendered on a display device comprises:

a first portion that specifies that the aggregated medical form data for the patient is viewable, with selection of the first portion causing a display of the aggregated medical form data when the aggregated medical form data is available; and

a second portion that specifies that the aggregated medical education data for the patient is viewable, with selection of the second portion causing a display of the aggregated medical education data when the aggregated medical education data is available.

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