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(54) **MONITORING USAGE OF A PORTABLE USER APPLIANCE**

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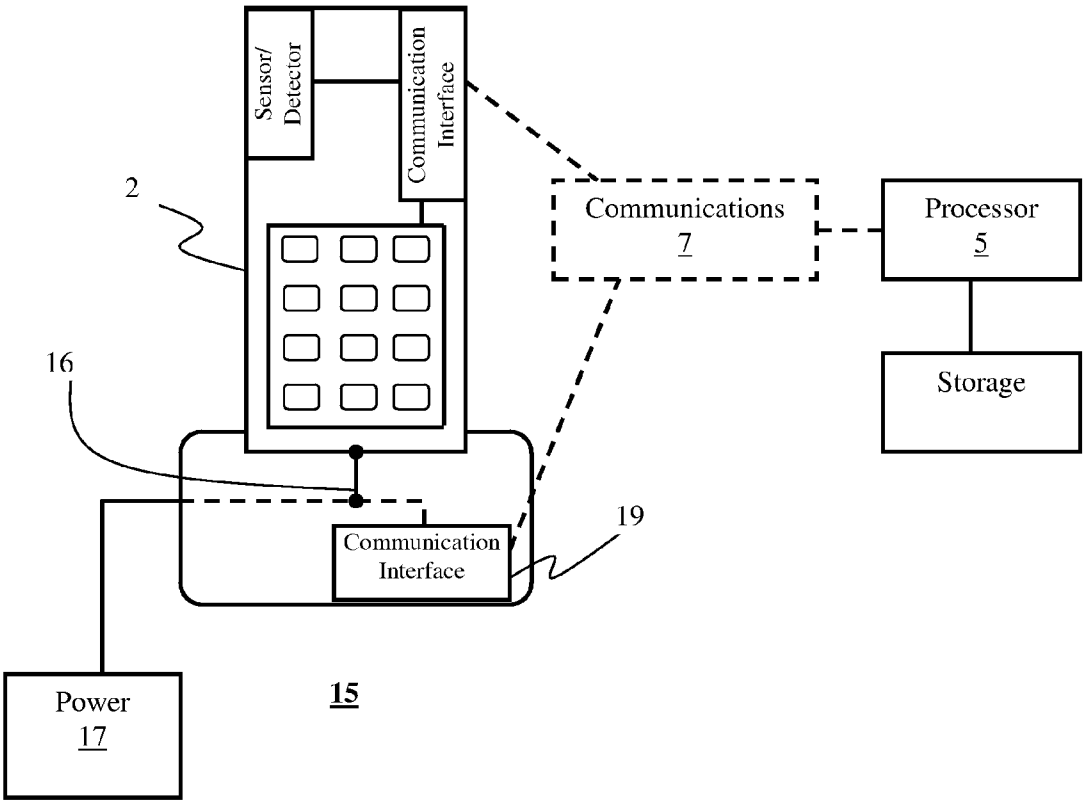
(52) **U.S. Cl.** .. **705/10**; 707/104.1; 709/224; 707/E17.009

(57) **ABSTRACT**

Methods and systems for gathering data concerning usage of a portable user appliance are disclosed. Content created in the use of the portable user appliance is monitored to produce content related data. The content related data is communicated to a usage data processing facility for producing reports of interest to advertisers, media organizations, marketers and the like.



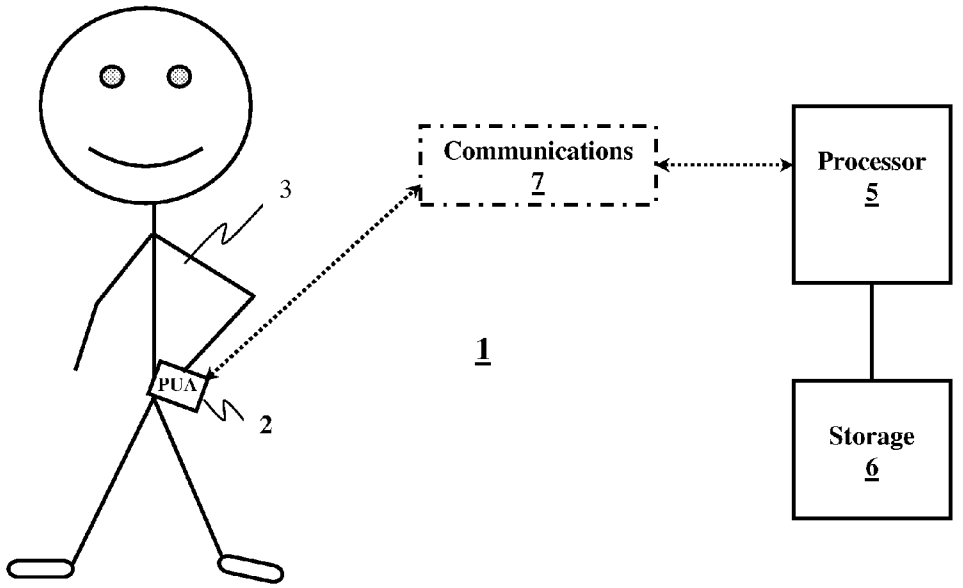


Figure 1A

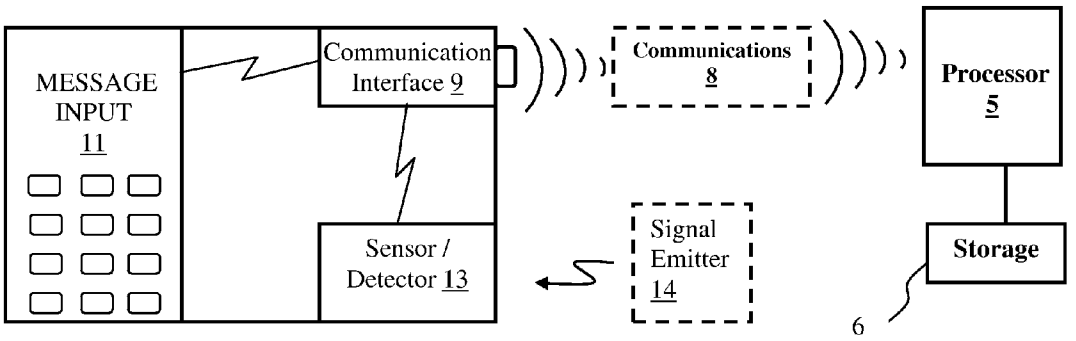


Figure 1B

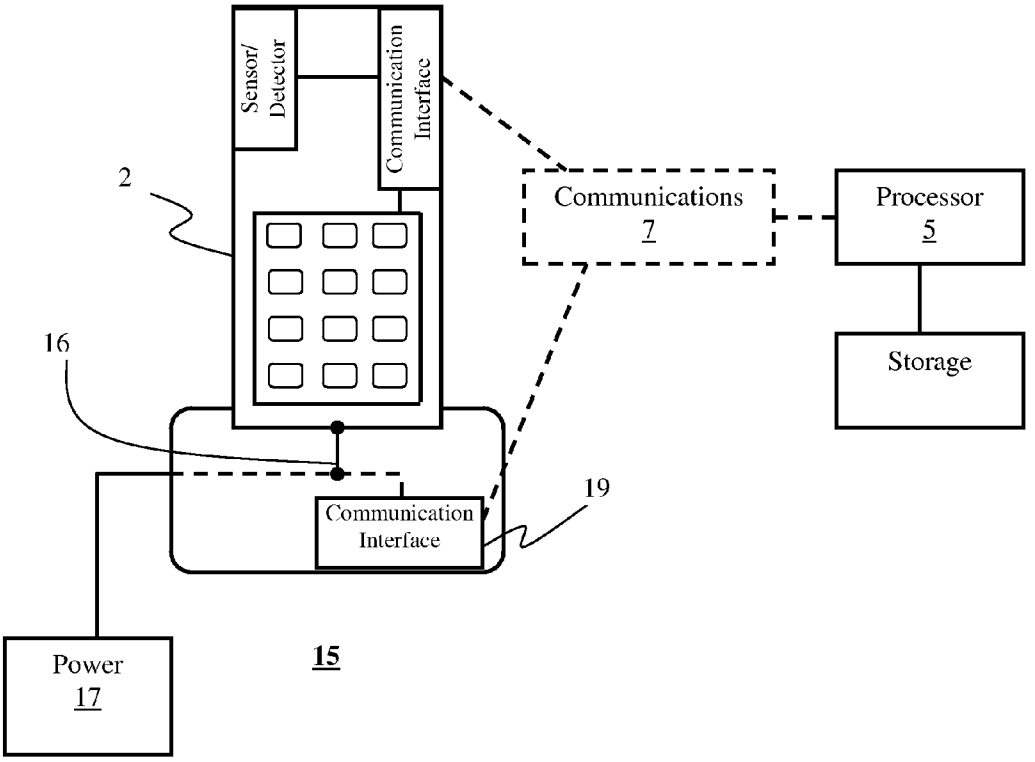

Sensor/
Detector
Communication
Interface
2
Communications
7
Processor
5
Storage
16
19
Communication
Interface
Power
17
15

Figure 1C

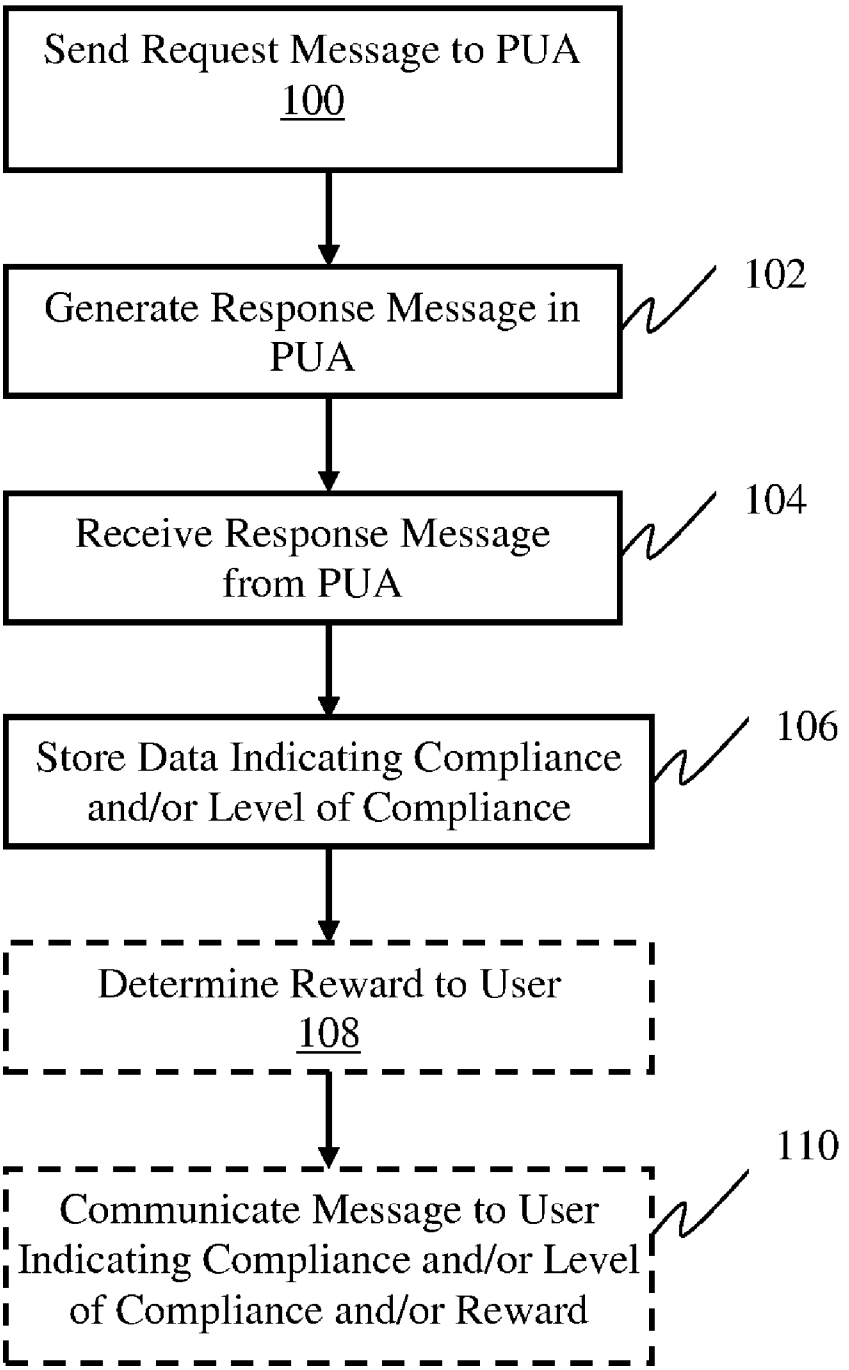

Send Request Message to PUA
100
Generate Response Message in PUA
102
Receive Response Message from PUA
104
Store Data Indicating Compliance and/or Level of Compliance
106
Determine Reward to User
108
Communicate Message to User Indicating Compliance and/or Level of Compliance and/or Reward
110

Figure 2A

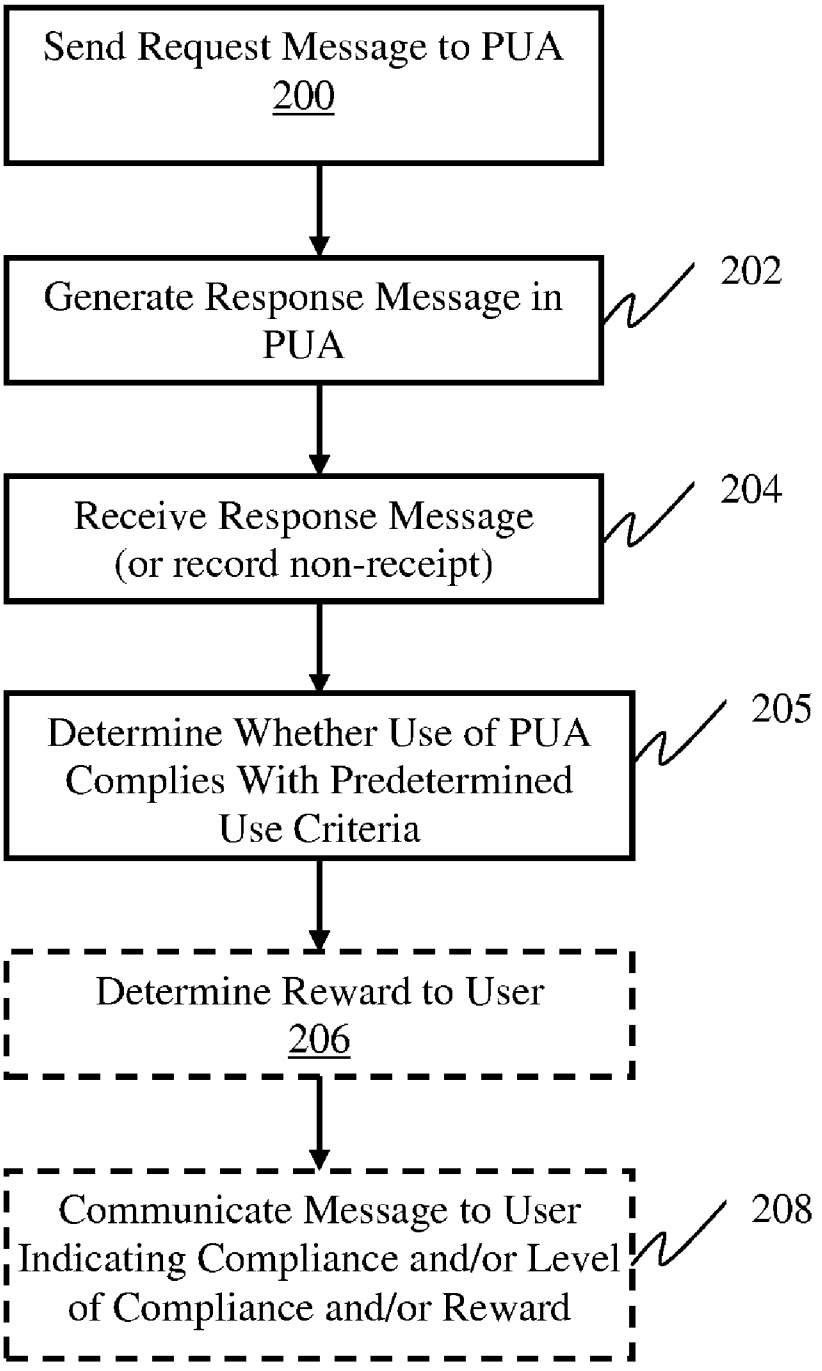

Send Request Message to PUA
200
Generate Response Message in PUA
202
Receive Response Message (or record non-receipt)
204
Determine Whether Use of PUA Complies With Predetermined Use Criteria
205
Determine Reward to User
206
Communicate Message to User Indicating Compliance and/or Level of Compliance and/or Reward
208

Figure 2B

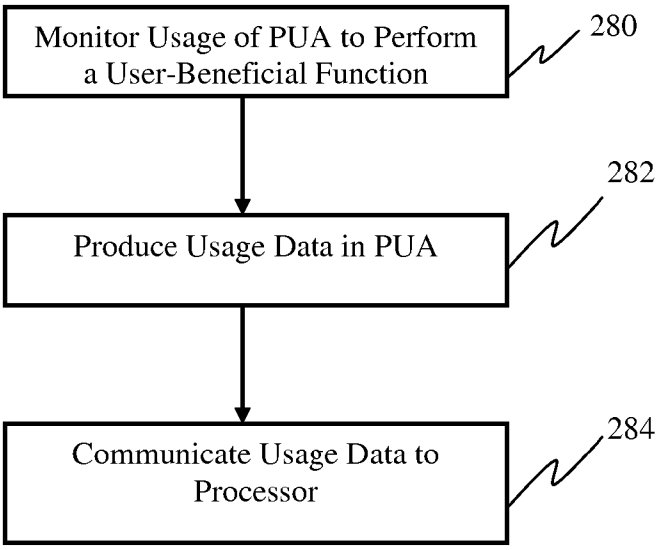


Figure 3

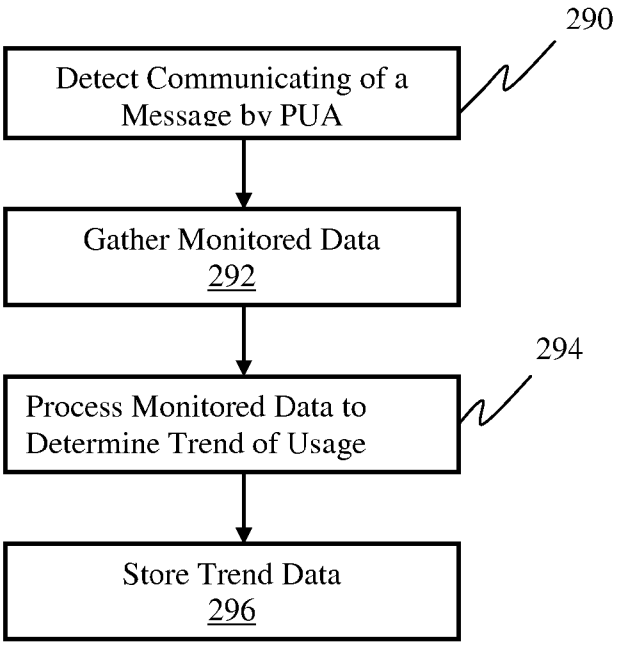


Figure 4

MONITORING USAGE OF A PORTABLE USER APPLIANCE

[0001] Methods and systems for monitoring use of a portable user appliance (PUA) are disclosed.

BACKGROUND

[0002] Media organizations, marketers, advertisers, and others are interested in learning consumers' opinions, preferences, beliefs and feelings about media, advertisements and products. Various ways of soliciting consumers' views on these matters have been employed, but they are relatively expensive to carry out and it is questionable whether the views so obtained are biased since many consumers can be reluctant to express their real views when they respond to an explicit request for them. Accordingly, a relatively inexpensive way of obtaining consumers' views on such matters which also tends to provide such views candidly in an unbiased manner, would be advantageous.

DISCLOSURE

[0003] For this application, the following terms and definitions shall apply:

[0004] The term "data" as used herein means any indicia, signals, marks, symbols, domains, symbol sets, representations, and any other physical form or forms representing information, whether permanent or temporary, whether visible, audible, acoustic, electric, magnetic, electromagnetic or otherwise manifested. The term "data" as used to represent predetermined information in one physical form shall be deemed to encompass any and all representations of corresponding information in a different physical form or forms.

[0005] The terms "media data" and "media" as used herein mean data which is widely accessible, whether over-the-air, or via cable, satellite, network, internetwork (including the Internet), print, displayed, distributed on storage media, or by any other means or technique that is humanly perceptible, without regard to the form or content of such data, and including but not limited to audio, video, audio/video, text, images, animations, databases, broadcasts, displays (including but not limited to video displays, posters and billboards), signs, signals, web pages, print media and streaming media data.

[0006] The term "research data" as used herein means data comprising (1) data concerning usage of media, (2) data concerning exposure to media, and/or (3) market research data.

[0007] The term "presentation data" as used herein shall mean media data, content other than media data or a message to be presented to a user.

[0008] The term "database" as used herein means an organized body of related data, regardless of the manner in which the data or the organized body thereof is represented. For example, the organized body of related data may be in the form of a table, a map, a grid, a packet, a datagram, a frame, a file, an e-mail, a message, a document, a list or in any other form.

[0009] The term "correlate" as used herein means a process of ascertaining a relationship between or among data, including but not limited to an identity relationship, a correspondence or other relationship of such data to further data, inclusion in a dataset, exclusion from a dataset, a predefined mathematical relationship between or among the data and/or to further data, and the existence of a common aspect between or among the data.

[0010] The terms "purchase" and "purchasing" as used herein mean a process of obtaining title, a license, possession or other right in or to goods or services in exchange for consideration, whether payment of money, barter or other legally sufficient consideration, or as promotional samples. As used herein, the term "goods" and "services" include, but are not limited to, data and rights in or to data.

[0011] The term "network" as used herein includes both networks and internetworks of all kinds, including the Internet, and is not limited to any particular network or internetwork.

[0012] The terms "first," "second," "primary," and "secondary" are used herein to distinguish one element, set, data, object, step, process, function, activity or thing from another, and are not used to designate relative position, arrangement in time or relative importance, unless otherwise stated explicitly.

[0013] The terms "coupled", "coupled to", and "coupled with" as used herein each mean a relationship between or among two or more devices, apparatus, files, circuits, elements, functions, operations, processes, programs, media, components, networks, systems, subsystems, and/or means, constituting any one or more of (a) a connection, whether direct or through one or more other devices, apparatus, files, circuits, elements, functions, operations, processes, programs, media, components, networks, systems, subsystems, or means, (b) a communications relationship, whether direct or through one or more other devices, apparatus, files, circuits, elements, functions, operations, processes, programs, media, components, networks, systems, subsystems, or means, and/or (c) a functional relationship in which the operation of any one or more devices, apparatus, files, circuits, elements, functions, operations, processes, programs, media, components, networks, systems, subsystems, or means depends, in whole or in part, on the operation of any one or more others thereof.

[0014] The terms "communicate" and "communicating" as used herein include both conveying data from a source to a destination, and delivering data to a communications medium, system, channel, network, device, wire, cable, fiber, circuit, and/or link to be conveyed to a destination. The term "communications" as used herein includes one or more of a communications medium, system, channel, network, device, wire, cable, fiber, circuit and link.

[0015] The term "message" as used herein includes data to be communicated, in communication or which has been communicated.

[0016] The term "processor" as used herein means processing devices, apparatus, programs, circuits, components, systems and subsystems, whether implemented in hardware, software or both, and whether or not programmable. The term "processor" as used herein includes, but is not limited to one or more computers, hardwired circuits, signal modifying devices and systems, devices and machines for controlling systems, central processing units, programmable devices and systems, field programmable gate arrays, application specific integrated circuits, systems on a chip, systems comprised of discrete elements and/or circuits, state machines, virtual machines, data processors, processing facilities and combinations of any of the foregoing.

[0017] The terms "storage" and "data storage" as used herein mean data storage devices, apparatus, programs, circuits, components, systems, subsystems and storage media serving to retain data, whether on a temporary or permanent basis, and to provide such retained data.

[0018] The terms "panelist," "panel member" and "participant" are interchangeably used herein to refer to a person who is, knowingly or unknowingly, participating in a study to gather information, whether by electronic, survey or other means, about that person's activity.

[0019] The term "household" as used herein is to be broadly construed to include family members, a family living at the same residence, a group of persons related or unrelated to one another living at the same residence, and a group of persons (of which the total number of unrelated persons does not exceed a predetermined number) living within a common facility, such as a fraternity house, an apartment or other similar structure or arrangement.

[0020] The term "activity" as used herein includes, but is not limited to, purchasing conduct, shopping habits, viewing habits, computer, Internet usage, exposure to media, personal attitudes, awareness, opinions and beliefs, as well as other forms of activity discussed herein.

[0021] The term "portable user appliance" (also referred to herein, for convenience, by the abbreviation "PUA") as used herein means an electrical or non-electrical device capable of being carried by or on the person of a user or capable of being disposed on or in, or held by, a physical object (e.g., attaché, purse) capable of being carried by or on the user, and having at least one function of primary benefit to such user, including without limitation, a cellular telephone, a personal digital assistant ("PDA"), a Blackberry® a device, a radio, a television, a game system (e.g., a Gameboy® device), a notebook computer, a laptop computer, a GPS device, a personal audio device (e.g., an MP3 player), a DVD player, a two-way radio, a personal communications device, a telematics device, a remote control device, a wireless headset, a wristwatch, a portable data storage device (e.g., Thumb™ drive), a camera, a recorder, a keyless entry device, a ring, a comb, a pen, a pencil, a notebook, a wallet, a tool, a flashlight, an implement, a pair of glasses, an article of clothing, a belt, a belt buckle, a fob, an article of jewelry, an ornamental article, a pair of shoes or other foot garment (e.g., sandals), a jacket, and a hat, as well as any devices combining any of the foregoing or their functions.

[0022] The term "research device" as used herein shall mean (1) a portable user appliance configured or otherwise enabled to gather, store and/or communicate research data, or to cooperate with other devices to gather, store and/or communicate research data, and/or (2) a research data gathering, storing and/or communicating device.

[0023] The term "user-beneficial function" as used herein shall mean a function initiated or carried out by a person with the use of a PUA, which function is of primary benefit to that person.

[0024] A method of gathering data concerning usage of a PUA, comprises: monitoring content created in the use of the PUA to produce content related data; and communicating the content related data to a usage data processing facility.

[0025] A system for gathering data concerning usage of a PUA comprises a monitor in or on the PUA and operative to monitor content created in the use of the PUA to produce content related data; and communications coupled with the monitor to receive the content related data and operative to communicate the content related data from the PUA to a usage data processing facility.

[0026] A method of monitoring use of a PUA by a user, the PUA including a communication interface for communicating with at least another PUA comprises detecting communication by the communication interface of the PUA; providing communication content data relating to content of the communication of the PUA; and providing trend data representing at least one trend of usage of the PUA by the user based on the communication data.

[0027] A system for monitoring use of a PUA by a user, the PUA including a communication interface for communicating with at least another PUA comprises a monitor operative to detect data communicated by the communication interface of the PUA and to produce communication content data relating to content of the communicated data; and a processor coupled with the monitor to receive the communication content data and operative to provide trend data representing at least one trend of usage of the PUA by the user based on the communication content data.

[0028] Certain embodiments of the methods and systems are presented in the following disclosure in conjunction with the accompanying drawings, in which:

[0029] FIG. **1**A illustrates various monitoring systems that include a portable user appliance ("PUA") used by a user and configured to operate as a research device;

[0030] FIG. **1**B is a block diagram showing certain details of the monitoring systems of FIG. **1**A;

[0031] FIG. **1**C is a block diagram showing the monitoring systems of FIG. **1**A including a PUA coupled with a docking station;

[0032] FIGS. **2**A and **2**B are flow diagrams illustrating actions by the monitoring systems of FIGS. **1**A-**1**C which actively monitor use of the PUA;

[0033] FIG. **3** is a flow diagram illustrating actions by the monitoring systems of FIGS. **1**A-**1**C which monitor usage of the PUA; and

[0034] FIG. **4** is a flow diagram illustrating actions by the monitoring systems of FIGS. **1**A-**1**C which provide trend data representing one or more PUA usage trends.

[0035] Various embodiments of methods and systems for monitoring use of a PUA by one or more users are described herein below. Referring to the drawings, FIGS. **1**A and **1**B are schematic illustrations of a monitoring system **1** that includes a PUA **2**, which is used by a user **3**, and a processor **5**. In certain embodiments otherwise corresponding to the embodiment of FIGS. **1**A and **1**B, the PUA **2** is replaced by a research device that does not comprise a PUA. The processor **5** may include one or a plurality of processors which are located together or separate from one another disposed within or controlled by one or more organizations. As shown, the PUA **2** may be coupled to the processor **5** via communications **7** which allows data to be exchanged between the PUA **2** and the processor **5**. In certain embodiments, the PUA **2** is wirelessly coupled via communications **7** to the processor **5**.

[0036] In some embodiments, the monitoring system **1** also includes storage **6** for storing data including, but not limited to, data received and/or processed by the central processor **5**. In certain embodiments storage **6** includes one or more storage units located together or separate from one another at the same or different locations. In certain embodiments storage **6** is included with processor **5**.

[0037] FIG. **1**B is a more detailed illustration of an embodiment of the monitoring system **1** in which the PUA **2** is adapted to communicate wirelessly with the processor **5** using wireless communications **8**. The PUA **2** includes a communication interface **9** for communicating and receiving data through communications **8**. As shown, the PUA **2** also includes a message input **11** to allow the user of the PUA **2** to input a message into the PUA **2**. The message input **11** is coupled with the communication interface **9** of the PUA **2**, so that a message inputted using the message input **11** can be communicated from the PUA **2** via communications **8**. It is understood that messages inputted using the message input **11** may be communicated to the processor **5**, or to another PUA **2**, or to another location or device coupled with communications **8**. In the illustrative embodiment shown in FIG. **1**B, the message input **11** comprises a plurality of keys **11** a in the form of a keypad. However, the configuration of the message input **11** may vary, such that, for example, the message input **11** may comprise one or more of a key, a button, a switch, a keyboard, a microphone, a video camera, a touch pad, an accelerometer, a motion detector, a touch screen, a tablet, a scroll-and-click wheel or the like.

[0038] In the illustrative configuration shown in FIG. **1**B, the PUA **2** also comprises a sensor or a detector **13** for detecting one or more parameters. The parameter or parameters detected by the sensor/detector **13** include, but are not limited to, the remaining power capacity of the PUA **2**, one or more of a user's biometric functions or parameters, a location of the PUA **2**, a change in location of the PUA **2**, data input to the PUA by the user, sounds external to the PUA **2**, motion of the PUA **2**, pressure being applied to the PUA **2**, or an impact of the PUA **2** with another object. In certain embodiments, sensor/detector **13** detects a presence indication signal or a personal identification signal emitted by a signal emitter **14** carried in or on the person of the user. In certain ones of these embodiments, the signal emitter **14** comprises a device worn or carried by the user, such as a ring, a necklace, or other article of jewelry, a wristwatch, a key fob, or article of clothing that emits a predetermined signal indicating a user's presence or the identity of the user wearing or carrying the device. The signal may be emitted as an acoustic signal, an RF or other electromagnetic signal, or a chemical signal that sensor/detector **13** is operative to receive, or an electrical signal. In certain embodiments, the signal emitter **14** comprises a device implanted in the user, such as under the user's skin. In certain embodiments, the sensor/detector **13** includes a plurality of sensors or detectors each for detecting one or more of a plurality of parameters.

[0039] As shown in FIG. **1**B, the sensor/detector **13** is coupled with the communications interface **9** of the PUA **2** so that data produced as a result of the sensing or detecting performed by the sensor/detector **13** can be communicated from the PUA **2** to the processor **5**. Although the PUA **2** shown in FIG. **1**B includes both the message input **11** and the sensor/detector **13**, it is understood that in other embodiments, one of these elements may be omitted depending on the design of the PUA **2** and the requirements of the monitoring system **1**.

[0040] As in FIG. **1**A, the illustrative configuration of the monitoring system **1** shown in FIG. **1**B includes storage **6** coupled or included with the processor **5** to store data, including data received and/or processed by the processor **5**. Data stored in storage **6** can also be retrieved by the processor **5** when needed.

[0041] The PUA **2** shown in FIGS. **1**A and **1**B may be supplied with power from an A/C power source or other power supply, or using one or more batteries or other on-board power source (not shown for purposes of simplicity and clarity). It is understood that batteries used to supply power to the PUA **2** may include any type of batteries, whether rechargeable or not, that are suitable for use with the particular PUA **2**. In certain embodiments, the PUA **2** receives power from rechargeable batteries or another kind of rechargeable power supply, such as a capacitor, and/or from a radiant energy converter, such as a photoelectric power converter, or a mechanical energy converter, such as a microelectric generator. In certain embodiments, the PUA **2** is connected with a docking station from time to time, which is used for charging the PUA **2** and/or transmitting data stored in the PUA **2** to the processor **5**. FIG. **1**C shows an embodiment of the PUA **2** used with the docking station **15**. The docking station **15**, which is typically not carried by the user and not coupled with the PUA **2** while the PUA is being carried by the user, is adapted to couple with the PUA **2** via a coupling **16**. The coupling **16** can be a direct connection between the PUA **2** and the docking station **15** to allow recharging of the PUA **2** and/or communication of data between the PUA **2** and the docking station **15**. In certain embodiments, data is communicated from the PUA to the docking station by a wireless infra-red, RF, capacitive or inductive link. In certain embodiments, data is communicated from the PUA **2** to the processor **5** by cellular telephone link or other wired or wireless network or device coupling.

[0042] As shown in FIG. **1**C, in certain embodiments the docking station is connected to a power supply **17** to provide power for charging the PUA **2** when the PUA **2** is coupled with the docking station **15**. In addition, in certain embodiments the docking station **15** includes a communication interface **19** adapted to communicate with the processor **5** through communications **7**. When the PUA **2** is coupled with the docking station **15** via the coupling **16**, data stored in the PUA **2**, such as data collected by the PUA **2** when it was carried by the user, is transferred to the docking station **15** using the coupling **16** and thereafter communicated using the communication interface **19** to the processor **5** through communications **7**. In these embodiments, the use of the docking station **15**, rather than the PUA **2**, to communicate to the processor **5** data collected by the PUA **2** enables conservation of power by the PUA **2** or the use of an internal power supply having a relatively low power capacity. In certain embodiments, the docking station **15** is also used to receive data from the processor **5** via communications **7**, and to transfer the received data from the docking station **15** to the PUA **2** via the coupling **16** when the PUA **2** is coupled with the docking station **15**.

[0043] As can be appreciated, the configuration of the docking station **15** is not limited to the configuration shown in FIG. **1**C and may vary from one embodiment to another. For example, in certain embodiments, the docking station is used only for charging the PUA **2** and does not include a communication interface **19**. In such embodiments, the docking station **15** is implemented variously as a cradle receiving the PUA **2** or as a standard AC-to DC converter, like a cellular telephone charger. In other embodiments, the docking station **15** is used only for communication of data between the PUA **2** and the processor **5** and does not charge the PUA **2**. In such embodiments, the PUA **2** may be connected to a power sup-

ply, separate from the docking station **15**, for charging, or charged using an internal power converter, or by replacing one or more batteries.

[0044] In certain embodiments, the PUA **2** shown in FIGS. **1**A-**1**C optionally includes an output (not shown for purposes of simplicity and clarity) for outputting a message to the user. The output can be in the form of a display for displaying text, or one or more symbols and/or images, a speaker or earphone for outputting a voicemail or a voice message, or one or more LED's or lamps for indicating a message to the user. It is understood that the output or outputs are not limited to the examples provided herein and can comprise any suitable output or outputs adapted to provide a message to the user.

[0045] The monitoring system **1** shown in FIGS. **1**A and **1**B is used in certain embodiments for monitoring use by a user of the PUA **2** in accordance with at least one predetermined use criterion. The at least one predetermined use criterion comprises one or more of the following criteria: that the PUA **2** is being carried and/or used, that the PUA **2** is being carried and/or used by a specific user, that the PUA **2** is turned "on," that the PUA **2** is charged, that the PUA **2** maintains a minimum power capacity, that the PUA **2** is, or has been, docked at, or connected with, the docking station **15** for a predetermined length of time, at certain times or during a predetermined time period, that the PUA is functioning properly to provide a benefit to the user, and that the PUA **2** is capable of collecting, storing and/or communicating research data, or of cooperating with one or more other devices to do so. Other predetermined use criteria not mentioned above may also be employed in monitoring the PUA's use.

[0046] In certain embodiments, the method of monitoring use by a user of a research device such as PUA **2** in accordance with at least one predetermined use criterion comprises communicating a request message to the research device, requesting a response from the user of the PUA, receiving a response message communicated from the research device in response to the request message, and storing data indicating whether the use is in compliance with the at least one predetermined use criterion and/or a level of the user's compliance therewith. This monitoring method is illustrated in more detail in FIG. **2**A, which shows a block diagram of the actions performed by the monitoring systems shown in FIGS. **1**A-**1**C.

[0047] As shown in FIG. **2**A, a request message is first communicated **100** to a PUA having a two-way communication capability with a remotely-located processor, such as processor **5** of FIGS. **1**A-**1**C, requesting a response from a user of the PUA. In certain embodiments, the request message comprises a text message, a telephone call, a voice mail, an e-mail, a voice message, a sound, a plurality of sounds, a web page, an image, a light alert, or a combination thereof, or any other data presented to the user via the PUA which indicates to the user that a response is being requested. The request message is presented to the user using an appropriate output (for example, a sound reproducing device, such as a speaker or earphone) if the message is a telephone call, a voice mail, a voice message, a sound or a plurality of sounds; a visual display, if the message is a text message, an e-mail, a web page or another image; and/or one or more light emitting devices (for example, LED's or lamps) if the message is a light alert. In certain embodiments, the request message requests a pre-determined response from the PUA user, or a more general response such as a response that acknowledges receipt of the request message. In certain embodiments, the request is accompanied by data of interest to the user, such as access to certain web sites or content, such as music, video, news, or electronic coupons. In certain ones of such embodiments, access to such data is conditioned on providing the requested response according to parameters expressed in the request message or otherwise predetermined. In certain embodiments, the processor is implemented as one or more programmable processors running a communications management program module serving to control communications with the PUA and/or its user, along with other PUA's, to request a response including data from which compliance can be assessed. In certain ones of such embodiments, such communications are scheduled in advance by the programming module with or without reference to a database storing schedule data representing a schedule of such communications, and carried out thereby automatically by means of communications **7**. In certain ones of such embodiments, such communications are scheduled in advance and notified to human operators who initiate calls to the PUA's and/or the PUA's users according to the schedule, to solicit data from which compliance can be assessed. In certain ones of such embodiments, both automatic communications and human-initiated communications as described above are carried out.

[0048] In response to the request message, a response message is generated **102** in the PUA. In certain embodiments, the response message is generated by inputting the response message by an action of the user using the message input of the PUA. In particular, in certain embodiments in which the response message comprises a code, including letter characters, number characters or symbols, or a combination thereof, the response message is generated using the message input of the PUA. Alternatively, the response message comprises data stored in the PUA, in which case, the response message is generated by selecting the stored data using the message input. In other embodiments, the response message is a response signal generated by activating the message input, such as, for example, by switching one or more switches or by pressing one or more buttons of the message input. Where the response message comprises one or more audible sounds, the response message is generated by inputting the sounds using the message input. In such embodiments, the message input comprises an audio input device, such as an acoustic transducer. As mentioned above, the response message can be generated in response to a request for a pre-determined response, or in response to a request for a more general response.

[0049] After the response message is generated in the PUA, the response message is communicated from the PUA through communications thereof and is received **104** in the remotely-located processor, such as processor **5**. In certain embodiments, such communications comprises cellular telephone communications, PCS communications, wireless networking communications, satellite communications, or a Bluetooth, ZigBee, electro-optical or other wireless link. In certain embodiments, such communications comprises as Ethernet interface, a telephone modem, a USB port, a Firewire connection, a cable modem, an audio or video connection, or other network or device interface. When the response message from the PUA is received, or a predetermined time period passes without receiving the response message, the processor provides data indicating whether the use of the PUA is in compliance with at least one predetermined criterion and/or the level of the user's compliance. The data provided by the processor is then stored **106** by the processor. In certain embodiments, the processor provides

data indicating a user's compliance and/or the level of a user's compliance based on whether or not the response message from the PUA was received. In other embodiments, the processor provides compliance and/or level of compliance data based on the content of the response message, and/or the length of time passed before the response message from the PUA is received, and/or other factors discussed in more detail herein below. In certain embodiments the processor is implemented as one or more programmable processors running a compliance analysis program module which receives the data returned by the PUA and/or the user of the PUA to the communications management program module and serves to analyze the compliance of the user based on such data and in accordance with compliance rules stored in a storage, such as storage **6** of FIGS. **1**A-**1**C. Based on such analysis, the compliance analysis program module produces compliance data indicating whether the user complied with the predetermined use criteria and/or a level of such compliance.

[0050] In certain embodiments, a reward may be provided to a user when the user's use of the PUA is in compliance with the predetermined use criteria or when the user's level of compliance is above a pre-selected compliance level. The reward may be in the form of cash, credit, a prize or a benefit, such as a free service or points usable to make purchases or receive prizes, either by means of the PUA or through a different means or service. In certain ones of such embodiments, the reward comprises data of interest to the user, such as access to certain web sites or content, such as music, video, news, or electronic coupons. As shown in FIG. **2**A, when data indicating compliance or a level of compliance above a preselected compliance level is produced and/or stored, a reward to the user is determined **108**. The reward to the user, including the type of the reward and/or an amount or quality of the reward, is determined by the processor of the monitoring system based on the stored data indicating user's compliance or the level of user's compliance. Where the reward is determined based on the level of the user's compliance, in certain embodiments the reward is provided to the user if the user's level of compliance is higher than a predetermined level and/or the type and/or the amount of the reward determined in **108** is varied as the level of the user's compliance increases or decreases. For instance, in certain embodiments a number of points awarded to the user that may be used to purchase goods or services, is greater where the user responds to a larger percentage of request messages, or is increased as the number of request messages that the user responds to increases.

[0051] Providing rewards to PUA users for use of the PUA in compliance with the predetermined use criteria provides an incentive for the users to comply with the use requirements so as to earn a reward or to earn a higher reward. Therefore, providing a reward to the PUA user for the correct use of the PUA also promotes correct use of the PUA in the future in accordance with the predetermined usage criterion or criteria.

[0052] In certain embodiments, the monitoring system also communicates a message to the PUA user indicating compliance and/or the level of compliance with the predetermined use criteria for the PUA and/or the reward earned by the user **110**. The message communicated to the user can be in the form of a text message, a telephone call, a voice mail, a voice message, an e-mail, an image or a combination thereof communicated via the PUA or otherwise. In some embodiments, the message can be in form of a light indication, such as by lighting up an LED or lamp to indicate whether the use of the PUA is in compliance or whether a reward has been earned by the user. As shown in FIG. **2**A, the determination of the reward to the user **108** and the communication of the message to the user **110** are optional actions by the monitoring system in monitoring the user's use of the PUA. In some configurations, for example, the determination of the reward is omitted and the monitoring system proceeds to communicating the message to the user indicating the user's compliance and/or level of compliance. In other configurations, however, the monitoring system determines the reward to the user and automatically provides the reward to the user, such as by sending the reward directly to the user or applying the reward to the user's account, without communicating any messages to the user indicating the user's compliance, level of compliance or reward earned. In certain embodiments, where the monitoring system has determined that a user has failed to comply, it sends one or more messages to the user and/or to the user's PUA noting such failure, with or without further message content encouraging compliance in the future. In certain ones of such embodiments, the message noting failure to comply is sent in a plurality of different forms, such as both a text message and a voice call, which can be generated either automatically or by human intervention. In certain embodiments, the determination of a reward is made by one or more programmable processors running a reward determination program module that receives the compliance data produced by the compliance analysis program module and serve to produce reward data based on stored rules, such as rules stored in storage **6**, specifying what rewards (including kind and amount), if any, to accord to the user for whom the compliance data was produced. Based on the reward data, the communications management program module communicates a reward notification to the PUA and/or its user, and/or communicates an order to a service (such as a supplier of goods or services, which can include content and other data) to provide the determined rewards to the user or credit an account of the user with such rewards.

[0053] In certain embodiments, the use of a research device is monitored by communicating a request message to the research device, the request message requesting a response from the user of the research device, receiving a response message communicated from the research device in response to the request message, and determining whether the use of the research device by the user is in compliance with the at least one predetermined use criterion. FIG. **2**B illustrates this embodiment of monitoring use of a research device, namely, a user's PUA, by the monitoring system. In certain other embodiments otherwise corresponding to the embodiment of FIG. **2**B, the user's PUA is replaced by a research device that does not comprise a PUA.

[0054] As shown in FIG. **2**B at **200**, a request message is sent to a PUA from a monitoring system, a response message is generated **202** in the PUA and communicated thereby to the monitoring system, in response to the request message and the response message is received **204** by the monitoring system from the PUA (or its non-receipt is recorded). These actions performed by the monitoring system are similar to those, i.e. **100**, **102** and **104**, described above with respect to FIG. **2**A, and therefore a detailed description thereof is omitted for purposes of clarity and simplicity. As further shown in FIG. **2**B, when the response message is received from the PUA, the monitoring system determines **205** whether the user's use of the PUA complies with at least one predetermined use criterion. This determination **205** is performed by a processor of the monitoring system. As mentioned herein

above, the predetermined criteria includes, but is not limited to, the PUA being carried, the PUA being carried by a specific user, the PUA being turned "on," the PUA being charged, the PUA maintaining a minimum charge or power capacity, the PUA being docked at, or connected with, the docking station for a predetermined length and/or period of time, or at certain times, the PUA functioning properly and the PUA being capable of collecting, storing and/or communicating research data, or of cooperating with one or more other devices to do so.

[0055] In certain embodiments, the determination **205** whether the use of the PUA is in compliance with the predetermined criteria is based on at least one of the receipt or non-receipt **204** of the response message from the PUA, the time of receipt of the response message and the content of the response message. For example, when the determination **205** is based on the receipt or non-receipt of the response message from the PUA, the processor determines that the use of the PUA is not in compliance with the predetermined criteria if the receipt message is not received within a predetermined period of time from the sending of the request message to the PUA in **200**. In certain ones of such embodiments, a request message requesting a response from the user (such as a text message or voice prompt) is sent to the PUA at regular intervals during the day, at intervals determined according to dayparts or according to a pseudorandom schedule, and the promptness of the user's response, if any, is used to determine an amount or quality of a reward to the user.

[0056] When the determination of compliance with predetermined use criteria is based on the time of receipt of the response message, the processor determines how much time had elapsed between the time of sending of the request message to the PUA and the time of receipt of the response message from the PUA and compares it to a selected compliant response time. The compliant response time in certain embodiments is a constant duration for all users, all PUA's, all types of request messages, all places and all times. In certain other embodiments, the compliant response time is selected based on user demographics or an individual profile. In certain embodiments, the compliant response time is based on the type of request message and/or its contents. In certain ones of such embodiments, the compliant response time is specified in the message, for example, "Please respond within ten minutes." In certain embodiments the compliant response time is selected based on the type of PUA that receives it, for example, a cellular telephone or Blackberry device for which a relatively short response time can be expected, as compared to a personal audio or DVD player, for which a longer response time may be appropriate. In certain embodiments, the compliant response time is selected depending on the manner in which the request message is to be presented to the user. For example, if receipt of the message is indicated to the user by an audible alert or device vibration, a shorter response time can be expected than in the case of a message presented only visually. In certain embodiments, the compliant response time is selected based on the time of day. For example, during morning or afternoon drive time, the response time may be lengthened since the user may not be able to respond as quickly as during the evening when the user is at home. In certain embodiments, the compliant response time is selected based on the user's location. For example, in certain places it may be customary to respond to messages more quickly than in others. In certain embodiments, the compliant response time is selected based on a combination of two or more of the foregoing factors.

[0057] If the time elapsed between the sending of the request message and the receipt of the response is less than the selected response time, it is determined that the user's use of the PUA is in compliance with the pre-determined criteria. However, if the elapsed time is greater than the selected response time, it is determined that the use of the PUA is not in compliance with the predetermined criteria. In certain embodiments, the amount of time elapsed between the sending **200** of the request message and the receiving **204** of the response message is used to determine a level of the user's compliance with the predetermined use criteria. In particular, the level of compliance determined by the processor will depend on how quickly the response message is received by the processor, such that the level of compliance is greater as the amount of time elapsed between the sending **200** of the request message and the receipt **204** of the response message is less.

[0058] When the determination whether the user's PUA use is in compliance with one or more predetermined criteria is based on the content of the response message, the processor determines whether the content of the response message complies with predetermined parameters. In such embodiments, a selected response message, complying with predetermined parameters, is requested **200** by the request message communicated to the PUA, and in determining compliance and/or the level of compliance, the processor compares the response message received **204** from the PUA with the requested response. In one illustrative embodiment, the request message communicated **200** to the PUA comprises a request for the user's password or for a particular code, such as a user' screen name or real name, and the response message received **204** in response to the request message is compared by the processor to pre-stored data, such as a password, code, screen name or real name stored in a database, to determine **205** whether the use of the PUA is in compliance with the predetermined criteria. If the received response message matches the stored message, i.e. password, a name (such as a screen name selected by the user or the user's real name) or a code, stored in the database, then the processor determines that the user is in compliance with the predetermined criteria. By requesting a selected response message, such as a password, name or code, the monitoring system is capable not only of confirming that the PUA is being carried and/or used, but also of confirming that the PUA is being carried and/or used by a specific user.

[0059] In certain embodiments, in addition to or instead of other requested information, the requested response comprises information from the user, such as what the user is doing when the message is received or at other times, the user's location or locations at various times, media or products to which the user has been exposed, has purchased or used, or plans to purchase or use, the user's beliefs and/or the user's opinions. In certain embodiments, in addition to or instead of other requested information, the requested response comprises information concerning an operational state of the PUA (for example, as indicated thereby or as determined by the user), whether and/or when the user performed some action (such as docking or recharging the PUA), and/or whether and/or how the user is carrying the PUA.

[0060] In certain embodiments, the processor determines **205** the level of the PUA user's compliance based on the content of the message. In this illustrative embodiment, the

response message received **204** is compared with stored data, such as a password, name or code stored in the database, and determines the level of compliance based on how closely the response message matches with the stored data. In certain ones of such embodiments, a first, or highest, level of compliance is determined if the response message matches the stored message, a second level of compliance, which is lower than the first level, is determined if the response message does not match the stored message, and a third, or lowest, level of compliance is determined if no response message is received **204** from the PUA. In some embodiments, a plurality of different intermediate levels of compliance may be determined instead of the second level of compliance, if a response message is received but does not match the stored message. In such embodiments, the level determined is based on the extent of similarity between the response message and the pre-stored data. Thus, for example, the intermediate level of compliance will be higher in a case where the response message received **204** from the PUA differs from the stored message by only one character than in a case where the response message received from the PUA is completely different from the stored message.

[0061] In certain embodiments, the user's compliance and/or level of compliance is determined not only based on the content of the response message but also on the time of receipt of the response message. In certain ones of such embodiments, the user's compliance will depend on whether the response message matches with the stored data, as well as on how quickly the response message is received from the PUA. In certain ones of such embodiments, the highest level of compliance is determined if the response message received from the PUA matches the stored data, and if the time elapsed between the sending of the request message to the PUA and the receipt of the response message is less than a selected time. If the response message does not match the stored data and/or the time elapsed between the sending of the request message and the receipt of the response message is greater than the selected time, then the level of compliance determined **205** is selected at a level intermediate a highest level of compliance and a lowest level. If no response message is received from the PUA, then the lowest level of compliance, or non-compliance is determined by the monitoring system.

[0062] In some embodiments, the monitoring system also determines and/or provides **206** a reward to the user for complying with predetermined criteria **206** and/or sends a message to the user indicating at least one of the user's compliance, the level of compliance and the reward to the user **208**. In particular, after the monitoring system determines whether the PUA use complies with the predetermined use criteria and/or the level of the user's compliance, the monitoring system proceeds to determine and/or provide **206** a reward to the user of the PUA. The system then communicates **208** a message to the user indicating the user's compliance, level of compliance and/or the reward earned by the user. These actions performed by the monitoring system are similar to those (**106** and **108**) described above with respect to FIG. **2**A, and thus a detailed description thereof is omitted. As in the embodiments described with respect to FIG. **2**A, the determination and/or provision **206** of the reward and the communication **208** of the message indicating compliance, level of compliance and/or the reward are optional. Moreover, as in the embodiments described with respect to FIG. **2**A, in certain embodiments, the determination and/or provision of the reward is performed without communicating the message to the user, while in other embodiments, the communication **208** of the message is performed without determining and/or providing **206** the reward.

[0063] In certain embodiments of monitoring methods and systems, the monitoring system monitors one or more parameters, such as biometric parameters, sounds external to a research device, an impact of the research device with another object, motion of the research device, proximity of the research device to the person of a user, proximity of the research device to a presence indicator or personal identification device in or on the person of a user, pressure applied to the research device, recharging of the research device, its power capacity, docking of the research device, data input (e.g., messages) to the research device, location of the research device and/or changes in the research device's location, to determine whether the use of the research device is in compliance with at least one predetermined criterion. In one illustrative embodiment, the monitoring system produces monitored data by monitoring at least one of a user's heart activity, a user's brain activity, a user's breathing activity, a user's pulse, a user's blood oxygenation, a user's borborygmus (gastrointestinal noise), a user's gait, a user's voice, a user's key, keypad or keyboard usage characteristics (e.g., keystroke recognition), a user's vascular pattern, a user's facial or ear patterns, a user's signature, a user's fingerprint, a user's handprint or hand geometry, a user's retinal or iris patterns, a user's airborne biochemical indicators (sometimes referred to as a user's "smellprint"), a user's muscular activity, a user's body temperature, sounds external to the research device, motion of the research device, pressure applied to the research device, recharging of the research device, docking of the research device, its power capacity, an impact of the research device with another object, data input to the research device by a user, location of the research device and a change in a location of the research device, and determines whether use of the research device by the user is in accordance with at least one predetermined criterion based on the monitored data.

[0064] Referring again to FIG. **1**B, the monitoring of the biometric parameters **222**, external sounds, presence indication signal, personal identification signal **224**, PUA location, PUA location changes **226**, data input **228** and/or impact of the PUA with another object, pressure applied to the PUA, motion of the PUA, recharging, power capacity, docking **230** is performed in the PUA **2** by the sensor/detector **13** in cooperation with a processor of the PUA (not shown for purposes of simplicity and clarity). As mentioned above, the sensor/detector **13** in certain embodiments includes a plurality of sensors and/or detectors which monitor a plurality of parameters. In the embodiments in which the sensor/detector **13** monitors one or more biometric parameters of the PUA user **222**, the sensor/detector **13** comprises one or more of a heart monitor for monitoring heart activity of the user, an EEG monitor for monitoring the user's brain activity, a breathing monitor for monitoring the user's breathing activity including, but not limited to, the user's breathing rate, a pulse rate monitor, a pulse oximeter, a sound detector for monitoring the user's borborygmus and/or the user's voice, a gait sensor and/or a gait analyzer for detecting data representing the user's gait, such as a motion sensor or accelerometer (which may also be used to monitor muscle activity), a video camera for use in detecting motion based on changes to its output image signal over time, a temperature sensor for monitoring the user's temperature, an electrode or electrodes for picking

up EKG and/or EEG signals, and a fingerprint or handprint scanner for detecting the user's fingerprint or handprint. Where the user's retinal or iris patterns are monitored, sensor/detector **13** comprises a low-intensity light source, for scanning, detecting or otherwise sensing the retinal or iris patterns of the user. Where the user's hand geometry is detected, sensor/detector **13** comprises a device configured with an optical sensor or other imaging device to capture predetermined parameters of the user's hand, such as hand shape, finger length, finger thickness, finger curvature and/or any portion thereof. Where the user's smellprint is detected, sensor/detector **13** comprises an electronic sensor, a chemical sensor, and/or an electronic or chemical sensor configured as an array of chemical sensors, wherein each chemical sensor may detect a specific odorant or other biochemical indicator. Where a vascular pattern of the user is detected, sensor/detector **13** comprises an optical or other radiant energy scanning or imaging device for detecting a vascular pattern or other tissue structure, or blood flow or pressure characteristic of the user's hand or other body part. Where the user's facial or ear patterns are detected, the sensor/detector **13** comprises a video camera, optical scanner or other device sufficient to recognize one or more facial features or one or more features of the user's ear or other body part. In certain ones of these embodiments, the sensor/detector **13** is mounted in or on the PUA **2**, while in others the sensor/detector **13** is arranged separately from the PUA **2** and communicates therewith via a cable or via an RF, inductive, acoustic, infrared or other wireless link.

[0065] In the embodiments in which the sensor/detector **13** of the PUA **2** monitors sounds external to the PUA **224**, the sensor/detector **13** comprises an acoustic sensor such as a microphone or any other suitable sound detector for detecting external sounds. In certain embodiments, the sensor/detector **13**, which monitors external sounds, cooperates with the processor for analyzing the detected external sounds. The external sounds detected by the sensor/detector **13** include, but are not limited to, environmental noise, rubbing of the PUA **2** against the user's clothing or other external objects, vehicle sounds (such as engine noise and sounds characteristic of opening and closing car doors), the user's voice print, dropping of the PUA, average ambient noise level, and the like. In the embodiments in which sensor/detector **13** receives a presence indication signal or personal identification signal from signal emitter **14**, sensor/detector **13** comprises a device operative to receive the signal, such as an RF receiver, a microphone, an optical sensor, an inductive pickup, a capacitive pickup, a chemical sensor or a conductive connection.

[0066] In certain ones of the embodiments in which the sensor/detector **13** monitors the user's data input **228** (e.g., messages or inputs to control a diverse operation of the PUA, such as to make use of an application running thereon, like a game), the sensor/detector **13** comprises a pressure sensor for sensing pressure applied to the message input by the user. Alternatively or in addition, the sensor/detector **13** comprises a utility, such as a key logger, running on the processor of the PUA to determine and record its usage.

[0067] In the embodiments in which location change is being monitored **226**, the sensor/detector **13** directly or indirectly detects the change in the PUA's location. Direct detection of the PUA's location is accomplished by detecting the location of the PUA and the change in PUA's location over time. In this case, the sensor/detector **13** comprises a satellite location system, such as a GPS receiver, an ultra wideband location detector, a cellular telephone location detector, an angle of arrival location detector, a time difference of arrival location detector, an enhanced signal strength location detector, a location fingerprinting location detector, an inertial location monitor, a short range location signal receiver or any other suitable location detector. The same means can also be employed to determine the PUA's location. Indirect detection of the PUA's location change is accomplished by detecting a predetermined parameter which is directly or indirectly related to the location of the PUA and determining from variations in the predetermined parameter whether a change in the location of the PUA has occurred. One of such predetermined parameters detected by the sensor/detector **13** can be variations in the strength of a RF signal received by the PUA, and in such case, the sensor/detector **13** comprises a RF signal receiver. Where location change data is available such data is used in certain embodiments to determine whether and when the PUA was or is being carried.

[0068] In embodiments in which the sensor/detector **13** monitors the impact of the PUA **2** with another object **230**, the sensor/detector **13** comprises an impact detector for measuring pre-determined levels of impact of the PUA **2** with other objects. In certain embodiments, the sensor/detector **13** comprises an accelerometer for detecting a relatively large acceleration upon impact of the PUA **2** with another object.

[0069] In embodiments where pressure applied to the PUA is monitored, a pressure sensor is placed on an enclosure of the PUA or mechanically coupled therewith to receive force applied to such enclosure. In certain ones of such embodiments, the magnitude of the pressure as it varies over time and/or with location on the enclosure are analyzed to determine if the PUA is being or was carried and/or the manner in which it was used and/or the event of non-use.

[0070] In certain embodiments where motion of the PUA is monitored, a video camera of the PUA is used as a motion sensor. In certain ones of such embodiments, changes in the image data provided at the output of the video camera (either the entire image or one or more portions thereof) are processed to determine movement or an extent of movement of the image over time to detect that the PUA is being moved about, either by translational or rotation. Techniques for producing motion vectors indicating motion of an image or an extent of such motion are well known in the art, and are used in certain embodiments herein to evaluate whether the PUA is moving and/or the extent of such movement. In certain ones of such embodiments, changes in the light intensity or color composition of the image data output by the video camera (either the entire image or one or more portions thereof) over time are used to detect motion of the PUA. In certain embodiments where motion of the PUA is monitored, a light sensitive device, such as a light sensitive diode of the PUA, is used as a motion sensor. Changes in the output of the light sensitive device over time that characterize movement serve to indicate that the PUA is being carried.

[0071] In certain embodiments, the one or more parameters also include power remaining in the PUA, recharging of the PUA and/or the event of docking of the PUA by coupling the PUA with the docking station, for example, as illustrated in FIG. **1**C. In such embodiments, the monitoring system produces monitored data by monitoring the power remaining in the PUA and/or by monitoring the docking of the PUA at the docking station. In the embodiments in which the docking of the PUA is monitored, the monitoring system monitors the length of time the PUA was coupled with the docking station,

the time period during which the PUA was coupled with the docking station, a time at which the PUA is docked, a time at which the PUA was undocked, whether or not the PUA is coupled with the docking station and/or the length of time passed since the PUA was last docked at the docking station.

[0072] The monitoring of one or more parameters **222-230** by the monitoring system, as described above, produces monitored data which indicates at least whether or not the PUA was being carried and/or used in one or more of various ways. For example, if monitoring includes monitoring one or more biometric parameters of the user, then the monitored data indicates at least whether or not the biometric parameters being monitored have been detected. Similarly, in the case of monitoring PUA location changes, external sounds, data input, pressure, motion, light changes and/or impact of the PUA with other objects, the monitored data includes data indicating at least whether or not any of these parameters have been detected. Monitored data that indicates that one or more of these parameters have been detected in the PUA, in turn, indicates that the PUA was being carried and/or used, while monitored data indicating a lack of any detection of one or more of the monitored parameters indicates that the PUA was not being carried or used.

[0073] In certain embodiments, the monitored data produced indicates at least whether or not the PUA was charged and/or whether or not the PUA was docked at the docking station according to a predetermined time parameter. In the case of monitoring the power charge in the PUA, the monitored data includes data indicating at least whether or not the PUA was charged, and in certain embodiments, the monitored data indicates whether the power capacity remaining in the PUA was greater than a predetermined minimum. Where monitoring includes monitoring of the docking of the PUA at the docking station, the monitored data indicates at least whether or not the PUA was docked at the docking station at any time, and in some embodiments, the monitoring data indicates one or more of whether or not the PUA was docked at the docking station for a predetermined length of time, how frequently the PUA was docked, when the PUA was docked, when the PUA was undocked and/or the time periods during which the PUA was docked. The monitored data produced in these embodiments can be used to determine whether the use of the PUA was in compliance with the criteria for recharging of the PUA and/or docking of the PUA.

[0074] In certain embodiments, monitored data comprises data which can be used to confirm the identity of the PUA user. For example, if one or more biometric parameters of the user are monitored by the sensor/detector, the monitored data includes data indicating or relating to one or more of the user's heart rate or other heart activity or parameter, EEG, blood oxygenation, breathing rate or other breathing activity or parameter, borborygmus, gait, voice, voice analysis, key, keypad or keyboard usage characteristics, fingerprints, handprints, hand geometry, pulse, retinal or iris patterns, olfactory characteristics or other biochemical indicators, patterns of muscular activity, vascular patterns, facial or ear patterns, signature, and/or body temperature detected once or a plurality of times over a predetermined period of time. In another example, if the PUA location change is being monitored, then monitored data can include data relating to the specific locations or changes in location of the PUA and/or relating to the specific RF signal strengths of the PUA detected one or a plurality of times over a predetermined period of time.

[0075] In certain embodiments the sensor/detector **13** of the PUA **2** comprises a digital writing tablet that is used to input a digital handwritten signature from the user to assess who is using the PUA. In accordance with known handwriting identification techniques, a storage of the PUA stores signature recognition software to control a processor of the PUA to compare the current user's signature input by means of the digital writing tablet against stored templates of one or more users' handwritten signatures to determine if there is a match. (The storage and the processor are not shown for purposes of simplicity and clarity.) Based on the results of the matching process, data is produced indicating whether the current user's signature matches any of the stored templates to assess the identity of the current user of the PUA. The templates of the users' signatures are produced in a training mode of the signature recognition software, in which each potential user inputs one or more signatures using the digital writing tablet from which a corresponding template is produced by the PUA's processor and then stored in its storage. In certain ones of such embodiments, the PUA includes a digital writing tablet to enable a user-beneficial function, such as note taking and it is then unnecessary to provide a dedicated digital writing tablet.

[0076] In certain embodiments, the sensor/detector **13** comprises a microphone and a voiceprint recognition technique is used to assess the identity of the user of the PUA **2**. In accordance with known voiceprint recognition techniques, the PUA's storage stores voice recognition software to control its processor to compare the current user's voice input by means of the microphone against stored voiceprints of one or more possible users to determine if there is a match. Based on the results of the matching process, data is produced indicating whether the current user's voice matches the voice represented by any of the stored voiceprints to assess the identity of the current user of the PUA. The voiceprints of one or more potential users are produced in a training mode of the voice recognition software, in which each potential user speaks into the microphone of the PUA to produce data from which the voiceprint is produced by its processor and then stored in its storage. Various ones of such embodiments extract the user's voiceprint under different conditions. In one such embodiment, the user's voiceprint is extracted when the user places a voice call using the PUA as a cellular telephone in response to a request message from a monitoring system. In other such embodiments, the PUA's processor extracts voiceprints continuously from the output of its microphone, or at predetermined times or intervals, or when a telephone call is made using the PUA as a cellular telephone or when the output from the PUA's microphone indicates that someone may be speaking into it (indicated, for example by the magnitude of the output, and/or its time and/or frequency characteristics). The extracted voiceprints are compared to the stored voiceprint to assess the identity of the person using the PUA.

[0077] In certain embodiments, the sensor/detector **13** comprises an imagining device, such as a video camera, or other radiant energy detector, such as a line scanner implemented by means of a CCD or an array of photodiodes, that is used to input data representing an image or line scan of a physical feature of the user, such as an iris, a retina, an image of all or portion of the user's face, finger, palm, hand or ear to assess the identity of the user of the PUA **2**. In the case of an iris or retinal image, the input data is processed to extract an iris or retinal pattern code. A facial image is processed to extract data unique to the user such as a signature or feature

set representing facial bone structure. An image of a finger, palm or hand is processed to extract a fingerprint or palm print, or other characteristic data such as hand geometry or tissue vascular structure. In accordance with known pattern recognition techniques, the PUA's storage stores pattern recognition software to control its processor to compare the current user's iris or retinal pattern code, facial signature or feature set or other characteristic data input by means of the imaging device against one or more stored pattern codes, signatures, feature sets or other characteristic data of one or more potential users, as the case may be, to determine if there is a match. Such characteristic data may be stored in storage **50** or in a storage of a separate device, system or processing facility. Based on the results of the matching process, data is produced by the PUA's processor operating under control of the pattern recognition software to assess the identity of the current user of the PUA. The pattern code, signature, feature set or other characteristic data of each potential user is produced in a training mode of the pattern recognition software, in which the appropriate physical feature of the potential user is imaged or scanned one or more times using the imaging device from which the desired data is produced by the PUA's processor and then stored in its storage. In certain embodiments the physical feature concerned is scanned or imaged at a plurality of different orientations to produce the desired data. In certain ones of the foregoing embodiments, the PUA (such as a cellular telephone) includes a digital camera to enable a user-beneficial function, such as digital photography or video imaging and it is then unnecessary to provide a dedicated imaging device or scanner.

[0078] In certain embodiments, a keyboard dynamics technique is used to assess the identity of the user. In accordance with known keyboard dynamics techniques, the PUA's storage stores keystroke monitoring software to control its processor to collect characteristic keystroke parameters, such as data indicating how long the user holds down the keys **11***a* of PUA **2**, the delay between one keystroke and the next (known as "latency"), and frequency of using of special keys, such as a delete key. Still other parameters, such as typing speed and the manner in which the user employs key combinations (such as keyboard shortcuts), may be monitored by the processor. These parameters are processed in a known manner to produce a feature set characterizing the user's key usage style which is then compared against a stored feature sets representing the styles of one or more potential users. Based on the results of this comparison, data is produced indicating whether the current user's key usage style matches that of one of the potential users as represented by a matching stored feature set to assess the identity of the current user of the PUA. The feature sets representing the usage styles of the potential users are produced in a training mode of the software, in which each potential user makes use of the key or keys of the PUA to produce data from which the feature set is produced by the PUA's processor and then stored in its storage.

[0079] In certain embodiments, the sensor/detector **13** comprises a motion sensitive device, such as an accelerometer, that produces data related to motion of the PUA **2**. This data is used to produce a feature set characterizing motion of the PUA, and thus the gait of a person carrying it. In accordance with known gait identification techniques, the PUA's storage stores pattern recognition software to control its processor to compare the current user's gait feature set against one or more stored reference feature sets representing the individual gaits of potential users to determine if there is a match. Based on the results of the matching process, data is produced indicating whether the current user's gait matches that represented by a stored feature set to assess the identity the current user of the PUA. The various feature sets each representing the gait of a potential user are produced in a training mode of the pattern recognition software, in which each potential user walks about carrying the PUA while the motion sensitive device thereof produces data from which its processor produces a respective reference feature set which it stores in the PUA's storage. In certain ones of such embodiments, the PUA includes an accelerometer as an input device to enable a user-beneficial function, such as a gaming input or scrolling command input, and it is then unnecessary to provide a dedicated accelerometer as the motion sensitive device.

[0080] In certain ones of such embodiments, multiple devices and pattern recognition techniques are employed to produce a more accurate and reliable identification of the user than is possible using only one such pattern recognition technique. In certain embodiments, one or more of such pattern recognition techniques or other passive data gathering technique is employed to assess the user's identity. Such detection may be based on an amount by which a monitored feature set differs from a stored feature set representing a characteristic of each potential user as determined by the PUA's processor. When the processor produces data indicating an identification of the user, in certain embodiments either the processor controls a speaker, earphone or visual display of the PUA to present a message to the user requesting a response from which the user's identity may be positively determined, or the processor sends a message to a monitoring system (not shown for purposes of simplicity and clarity) indicating that such a message should be presented to the user. In the latter case, the monitoring system responds to such message from the processor to send a message to the PUA for presentation to the user to request an appropriate response from the user from which the user's identity may be determined, either by the processor or by the monitoring system. The user's response to such message is used to determine the user's identity.

[0081] In certain embodiments, data concerning usage of a PUA to perform a user-beneficial function is gathered by the monitoring system. In particular, the gathering of data concerning such usage of the PUA comprises monitoring usage of the PUA to produce usage data within the PUA, and communicating the usage data from the PUA to a usage data processing facility. This embodiment is illustratively shown in FIG. **3**. This is especially useful for gathering marketing data concerning how users employ PUA's with an ability to communicate, such as cellular telephones, PDA's, notebook and laptop computers, Blackberry devices, PCS devices, two-way radios, as well as other kinds of PUA's having device-to-device communicating ability or wireless networking ability.

[0082] As shown in FIG. **3**, the monitoring system monitors the user's use of the PUA **280** and produces usage data within the PUA **282** based on such monitoring. If the monitoring system shown in FIG. **1**B is employed, certain monitoring of PUA usage is performed by the sensor/detector **13**, which detects the use of one or more functions performed by the PUA. For example, if the PUA includes a function of generating and communicating a text message to another PUA, the sensor/detector **13** in the PUA **2** detects when the user generates and/or communicates a text message, and usage data relating to the generation and communication of the text message is produced in the PUA **2**. In certain ones of these

embodiments, the operations of sensor/detector **13** are implemented by a processor of the PUA that may carry out additional operations beyond those of sensor/detector **13**.

[0083] The usage data produced in the PUA **2** includes at least data relating to content generated by the performance of the PUA function. In certain embodiments, the usage data also comprises one or more of data indicating the type of PUA function used, data indicating the time of use of the PUA function, data indicating the length of time of the use of the PUA function, and data relating to the use of communications, if any, to send or receive messages with the use of the PUA. Data relating to the use of communications by the PUA includes data relating to the time a message is communicated, the size of the message and/or the destination of the message, such as the recipient's telephone number, email address and/or IP address. Data relating to the content generated by the use of the PUA function includes data relating to the subject of the generated content and/or data relating to words, phrases, names or concepts included in the content, such as "buzz words". Buzz words comprise words, terms or phrases that advertisers and other businesses would find of value as descriptive of consumers' experiences and reactions to media and advertising content. Some examples include word pair choices such as "boring" vs. "exciting"; "essential" vs. "unnecessary." Further examples include words and phrases that convey a rank-order (ordinal) scale such as "superior quality" vs. "good quality" vs. "acceptable" vs. "poor quality" vs. "unacceptable," "not interested at all" vs. "slightly interested" vs. "might consider purchasing" vs. "interested in purchasing" vs. "plan to purchase" vs. "will definitely purchase."

[0084] The usage data produced in the PUA is thereafter communicated **284** to a usage data processing facility. The usage data processing facility includes a processor, such as the processor **5** shown in FIG. **1**B. The processing facility is adapted to receive and process usage data to generate trend data relating to a variety of trends. The trend data generated by the processing facility includes, but is not limited to, data relating to the time, frequency and/or manner of usage of the PUA function, the preference of one PUA function over others, the use of a particular "buzz word," name, brand and/or concept by users, the communications to a particular area code, IP address and/or email service, and other trends relating to the usage of the PUA.

[0085] In certain embodiments, the PUA includes communications for communicating with at least another PUA, and the methods and systems for monitoring use of a PUA comprise detecting communicating a message by the communications of the PUA, providing monitored data relating to content of the message, and providing trend data representing at least one trend of usage of the PUA by the user based on the monitored data. These embodiments are illustrated in FIG. **4** which shows a flow diagram of actions performed by the monitoring system.

[0086] In this embodiment, the PUA is adapted to communicate with other PUA's using a communication interface. As shown in FIG. **1**B, the PUA **2** includes communications in the form of an interface **9** which can communicate using the communications **7**. In this case, each of the other PUA's also includes a corresponding interface which is coupled with the communications **7**, such that each such PUA can communicate with other PUA's via the communications **7**.

[0087] Referring now to FIG. **4**, when the interface of the PUA communicates a message with another PUA or with any other device, the communicating of the message is detected **290** in the PUA. If the PUA **2** shown in FIG. **1**B is employed, the sensor/detector **13** is used to detect the communicating of the message by the PUA **2**. In certain ones of such embodiments, the operation of sensor/detector **13** is provided by a processor that may carry out operations in addition to those of sensor/detector **13**. In certain embodiments, the communicating by the PUA is detected by detecting a connection between the interface of the PUA with another PUA or device. In other embodiments, the communicating by the PUA is detected by detecting data sent from or received by the interface.

[0088] When communicating of the message by the PUA is detected, monitored data relating thereto is gathered **292** comprising at least data representing content of the message, such as the subject of the communication and/or the use of pre-selected words, names, concepts or images in the communication. In certain embodiments, the monitored data includes data related to one or more of the time of communicating, the duration of communicating, the length or size of the message, the type of message (e.g., e-mail, voice, text message, etc.), and the source and/or the recipient of the message. The monitored data is then processed **294** to determine at least one trend of usage of the PUA by the user and to provide trend data relating to at least one trend of usage. If the monitoring system **1** of FIG. **1**B is used, the monitored data is processed either in the PUA **2**, or is first communicated to the processor **5** via the communications **5** and thereafter processed by the processor **5** to provide trend data. Trend data provided based on the monitored data comprises data relating to at least one of the PUA functions used by the user, the type of messages sent or received by the user, the frequency of messages sent or received by the user, the time of communicating the messages, the duration of the communicating, the source and recipient of the messages and the content of the messages.

[0089] The trend data provided by the monitoring system is then stored **296** either in the PUA or in an external storage. In the monitoring system **1** of FIG. **1**B, the trend data is stored in at least one of the PUA **2** or in the storage **6**. If the trend data is stored in the PUA **2**, this data can thereafter be communicated to an external storage device such as the storage **6** of the monitoring system **1**.

[0090] Trend data provided in the embodiments shown in FIGS. **6** and **7**, and described above, can be used as market research data to determine user preferences, including the user's preferences relating to the PUA functions. Thus, for example, trend data can be used to determine which functions of the PUA are most frequently used by which users, which functions could be removed or added in future versions of the PUA products. In the embodiments in which trend data includes data related to the content of PUA users' communications, trend data can be used to determine the popularity or success of a particular product, brand, person or concept and to ascertain how well a particular product, service or brand may do in the market.

[0091] Although various embodiments of the present invention have been described with reference to a particular arrangement of parts, features and the like, these are not intended to exhaust all possible arrangements or features, and indeed many other embodiments, modifications and variations will be ascertainable to those of skill in the art.

What is claimed is:

1. A method of gathering data concerning usage of a PUA, comprising: monitoring content created in the use of the PUA

to produce content related data; and communicating the content related data to a usage data processing facility.

2. The method of claim **1**, wherein the PUA comprises communications operative to provide device-to-device communicating ability and/or wireless networking ability.

3. The method of claim **2**, wherein the PUA comprises one of a cellular telephone, a PDA, a notebook computer, a laptop computer, a PCS device, and a two-way radio.

4. The method of claim **3**, wherein a processor of the PUA monitors content created in the use of the PUA and carries out additional operations.

5. The method of claim **1**, wherein the content related data comprises data indicating the type of PUA function used, data indicating the time of use of the PUA function, data indicating the length of time of the use of the PUA function, data relating to the use of communications to send or receive messages with the use of the PUA and data relating to content generated by the use of the PUA function.

6. The method of claim **5**, wherein the data relating to the use of communications by the PUA comprises data relating to the time a message is communicated, the size of the message and the destination of the message.

7. The method of claim **1**, wherein the data relating to the content generated by the use of the PUA comprises at least one of data relating to the subject of the generated content and data relating to words, phrases, names or concepts included in the content.

8. The method of claim **1**, wherein the usage data processing facility comprises a processor.

9. The method of claim **1**, comprising gathering data with the use of the PUA from which an identification of a user thereof may be assessed.

10. A system for gathering data concerning usage of a PUA comprises a monitor in or on the PUA and operative to monitor content created in the use of the PUA to produce content related data; and communications coupled with the monitor to receive the content related data and operative to communicate the content related data from the PUA to a usage data processing facility.

11. The system of claim **10**, wherein the PUA comprises communications operative to provide device-to-device communicating ability and/or wireless networking ability.

12. The system of claim **10**, the PUA comprises one of a cellular telephone, a PDA, a notebook computer, a laptop computer, a PCS device, and a two-way radio.

13. The system of claim **12**, wherein operations of the sensor/detector are implemented by a processor of the PUA that is operative to carry out additional operations beyond those of the sensor/detector.

14. The system of claim **10**, wherein the usage data comprises data indicating a type of PUA function used, data indicating a time of use of the PUA function, data indicating a length of time of the use of the PUA function, data relating to a use of communications to send or receive messages with the use of the PUA and data relating to content generated by the use of the PUA function.

15. The system of claim **14**, wherein the data relating to the use of communications by the PUA comprises data relating to the time a message is communicated, the size of the message and the destination of the message.

16. The system of claim **10**, wherein the data relating to the content generated by the use of the PUA comprises data relating to the subject of the generated content and data relating to words, phrases, names or concepts included in the content.

17. The system of claim **10**, wherein the monitor is operative to gather data from which an identification of a user of the PUA can be assessed.

18. A method of monitoring use of a PUA by a user, the PUA including a communication interface for communicating with at least another PUA comprises detecting communication by the communication interface of the PUA; providing communication content data relating to content of the communication of the PUA; and providing trend data representing at least one trend of usage of the PUA by the user based on the communication data.

19. The method of claim **18**, wherein the communication content data comprises at least one of data relating to the subject of the generated content and data relating to words, phrases, names or concepts included in the content.

20. The method of claim **18**, wherein the trend data is stored in one of the PUA or an external storage.

21. The method of claim **18**, comprising processing the trend data to produce market research data reflecting user preferences.

22. A system for monitoring use of a PUA by a user, the PUA including a communication interface for communicating with at least another PUA comprises a monitor operative to detect data communicated by the communication interface of the PUA and to produce communication content data relating to content of the communicated data; and a processor coupled with the monitor to receive the communication content data and operative to provide trend data representing at least one trend of usage of the PUA by the user based on the communication content data.

23. The system of claim **22**, wherein the communication content data comprises at least one of data relating to the subject of the generated content and data relating to words, phrases, names or concepts included in the content.

24. The system of claim **22**, wherein the trend data is stored in one of the PUA or an external storage.

25. The system of claim **22**, wherein the trend data is processed to produce market research data reflecting user preferences.

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