

person, a group of persons, an organization of staff, or one or more simple or complex mechanisms.

- [35] Alerts, content delivery, event and location awareness can be provided to an appropriate mobile channel based on the context for multiple lines of business. Business process 101 may be based on a business infrastructure that further applies a layer of security, in which a request may be generated at appropriate points of business process 101. Examples of requests include, but are not limited to, an alert to a user, push content to the user, and obtaining the location of the user.

- [36] Block 102 then sends a message to a wireless device of the user based on the device type. Different types of mobile device types may be supported, including iPhone® devices, ~~Blackberry® devices, Android™ devices,~~ mobile Internet devices, and SMS-capable mobile devices. With some embodiments, block 102 is implemented as middleware that is executed at Context Server 215 as shown in Figure 2. Block 102 processes the request based on who is the user, where the user is, what the user is doing, and what the user wants. The request may be initiated through an application programming interface (API), in which business process 101 provides a user identity. With some embodiments, the API may be based on REST-style architectures that consist of clients and servers. Clients initiate requests to servers. The servers then process requests and return appropriate responses. Requests and responses are built around the transfer of representations of resources. A resource may be essentially any coherent and meaningful concept that may be addressed. A representation of a resource is typically a document that captures the current or intended state of a resource. Block 102 then determines what type of device the user is associated with and directs the request accordingly. Also, if content is being pushed to the user, the format of the content may be formatted in accordance with the associated device type.

- [37] Business process 101 may be associated with different types of businesses. While some of the examples described herein may be related to financial institutions, embodiments may also support other types of businesses including manufacturing, service businesses, retailers, information businesses, and high technology businesses.

- [38] Figure 2 shows system 200 that integrates different wireless devices 204-209 with a business process model in accordance with various aspects of the embodiments. With

traditional systems there may be a significant amount of complexity regarding the wireless channel resulting in the mobile channel being underutilized for associates and customers, in which usage may be limited to mobile web-content. However, mobile banking services are trending toward a richer offering for the user. For example, a bank may offer on-line banking customers mobile banking, in which a customer may access an account through the mobile web or with a mobile application. Mobile applications may be provided for different mobile devices, including iPhone[®]—one type of commercially available mobile phone devices (e.g., device 204) another type of commercially available mobile phone BlackBerry[®]—devices (e.g., device 205), and another type of commercially available mobile phone Android[™]—devices (e.g., device 207). The mobile applications may be designed to provide a customized mobile banking experience and to offer convenience to the user. Moreover, Context Server 215 may support new device types as they become available by integrating only components at tiers 202 and 203 that support the new device type.

- [39] With some embodiments, mobile banking provides a richer set of functioning alternatives to the general web based banking features. However, the alternatives typically circumvent a piecemeal, fragmented fashion with little continuity. As the feature and customer space grows both in size and capability, there may be more offerings, and consequently embodiments should avoid potentially more fragmentation so that a user (customer) is offered a coherent relationship channel to the financial institution.
- [40] System 200 provides a mobile implementation channel to enable secure mobile customer alerts, content delivery, event and location awareness and context integration that can be leveraged across multiple lines of business using simple interfaces. System 200 enables secure reach to different mobile device types, abstracts away delivery peculiarities, and provides logging and security support when necessary taking into account who the user of a mobile device is, where the user is, and what the user may be doing, consequently leveraging identity, location (location based services), and activity (business process management). Thus, system 200 processes requests based on the user context, where supporting system components may be referenced with the term “wContext” in the description herein.
- [41] With an aspect of the embodiments, system 200 supports enterprise integration using either a console, device library, RESTful API, or direct industry standard XML Process

Definition Language (XPDL) or Java specification requests (*e.g.*, JSR 211) for business process management (BPM) or enterprise content management (ECM), respectfully. In addition, some embodiments handle the security, logging, and delivery details based on the request preference.

- [42] System 200 may be modeled into layered tiers, including application tier 201, external wireless gateway tier 202, and carrier networks tier 203, in which system components are partitioned into application components, external wireless gateway components, and carrier network components, respectively.
- [43] Context Server 215 determines which devices the users (identified administrators) have from request 251 through HTTP server 214 and pushes the alert request through the appropriate mobile channel(s) to the devices. For different device types, the request may be directed to different mobile channel types. For example, with certain Blackberry devices 205, the push may be sent through ~~RIM-an~~ External Wireless Gateway 212 to a RIM-Network Operations Center 210. With other iPhone-devices 204, the push may be sent through a Apple-Push Notification Service (APNS)-Wireless Gateway 211. With other Android-devices 207, mobile internet device 208, or E-reader device 209, the push may be sent directly to device 207 through the wireless network and processed by the client component 254-258. Also, Context Server 215 may support short message service (SMS)-capable mobile devices (*e.g.*, mobile device 206) through SMS aggregator 213, which functions as an SMS gateway.
- [44] Request 251 may include one or more request type, including alert, location request, push ECM content), and content. Request 251 may be initiated from a Web console, device, or application via the API. With some embodiments, request 251 includes a user identity. Context Server 215 may access data repository 217 in order to obtain the type of device type for the user's device. Context Server 215 consequently directs the request through the appropriate mobile channel type based on the device type.
- [45] With some embodiments, client components 254-258 provides the appropriate device type of mobile devices 204-208 to Context Server 215 when the mobile device registers. Also, with some embodiments, client components 254-258 obtain location information for the mobile device, *e.g.*, from a Global Positioning System (GPS) receiver, and report the location information when a request is received from Context Server 215.

sends request 253 at block 605 to application server 211, which consequently sends the request to Context Server 215 at block 606.

- [69] Context Server 215 determines which devices the users (identified administrators) have from the request and pushes the alert request through the appropriate channel(s) at block 607. For different device types, the request may be directed differently. For example, with certain BlackBerry-devices 205, the push may be sent through ~~RIM~~-an External Wireless Gateway 212 to a ~~RIM~~-Network Operations Center 210. With other iPhone devices 204, the push may be sent through a ~~Apple~~-APNS-Wireless Gateway 211. With another Android-device 207, the push is sent directly to device 207 through the wireless network and processed by client component 257.
- [70] Figure 7 shows a continuation of flow diagram 600 shown in accordance with various aspects of the embodiments. Context Server 215 sends an alert at block 701 to the mobile device of the administrator (corresponding to screenshot 401 as shown in Figure 4) with an option to approve the unlock request. At block 702 the administrator can chose to approve the unlock (corresponding to screenshot 403). The cash management mobile application generates a selectable display so that the administrator can perform the necessary actions to unlock the selected account.
- [71] Figure 8 shows flow diagram 800 in which a bank loan officer (the user) wants to push an alert and corresponding document to a customer in accordance with various aspects of the embodiments. Flow diagram 800 may depict a scenario in which a bank loan officer wants to push an alert and corresponding document to a customer for the customer's review. The alert and document content are delivered to the customer's mobile device(s), which may be one of different types of mobile devices, *e.g.*, devices 204-209.
- [72] The bank loan officer initiates request 251 to system 200 at block 801, where the request includes an alert message and document content from a Context Request page (not explicitly shown) that is displayed on a Web console. Consequently the API forwards request 251 (as shown in Figure 2) to HTTP Server 214 at block 802. HTTP server 214 sends request 253 at block 803 to application server 211, which consequently sends the request to Context Server 215 at block 804.

- [73] Context Server 215 determines which devices the user has from the request and pushes the alert request and content through the appropriate wireless channels at block 805. For different device types, the request and content may be directed differently. For example, with certain BlackBerry devices 205, the push may be sent through ~~RIM~~ an External Wireless Gateway 212 to a ~~RIM~~ Network Operations Center 210. With other iPhone devices 204, the push may be sent through a ~~Apple APNS~~ Wireless Gateway 211. With another Android device 207, the push is sent directly to device 207 through the wireless network and processed by client component 257. The pushes may also be sent securely and are logged.
- [74] The customer (user) is alerted and directed to view the document on the user's device at block 806.
- [75] Figure 9 shows flow diagram 900 in which a customer registers to have alerts and periodic account statements push to the customer's communication device in accordance with various aspects of the embodiments. Flow diagram 900 may depict a scenario in which a bank customer registers to have alerts and periodic account statements pushed to the customer's device(s). The alert and account content are delivered to the customer's mobile device(s), which may be one of different types of mobile devices, *e.g.*, devices 204-209.
- [76] At block 901, a customer (user) registers with the enterprise content management (ECM) system (which may support business process 101 as shown in Figure 1) to have account statements pushed to the customer's device at a desired frequency (*e.g.*, every month). The ECM system schedules itself at block 902 to send request 251 to Context Server 215 at the desired times (*e.g.*, on the first business day of each month).
- [77] At each desired time, ECM system fetches the request account statement for the user at block 903. The ECM system then issues request 251 with an alert type, user identification, and account statement via an API request, which is directed via HTTP server 214. HTTP server 214 sends request 253 at block 904 to application server 211, which consequently sends the request to Context Server 215 at block 905.
- [78] Context Server 215 determines which devices the user has from the request and pushes the alert request and account statement through the appropriate wireless channels at block 906. For different device types, the request and content may be directed

differently. For example, with certain Blackberry-devices 205, the push may be sent through RIM-an External Wireless Gateway 212 to a RIM-Network Operations Center 210. With other iPhone-devices 204, the push may be sent through a Apple-APNS Wireless Gateway 211. With another Android-device 207, the push is sent directly to device 207 through the wireless network and processed by client component 257. The pushes are typically sent securely and are logged.

- [79] Figure 10 shows a continuation of flow diagram 900 in accordance with various aspects of the embodiments. At block 1001 the user (customer) is alerted and is directed to view the account statement on the customer's device. For devices that do not handle document display automatically, a context client library may be invoked to display the account statement via the ContentHandler API.
- [80] Figure 11 shows flow diagram 1100 in which a manager wants to determine the locations of the manager's associates in accordance with various aspects of the embodiments. Flow diagram 1100 depicts a scenario in which a bank manager wants to determine the location of the manager's associates after an emergency event forces an evacuation of an office building. The bank manager uses a Web console to send a location request to the mobile devices of the associates via system 200. The associates may have different mobile devices, *e.g.*, devices 204-209.
- [81] At block 1101, the banking manager (user) submits a location request for the manager's associates through a Context Request page that is displayed on the manager's Web console. However, embodiments also support the manager initiating a request through another type of device, including devices 204-209. The request may include a list of users (associates) as well as user information. Consequently, a application executing on the Web console initiates request 251 at block 1102 with a location type and user identifications of the associates and manager via an API request, which is directed via HTTP server 214. HTTP server 214 sends request 253 at block 1103 to application server 211, which consequently sends the request to Context Server 215 at block 1104.
- [82] Context Server 215 determines which devices the user has from the request and pushes the location request to each device through the appropriate wireless channels at block 1105. For different device types, the request and content may be directed differently. For example, with certain Blackberry-devices 205, the push may be sent through RIM an External

Wireless Gateway 212 to a ~~RIM~~-Network Operations Center 210. With ~~other iPhone~~ devices 204, the push may be sent through a ~~Apple APNS~~-Wireless Gateway 211. With ~~another Android~~-device 207, the push is sent directly to device 207 through the wireless network and processed by client component 257. The pushes are typically sent securely and are logged.

- [83] At block 1106, the location request push is received and processed by the client component 254-259 on each device of the manager's associates.
- [84] Figure 12 shows a continuation of flow diagram 1100 shown in accordance with various aspects of the embodiments. At block 1201 context client component 254-259 on each device of the manager's associates fetches its devices location and sends it back to the manager via Context Server 215 through the location processor API. The manager is then alerted with the location of each associate's device at block 1202.
- [85] Figure 13 shows flow diagram 1300 for a client component 254-259 in accordance with various aspects of the embodiments. With some embodiments, context client component 254-259 executes computing platform 501 as previously discussed.
- [86] At blocks 1301-1302 users register with Context Server 215 in order to provide the device types of each user's device. However, registrations typically occur at different times when user devices become active.
- [87] When a user (*e.g.*, a manager) requests a location request at block 1303, device locations of selected users (*e.g.*, associates) are fetched at block 1304, and the location information is provided to the requesting user at block 1305.
- [88] Figure 14 shows a system in which a customer generates a query in accordance with various aspects of the embodiments. A bank customer initiates a query request to bank infrastructure 1401 through terminal 1403 about a general question (*e.g.*, identifying a branch/ATM location through a web service call or by text messaging through an automated system). Consequently, terminal 1402 generates query message 1451 to bank infrastructure 1401. Bank infrastructure 1401 may include different banking systems that are separate from system 200 or may be incorporated into system 200 as shown in Figure 2. With some embodiments, bank infrastructure 1401 may receive query