METHOD, SYSTEM AND COMPUTER PROGRAM FOR SHARING CONTENT BASED ON A SHARED SOCIAL CONTEXT

This invention relates generally to sharing content between individuals and more particularly to enabling the sharing of content between individuals based on a shared social context. Users are linked to network devices that can provide to a server a location. Users are also linked to user objects on the server. The user objects are linked to one or more web applications having content. The server identifies a plurality of users being in a shared social context based on their co-located network devices and generates and shares user handles to the network devices associated with the user objects. The server obtains or identifies the content for each user including through user object mapping. The server shares the content to the network devices as identified by the user handles, or a subset thereof selected by a user.
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FIELD OF INVENTION

This invention relates generally to sharing content between individuals and more particularly to enabling the sharing of content between individuals based on a shared social context.

BACKGROUND OF THE INVENTION

Traditionally, digital content was created, stored and consumed locally on computer devices. As a trend, individuals are moving toward creating, storing and consuming content using web-based applications and services (hereinafter "web applications"). These individuals are increasingly making their personal content available on the Internet by hosting and sharing the content on a variety of web applications. Extremely popular web applications include Flickr™ for photos, Google™ Calendar for scheduling, and Imeem™ for sharing music.

This has resulted in a situation where individuals have two modes of interaction: traditional face-to-face or personal interaction in the real world, which is synchronous, and computer-based interaction on the web (e.g., commenting on a friend's photographs), which is asynchronous.

Web-based interaction is enabled through web application identifiers, for example login names and other machine identifiers, such as email addresses. These aliases are designed for the benefit of machines rather than individuals. Conversely, personal interaction is done via device names, such as Bluetooth addressed or network addresses. Again, these aliases are designed for the benefit of machines rather than individuals.

Sharing of certain content requires authenticated access. For example, sensitive content is typically made available for sharing through secure logins to trusted individuals. An individual must request creation or generation of these logins for the trusted individuals, complicating sharing of web-based content during personal interaction.
Other content that is less sensitive typically is made available to lists of individuals. Still, logins, or at least lists, must be created by the individual for enabling access to this content, granting levels of permissions, and providing directions for where and how to access this content. These complex sets of operations are cumbersome and disruptive during a face-to-face meeting, especially if this is the first introduction between individuals.

Furthermore, this sharing of content, even when shared with individuals in close proximity, is asynchronous. For example, an individual attempting to schedule a meeting with a set of other individuals might share calendar content with the other individuals. However, an offline discussion is required to determine a mutually agreeable time to schedule a future meeting.

Thus while sharing content and collaborating in social settings is desirable, it is cumbersome and rarely done. Instead, these tasks are done later, and may involve multiple rounds of emails for coordination.

Several solutions for accessing content based on social context have been proposed.

United States patent 6,714,778 describes a system where a mobile device senses its context, and either by computing the context itself or forwarding the computation to an Internet service, gathers web information relevant to the individual's context. However, there is no disclosure or contemplation of using the context to share content between individuals.

United States patent 7,359,714 describes a system where cellular phones are updated with their tracked location, and as a result receive information which is contextually relevant to the phone's location. This can include geographically close points of interest as well as modifying the phone's behavior such as altering its ring-tone or volume. However, there is no disclosure or contemplation of using the context to share content between individuals.

Thus there is a need for a solution for enabling sharing of content based on a shared social context.
SUMMARY OF THE INVENTION

The present invention provides a computer network implemented method for enabling the sharing of content between a plurality of users based on a shared social context, the method characterized by: (a) linking each user to a network device operable to provide to a server a social context; (b) associating each user with a user object on the server, each user object linkable to one or more web applications having content; (c) identifying, by means of the server, a plurality of users being in a shared social context based on the social context of each network device; (d) generating and sharing, for each user in the shared social context, user handles associated with the user objects to the network devices; (e) obtaining the content by means of the user objects; and (f) sharing the content, or a subset thereof, with the network devices for each user in the shared social context.

The present invention also provides a computer system for enabling the sharing of content between a plurality of users based on a shared social context, the method characterized by: (a) one or more web applications having content; (b) a network device linked to each user, each network device operable to provide to a server a social context; and (c) a server computer operable to: (i) associate each user with a user object, each user object linkable to one or more of the web applications; (ii) identify a plurality of users being in a shared social context based on the social context of each network device; (iii) generate and share, for each user in the shared social context, user handles associated with the user objects to the network devices; (iv) obtain the content by means of the user objects; and (v) share the content, or a subset thereof, with the network devices for each user in the shared social context.

The present invention further provides a method of enabling the sharing of content between a plurality of web applications, the method characterized by: (a) a user object linkable to each of the plurality of web application, the user object linked to user credentials for accessing content from each of the plurality of web application; and (b) an adaptation service operable to interface with each of the plurality of web applications; wherein the user credentials for a first web application can be delegated to a second web
application for obtaining content from the first web application and translating the content for use by the second web application.

In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a computer architecture of the present invention.

Fig. 2 illustrates an example of server modules that enable the functions of the present invention.

Fig. 3 illustrates the process by which a proxy is operable to enable the sharing of content between competing web applications from a first user to a second user.

Fig. 4 illustrates a calendar interface optimal for a desktop computer in accordance with the present invention.

Figs. 5 and 6 illustrate calendar interfaces optimal for a mobile phone in accordance with the present invention.

Fig. 7 illustrates two possible sharing commands for enabling a user to explicitly share content.

Fig. 8 illustrates a selection display for selecting users with which to share data.

Fig. 9 illustrates an explicit sharing sequence comprising a sharing routine.

Fig. 10 illustrates a context update that initiates web application adaptation.
Fig. 11 illustrates a user object.

Fig. 12 illustrates steps of the context update previously illustrated in Fig. 10.

In the drawings, embodiments of the invention are illustrated by way of example. It is to be expressly understood that the description and drawings are only for the purpose of illustration and as an aid to understanding, and are not intended as a definition of the limits of the invention.

DETAILED DESCRIPTION

The present invention provides a method, system and computer program for online collaboration between users in a shared social context. More specifically, the present invention provides a mobile computer architecture for enabling a plurality of individuals, at least one of which is associated with a user object, to socialize and collaborate simultaneously and synchronously at both a real-world and web-based level.

Individuals that have created or enabled the creation of a user account (or profile) with a server of the present invention are referred to herein as users and are represented by user objects. These user objects encapsulate web applications (or services) and content. User objects are provided as an intuitive model for enabling finding and sharing of content and collaborating with other individuals, who may or may not be users, linked by a shared social context. The result is a collaboration experience in which content is seamlessly made available to individuals interacting in the real world, instead of forcing individuals to focus on mobile devices and retreat away from the social interaction in order to navigate the web.

It should be understood that a "web application" can include a fully web-based service and/or an application that may be installed or linked to a client device wherein content corresponding to the application is stored, storable and/or communicable using a web-based service.

In one example, the social context is proximity between the user and the other individual(s). In a more specific example, the present invention provides sharing of
content between individuals during face-to-face interactions. The present invention may also provide sharing with one or more individuals that a user has met in the past, or one or more individuals a user has "met" indirectly through other users. For example, the present invention may provide sharing between individuals that have a relationship based on the common social network friend when the individuals are in proximity of each other. Other examples of social context include physical location, for example, using GPS technology; and web-based social network friends, for example, obtainable from a web-based social network. Social network relationships may be obtainable through standardized web protocols and published application programming interfaces (APIs) such as IMAP, Web2.0, JSON, etc. provided by social network administrators.

The social context may also be obtained from various forms of interactive communication, for example teleconferencing, and instant messaging. These web-based applications typically also provide APIs enabling extraction of this information. These applications typically provide APIs to determine the current participants a user a communicating with, which can be used to determine social context. The key with these forms of communication, similar to physical face-to-face meetings, is that communication is bidirectional and occurs in real time. The present invention can use these characteristics to determine various forms of interactive social context, and use the social context to enable sharing of other data, for example, pictures of the shared participants taken in the past.

The present invention also provides a system, method and computer program for enabling a comprehensive user and data mapping system which allows individuals to collaborate on a synchronous basis.

The present invention also provides user objects for mapping particular users to their content and web applications. A system is provided for automatically organizing and interoperably linking user objects, even across disparate and competing web applications, based on the user's social context.

Each user object includes a profile that describes and encapsulates one or more web applications that the user uses along with user credentials for accessing content from the
one or more web applications. When a user registers a web application with the system, the user provides the user credentials, thus allowing the system to access the content from the web application. For example, the user object may include a map between one or more low-level device identifiers, such as a Bluetooth MAC address of a user's network device, and the user. The one or more low-level device identifiers may be associated with the user object when registering with the server of the present invention. For example, when a user registers with a server of the present invention, the user's current network device may be associated with the user. The low-level device identifier of the user's current device may be obtained by the server and automatically associated with the user. Similarly, if the user later re-registers with the server using a different network device, the low-level device identifier of this different network device may also be associated with the user.

The user object may further map the user to its web applications, user credentials and content. The user objects are shared by providing other users with user handles, which are associated with the user objects, in a particular social context.

In a further implementation, the user objects enable the present invention to be integrated in a third party web application, enabling the adaptations of the present invention to be visible on a network device when users access the third-party web application via the web or via custom client applications. For example, a third-party web application can implement the present invention to enable content from competing web applications to be displayed on the third-party web application, providing interoperable linking of shared content.

The method of the present invention includes the steps of: (a) linking each user to a network device operable to provide to a server a social context; (b) associating each user with a user object on the server, each user object linkable to one or more web applications having content; (c) identifying, by means of the server, a plurality of users being in a shared social context based on the social context of each network device; (d) generating and sharing, for each user in the shared social context, user handles associated with the user objects to the network devices; (e) obtaining the content by means of the
user objects; and (f) sharing the content, or a subset thereof, with the network devices for each user in the shared social context. The method may also include, prior to sharing the content, enforcing access control to the content and converting the content between data types supported by different web applications using an adaptation service or utility.

The user objects provided by the present invention enable the construction of new web applications that can take advantage of the user objects for seamless sharing and collaboration. The present invention also provides an adaptation service that is operable to act as an interface with existing web applications to enable sharing and collaboration with users in the shared social context. The adaptation service is further operable to translate content between the web applications. This service takes advantage of the programmable interfaces available in modern web applications. Although the present invention can attempt to use the native access control settings of a web application whenever possible, these settings may be insufficient due to individuals' privacy settings, insufficient granularity in the web application's access control mechanism, or lack of common service membership between individuals (e.g., the individuals do not use the same web application). In these cases, the present invention may securely proxy content using the credentials of the individual that is the content owner, thus enabling access control at the user object granularity level. This can be provided by credential delegation wherein web applications allow the delegating of a user's credentials to other web applications, allowing the other web applications to access content from the delegating web application on behalf of the user. For example, a user's account on a first web application can be accessed by a second web application by delegating the user credentials of the first via to the second web application.

The user objects provided by the present invention may also enable web application installation, access and/or customization. For example, when a user interacts with an individual who has never used a particular web application that is needed to share data, the present invention may provide means by which the individual is requested to install/access the web application. The present invention may notify the individual that another user wishes to share data and may ask the individual to confirm whether they would like to install/access/set up and optionally customize the corresponding web
application. For example, a user may wish to share a game web application with a friend. The present invention may set up the game web application for the friend, configure the game web application so that the friend could play with the user and the user's other friends, and optionally make the user's game results available to the friend.

The present invention also provides for a range of sharing models based on the user sharing the content (sender) and the individual, who may or may not be a user, with which the content is shared (receiver). The sharing model may require explicit interaction from both sender and receiver, a mixed mode in which just sender or receiver provide explicit interaction, or be completely automated without requiring any user interaction.

The present invention may be used for a wide range of web applications from different domains and web providers. Examples of how the present invention may be implemented in web application, calendar, photo sharing and email applications are provided, but are not intended to limit the application.

In accordance with the present invention, web applications receive content, and operations are performed on the content, based on a shared social context. The operations can be performed by a server (or a processor linked to the server) and the results are then pushed to the web applications. Alternatively or in addition, the server can offload operations to the web applications, both to decrease server load and improve responsiveness for the end-user. These implementations enhance the social contextualization of web applications and enable the delivery of various new services with new revenue potential, as further described below.

The initiation of communication is facilitated by a shared social context between users. For example, proximity is one example of a shared social context that can be used for facilitating the initiation of communication, including by specifying users using user handles generated from user objects, independent of machine names such as logins or email addresses. This in turn, subject to permissions, enables users to access and manage data or to trigger actions, in ways that reflects the social context. For example, data that relates to particular users, who are now in proximity, may be brought forward automatically, rather than requiring, for example, searching and distribution of this data.
One example includes documents on which users now in proximity may have collaborated. Shared documents can now be brought forward to the users because shared social context, being proximity in this example, makes them relevant. This enables users to make the most of the opportunity to interact in proximity. The system creates a bridge between the digital world and the physical world that enables more effective use of face-to-face contact, or the opportunity for face-to-face contact.

The present invention may also provide learning algorithms that can be applied to the social context information. These algorithms can be used to implement web advanced application adaptation policies. For example, the server can provide information to web applications, such as friends that a user meets regularly, friends with whom a user regularly shares specific types of data (e.g., pictures), groups of people with whom a user interacts frequently (cliques), etc. Web applications can adapt their behavior based on this rich information. For example, a calendaring application can suggest meeting times with another user based on the times they have met in the past. As another example, an email application could automatically generate a mailing group (e.g., all hockey team mates) based on the learned information. As yet another example, a web application may suggest to a user the books they may like to read based on e-book suggestions being shared by their cliques.

It should be understood that the present invention is operable to directly interface with web applications to not only filter, reorganize, and adapt content, but also make content interoperable between disparate and often competing web applications.

Fig. 1 illustrates a computer architecture in accordance with the present invention. The present invention provides a mobile computer architecture for enabling a plurality of individuals, at least one of which is associated with a user object, to socialize and collaborate simultaneously and synchronously at both a real-world and web-based level.

One of the individuals is a first user. The first user is associated with a user object. A second individual may or may not be a user.
Each of the first user and the second individual is associated with one or more network device (1),(3). A network device can be, for example, a desktop or laptop computer, a wired or wirelessly networked mobile device, a data enabled mobile smartphone, a tablet computer, a slate computer, etc. The network device is connected to the Internet by an Internet connection. The network devices are operable to link to a server (7) over the Internet or another network (5) using a communications protocol, for example Bluetooth™, WiFi, WiMax™, IEEE 802.11, USB, etc. or through a proxy.

The server (7) is linked to the Internet by a wired or wireless Internet connection. The server (7) may be operable to enable the network devices (1),(3) to display a user interface to users and individuals to interact with the server.

The server (7) may further include or be linked to a social context identifying utility (8) for determining which individuals are in a shared social context, for example within proximity. The social context identifying utility (8) may use context updates and context detection algorithms to determine the presence of a shared social context, such as proximity of users. For example, the social context identifying utility (8) may be configured with a particular proximity threshold for determining whether two individuals are within proximity. Similarly, the social context identifying utility (8) can be configured to detect proximity based on different radio signatures, for example using Bluetooth, WiFi, WiMax, cellular and/or IEEE 802.11.

For example, a Bluetooth radio is available in typical mobile devices. Typically, a Bluetooth signal has a radio range of less than 10 meters. A Bluetooth device, when in discoverable mode, is able to be seen (discovered) by other Bluetooth devices. Thus, in accordance with the present invention, where a network device discovers a Bluetooth signal from another network device, the social context identifying utility may determine that the two network devices are in proximity.

In the case of WiFi, WiMax, cellular, etc., because their radio technology has a longer range, e.g., over 500 meters, further processing must be carried out by the social context identifying utility if a closer proximity is desired. For example, proximity may be determined by comparing the signal strengths of various nearby WiFi base stations and/or
cell towers. Devices in proximity see similar signal strengths (and variations in signal strengths over time) of the base stations and towers, while devices that are further apart (roughly over 5 meters apart) see dissimilar signal strengths.

Alternatively, or in addition, each individual's network device (1),(3) may be equipped with a means for location sensing, for example GPS, and may upload the location data to the social context identifying utility (8). The social context identifying utility (8) may correspondingly correlate individuals' location data for determining which individuals are within the threshold proximity of other individuals.

As previously mentioned, the social context identifying utility may determine shared social context in other ways, for example based on web-based social friends, teleconferencing and instant messaging networks to collocate individuals.

Each network device (1),(3) is operable to execute computer instructions for implementing the system of the present invention. Specifically, each network device (1),(3) is operable to execute a client utility. The client utility may comprise a user interface for registering a user with the server. The client utility may also comprise a sensing function. The sensing function is operable to sense the social context of an individual, for example proximity to another individual's network device (1),(3). For example, each network device's (1),(3) sensing function may scan the local environment (either periodically or manually) and upload the scan results to the social context identifying utility (8) by means of the server (7) using the network. The social context identifying utility (8) may then determine which individuals (whether users or not) are within the specified social context. The scan period may be set as desired, as it is a trade-off between the time needed to determine social context and power consumption. A short period helps determine social context more accurately but consumes more power. A typical period ranges between 5-10 minutes.

The client utility also comprises an application interface for connecting to the server (7) for communicating with one or more web applications (9). For example, the application interface for the first user's network device may poll a web application to determine whether the second individual in the shared social context of the first user is linked to the
web application. The client utility or the social context identifying utility may include programming for obtaining the needed data from the web application, such as user credentials (including for example a token) or other data for processes enabled by the present invention. The client application may include a driver for directly interfacing with other local third party clients, for example a local client for accessing a web application described below.

Figs. 10 and 12 illustrate a context update that initiates application adaptation. A first and second user, for example, are associated with network devices. Each user's network device provides a context update (11), for example by scanning its radio environment and collecting detected RFID, Bluetooth, WiFi, and/or GPS information (depending on the protocols the network device supports). Each network device then sends 13 this packaged context update securely to the social context identifying utility by means of the server. The server stores the context update into a database (15), which may be a temporary log, and the social context identifying utility translates any known radio fingerprints of Bluetooth, RFID, or WiFi identifiers to known users and locations. These translated results are also inserted into the database (15). The social context identifying utility processes context detection algorithms which provide one or more scans of the database to determine updates to users’ context (17). For example, the detection algorithms may determine that a first and second user are in proximity based on the first user's network device having detected the Bluetooth signature of the second user's network device. It should be noted that the present invention provides context detection using many additional means beyond the identifier matching in this example.

Once the user's social context is determined, the server determines how best to update the presentation and organization of user content to suit this context (17). This determination is made by integrating user preferences with knowledge of where and how their content is stored across web applications. For example, the server may determine that a first user uses Google™ Calendar and Yahoo™ Mail, while a second user uses Facebook™ for its calendaring. The first user may have configured its preferences such that its calendar and email are sorted based on social context. For example, the first user may wish to see the email messages of the second user before any other user's messages. The server can
update the first user's web applications (21) based on these preferences and constraints. The first user's Google Calendar can highlight mutual free times between the first and second user by examining the second user's committed events from its Facebook calendar. The server can also update the first user's Yahoo Mail to preferentially sort correspondence with the second user first.

Furthermore, in steps (11) and (13), the users' network devices can capture and send a context update to the server over the Internet securely, for example via 3G or WiFi. The server can store this information securely in step (15) in its context log. The server knows the users of the network devices and uses this information to contextually locate users.

Step (17) can use algorithms to co-locate users, for example to determine that two users are nearby. Based on the output of these algorithms, steps (19) and (21) can generate and apply updates to web applications, customizing the applications based on the users' context.

It should be understood that, in addition to the architecture provided above, the particular processes executable by the client and by the server can be modified and optimized based on desired data privacy or processing, memory and power capabilities of the network devices and server.

Fig. 2 illustrates an example of the server modules that enable the functions of the present invention. The server modules include an adaptation service (23) and an API (25).

The server modules include native applications (27) that contain the high-level logic for how applications should behave, including based on user preferences. The native applications (27) are visible to the users from users' network devices. The native applications (27) interface with application classes (29) using an API (25). The application classes (29) encapsulate and abstract the expected set of behaviors and common data types for the specific application class. This abstraction enables the API (25) and native applications (27) to function independently of the underlying applications and services (31). Mapping tables are provided for enabling the server to map network devices to users, and users to their web applications and services. This two tier mapping provides user object transparency, wherein users are made aware of other users in a social
context without knowing details such as the network devices or the web applications of the other users.

The mapping tables enables web application and service specific "drivers". These drivers implement one or more specific application classes (29). These drivers also implement connector codes to realize the specifications of the application class (29) APIs onto third-party applications and services (31). Interaction with third-party applications and services (31) is typically done through standardized web protocols and published programmable interfaces such as IMAP, Web2.0, JSON, etc. The third-party web applications and services (31) are those that users utilize for their basic application functionality and content storage needs.

A proxy utility may also be provided for bridging incompatible registration and permission domains from different competing web applications.

The present invention also provides user objects for referencing relationships between users, their one or more network devices, and access interfaces for their remote web applications or services. The user objects enable the present invention to obtain or identify content accessible from the web applications.

A user object is a container which organizes and manages sets of identifiers and credentials for a particular user and the user's associated web applications, online identities (e.g. email and login) and personal points of contact (e.g. cellular number). For example, a user object may include, for a user, one or more web application or service identifiers. For each web application or service identifier, the particular credentials for accessing the web application or service may also be referenced.

Fig. 11 illustrates a user object. All elements of a user object are referenced in a database linked to the server. Each user object can abstract a web application and a user's credentials (33) for the web application. A user object can also be non-application specific (35), for example by referencing names, phone numbers, hardware device identifiers, etc. User objects that are associated with web applications and user credentials enable the server to universally reference and access web applications (37) for obtaining
a user's web application content (39). Content that is shared to the user and not owned by the user is accessed by referencing another user's delegated credentials from a user handle associated with the other user's user object (41).

The present invention is operable to map user objects to provide two functions: (1) identifying a particular user, given any of the user's identities; and (2) given a particular user, map to the particular user's set of appropriate available identities in order to facilitate communication, collaboration, and sharing with other users.

The user identities may be those associated with each particular web application used by the user. For example, the user might have user credentials related to a plurality of online web applications, wherein the user credentials for each differs (for example, different user names and passwords for each web application).

The user object mapping enables the present invention to associate a plurality of user identities with each other, effectively providing a single universal online identity. This single universal online identity enables the present invention to simplify the number of user credentials to be provided to other users for communication, collaboration, and sharing with the user. Furthermore, the single universal online identity overcomes limitations inherent in similar prior art approaches that are vulnerable to limited adoption, for example due to competition (i.e. one competitor not implementing another competitor's identity system). The single universal online identity provides facilitation and bridging that enables users to identify other users and share content with one another, even across providers of competing or incompatible applications. Since the single universal online identity identifies users rather than online identities, a particular user can be identified via any number of identities.

The present invention provides a user object mapping utility for enabling a user to initially associate identities with a user object. The user object mapping utility could be provided as a web interface to the user, an application executable on a user's network device, or as a service hosted by third party web applications enabling the user to associate that web application with its user object. For example, a web interface may
provide icons for commonly used web services (Google, Facebook, Yahoo, etc.), and ask the user to associate their identities with these services with the user object.

The present invention enables association of identities using credential delegation, a widely available feature on Web2.0 applications, that allows third parties to make requests on behalf of a user. To set up delegation, users may authorize the server to interact with web applications, after which the server may receive a token that it uses to access the web applications with the user's credentials. Security is provided by using public/private key certificates to sign requests. The server may search and access content using the credentials of the user/content owner. This enables the server to provide search and fine-grained access control across web applications without requiring mutual membership from all the users involved (e.g., a user on Google may share data with a user on Facebook even though neither has an identity associated with the other application).

It should be understood that user object mapping could be provided as a means for enabling a single-sign-on service. However user handles based on the full user objects need not be exported to users other than the particular user for security and privacy reasons. In other words, these objects may be protected and maintained by an administrator of the present invention.

The users' content can be shared using a plurality of sharing models including based on the user sharing the content (sender) and the individual with which the content is shared (receiver). Applications and tasks may require explicit interaction from both the sender and receiver, or a mixed sharing model in which just sender or receiver provide explicit interaction, or be completely automated without requiring any user interaction.

In the explicit sender and receiver interaction model, the sender explicitly marks the content to share and the individuals with whom to share (e.g., by clicking on their picture on her mobile device). Similarly, the receiver explicitly chooses the users from which to receive content. Many implementations can be provided with this model, including for example sharing of documents, media, scheduling meetings, etc.
In the mixed sharing model of operation, user interaction is required from only the sender or receiver. One illustrative example of a mixed mode of operation is a contact information exchange web application. For example, a first user willing to share its contact information can set the contact information content to be available automatically to any other interested user. Conversely, a second user may wish to be more selective with which contact information content to accept. In this mode, the sender is offering content without requiring user interaction, however the receiver chooses to selectively and interactively accept content. In another example, a sender could be selectively making contact information content available while the receiver is choosing to accept all available contact information content.

In the automated sharing model the application implicitly shares and accepts content on behalf of users. There are many possible implementations for which this mode may be preferable. For example an application that enables a first user to take a tour of a city without taking any photos. Later, the application can build a photo-album from the available photos of the other users the first user took the tour with, or even random users who happened to be in proximity to the first user.

In one particular example, a first user and a second user share a social context, for example being in proximity of one another. The first user is attempting to share calendar information from a first web application to the second user. The first user may not know what second web application the second user uses, or what the online identity is of the second user with the second web application.

In an automated sharing model, the first user may have designated content from a particular web application as automatically shared. The first and second user's network devices are equipped with the client utility including the sensing function. The sensing function of each network device uploads scan information to the server, which determines that the second user's network device is in proximity of the first user's network device. The server determines from the second user's user object whether the second user is permitted to access the content. If the second user is permitted to access the content, a sharing routine is executed.
Alternatively, the first user may be presented with a sharing command when viewing content. Fig. 7 illustrates two possible sharing commands for enabling a user to explicitly share content. Fig. 9 illustrates an explicit sharing sequence comprising a sharing routine. In an explicit sharing model, the first user and the second user may come in proximity. The sensing function of each network device uploads scan information to the server, which determines that the second user's network device is in proximity of the first user's network device. The first user's network device displays to the first user a selection of other users to share with. Fig. 8 illustrates a selection display for selecting users to share with. The selection display may include a name and/or a picture of other users for easily enabling the first user to choose the other user with which to share content. Pictures may have been manually provided by users to the server or may be extracted from photo web applications for the users. If the other users are not associated with the system, the first user can specify a cellular number to indicate another user. The cellular number can be used to identify the other user via SMS and provide an automated link which completes the sharing process.

The first user may select the user with whom the first user wishes to share content, upon which selection the sharing routine is executed.

The sharing routine begins after the automated or explicit selection of the user with whom to share. For example, a list of individuals that are in the shared social context may be displayed to the user on its network device. The user may select one or more of the individuals and configure sharing models for each individual and each type of content. The server applies sharing to the first user's web applications, confirms with the first user's network device that sharing has occurred, and optionally notifies the second user's network device.

Users may have content of interest to other users but content may be associated with a web application with which the other users do not have an account. Furthermore, the web application may not be operable or configured to share the content to the public (i.e. it is privately shared only to particular users that have accounts). The user may desire to share the content with the other users.
Fig. 3 illustrates the process by which a proxy is operable to enable the sharing of content from a first user to a second user. The first user is a sender and the second user is a receiver of the content. Receivers are notified of shared content in two possible ways: instant notification (via SMS or other instant messaging services), with a message containing an embedded link; or the embedded link is added to the receiver's web applications, depending on the second user's preferences.

The receiver may access the embedded link. The proxy verifies the permissions of the receiver, ensuring that the receiver is permitted to access the content. The proxy, which is operable to access the sender's credential information from the sender's user object, then connects to the web application of the sender using the sender's credentials and receives the shared content. The proxy then makes the shared content available to the receiver either by interfacing with a web application used by the second user that is operable to host the content or by temporarily hosting the content.

Optionally, when the server interfaces with a web application used by the second user that is operable to host the content, the server may also create or update a virtual folder or album containing thumbnails or summaries of shared content.

In certain cases, a first user of the present invention will not be alerted to the presence of a second individual of the present invention to enable sharing of content with the second individual. For example, the second individual may not be a user registered with the system of the present invention, the second individual may be a user having its privacy settings set to very high rendering them invisible to the first user, or the second individual is currently not in the social context of the first user.

In these cases, the present invention enables sharing by using an alternative messaging means, for example SMS messages. To establish a share, the first user can input a known identifier for the second individual, for example the second individual's cellular telephone number. Entering and exchanging phone numbers is a well understood and socially acceptable concept, and is well supported on mobile devices.
The server may determine whether the cellular number is associated with a known user of the system. If the second individual is a user, the server performs the requested sharing and collaboration adaptations.

If the second individual is not a user, the server creates a unique unnamed account, and performs any adaptations it is able to using this newly created account. The server then sends the second individual an SMS message, which includes a link in the body of the message. This link points to a secure and unique address hosted by the server. When the second individual clicks on the link, they are directed to the server, which facilitates the sharing and collaboration of content.

Example Implementations

Calendar-based Meetings

A common difficulty in the workplace is the need to schedule meetings between individuals, especially if the individuals are from different departments, companies or institutions. The present invention can be implemented to facilitate scheduling, such as for meetings, by interfacing with users' calendar applications. The users need not all use the same calendar application.

Users in proximity, for example, can schedule a follow-up meeting at a time during which each of the users is free without having to discuss possible times for the meeting. The present invention aids the users by highlighting which time-slots are free for all or some of the participants. The users can then schedule this meeting, which automatically updates the participants' calendars by means of the present invention.

Additionally, unlike existing solutions, the present invention directly interacts with existing applications (for example, Google™ Calendar or Microsoft™ Exchange Server™) at the server source. Thus the complex logic and processing is managed at the server of the present invention, with no strain placed on users' network devices.

The present invention is operable to collect and interpret calendar information from many different calendar applications, which means participants can schedule a meeting even if
they do not all use the same calendaring system. Because the server manages the interpretation and adaptation of calendar entries, users do not have to reveal which calendar service they are using, thus providing a stronger privacy setting than is available with any other application today.

Fig. 4 illustrates a calendar interface optimal for a desktop computer in accordance with the present invention. The interface can be made to show the union of busy times, making free slots very easy to see.

Figs. 5 and 6 illustrate calendar interfaces optimal for a mobile phone in accordance with the present invention. In Fig. 5, free slots shown by the union interface are not as clear as in Fig. 4. Instead, the interface can be as shown in Fig. 6 in which free times are clearly displayed as available.

When a user scheduling the meeting selects a time, the user's calendar and the calendars of all other users may be automatically updated to mark that selected time as reserved for the future meeting.

Calendar Contact Journaling

The present invention can be implemented to facilitate contact management based on a calendar. As a user goes about its day, whether or not according to a schedule in a calendar web application, the present invention can automatically annotate the user's calendar, on a periodic basis or continuously as specified by the user, with names and links to the people the user met throughout the day.

This provides a convenient and new application model for referring to colleagues or recalling when scheduled or impromptu meetings took place and with whom. This can also provide a useful interface for gathering contact information for new contacts the user meets in the course of daily business. This implementation also enables users to "roll back the clock", indicating to the system that it should dynamically update its adaptation context to match the time, location, and social setting of a specific meeting with a specific user in the past. This feature enables users to easily create meetings, for example, after-the-fact.
The updated calendar can be used by the user to facilitate sharing. For example, if a first user has an impromptu meeting or chance encounter with a second user, the first user can later use its calendar web application to select the second user to share content with the second user, set up follow up meetings, etc.

Furthermore, during an impromptu meeting or chance encounter, the first user can select a content sharing function and the present invention can default to sharing with the second user, who is currently in a shared social context with the first user.

Since these adaptations are managed by the server rather than the users' network devices, this feature enables the server to perform powerful machine-learning and advanced adaptation policies without draining the users' network devices.

**Email Smart Filtering and Searching**

As the amount of email communication continues to grow, with increasingly complex threads of conversation, searching has become a critical feature. While typing search parameters is feasible on a desktop, it is inconvenient, distracting, and time-consuming on a mobile device in a social setting.

The present invention can be implemented to facilitate complex automated dynamic filtering and sorting of email based on a user's social setting. This is enabled by creating dynamically managed folders which contain sorted and filtered results for the user.

While the present invention can be used to sort and filter email based on a sender that is a user in a shared social context, optimally the present invention is used to sort and filter email based on a set of users in a shared social context. Thus, while some individuals are involved in multiple projects or lines of correspondence, email can be sorted and filtered more appropriately based on a set or group of people involved in a project or line of correspondence.

For example, a user may choose to sort and filter email based on all members in proximity. This enables the server to sort and filter emails based on a subset of all other
users in proximity, providing a finer-grained selection that merely sorting and filtering based on a sender.

Alternatively, a user's calendar web application can be used to provide a context for the email sorting and filtering. Alternatively, the server can utilize machine learning techniques to provide smart filtering and sorting capabilities, for example by pulling in the user's social context, past behavior, and calendar information to formulate a selection criteria which more accurately matches the user's context and needs.

*Photo Album Smart Filtering and Searching*

Copernicus provides a platform which enables dynamically creating and managing albums and photos based on user's social context. This includes user content, user's shared content, and content shared to the user. Users are free to use their preferred web application even if content shared to them is originally hosted on a competing service.

This photo capability also enables new avenues for sharing and community building. For example, in addition to the theme-based and geo-position-based groups and communities on FlickR™, users will be able to build social proximity and serendipity contact-based communities for sharing and discovering content, as described in the implicit sharing example earlier, where a user can build a photo-album from the photos made publicly available by people taking a city tour.

*Virtual Photo Touring*

The present invention can provide geographic position context to enable users to collect content based on travel. For example, the system of the present invention can provide a user with a photo album of a tour without requiring the user to take a single photo. The system tracks the movement of the user and collects content from other users that share the social context of the user's movement. The system can also use time to further refine the collection of content. Not only would such an application build a photo-album containing photos taken at geographic coordinates the user visited, but it would enable the user to find photos taken when the user was nearby the photographer when the photo
was taken. This is a novel and advanced searching and filtering capability not currently available.

*Business Card Exchange*

The present invention can be implemented to facilitate exchange of contact information or "business card exchange", between two or more users. For example, if a first user meets a second user, a potential new client, at a convention, the present invention enables easy exchange of contact information.

If the first and second users are registered users of the system, the first user sees the second user's profile photo and name, which the first user selects on its mobile device. The server then provides the business card exchange. The first user and the second user's network devices do not need to initiate any communication.

If either the second user or the first user is not registered users of the system, their contact information can be exchanged using the SMS sharing system described above.

Unlike Bluetooth vCards of the prior art, which are limited in the amount of information they carry, the business card exchange of the present invention can carry an arbitrarily large and rich collection of content because they are all exchanged and managed from the server. For example, the business card exchange can carry a portfolio of photos, videos, 3D mesh models (for artists), or collections of product PDFs and videos for sales and marketing representatives.

The server can automatically link the business card exchange information into the users' contact and calendar applications. For example, the first user's calendar will have a new entry, indicating it met with the second user at this time, providing the first user with future context and reference for this meeting. This is in contrast with traditional vCards or business cards which are not integrated and provide little context information for future reference.

*Time-shifting and Adaptation Pivoting*
The meeting scheduling, email sorting, and other adaptation applications have thus far been presented as providing adaptations \textit{in situ}. However, many tasks performed after-the-fact require social/physical context from a previous event. For example, a first user may be trying to schedule a follow-up meeting to one that just ended 30 minutes ago.

The present invention is operable to provide the ability to apply adaptations to applications and services based on previous social context, not just current social context.

For example, this feature can be accessed as an integrated feature with a web application system as described above. For example, automated calendar entries created by the server can include links to be used for specifying which other user(s) to adapt for. The specific other user(s) to adapt for can be specified by selecting from a list provided by the server, or via an interface integrated into the user's contact and address book by the server.

Once the other user(s) have been selected, the server adapts the user's web applications to suit that social context. For example, a first user can select the meeting it had 30 minutes ago, and the server automatically adapts the first user's calendar web application with a list of mutual free times from all participants in the meeting. This enables the first user to easily schedule the follow-up meeting. The server can also sort and filter the first user's email to prioritize the correspondence and threads of conversation pertinent to that meeting, enabling the first user to quickly find relevant discussions.

This enables flexible adaptation and pivoting based on users and/or time and provides a contextual anchor around users, places, and time for quickly finding and adapting content.

\textit{Application Installation and Customization}

Users interacting with individuals may also wish to share not just data but applications. For example, a user may use a particular web application. Upon entering into a shared social context with a friend, the server of the present invention may determine that the friend is not a user of the web application, or optionally of any comparable web application. The server may initiate a notification to be provided to the friend by means of the friend's network device. The friend may provide a confirmation by means of the
notice, and the server may install/provide access to, setup and/or customize the web application for the friend.

For example, a user may have recently started using a multi-player game web application to which the friend is not a user. Upon the user and the friend entering a shared social context, the server may determine that the friend does not have access to the game web application. The server may initiate a notification to be sent to the friend via the friend's network device and the friend may provide a confirmation that it wishes to have access to the game web application. The server may then set up and customize the web application, which may include: setting up authentication information, configuring and possibly installing relevant game maps on the friend's device, setting up permissions so that the friend can play with the user and the user's other friends or in the same clan, and making the user's previous game results available to the friend. Similarly, after installing a mapping application, user-specific points-of-interest, notes, or trail annotations can be shared.

Privacy Preserving Sharing

Some web applications of the prior art provide basic sharing features for accessing content, even if it is marked as private, using a feature known as "guest passes". However, this approach has several drawbacks. For example, finding or generating a guest-pass is often a "tacked-on" feature, and is difficult to find or generate, especially on a mobile device which has a much more constrained browsing environment than a desktop computer. This obstacle can be frustratingly distracting in a social setting. Additionally, the guest pass still points back to a specific web application, which reveals the sharer's web application and often also reveals their login alias.

The present invention provides a fine-grained and feature-rich content sharing system which is privacy preserving. Because the sharing of content is mediated by the server, users do not have to reveal their login name or preferred web application hosting the shared content.
It will be appreciated by those skilled in the art that other variations of the embodiments described herein may also be practiced without departing from the scope of the invention. Other modifications are therefore possible.

**Face to Face Meeting**

A further application of the present invention is to facilitate face-to-face meetings of users that may have not previously met. For example, a user that has a desire to meet another user, and is confident of the general location of the other user, may configure a notification application to notify it of when the other user is in proximity.

In a more specific example, a first user may be confident that a second user will be present at a conference. The first user may identify the second user to the notification application by means of a known identifier, such as email address of telephone number. Provided that the second user is associated with this known identifier in the second user’s user object, the notification application of the first user may notify the first user when the second user is in a shared social context, namely proximity, of the first user, thus greatly increasing the chances of the two users meeting.

In another example, the first user may wish to meet any other user that has a particular characteristic, for example a particular job. Provided that any one of the web applications is operable to provide data corresponding to such a characteristic (which in this case may be a career-oriented social network), the first user may be notified by the notification application of one or more other users having the characteristic.
CLAIMS

1. A computer network implemented method for enabling the sharing of content between a plurality of users based on a shared social context, the method characterized by:

   (a) linking each user to a network device operable to provide to a server a social context;

   (b) associating each user with a user object on the server, each user object linkable to one or more web applications having content;

   (c) identifying, by means of the server, a plurality of users being in a shared social context based on the social context of each network device;

   (d) generating and sharing, for each user in the shared social context, user handles associated with the user objects to the network devices;

   (e) obtaining the content by means of the user objects; and

   (f) sharing the content, or a subset thereof, with the network devices for each user in the shared social context.

2. The method as claimed in claim 1, characterized in that the user handles are associated with the user objects through user object mapping.

3. The method as claimed in claim 1, characterized in that the shared social context is based on proximity.

4. The method as claimed in claim 3, characterized in that proximity is determined based on co-located network devices.

5. The method as claimed in claim 1, characterized in that the shared social context is based on physical location.

6. The method as claimed in claim 1, characterized in that the server is operable to:
(a) determine whether each user in the shared social context is associated with a user object linked to a web application with which the content is usable; and

(b) notify each user, by means of its network device, of a web application with which content is usable if the user object associated with the user is not linked to a web application with which the content is usable.

7. The method as claimed in claim 6, further characterized by enabling the user, by means of its network device, to access the web application.

8. The method as claimed in claim 1, characterized in that each user object includes:

(a) a profile corresponding to each web application linked to the user object; and

(b) user credentials for accessing content from each web application linked to the user object.

9. The method as claimed in claim 1, characterized in that each user is linked to a user object by means of a device identifier of the user's network device.

10. The method as claimed in claim 1, characterized in that the subset is determined by the user associated with the content to be shared

11. A computer system for enabling the sharing of content between a plurality of users based on a shared social context, the method characterized by:

(a) one or more web applications having content;

(b) a network device linked to each user, each network device operable to provide to a server a social context; and

(c) a server computer operable to:
(i) associate each user with a user object, each user object linkable to one or more of the web applications;

(ii) identify a plurality of users being in a shared social context based on the social context of each network device;

(iii) generate and share, for each user in the shared social context, user handles associated with the user objects to the network devices;

(iv) obtain the content by means of the user objects; and

(v) share the content, or a subset thereof, with the network devices for each user in the shared social context.

12. The system as claimed in claim 11, characterized in that the user handles are associated with the user objects through user object mapping.

13. The system as claimed in claim 11, characterized in that the shared social context is based on proximity.

14. The system as claimed in claim 13, characterized in that proximity is determined based on co-located network devices.

15. The system as claimed in claim 11, characterized in the shared social context is based on physical location.

16. The system as claimed in claim 11, characterized in that the server is further operable to:

(a) determine whether each user in the shared social context is associated with a user object linked to a web application with which the content is usable; and

(b) notify a user, by means of its network device, of a web application with which content is usable if the user object associated with the user is not linked to a web application with which the content is usable.
17. The system as claimed in claim 16, further characterized by enabling the user, by means of its network device, to access the web application.

18. The system as claimed in claim 11, characterized in that each user object includes

   (a) a profile corresponding to each web application linked to the user object; and

   (b) user credentials for accessing content from each web application linked to the user object.

19. The system as claimed in claim 11, characterized in that each user is linked to a user object by means of a device identifier of the user's network device.

20. The method as claimed in claim 1, characterized in that the subset is determined by the user associated with the content to be shared.

21. A method of enabling the sharing of content between a plurality of web applications, the method characterized by:

   (a) a user object linkable to each of the plurality of web application, the user object linked to user credentials for accessing content from each of the plurality of web application; and

   (b) an adaptation service operable to interface with each of the plurality of web applications;

   wherein the user credentials for a first web application can be delegated to a second web application for obtaining content from the first web application and translating the content for use by the second web application.
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**FIG. 5**
sense local context (11) → context update (13)

raw device updates → device context to real person mapping

context detection algorithms → vote weighing and selection algorithm

sliding window context log → real person to web application mapping

vote weighing and selection algorithm → application update engine

application update engine → Web application providers

user preferences

FIG. 10
11. Sense local context
13. Send context to server
15. Insert translated identifiers to database
17. Determine context updates
19. Organize content
21. Present content

FIG. 12
INTERNATIONAL SEARCH REPORT

International application No.  PCT/CA2010/001437

A. CLASSIFICATION OF SUBJECT MATTER
IPC: H04L 12/16 (2006.01)  
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPCs: H04L-12/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched.

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Canadian Patent Database, and EPOQUE (EPODOC, English Full Text Databases) - Search terms used: sharing, content, social network, web application

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<td>WO 2009/055825 A1 (WANG et al.) 30 April 2009 (30-04-2009)</td>
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

Date of the actual completion of the international search
30 November 2010 (30-11-2010)

Date of mailing of the international search report
14 January 2011 (14-01-2011)

Name and mailing address of the ISA/CA
Canadian Intellectual Property Office
Place du Portage I, C114 - 1st Floor, Box PCT
50 Victoria Street
Gatineau, Quebec K1A 0C9
Facsimile No.: 001-819-953-2476

Authorized officer
Donald Lefebvre (819) 997-2822

Form PCT/ISA/2 10 (second sheet) (July 2009)
**International Search Report**

**Observations where certain claims were found unsearchable (Continuation of item 2 of the first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [ ] Claim Nos.:
   because they relate to subject matter not required to be searched by this Authority, namely:

2. [ ] Claim Nos.:
   because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. [ ] Claim Nos.:
   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

- **Group A** - Claims 1-20 are directed to a method and system for sharing of content between a plurality of users based on a shared social context.

- **Group B** - Claim 21 is directed to a method for enabling the sharing of content between a plurality of web applications.

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [X] As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claim Nos.:

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim Nos.:

   **Remark on Protest**

   [ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

   [ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

   [ ] No protest accompanied the payment of additional search fees.
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