Integrating personal information from social media into enterprise CRM

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European internet users deserve protection of their fundamental right to privacy, even when they interact in the digital world. Since the rise of social media, individuals are revealing more personal data online than ever before. People's need for communication is now growing faster than their understanding of the implications of sharing personal information through existing social media tools. Of course, this data disclosure gives value to users, like enhancing social contacts or obtaining personalized services and products, but compromises their privacy, resulting in a users' loss of control over their personal data.

Customers want control of their data, without sacrificing the convenience of online interaction. Businesses want as much insight on their customers as they can obtain, without losing their customer's trust. The di.me framework demonstrates a holistic approach to mitigate between these conflicting privacy interests and showcases how to effectively integrate personal information from social media into enterprise CRM within the European market environment.

Introduction

Modern individuals have multiple digital identities. In simplified form, this includes a 'work' persona and a 'private' persona belonging to a single person who uses online social networks (OSNs) with one or both of these personas. OSNs are often criticized for not differentiating between these personas, but instead forcing users to maintain a single digital identity with a single persona (Vallor, 2012). Thus, depending on whether an individual happens to be at home or at work, they may approach identity management differently:

> *Individuals want control of their data,*
> *without sacrificing convenience.*
>
> *Businesses want as much insight on their customers*
> *as they can obtain on a trust basis.*

Media theorist Rob van Kranenburg (2007) writes: "I focused on moving from privacy to privacies, which acknowledged that in a hybrid environment we leave different traces and might want to build temporary personalities around these traces, not exposing our entire personality all the time."

European Commissioner Gérald Santucci (2013) comments on that remark: "Just as privacy needs to be re-thought by considering privacies, trust is an issue that should not be addressed in terms of the actions required to create or restore trust. We should focus instead on the conditions that are necessary to empower citizens to orient themselves properly in a hyper-connected environment and make their decisions themselves. The notion of orientation should prevail over the notions of transparency and control: ***acquiring the knowledge, means and tools to orient oneself and make proper decisions*** is much more conducive to societal cohesion and sense of freedom than basing freedom on transparency and control."

That is precisely what the di.me framework is designed to do: it ***demonstrates a holistic approach to mediate between conflicting privacy interests*** (see *Figure 1*) through a mediating platform that offers the user a ***convenient tool to manage multiple online digital identities*** in various platforms (Wrobel, 2013).

> *Privacy and competitiveness should not be presented as antagonistic objectives. On the contrary, modernised data protection rules are a crucial market opener in our digital economy … We are also encouraging innovation by introducing tools, such as 'privacy by design' or data portability, which will give companies the right incentives to gain a competitive edge in digital marketplaces where privacy does increasingly matter for consumers.*
>
> - *Viviane Reding, Vice President of the EC*

Keeping in line with how the EC hopes to shape Europe's online future (Reding, 2013), companies who want to maintain a competitive edge in digital marketplaces would be well-advised to consider modernized data protection, and a 'privacy-by-design' approach to data management. Customer relationship management (CRM) solutions should provide persons with such control, while providing businesses with a convenient system to access all customer-related data. Indeed, according to Gartner, cloud and social are already two of the five catalyst trends driving current CRM interest and spending (Thompson, 2013).

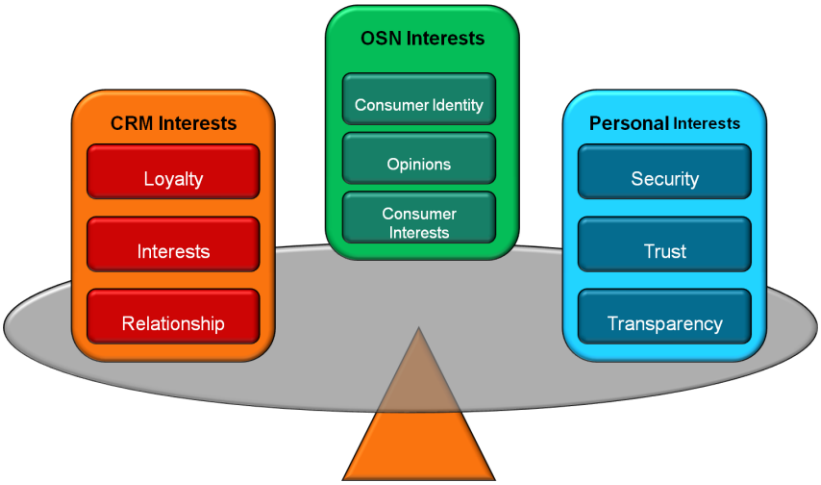

Figure 1. *Online relationships between individuals and businesses are riddled with conflicting privacy interests.*

Problem

When users interact online in their different personas, they want to feel safe: they want the systems they interact with to act in their interests for the persona they are in. These interests, which differ for each persona, still need to be managed and consolidated in such a way that users who lack digital literacy are still able to protect their implicit interests during their online interactions. To facilitate this, a mediator must interact between the involved personas to ensure that these interests (see *Figure 1*) are preserved through interactions in online relationships between individuals and businesses.

This paper evaluates how the di.me project addresses this problem by using a context-sensitive, adaptive trust metric to generate data negotiation recommendations. Integrating these recommendations into service connectors between cloud-based web services can create a ***powerful social CRM solution enabling secure digital interactions between customers and businesses that strengthen existing business relationships.***

High-Level Solution

di.me offers an alternative OSN which can interact with other OSNs, and support the needs of multiple digital identities. It uses various devices and services to facilitate digital information exchange between social and business networks, while keeping digital faces separate and maintaining customer confidence, trust, and policy compliance.

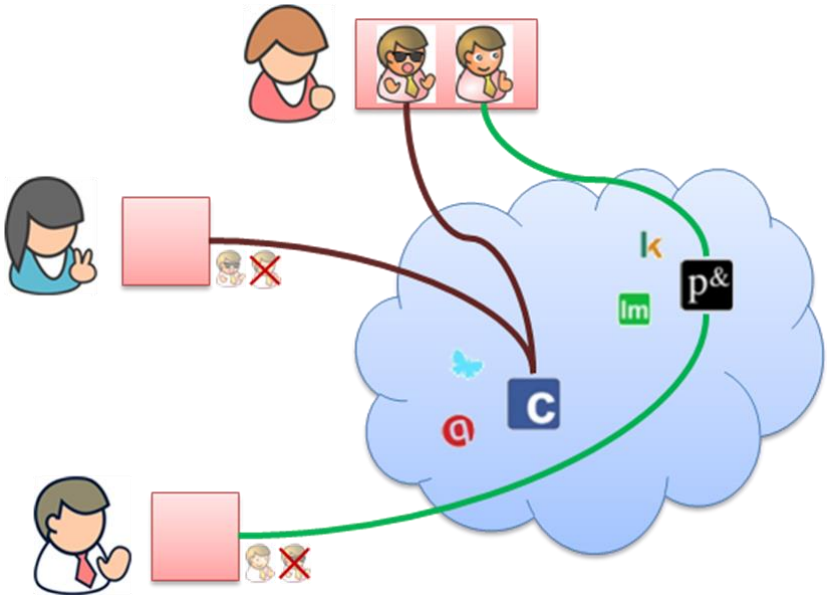

Figure 2. *Each user has multiple digital identities. The di.me userware (red) operates as a series of decentral nodes. Each node manages a single user's digital identities to ensure that the user's contacts are only able to see the profiles that the user explicitly wants to share with them, and helps to avoid inadvertently revealing the user's alternate digital identities to their contacts.*

di.me is conceived to integrate all personal data into a single personal information sphere, the *di.me personal server*, and is motivated by the philosophy behind the EU legal framework, with privacy-by-design playing a significant role in its architecture and design. It can be run on any trusted computer, be it a hosted enterprise server accessible via a web browser, or completely run on a laptop. It realises decentralized communication to avoid external data storage and unnecessary third-party data disclosure, with each personal server acting as a node in the di.me network, capable of exchanging information with other di.me nodes or other web services (see *Figure 2*). The result is ***a user-controlled personal service providing intelligent personal information management and targets integrating social web systems and communities.***

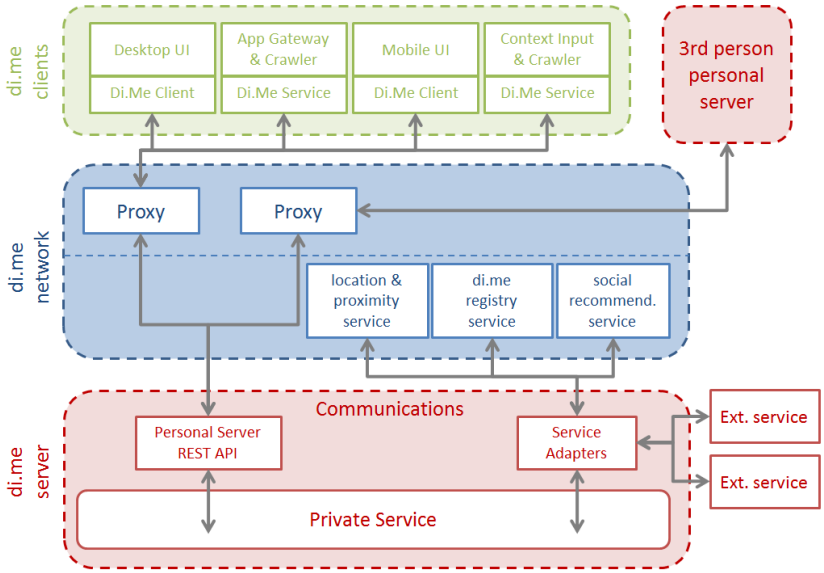

Figure 3. *The di.me framework consists of three layers: The userware, the network, and the personal server.*

In order to function securely, the personal server needs to speak to the di.me network (see), which provides:

1. *Location & Proximity Service* – provides contextual information about where the user is.
2. *Di.me Registry Service* – allows users of di.me personal servers to look up and find each other via aliases. This service provides a directory containing the user's alias and publicly shared profile information, as well as the address (IP address, domain name, or onion address) to the corresponding di.me personal server. For maximum security, a single server could be registered with multiple onion addresses.

3. *Social Recommender Service* – provides contextual information about the personal devices that located in the proximity of the user. For example, a cellular phone equipped with another di.me client could be detected and this information compared to the information on the di.me network to make intelligent suggestions on people with whom the user may likely have interacted and have opted into using this service.
4. *Proxy layer* – provides additional security to communications to and from the di.me personal server to prevent profiles from being linkable as a result of deep network packet analysis.

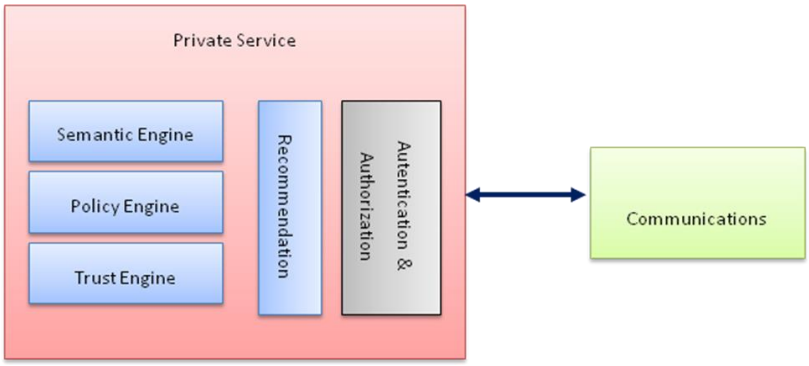

Figure 4. *The private service comprises of a semantic lifting engine, a policy engine, and a trust engine which work together to intelligently determine and analyse the context under which digital identities operate in real-time. Using this analysis, the recommendation engine can present the user with appropriate warnings in real time.*

The inner workings of the di.me private service (see) contain a comprehensive modelling platform that is able to represent the structure and semantics of a wide-range of informational input as well as their associated implicit relationships. This enables the discovery and integration of distributed personal information, and also paves the way for advanced functions such as smart reasoning to act as a privacy-enhancing technology (PET) that delivers intelligent, contextual recommendations to the user (Thiel, 2012).

To look at the effectiveness of the di.me framework for professional users at work in enterprise settings, more concretely for CRM operators, *CAS Software AG*, a middle-sized enterprise offering CRM software to the European market, and German market leader in CRM for small and medium enterprise (SME) solutions, invited its customers to validate the di.me framework on a trial server, in order to determine the effectiveness of the di.me concepts and ideas

CAS PIA:

- *Offers a **low cost, professional** CRM solution.*
- *Serves **small and medium enterprises** with typically 2-10 users per enterprise.*
- *Covers a **broad spectrum of industry** ranging from laborers to insurance agencies to manufacturers to charities.*

against a prototype demonstrator, dubbed *di.me userware*, as well as against a custom CRM solution prototype, dubbed *dime CRM*, in order to investigate the impact of tight integration on user uptake of the prototypical technology. *dime CRM* is based the cloud-based solution *CAS PIA*, which is particularly attractive for small and medium enterprises.

The dime CRM prototype showcased an integrated workflow involving appointment planning using a popular Switzerland-based web service, Doodle. The di.me userware prototype showcased a workflow involving sharing confidential documents in a business context to a new potential client.

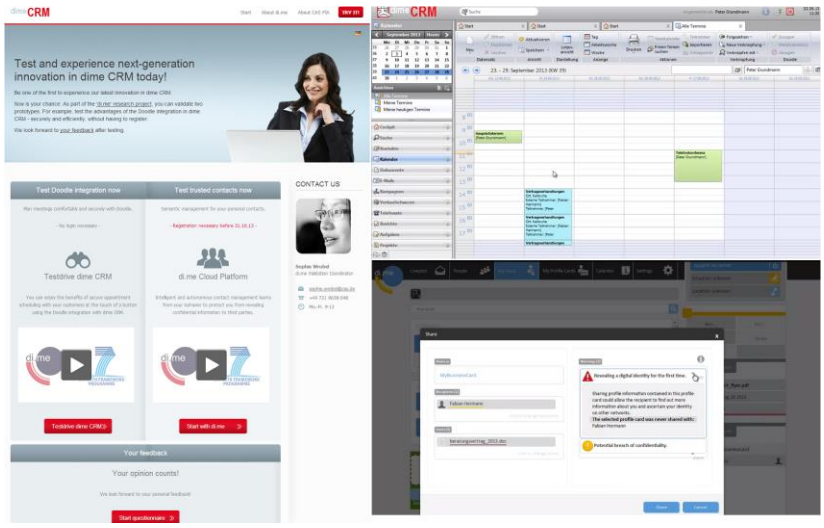

Figure 5 *The prototype demonstration environment consisted of an instructional landing page (left), the dime CRM prototype (top right), and the di.me userware prototype (bottom right).*

User Validation

Objectives. The main objectives of the user validation were to monitor and validate the acceptance of the project's approach to provide a mitigating platform for CRM operators. Feedback and user engagement formatively supported development.

Approach. An acceptance and user experience model, which explains how user's needs are addressed by the prototype (Sproll 2010), was used to collect data on technology acceptance (see *Figure 6*). It is based on the classical Technology Acceptance Model (Davis 1989) (Venkatesh 2003). The validation analysed the following aspects:

- *Acceptance and Utility (perceived usefulness):* the degree to which a person has a positive impression of the system, and believes that using the system will enhance his or her performance.
- *Usability (perceived ease-of-use):* the degree to which a person believes that using the system can be used and learned easily, successful, and with low effort.
- *Privacy concerns:* concerns echoed by consumers about how their data is handled in online information collection practices (Beier 2006).

Data collected from both objective and subjective measures was analysed to assess the success of the di.me solution against the acceptance model. Objective data was collected in form of server activity logs and individual interaction logs (with user consent). Subjective measures were collected through a user questionnaire.

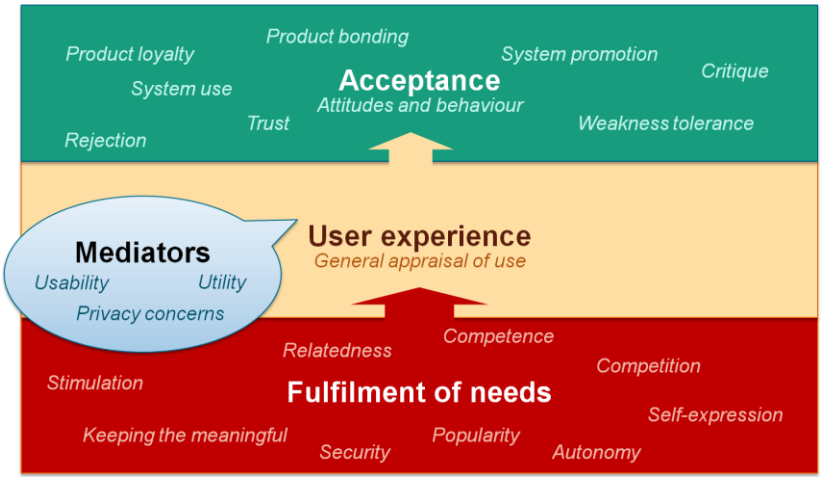

Figure 6. *The di.me user experience and acceptance model explains user acceptance based on user needs, experience and mediating conditions like usability, utility, and privacy concerns.*

Surveyed customers from a wide range of industry sectors were invited to explore the prototypes in a demonstration environment over a period of two months. After reviewing the demonstrator, subjects were asked to provide feedback via an online questionnaire comprising of both multiple-choice and free-text questions. This data, together with anonymous server logs and server profiling data, was used to provide steering input for subsequent demonstrator updates.

Results. Feedback on the prototypes was quite positive. There was an overwhelmingly positive response to the di.me concept and system. This suggests that both di.me concepts would be equally accepted by CRM users. Further, tight integration with familiar existing environments, as demonstrated by the deep tooling integration prototype, provides a significant edge to making the advisories usable for CRM operators.

There are several areas that CRM respondents found particularly notable and need special consideration to ensure the best possible user experience (see *Figure 7*). Keyword clustering over freeform responses reflects the most important features to CRM users in the mediating conditions:

- *Privacy Concerns:* access, trust, understanding
- *Usability:* interface, creating, sharing
- *Utility:* integration, suggestions, documents, polls

Figure 7. *Tagcloud consisting of free text tester commentary.*

Finally, responses from across Europe during the trial phase

have been very encouraging and indicate the presence of an immediate market for di.me technology:

Benefits

The di.me framework can help businesses by providing:

- ***Enriched contact data.*** Integrating social collaboration allows contact data enrichment with information consolidated from other digital profiles and services, and to keep that data synchronized with the social sources.
- ***Efficiency.*** Integrating successful team collaboration into streamlined everyday processes saves time in daily office tasks.
- ***Managed information disclosure.*** Intelligent privacy recommendations allow enterprise CRM to become smart, alerting workers when there is a risk of inadvertent information leakage.
- ***Context-sensitive targeting.*** Intelligent context recognition drives relevant recommendations to empower customer relationships.

- ***Made in the EU.*** Designed with the interests of privacy-conscious Europeans in mind, di.me provides incentive for users to willingly disclose both their information and willingness for their information to be processed, as well as demonstrates how mitigated data exchange could work in the privacy-first approach to information handling adopted in the EU legal framework.
- ***Data control.*** di.me is a decentralized social network which offers each person their own system, holding their own personal data. A user can communicate via peer-to-peer technology with other users, without needing to trust an external server. It can operate in two different modes: as a 'group server' hosting multiple user accounts, like Diaspora communities, or as a 'single user server' running on a privately-owned PC.
- ***Convenience.*** Access all relevant data anytime and anywhere from one central place.

di.me guarantees security and privacy:

6. *A **decentralized data model** prevents data from being saved unnecessarily on third party servers.*
7. *An **opt-in approach** guarantees that the user explicitly authorizes every connection to third party contacts and services.*
8. ***Decentralized, secure direct communication** eliminates man-in-the-middle attacks and protects your valuable data.*
9. *Explicit support for **multiple digital identities**, called 'profiles' in di.me, allows for targeted control over which parties can access which personal information.*
10. *A **trust-based recommendation engine** warns users when sharing information in a particular context could lead to unintended consequences.*

Conclusions

di.me is significantly effective as a mediating platform in making PETs involving semantic lifting, trust metrics, policy management, recommendation engine, and data negotiation across OSNs accessible to CRM operators, and satisfies utility, usability and privacy concern conditions for market acceptance. It assists CRM operators in communicating securely and effectively with customers by providing an advisory mechanism to warn users before their actions open up potential security risks. It is also easy to use when tightly integrated with familiar and popular CRM technology.

Service mediation technology, integrated in familiar and powerful CRM solutions, enhances the CRM experience.

1.1 What next?

Two results which CRM operators may benefit from include:

Alternative platform for online communication. di.me is offered as an open-source platform solution licensed under the EUPL. It is actively supported by an open-source community operated by the involved research partners (see Acknowledgements), for all parties interested in elaborating on the di.me concept and making PETs and data negotiation more accessible to enterprise environments.

Service mediation in commercial CRM solutions. Strong uptake results during this validation phase further suggest that highly integrated service components can succeed on the commercial market. CAS Software AG is committed to delivering easy-to-use, powerful CRM andXRM solutions at a low price for small and medium enterprise, and will be considering commercializing selected di.me results in the future as part of CAS PIA to build trusted collaboration spaces between businesses, and bridging online tools and services.

Companies with special CRM requirements – such as branch-specific solutions – may wish to have a CRM solution based on di.me or CAS PIA, and are encouraged to contact the open source di.me community or CAS Software directly.

Further information:

1. *di.me Project Overview:* *http://www.dime-project.eu/*
2. *di.me Open Source Project:* *http://dime-project.github.io/*
3. *CAS PIA:* *http://www.cas-pia.de*

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