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► **To cite this version:**

Mayla Alimam, Emmanuel Bertin, Noel Crespi. Improving the Capabilities of Email for Businesses - The Case of Social Tagging. Twenty-Fourth European Conference on Information Systems (ECIS), Jun 2016, Istanbul, Turkey. hal-01368015

**HAL Id: hal-01368015**

**<https://hal.science/hal-01368015>**

Submitted on 18 Sep 2016

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# IMPROVING THE CAPABILITIES OF EMAIL FOR BUSINESSES – THE CASE OF SOCIAL TAGGING

*Complete Research*

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## Abstract

*Email is one of the most used tools in enterprises for various purposes. However, the enterprise transformation programs are focusing today on social media tools rather than email. This paper discusses the properties of email in enterprises and whether further research is yet necessary on this tool. We provide a set of capabilities to compare between social media tools and email. As email is still affording some distinctive capabilities, we suggest improving this tool by applying a social bookmarking service to email messages. An experiment on the prototyped service highlights the perceived utility of email social tagging service for socializing employees' activities. The paper details, finally, future implications of this research.*

*Keywords: Email, Email social bookmarking, Email capabilities.*

## 1 Introduction

Electronic mail, commonly called email, is a ubiquitous communication tool in enterprises, being used as part of the employees' daily activities in the workplace. Despite some issues mainly represented by email overload (Whittaker & Sidner, 1996; Fisher et al., 2006), email possesses some intrinsic capabilities that make of it one of the most popular tools in the enterprise (Sumecki et al., 2011). However, the rise of a new wave of enterprise communication tools known as Enterprise Social Media (a term further explained in Section 2.1) has altered the way email was regarded. Taking usually the form of integrated platforms (e.g. enterprise social networks), these newer tools rely at their core on the creation of relationships between users (Leonardi et al., 2013). This has enabled a new way of establishing employees' communicational activities (McAfee, 2009): A way that capitalizes more on the social aspect compared to the traditional user-centric tool as email (Treem & Leonardi, 2012). Enterprises' strategies have been thus encouraging the shift from email towards social media tools for the internal organizational collaboration and communication (Alfaro et al., 2013; Silic et al. 2015). Yet, in practice, email is continuing to play a central role in the enterprises. Its widespread use is even expected to continue growing according to recent market statistics and forecasts for 2019 (Radicati Team, 2015).

In this context, the place of email within a world of social media tools can be yet seen as undetermined. Many scholars are indeed contributing to the research on enterprise social media tools. However, they mainly focus on measuring their impacts, evaluating their benefits and hence encouraging their adoption (McAfee, 2013; Smits & Mogos, 2013; Alfaro et al., 2013). Few are the studies investigating the wider perspective of these tools, i.e. having their functionalities and use examined and compared to the enterprise's existing set of communication and collaboration tools including email (Treem & Leonardi, 2012; Alimam et al., 2015b).

Furthermore, it is argued that social media tools are gaining the attention because they exploit the users' social graph while benefiting from useful Web 2.0 features such as enabling dynamic rich user experience (O'Reilly, 2007). This seems to support enterprises' increasing demand for the social collaboration (Daft, 2012; Alimam et al., 2015a). Regarding email specifically, blending it with Web 2.0 features for that same purpose has been disregarded. In terms of products, although a new enriched wave of email systems has emerged in markets recently (e.g. IBM Verse<sup>1</sup>, Google Inbox<sup>2</sup>, etc.), however, these solutions are mainly addressing the problem of email management (Jackson & Russel, 2015). As for the remaining research on email, it is as well focusing on reducing the effect of email overload. Mechanisms for message organization and content classification have been, hence, studied (Nairn et al., 2013; Meek et al., 2012; Dolata et al., 2013; Stern et al., 2013; Koren et al., 2011). Scholars are considering email as a user-centric tool for personal information management rather than a tool for groups' collaboration as it was originally designed (e.g. Whittaker et al., 2006; Sumecki et al., 2011); giving that email system is itself a social network (Bird et al., 2006; Godoy-Lorite et al., 2016). Further, with multi gigabytes of capacity nowadays, employees' inboxes are becoming important sources of information. Nonetheless, unlike in online social networks (Merz et al., 2015), studies on email are failing to socialize and capitalize on this underlying knowledge.

This paper provides insight into the potentials of email having it compared to social media tools in the enterprises. It proposes to further investigate email's social and collaborative aspect while drawing attention to its latent knowledge. To that end, it proposes a service that applies a social tagging mechanism on email messages and exploits the resulted tags. A prototype of the proposed service is therefore developed and then experimented by a qualitative sample of employees in order to demonstrate

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<sup>1</sup> A cloud business email hosting platform and messaging software that engage contacts' social information (Mullen, 2014)

<sup>2</sup> An application by Gmail offering a different way of organizing messages <https://www.google.com/inbox/>

and evaluate the perceived utility of the service. Formally, the paper addresses the following research question: (Q1) Can email's intrinsic capabilities explain its central role in the enterprise? (Q2) Could email be enhanced to further support the collaboration between users in a similar way to social media tools?

The rest of the paper is organized as follows: Section 2 details the related work. Section 3 presents the research method. Section 4 addresses the first research question and highlights email's capabilities. Section 5 is devoted to the second research question providing explanations of the proposed social email tagging service, the experiment and its results. Section 6 discusses the results. Finally, section 7 contains our conclusions and future work.

## **2 Related Work**

In order to better present this paper's polemic, we provide in this section a review of literature related to our issue of interest. First, we clarify the notion of Enterprise Social Media and the motives for their adoption while reviewing the literature relating these tools to email's uses. Second, as our contribution suggests enriching email to get a social benefit out of it, we highlight the few studies addressing the social aspect of this traditional tool. Finally, for the purpose of our proposed service, we present the literature related to email tagging and its existing approaches.

### **2.1 Enterprise Social Media**

Enterprise Social Media (ESM) are defined in the literature as: "Web-based platforms that allow workers to (1) communicate messages with specific co-workers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular co-workers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing" (Leonardi et al., 2013). They are also referred to in the literature as Enterprise 2.0 (McAfee, 2009), Enterprise Social Software (Herzog et al., 2013), Emergent Social Software Platform (McAfee, 2013). Although they take usually the form of various features into one integrated platform (e.g. social networking, microblogging, social tagging, etc.), ESM can also exist as individual stand-alone tools. The benefits and impacts of their use in the enterprises have been widely discussed. McAfee (2009) argues that these tools exert powerful effects on ways of communicating in enterprises. Smits & Mogos (2013) highlight how combining them into enterprises' ecosystems enhances business capabilities and performance. Alfaro et al. (2013) point out new organizational purposes for the use of social media such as engaging with the industry.

From a perspective that involves the organizational whole set of workplace tools, Alimam et al. (2015b) propose a categorization of this set. In a detailed survey, Treem & Leonardi (2012) compare the use of social media tools to the one of traditional communication tools such as phone and email. They argue how ESM better afford organizational activities and processes from different aspects.

The impact of social media in the enterprises has been the motive for launching initiatives to shift the use of traditional communication tools to social media. For example, Silic et al. (2015) discuss the case of Atos company which announced the objective of eradicating the use of email by replacing it with a social platform. These initiatives are, however, encountering critical challenges and barriers mainly because of the employees' attachment to their tools.

### **2.2 Social Approach on Email**

It has been made clear that the key factor of ESM success is that they are able to capitalize on an explicitly established social network. But email has, as well, its own latent social network. In fact, email was originally designed as a tool that supports asynchronous collaboration between multiple users (Rama & Bishop, 2006). Nevertheless, few are the scholars considering its people-centricity aspect.

Their studies address the underlying email-based social network. They mine the social status and relationships created between users during email activities (Bird et al., 2006). The dynamic nature of these relationships is observed in (Juszczyszyn et al., 2012) providing the possibility to predict changes to the structure of networked communication systems. A macroscopic analysis of the individuals' behaviours on these networks is provided in (Godoy-Lorite et al., 2016).

### **2.3 Email Tagging**

Email tagging (i.e. associating relevant pieces of information to its content) has been explored through different mechanisms and for different purposes. For the purpose of distributing information, Nairn et al. (2013) introduce a method to automatically process and send emails to targeted users based on established user-to-tag records. However, they don't involve users in tag processing. Meek et al. (2012) provide an improved classification and description of users' emails based on an automatic machine learning tag generator. Dolata et al. (2013) allow further user adjustment to the generator. However, in both approaches, tags are merely exploited at the end-user level whereas their collective benefit is omitted. Within the same scope of personal information management and organization, Stern et al. (2013) enable a collaborative and dynamic tagging process wherein both senders and users identified as having received the email have the possibility to add tags to the email. Further, Koren et al. (2011) propose a tag-based email classification that makes it possible for passive email users to learn from the wisdom of crowds in terms of how to better categorize messages.

## **3 Research Method**

We execute two separate steps in order to achieve our research objectives. To address our first research question, we compare email to five main types of social media tools currently used in businesses. For that purpose, we provide a set of capabilities that extends the analysis of ESM and involves the email's perspective. As email proves to have a consistent set of capabilities that are not yet fulfilled together in any other individual tool, we infer that email is a tool that will last in the enterprises. To address our second research question, we propose to enrich email's less efficient social aspect by applying to it the advantages of social tagging. Assessing the perceived utility of this proposed service requires to design, to implement and to experiment a prototype of it (Sjoberg et al., 2007; Wohlin et al., 2012). We therefore conduct a qualitative experiment on a typical sample of employees and evaluate the service based on the measured use as well as the participants' feedback. The next two sections are devoted to these two contributions.

## **4 Capabilities of Email Compared to ESM Tools**

The emergence of ESM tools (previously described in Section 2.1) has drawn attention to their ability of highly affording some useful capabilities (Vaast & Kaganer, 2013). Treem & Leonardi (2012) pursue an affordance approach based on Gibson's formulation of affordance that studies the relationship between new technologies and social practices (Gibson, 2014). This approach looks at the communicative actions of tools' properties in the enterprise context (Gaver et al., 1991; Markus et al., 2008). Treem & Leonardi reveal four affordances that are distinguishing the use of different social media tools in organizations and then present how these affordances differ from those of traditional communication tools such as email. They individually study five types of social media tools that are considered as the most popular types in enterprises. The five considered types are: wikis, social networking sites, blogs, social tagging applications and microblogs. For each type, they discuss the following four affordances: persistence or reviewability, editability, association, and visibility. Their findings suggest that enterprise social media tools, with their different types, afford a consistent high degree of each of the four affordances, whereas email lacks the affordances of association and visibility.

Nonetheless, social media tools are no longer emergent in the enterprise. We therefore consider their affordances as residing capabilities. Inferring these capabilities should put together, in the same analysis, the entire collection of enterprise tools (Alimam et al., 2015b). Particularly for the case of email, two additional capabilities arise: universality and plasticity. The extended perspective of the six capabilities is provided here. The comparison is then illustrated in Table 1.

#### 4.1.1 Persistence

Persistence (also referred to as reviewability (Clark & Brennan, 1991), recordability (Hancock, Toma, & Ellison, 2007) or permanence (Whittaker, 2003)), represents the ability of a communication act to remain accessible, in the same form as in the original display, after a communication whether real-time or asynchronous (Bregman & Haythornthwaite, 2001; Donath et al., 1999; Clark & Brennan, 1991). The persistence of email is a key factor in the availability of its messages for users (Panteli, 2002). Both email and social media tools afford the capability of persistence. When an employee sends an email message or posts to a social platform, the sent/posted information remains available to its readers. A record of the information remains and prevents eventual confusion about the interaction's contained information (Gergle et al., 2004; McCarthy et al., 1991). This record does not expire or disappear when the sender is not connected, as in the default case of a voice call. Its availability enables further development and new uses of the content (e.g. restructuring, searching, etc. (Erickson & Kellogg, 2000)).

#### 4.1.2 Editability

Editability concerns the ability to craft and re-craft a communication act before it is viewed by others (Walther, 1993). The literature agrees on how email affords a high degree of editability. Email users can carefully craft messages and attach them with resources prior to sending (Barnes & 1994). This capability is also afforded in social media tools to different degrees. For instance, employees can modify and revise their content with the use of a wiki tool (Yates et al., 2010).

#### 4.1.3 Association

Association stands for the ability to establish connections. It exists in two forms: between a person and another person and between a person and content. Social media tools support those two forms. For example, in online social network sites (Boyd & Ellison, 2007; Steinfield et al., 2009), social media tools enable the creation of explicit relationships between users, also known as social ties (Granovetter, 1973). They also provide the association between a person and a piece of information such as in a wiki contribution or a post tagging (Ding et al. 2007; Zhang et al. 2010). Contrary to social media tools, classical email lacks this capability. While some scholars are providing mechanisms for tagging email messages (Nairn et al., 20013; Stem et al., 2013; Meek et al., 2012; Koren et al., 2011), these scholars are failing to capitalize on the social connections this tagging is carrying.

#### 4.1.4 Visibility

Visibility means the ability to make their behaviours, knowledge, preferences and previously invisible communication network connections visible to others in the organization. Email lacks a certain degree of visibility (Lerman & Ghosh, 2010; Bird et al., 2006; Liben-Nowell & Kleinberg 2008). It does not allow public communications as messages are always limited to recipients selected by the sender(s). In addition, the only possibility for a user to establish a connection is to know the other person's precise email address or name in the case of having an organizational directory. In fact, affording visibility relies implicitly on the created associations, whether between persons or between persons and contents. For example, allowing tags to be displayed publicly helped attracting employee's attention to specific contents according to multiple experiments (Millen & Feinberg, 2006; Damianos et al., 2007).

Social media tools therefore enable employees to easily and effortlessly see information related to colleagues' activities, shared knowledge, etc. (Boyd, 2010; Grudin, 2006).

#### 4.1.5 Universality

Universality concerns the ability of email messages to reach email clients independently of their platform. The message queue interaction scheme of the email system allows messages to pass through private channels between the sender's and the recipients' servers using the Simple Mail Transfer Protocol (Postel, 1982). The standardization of the transfer of messages between email servers allows all email clients to reach each other across servers. This universality of access gives email a great advantage as a communication tool, while all types of social media tools still lack this universality of communications. Their model requires their users to be subscribers in order to access their services, which are usually limited to the enterprise's circle. For example, a member of a specific social network cannot publish a microblog in another network without becoming a member in the new platform too. This situation implies that employees cannot communicate with external collaborators by using this tool (Figueiredo et al., 2009).

#### 4.1.6 Plasticity

Email was originally designed as a communication application. However, the use of this tool has been evolving and additional functions have been associated with it (Whittaker & Sidner, 1996; Fisher et al., 2006). The literature is revealing four main functionalities of email: asynchronous communication concerning interactions across time (Whittaker & Sidner, 1996); task management allowing to track the progress of ongoing tasks (Bellotti et al., 2003); personal information management enabling to search, sort, and archive messages (Whittaker et al., 2006); and knowledge management, providing the common characteristics of knowledge management systems (Fischer & Ostwald, 2001). All of these functions are enabled by the same tool using the same mechanism, which makes it a plastic tool. Social media tools however do not afford the plasticity in an individual tool. Only full-featured platforms such as an enterprise social networking platform may have a multi-functional activity enabled by its integrated tools (e.g. a wiki to edit a document collaboratively and microblogs or blogs to publish information). However, the plasticity of their use varies according to each platform's richness of functionalities and intuition.

## 4.2 Results of comparison

Table 1 extends the set of capabilities provided in (Treem & Leonardi, 2012) and adds two new email-specific capabilities as shown below.

Tool	Capability's affordance					
	Visibility	Persistence	Editability	Association	Universality	Plasticity
<b>Social media tools</b>	High	High	High	High	<i>Low</i>	<i>Low</i>
<i>Wikis</i>	High	High	High	High	<i>Low</i>	<i>Low</i>
<i>Social networking apps</i>	High	High	High	High	<i>Low</i>	<i>Low-high</i>
<i>Blogs</i>	High	High	High	High	<i>Low</i>	<i>Low</i>
<i>Social tagging</i>	High	High	High	High	<i>Low</i>	<i>Low</i>
<i>Microblogging</i>	High	High	High	High	<i>Low</i>	<i>Low</i>
<b>Email</b>	<i>Low-high</i>	High	High	<i>Low</i>	High	High

Table 1 – Comparison of the capabilities' affordances between email and social media tools

Drawing upon this table, we highlight the higher degree of consistency of email's capabilities compared to social media tools. Email is highly affording two critical communication capabilities that are not thus far highly afforded in social media tools. These advantages make email a unique tool that will

continue to last in enterprises in tandem with social media tools. Nevertheless, further research on email as a tool is needed, particularly to develop its affordances of visibility and association like in social media. Our second research question is addressing this issue.

## **5 Email Enrichment**

This section proposes to enhance email's deficient capabilities relying on one advantage of ESM features. Indeed, association can be enhanced by applying tagging mechanisms such as in (Meek et al., 2012; Stern et al., 2013; Koren et al., 2011). However, email tagging approaches are so far neglecting the aspect of tags' visibility to the whole community of users. Compared to social tagging of different contents (or social bookmarking), this latter carries a social capital that produces a greater diffusion of knowledge to potential audiences (Damianos et al., 2007; Pan et al., 2008; Thom-Santelli et al., 2008). Hence, in the same way, we propose a service of social tagging on an email client. Our approach goes beyond the user-centric perspective delivering the benefits of collaboratively tagged email contents to the social workforce. It leverages the visibility of the social connections underlying exchanged email messages. The utility and usefulness of our service is then assessed based on a qualitative experiment.

### **5.1 Design of Email Social Tagging Service**

#### **5.1.1 Description**

Email Social tagging services deliver to the service's users the capability of collaboratively associating tags to their email messages. The mechanism consists of the following: (1) automatically analysing a user's incoming messages, providing that user with a list of automatically suggested tags; (2) enabling users related to a specific message (i.e. its sender and recipients) to collaboratively process the message's tags, which includes confirming suggested tags, and adding/removing tags; and (3) providing users with access to the collection of his/her personal tags as well as the enterprise's tags. Social connections are therefore created between relevant tags and the persons concerned with those tags. The collection of tags is provided to users based on their frequency of appearance in messages.

#### **5.1.2 Advantages and Challenges**

This service accumulates the advantages of the email tagging approaches mentioned in Section 2.3 and adds its own.

- The system's automatically suggested tags enable the affordance of association to all the messages, even if it is not manually provided by users. The relevancy of the suggested tags depends on the text analyzer and its semantic capacity to extract relevant keywords, even from short texts. Thus, automatically generated tags are considered as "unconfirmed" until they have been confirmed by one of the concerned users.
- The collaborative tag processing allows concerned users to commonly accomplish the task of tagging a message. On a larger scale, a user benefits from his colleagues' processing of his own messages. This allows avoiding passive users.
- The social connections that associate persons and tags are as interesting as the associations between persons, especially in organizational contexts. They are indicators of activities on different levels: employee's personal level, group's level and enterprise's level.
- Privacy of the content of user's email messages is a first priority in designing this service. Although contents pass through a text analyzer, the service only retains in its repository a pointer to the message with the output set of keywords. Contents of messages are therefore not exposed to the workforce. Moreover, the user has the possibility to un-tag the message.



- The language used in user’s messages is a challenging point for the text analyzer. In business contexts and especially in multinational companies, users often communicate using more than one language. They even mix the use of different languages in a single message. This requires a powerful analyzer able to detect these differences.

### 5.1.3 Prototyping the service

For experimental purposes, we developed a prototype that enables users to experience the utility of this service. Two models are possible for such a service. The first model consists in delivering an integrated functionality of an advanced email client application. Implementing such a model entails either providing a new email client application and requiring users to shift to it, or plugging-in the new service into the employees’ currently used email application. However, plugins are only compatible with their specific applications. For example, a plugin for Microsoft Outlook does not function for Mozilla Thunderbird; whereas both of these email applications can be used, side by side, in the same company. The second model is to deliver an on-demand explicit service that is accessible to the entire enterprise users independently of their local email applications. Based on our previous analyses in (Alimam, 2015b), we have decided to focus here on this last approach. The prototype of our service is thus a web application delivered as Software as a Service (Figure 1). As the mechanisms of semantic text analysis are not the target of this research, our system externally calls another service in order to semantically analyse the content of emails and extract relevant keywords out of it.

The main components of our proposed architecture are as follows:

- An application server where tags and their related data are stored. The system’s core functions and stored procedures related to the data processing are also stored on this server.
- Client-side application where user’s emails associated with tags and their collections are displayed.
- The system communicates with the enterprise’s mail server from which it extracts users’ emails.
- The system also communicates with a text analyzer named TiLT (see details in Heinecke et al., 2008 and Gaillard et al., 2010) in order to extract keywords relevant to an analyzed content. Certainly, the privacy of user’s emails content is considered; the system only stores data related to the tags and the header of messages (i.e. message’s identification, sender’s and recipients’ names and addresses).

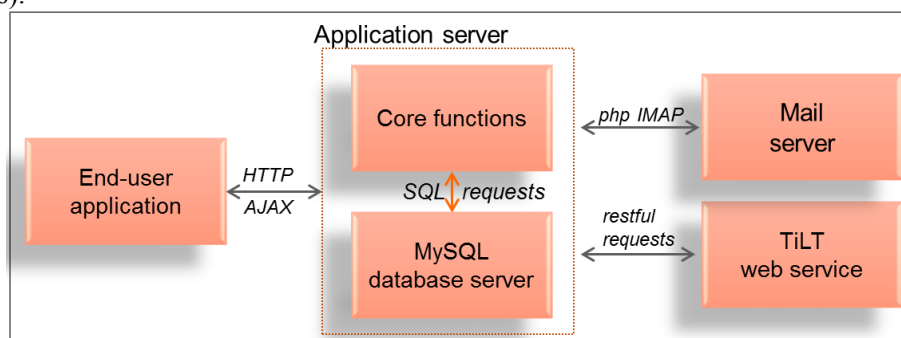


Figure 1 – Architecture of Email Social Tagging service

The implementation of the prototype made use of dynamic web technologies in order to ensure interactive real-time processing and browsing of the tags on the client-side. The following languages and techniques were used: (1) PHP language for the system’s data processing, including PHP IMAP functions for the mail server’s communications, PHP cURL for the keyword extraction web service’s communications, and MySQLi extension for the database communications; (2) MySQL for the database server; (3) HTML5, AJAX, and jQuery for the end-user application and real-time client side interaction with a service server; and (4) CSS5, JSON, and D3 JavaScript library (Bostock, 2013) for visualizing the collections of tags. Figure 2 shows a screenshot of the user’s main interface.

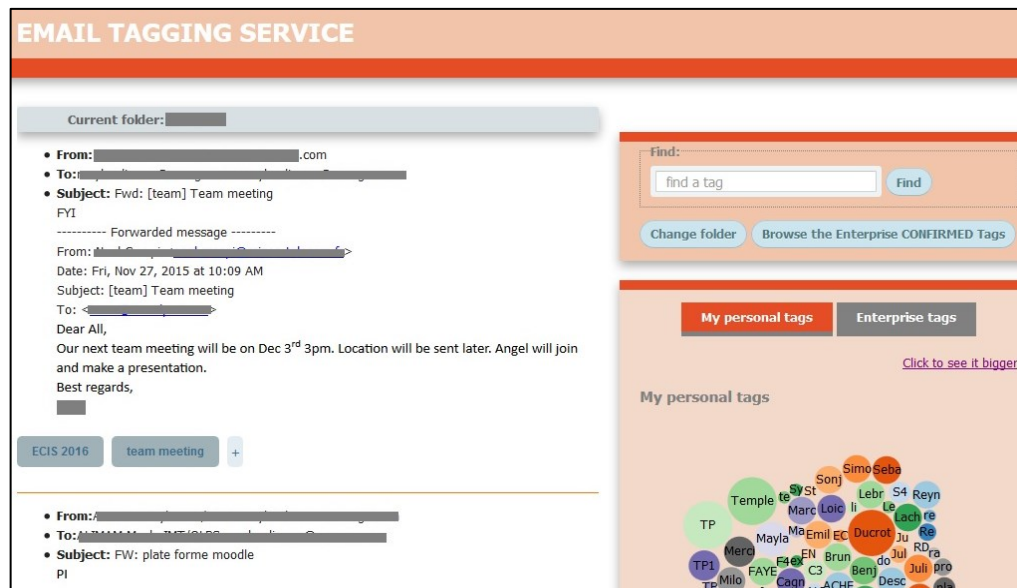


Figure 2 – Screenshot of the prototype's main interface - Email Social Tagging service

## 5.2 Experiment

In order to investigate the potential of the prototyped email social tagging service described in Section 5.1.3, we conducted a qualitative experiment in which participated a selected sample of 36 employees of a large telecommunication provider. We additionally conducted semi-structured interviews with 16 of the participants. The purpose of the experiment was to create a large collection of the sample's tags (i.e. the tags generated by participants representing the entire enterprise), and to assess the user's perception of the service. Profiles of the participants were accurately selected to include employees of various ages, types and backgrounds (i.e. project managers, team leaders, research and development engineer, academic researchers). The qualitative interviews allowed making an exploratory assessment of the utility of the email social tagging service (Spencer et al., 2003). The interviews contained 9 categorized questions including questions about the context in which participants were using their enterprise email, questions about the usage of the proposed service, questions about their anticipation of the utility of the proposed service and finally their sentiment and global satisfaction. For participants to experience the collaborative aspect of the tag processing, it was necessary to require each of them to carefully select a sample of his/her own message on which the service was going to be launched. Participants' samples of messages had to mutually contain common messages (i.e. participant A adds, to his sample, message A that he sent to participant B and participant C; reciprocally, participant B and participant C also add message A to their sample along with other messages). Prior to launching the experiment, we distributed test guidelines containing an overview of the service and a precise description of tasks to be carried out by the testers. We describe in the next paragraph a simple scenario that a participant has performed during the experiment.

## 5.3 Use Cases

### 5.3.1 Collaborative Tag Processing

Bob connects to the application using his email's login credentials provided by the company. He navigates to the folder in which his email sample is located. He notices his messages displayed and appended each by few tags. As tags are color coded, he notices that a message he has received with Alice from Carlos is already having confirmed tags. He understands that either Alice or Carlos had previously processed these tags; he finds them adequate. Another message he has privately received from Car-

los is having unconfirmed tags. He starts processing tags of this message: while he's removing an irrelevant tag, he recognizes a new confirmed tag that has just been appended to the message and understands that it has been added by Carlos. He thinks that this message still need another tag that he also finds relevant so he adds the new tag, confirms one suggested tag and removes the rest. He recognizes the change of his personal tag collection displayed on his panel.

### 5.3.2 Organizing

Instead of the default view of messages arranged by date, Bob displays separately all of his messages that are having the tag "ECIS 2016 paper" for a quick access to these messages. He recognizes the collection of his personal tags that are related to this particular tag. He browses the quick access menu that is linking to people related to the tag "ECIS 2016 paper" according to his messages.

### 5.3.3 Socializing

Bob browses the entire collection of his enterprise tags and recognizes the most popular tags while having direct access to people in his enterprise who are related to these tags. Being interested in ECIS, Bob needs to know whether someone else in his enterprise is also concerned with this term, he particularly searches for "ECIS 2016 paper" tag and finds out that his colleague Alice as well as Dave (another colleague whom he hasn't met before) are related to this term. He has the contact details of both of them through his direct access menu.

## 5.4 Measures

The method we used to structure the interview's questions and the service's evaluation relies on an evaluation template of top-down evaluative framework for collaboration technologies (Steves & Scholtz, 2005). This framework maps service goals to evaluation objectives, metrics and measures. The measures are constituted of two level of abstraction: conceptual and implementation-specific. However, given the distinction between a prototype and a full-featured system, we only involved the Conceptual Measures (CMs) in our evaluation. Table 2 provides a set of metrics and measures used for the evaluation. Each metric scopes, by its own, a set of associated measures. Some measures are compared with the participant's previous use of email.

<b>Goal statement 1: The email social tagging service will support the email's capability of <i>association</i></b>
<b>Evaluation objective 1: Assess the real-time collaborative tagging between the participants</b>
Metric 1: What was the user's evaluation of the automatically suggested tags? CMs: user rating, recommendation
Metric 2: Can this tag processing be improved? CM: recommendation
<b>Evaluation objective 2: Assess the perception of personal organization</b>
Metric 3: What was the user's perception of the service's utility for organizing user's own messages? CMs: user rating, time estimation with & without the service
Metric 4: What was the user's perception of the service's utility for finding a specific message? CMs: user rating, time estimation with & without the service
<b>Goal statement 2: The email social tagging service will support the email's capability of <i>visibility</i></b>
<b>Evaluation objective 3: Assess the perception of connecting tags to other tags and people</b>
Metric 5: What's user's perception of the service's utility for reaching people concerned with a specific topic? CMs: user rating, time estimation

**Goal statement 3: Adding a social tagging service to email will add value to organizational processes**

**Evaluation objective 4: Assess the impact of this service on the ways of working at the workplace**

Metric 6: To which level a user anticipates that this service will impact the usage of email?

CM: user percentage

*Table 2 – Metrics and measures for evaluating the utility perception of email social tagging service*

## 5.5 Results

The conducted experiment targeted a qualitative sample of various accurately profiles of users for the purpose of obtaining valuable indicators concerning the potentials of the email social tagging service. Analysis of the interviews and the collected measures reveals that participants indeed perceive a potential utility in this service (see Table 3).

### 5.5.1 Goal 1: Supporting Association

Participants are aware of the capability of association and the advantages of collaboratively tag processing of messages (quote of interviewee 8 (i8): *“It’s great to know that even if I forgot or maybe didn’t get to tag my message each time, someone else can do it for me!”*). However, they criticize the relevance of the system’s automatically suggested tags. 56% of them think that the suggested tags are not always appropriate. They also find that the tags suggestion process needs more enhancements to be able to deliver terms that emerge from the evolving corpus (i15: *“Suggesting tags is a great idea, only when tags are exact. It would have been a lot more useful if the system was capable of suggesting for me a tag that I use often in similar contexts”*).

Despite their awareness of association, participants are uncertain about the impact of this service on their ongoing processes related to information management such as the classification of email messages. 31% of them assess the use of tags for the organization of messages as useful against 25% finding it unhelpful. This is probably due to the evolution of such a requirement. In fact, participant estimate receiving an average of 40 email message per day. If needed, these messages are then manually classified by each user in categorized folders as declare 89% of the participants. Messages organization is no longer a priority (i12: *“When I need to get back to an older message I use the search field to find it. Classification is not important for me!”*, i2: *“Indeed, I use a folder-based categorization, but I only do that to my most important messages”*). On the other hand, searching for a specific message, artefact, or a person related to a specific topic is becoming a first priority as highlighted by the participants. They all confirmed the potential of the service for this context. As the task of finding a message was estimated to be taking longer than 5 minutes in 19% of cases, a regression of 3% is estimated for this task.

### 5.5.2 Goal 2: Supporting Visibility

Regarding the expansion of the social connections and the reach of new people related to a specific topic, 88% of the participants perceive a utility potential of the email social tagging service for this purpose (i9: *“During my travel last year, I was introduced to a colleague, from the branch of Spain. He was also working on a particular project I was interested in, so we collaborated together for six months. It’s funny to remember though how it was only the coincidence that brought us together that day!”*). They think that email continue to have its particular usage and thus, would need more visibility (i14: *“Although I am identified as an active member on our enterprise social network, I am not sure that my colleagues are aware of my entire activities of interest. What I share on the platform is sometimes different from what I deliberately send to specific colleagues by email”*).

### 5.5.3 Goal 3: Adding Value

Participants’ evaluation indicates a potential of 65% for this service to add value to the organization.

Goal statement	Measure	Result
<b>Goal 1: supporting association</b>	M 1	56% saying: tags are not always appropriate
	M 2	Applying machine learning algorithms to adapt the system's suggestions to users' choices of tags
	M 3	31% saying: tags are useful for classification 25% saying: tags are not useful for classification
	M 4	100% saying: tags have a utility potential for finding messages, artefact or persons
<b>Goal 2: supporting visibility</b>	M 5	88% saying: email social tagging service has a potential for expanding a person's social network
<b>Goal 3: adding value</b>	M 6	65% is the potential of email tagging service for adding value to the organization

Table 3 – Evaluation of the utility perception of email social tagging service

## 6 Discussion

The comparison between ESM tools and email (Section 4) suggested to develop email's affordance of association and visibility, for which, a social tagging service was proposed and evaluated (Section 5). Evaluation results revealed a perceived utility of the service. We discuss in the following, each of those two capabilities, their limitations and implications as the experiment has demonstrated.

### 6.1 Association

The semi-automatic collaborative tagging of messages allows users to easier accomplish the association of tags. However, the tag suggestion algorithm is reported as needing more enhancements. Indeed, as mentioned previously, for simplicity reasons and due to some limits of the text analyser, the prototype's architecture only made use of the analyser's output. No machine learning mechanisms were applied to the tag suggestion algorithm. Further modifications are therefore possible to allow the service to suggest keywords that are adapted to the user's usage.

Also, our findings indicate that the association is interesting for users mostly for the purpose of navigating and searching through the personal messages. This implies delivering this service as an integrated functionality in an advanced email client as has been proposed to the participants. A second delivery model is also possible for this service, which is proposing it as an on-demand service independent of the email client. The advantage of this second delivery model is that the tagging service can be more opened in terms of the type of the tagged object. In this case, several new sources can be added to the service to be tagged and merged together into a single tags collection. Such inputs would be data from the user's videoconference meetings, instant messages, or even social activity on the enterprise's platform of social media tools.

### 6.2 Visibility

The visibility of tags referring to messages and people while maintaining the privacy of email messages' content is declared useful for employees for the purpose of expanding their professional social network. Our insights confirm the legitimacy of pointing out the social connections underlying employees' emails messages. Users consider these connections as important as their social networks that are created through platforms of social media tool. These highlighted patterns have several implications. In addition to enabling employees to mine for expertise and reach new people (Varshney et al., 2013), these connections can be integrated in an automatic skill assessment system to improve the existing business processes in the enterprise (Campbell et al., 2004). Skill profiles are problematic as

they have to be manually updated by the user who, practically, often fails to keep them current. Thus, in addition to the Human Resources maintained data about the employees, new indicators are now rising for the expertise mining in corporations. Some approaches are thus considering elements from sources such as ESM tools (Guy et al., 2013). Email communications also rise as a legitimate source.

## **7 Conclusions and Future Work**

This paper contributes to the polemical striving between email and social media tools in the enterprises. It addressed a question related to defining email's role in enterprises by providing a set of capabilities of the enterprise communication tools and comparing between these capabilities in both email and the social media tools. It highlighted the consistency of these capabilities in email and inferred its durability in the enterprises aligned by the social media tools. The paper also addressed another question related to email enrichment. It contributed to improve its affordance of association and visibility as previously argued. We applied a social tagging mechanism to email and developed a prototype of the service. We finally conducted an experiment to perceive the utility of this service. Profiles of participants were selected formerly to provide an accurate evaluation of the service. Our findings highlighted the utility of the prototyped service for supporting the email's lacking capabilities. The email social tagging service enables organizations to capitalize on the power of its workforce. Associating people to contents while relying on a legitimate source of information has several advantages for enterprise management. The automatic streaming of employees' activities enables managers to correlate the different groups' activities with the enterprise strategy. Also, providing a temporal exploitation of this association allows observing the evolution of the activities of entities (i.e. employee, team, hierarchal entity, . . . , the whole enterprise). The proliferation in the database is dissolved here according to Mondads, which is a navigational practice where the overlapping entities (employee, team, enterprise) inherit from one another to relocate the notion of the whole (Latour et al., 2012). Groups of persons having similar activities can also be automatically identified. This can for example lead to the creation of reliable communities to be suggested for the users' collaboration over social platforms.

Furthermore, as enterprises are evolving towards more agile forms (Daft, 2012), it is being argued how social media tools support the organizational transformation in different types of enterprises (Alimam et al., 2015a). However, shifting towards a newer generation of tools is facing barriers related to organizational culture and mindset of employees (Silic et al., 2015). This suggests a reconsideration of the transformation strategies. Rather than eradication, an incremental evolution of the enterprise's digital services seems more feasible. Business strategies might therefore consider applying services to their enterprise context (Feldmann et al., 2014) or tools for new innovative purposes such as in our proposed service.

Regarding the prototype, for simplicity reason during its first iteration, we provided a collection of non-semantic and unstructured tags containing three entities: Tags, Users, and Tagging activity. Our tag suggesting algorithm was also very basic. Future research can advance the development of this prototype to improve tag suggestion algorithm. Machine learning mechanisms can also be applied to adapt the text analyser's corpus and provide a suggestion of tags that corresponds to the user's previously approved or eliminated tags. Another evolution of our prototype will be to apply a structuration to the users' generated collection of tags. The established social connections can additionally include various new entities. An example of such an entity is Time (i.e. age of the tag according to a specific date (John & Seligmann, 2006)) which enables to follow the time evolution of tags. Another example is Distance where, in addition to direct relationships between tags, extended relationships appear. Further advance is to involve semantic techniques to differentiate between the types of the tags themselves (e.g. concept, person, artefact, etc.). Tags can also be transformed into structured tags with semantic connections (e.g. creating a relationship between the tag "java" and "programming").

In conclusion, our work highlights the need of further research on how the email tool can become a more innovative service in complement to the studies on new social tools.

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