ABSTRACT
Our use and interaction with computers creates a lot of information about our activities, interactions with others and, ultimately, about ourselves. However, this information is often spread over many different places making it difficult to visualize and control. Some applications already tried to help users manage all this information however, their approaches are typically quite unsophisticated doing no much more than simply gather, in one single place, information from several sources. This means that the information is usually not processed nor cross-referenced with information from other sources. Moreover, typically the format of the information is similar to the one present on the original source, what means that these application add no value to the information.

We present Personal Information Dashboard, a web application that proposes a new approach to this problem allowing users to see, at a glance, various facets of their lives at some given point. The idea is to show people's life patterns using and combining several sources of personal information in a more natural and graphical way. Imagine waking up in the morning and, just by looking at the computer, immediately know, not only how many emails you have on your incoming box, but also which ones are of most interest to you based on several aspects of yourself and the email itself.

On this paper we’ll describe the development of Personal Information Dashboard, explaining some of the most important decisions and aspects of our implementation. At the end of this paper, we’ll also present some of the most interesting results we extracted from the user tests we performed.

Keywords
Information Visualization, Personal Information, Awareness, Dashboard, Patterns, Human-Computer Interaction.

1. INTRODUCTION
Nowadays the use of computers (in its many forms) has become a commonplace in our lives for many different reasons: to work, for pleasure, to communicate, etc. As a result, our interaction with these devices and often, by extension, with others creates an enormous amount of information about us and about what we do: the files we create, the emails we send, etc. These kind of artifacts are part of a kind of information widely known as personal information: information from or to someone not always owned or controlled by the subject. This information is part of us, a piece of our history that can help us understand who we are and what we do. It’s our “reflection” in this digital river we all live in.

However, and thanks to the proliferation of things like Internet and social networks, this information about us can be virtually anywhere: in our brand new laptop, in our email archive, in that old newsgroups that we no longer attend, in that forgotten social network we thought extinct, etc. This high level of dispersion makes it difficult, and sometimes impossible, to keep track of all that information and see everything as a whole. For instance, the things I say and discuss via email might be related to the ones I write via instant messenger, but that information is often broken into two different sets of information, not reflecting this. Moreover, these sets might complement each other, making more sense when analyzed together. Finally, the level of dispersion tends to increase directly increase with the number of platforms, application or services we use: online social networks are a striking example of such fact. Through it all, managing all our personal information might just become a terrible nightmare and, therefore, we tend to ignore the management and value of such information, until the day we either need it or lose it (or both).

To deal with such problems and limitations, we developed a dashboard-like application we called Personal Information Dashboard. The main objective of our work is to, using and combining several sources of our personal information, show interesting facets and patterns of our lives giving an idea, at-a-glance, of what’s important at the moment. The idea is having all our information is just one place and treated as just one set, and not like a set of sets. This is a new way of looking at personal information, a cohesive way of dealing with the information we produce in a daily basis.

Personal Information Dashboard is a web application that follows a plugin based approach. Each plugin manages a visualization and the visualizations are the entities that ultimately show the user’s personal information. The idea is that the visualizations should display the information in a more graphical and glanceable way, providing a new way of looking at the information. The number of possible visualizations is immense and one of the first challenges was trying to understanding which ones were the most interesting to start with. During our work, we have implemented a total of 11 plugins for Personal Information Dashboard and
these plugins are just a small sample of what can be done: it was not our intend to fully explore all the possibilities on this regard. Based on information retrieved by several sources of personal information (emails, instant messaging, visited pages, documents, etc.) it should be possible to create several visualizations that show statistics and interesting patterns about our lives at any given point. The system’s architecture is prepared to easily support either new plugins and new sources of personal information.

Imagine waking up in the morning and, just by looking at the computer, immediately know what’s happening. Does anyone sent you an email while you’re sleeping? What are the last news on Facebook? Do the emails you receive have something to do with the tweets of your friends? These are just some of the things that a well organized plugin can answer in a very glanceable way.

At first sight it can be argued that some applications already do something like this. Some of those applications can probably be found in section 2. In fact, some applications were able to join information from several sources and present the information as a whole nowadays, changing this is the goal of Personal Information Dashboard.

In this paper we start by analyzing all the existing solutions that, somehow, can contribute or are related to our work. Next we’ll describe Personal Information Dashboard and then discuss the results from the user tests we conducted in order to test our solution. The primary contribution of our work is the definition of a framework that allows a more cohesive and centralized way of looking at our personal information.

2. RELATED WORK
The visualization of our patterns, us and our lives has been the subject of various proposals and solutions over the years. One of the more distinguish works on this regard is Themail, described in [16]. This work proposes a visualization of our personal information based on piles of important words that describe our relationships with others. However, we can only examine our relationship with a friend at a time: there’s no general view of our relationships with all our friends. Moreover, only one source of information is used (email) what might be too little to effectively describe something as complex as a human relationship. Works as the one described in [15] also uses email to mirror our relationships with other, but the visualizations are too high level, not allowing the users to track down the information until the email level. This flaw is also shared by the work described in [17] that uses newsgroups as a source of personal information.

Other works have been focus on keeping the user aware of his/her transient information. Works as the ones described in [14] or [3] are just some of many examples of this kind of work. One great aspect of this kind of work is the fact that they require little space to keep users aware of what’s important at the moment. Other works like [11] and [4] are more abstract in the way that the information is shown and require a little more space to make it work. As a consequence of its nature, these works show little information as only transient information is shown: it’s not possible to explore our information and, most of the times, the interactions with the application are quite limited.

There are already some personalized frameworks for collecting information from distinct sources. Works as iGoogle\(^1\) and Rainmeter\(^2\) are two well know example of this. These works were capable of gathering, in one place, information from more than one source however, the information is not correlated. The information from several sources is indeed closer, but it continues separated. It’s not possible to see the information as a whole.

3. SOLUTION
Personal Information Dashboard is a web application that uses the dashboard metaphor to express users’ personal information in a more graphical and glanceable way. On our interpretation of this metaphor, the dashboard is populated by several, possibly distinct, visualizations of the user’s personal information. The visualizations can be moved from place to place and even resized at user’s will. In order to add a new visualization, we’ve implemented a simple catalog where all the plugins are listed.

Each visualization is associated to a plugin instance, the entity responsible by processing personal information and generating the correspondent visualization. The plugins can be configurable in order to show different aspects of the personal information: the user can, for instance, configure the time range to consider. The information is typically show in a very summary form but the user can request for more details by holding the mouse over the intended item. The visualizations are connected to each other as an action in one visualization can affect others visualization: for instance, clicking on a word in one visualization will fade-out all the other words on all other plugins. This last mechanism is known as plugins intercommunication and we’ll explain it further in this document.

The information used on the plugins is fetched from several sources of personal information. We currently support Gmail, Facebook, Twitter, Flickr and Panoramio but the architecture is prepared to allow an easy addition of new sources of personal information. An important aspect of our personal information is the people who we communicate to. On our solution we simple call them contacts. We support the fetching, from personal information sources, and management of such entities. Associated to the concept of contact is the concept of group. We also support this concept. Moreover, one of our solution main objectives is to show the information as a whole.

Figure 1 is a screen shot of an user’s dashboard.

\(^1\)http://www.google.pt/ig
\(^2\)http://rainmeter.net/RainCMS/
Architecture and Extensibility

One of our major concerns was creating an easily extensible solution. We wanted our work to be able to grow gradually as new ideas and resources appear. In short, it should be possible to easily add new visualizations, sources of personal information, etc. This major requirement ultimately shaped most of our work’s architecture.

Our architecture is based on a flexible structure composed by two main types of entities: the dynamic entities and the static entities. The dynamic entities are those that can be added and removed from the system in order to add or remove some behavior. These are the entities that allow and support the addition of new sources of personal information, new plugins, etc. They are, in short, the extensible part of the application playing a fundamental role in the achievement the extensibility requirement. The static entities are those whose job is to manage all the flow of the system. They work just like glue between the dynamic entities or as common interface for the dynamic entities.

Visualizations

Visualizations, and by extension plugins, are a core concept of Personal Information Dashboard. Therefore, we’ve dedicated some of our time developing a set of 11 plugins. These plugins are, above all, a proof of concept for our idea, a way of showing what kind of visualizations are possible. The implemented plugins are not an end, but rather a mean of showing Personal Information Dashboard’s true potential. The currently implemented plugins try to show different perspectives of user’s personal information from distinct point of views. For the visualizations we typically use Protovis[1], a visualization toolkit that uses JavaScript and SVG for web-native visualizations. It’s however possible to use other resources.

One interesting plugin is Keywords Cloud, a tag cloud like visualization that shows the most important words from a set of emails, posts and/or tweets. To calculate the important words, we use the Salton’s TF-IDF Algorithm[13], an algorithm that scores words based on their relative frequency in one document out of a collection. On this visualization, the most important words are placed larger and more centrally. This way, just by looking into it the user can easily understand and remember the kind of topics he/she has been talking about. As in the case of the most of the implemented plugins, Keywords Cloud can be configured to show data from a specific time period. This feature can be useful to compare the discussed topics within two different periods of time, as figure 2 show.

My E-Emotions (see figure 3) has a very unique approach by trying to infer emotion on people’s writings based on the Regressive Imagery Dictionary (hereafter referred to by
RID\cite{5, 6, 7, 9, 10, 12, 18, 19, 20, 8} coding scheme. RID contains a few thousand words grouped into categories and subcategories. One of those categories is emotions that is then divided into several subcategories for distinct common emotions. For instance, words like “mate” and “sorry” would indicate affective and sadness emotions, respectively. With this information at hand, we can infer the emotions from text and create simple pie charts that reveal the emotions detected for a specific period and set of sources of personal information.

My Feeds and You’ve Got Bubbles are two plugins that can help users being aware of what is happening. My Feeds gathers in just one place events from multiple sources. Each outer circle represents the contact associated with that circle’s border color and each inner circle an “event” from that contact: email (red), facebook post (facebook’s blue) or tweet (twitter’s blue). This way, all the events from a contact are located inside the same outer circle making it easy to follow a contact’s activity. As events become older and older, they shrink until they finally disappear. This way, more recent things appear bigger, getting user’s attention.

On the other hand, You’ve Got Bubbles is dedicated to email only. Here, each email is a bubble and it’s possible to configure what some of the visual dimensions mean: it’s possible, for instance, to assign a value to the bubble’s color or size. It’s also possible to define what emails to see (email box/label, state, etc).

Using the Google Maps API\footnote{Google Maps is a well known web mapping service application and technology provided by Google. Its API can be found at http://code.google.com/apis/maps/index.html} we’ve created a map like visualization, the FriendsMap, that marks places based on Gmail’s and Facebook’s information. From Facebook, we can get the location and hometown of each one of user’s friends. From the received emails, using the “received” field from the email’s header and a geolocation service\footnote{Freegeoip is a free IP geolocation web service that can be found at http://freegeoip.net}, we can infer the location of the contact when he/she sent an email. With this information, we can then mark those places with distinct markers (blue for location, green for hometown, yellow for location and hometown and red for email sent). Users can then find out where are their friends from, where have they been lately and where are they right now. This visualization can also lead to interesting and unexpected findings: a friend who recently moved to another country, a friend who was born in a distant city, etc.

Keeping track of your activity with each one of your contacts can be difficult when the amount of data is just too much to handle. Who&How is a solution for such problem. This plugin’s visualization is based on several concentric areas arranged on the edges of a central circle. Each one of these areas is associated to one contact. Then, inside that areas, we can find a bar for each kind of source activity: one bar for the amount of emails sent from that contact, one bar for the amount posts on Facebook made by that contact and one bar for amount of Tweets. With this visualization, the user can observe several patterns: am I receiving many emails from many contacts, or are the emails from a restrict group...
of contacts? Are the people who sent me emails the same ones who post on Facebook? etc.

Knowing what our friends like is not only a self-knowledge experience but also a funny way of finding out things you might just like. Facebook tells you what each one of your friends like but no general view is available. Our Favorite Stuff is that forgotten general view. The visualization is presented as a mosaic with the images of the things user’s friends like ordered (from left to right and from top to bottom) by the number of likes. Holding the mouse over an image will display a tip with information about that item.

Nowadays, many of our photos are in the digital format and not in physical one. Stacked Memories is just like a call from the past as it organizes your photos in scattered piles of nostalgic Polaroid-like photos. The interaction with the photos resembles the old days: the user can move the photos from place to place, dig through out the piles of photos and click on some of them to see it larger. For this plugin we used the photos, from Facebook, where the user is tagged. By only using photos where the user is tagged we are maximizing the chances of that photo actually mean something: the user was there, he/she will probably associate that photo to an event, resulting in a nostalgic moment.

Spark Stats is a simple visualization that uses the concept of Spark Line\(^5\). A sparkline is a type of information graphic characterized by its small size while presenting trends and variations associated with some measurement over a period of time. This plugin uses this lines to show measures such as emails sent and received, posts made, etc. Sparklines are the perfect way of revealing such measure’s evolution without requiring too much space. Figure ?? shows two instances of this plugin with slightly different configurations. The left most instance simply shows the measures and its evolution for the last month. The right most instance is configured to highlight the two weeks in the middle of that month, showing the values of the measures for that period. This

\(^5\)See, for instance, more information about sparklines.
Finally, we have The Surroundings and Photo Search, two photo slider visualization. The Surroundings uses the user’s location and the Panoramio source to obtain photos of possible nearby places. This plugin can be particularly useful for users that travel from time to time to always being aware of nearby places. Photo Search performs automatic search for photos on Flickr that meet a given criteria. As depicted before, the implemented plugins are just some examples of what is possible to implement on Personal Information Dashboard. The system is prepared to easily support new plugins and, therefore, imagination is the limit.

![Figure 9: Spark Stats](image)

Details-on-demand

Details-on-demand is a common mechanism implemented in most PIM applications. Such mechanism can help users better understand their own information and have a more enjoyable experience. Moreover, it allows the application to show top patterns created by the information without compromising the user’s need for more detailed information. On Personal Information Dashboard this mechanism was implemented using balloon-like tool-tips as the ones observe in figure 11.

Holding the mouse over a visualization’s element will pop out the corresponding tool-tip with useful information about that item. On figure 11(a) for instance, the tool-tip simply shows information about the contact that lives on that location. On the other hand, on figure 11(b) we have more detailed information: the sender, the time, the message and a link to the original post on Facebook. With this mechanism the user can easily trace back all the information on the dashboard and understand where that information came from.

![Figure 10: The Surroundings and Photo Search](image)

Plugin Intercommunication

Another common mechanism in PIM application is the filtering mechanism. This mechanism help users filtering unimportant things and focus in more relevant aspects of the information. As our solution holds many visualization on the dashboard, we’ve created a dashboard level filtering mechanism. This means that all the visualization on the dashboard are filtered for the same criteria, making it more easy to correlate information among different plugins. To filter information, the user only needs to click on the intended element: the user can, for instance, filter by a word contained in a visualization. In order to filter things, we opted by dramatically fade-out unselected things, highlighting the important ones by contrast.

Figure 12 shows a typical usage scenario for this mechanism. On this case, the users clicked on one bubble in the right most plugin: here, each bubble is a email from someone, with the color mapping the sender. In response to that action, all the unrelated emails (bubbles) from that visualization faded out, making the important ones stand out. Also, as the selected email contained the word “chillis”, the other words from the plugin in the middle also faded out, with the word “chillis” becoming highlighted by contrast. Finally, on the left most plugin only one marker became selected: this marker indicates the living place of the sender of the selected email. This simple scenario shows how all the information from multiple sources (Gmail, Facebook and Twitter) can be correlated using this mechanism.

Regarding the back-end implementation of this mechanism we opted by a bus-like implementation. The idea is that all filtering mechanism are propagated to the bus and is up to each plugin to gather the necessary information in order to apply the current filtering state. This bus works as follow:

1) The user triggers a filtering event by clicking on some element in a plugin’s visualization;

1) That plugin propagates this event to the intercommunication bus;

3) Each plugin in the dashboard, including the first plugin, is notified of the filtering event and has the chance to update its visualization accordingly.

Regarding the filtering event, these events have the following structure:

Event = (PluginID, Feeds)
Feeds = (Feed1, Feed2, ...)
Feed = (EventType, EventInformation)

An event object has two components, the PluginID and the Feeds. The PluginID holds the identification of the plugin that triggered the event. This can be useful by many reasons as, for instance, if the plugin wants to have a different behavior in the case of being the triggering plugin. The Feeds is a set of Feed elements, each one of them with two elements. The EventType represents a type associated with that event: “contact”, “word”, etc. The EventInformation has all the specific information for the current event ie, information of what is selected. Conceptually speaking, this field can hold virtually anything, the EventType will specify how to deal with it. The use of several Feeds instead of just one, makes it possible to trigger event with multiple types associated to it.
3.1 Contact and Group Management

Contacts and groups of contacts are two very important dimensions of one’s personal information: much of the information we produce is, one way or another, related to the persons we know and the persons we talk to. Therefore, supporting these dimensions became a fundamental goal to our project. Currently, our prototype automatically imports the contacts from Gmail, Facebook, Twitter and Flickr. We also automatically import the groups from Gmail, Facebook and Flickr.

On our prototype, we have a list of all the contacts from all personal information sources configured by the user. This list, shown in figure ??, is automatically populated by the system and the process is triggered as soon as the user ends configuring the respective source of personal information. When we import lists of contacts from several sources of personal information this list will have a lot of intercations: for instance, Adelino is my friend on Facebook and on Twitter. For the user, this is obvious but it’s not for the system. In order to minimize this problem we’ve created to merging mechanisms for merging contacts belonging to the same person. The first method is an automatic one that merges contacts based on their email. This is possible for some sources but not for Twitter for instance. To solve the cases that the automatic merge does not help, we’ve also created a manual one. On this approach, the user should use the Merge Panel on the contacts list.

Another concept present in some sources of personal information is the concept of “group”. This concept is useful to group contacts with something in common and deal with related people as they were only one entity. As in the case of the contacts, our work also has a list of groups automatically imported from the configured sources. Currently, Personal Information Dashboard imports the groups from Gmail, Facebook and Flickr. Additionally, it’s also possible to create groups and add or remove contacts from a group directly from Personal Information Dashboard.

4. EVALUATION

In this section we will present the evaluation methodology used to evaluate our prototype. Next we will briefly describe some of the obtained results along with some interpretation of them.

4.1 Evaluation Methodology

To evaluate our prototype, we have performed two class of tests: Usability Tests and Case Studies. On both tests, users performed a pre-selected set of tasks intended to test different aspects of our prototype. For the Usability Tests, users did not use their own personal information but rather a set of information supplied by us: the idea was to evaluate the intrinsic quality of the interface to transmit information unknown to the user. For the Case Studies, the users used their own personal information: these tests were essential to correctly evaluate our solution since it’s what Personal
Information Dashboard is all about, personal information. Moreover, we were also interested in observing how the users would react to their own personal information.

The tasks were similar for both tests and different groups of tasks aimed to test different aspects of our solution. Typically, these tasks requested the user to look for some information in one or more plugins. Here are some examples of the 18 tasks the users performed:

- Do you have any unread email on your inbox? If so, can you identify the senders of some of those emails?
- Did someone sent you an email, posted on facebook or made a tweet for the last 6 hours?
- Add two instances of My E-emotions. Configure the first instance in order to only display Gmails data and the second instance to only display Facebook data. Can you notice any difference?

Sixteen users performed the Usability Tests and five of those user also performed the Case Studies. During the Usability tests we were measuring the number of errors, time spent and number of assist for help. Our idea was trying to get objective data and measures to perform do some statistical work in order to better understand what tasks might be difficult for the users.

During the Case Studies we adopted a more interactive posture, constantly asking for the users feedback regarding what was happening. In fact, we encouraged the users to keep talking about what they were doing and about their findings.

At the end of each test session the users were asked to answer a satisfaction questionnaire. This questionnaire was divided in two parts. The first one was the System Usability Scale (SUS)[2], which is a standard usability set of questions that is associated with a method that assigns the system a usability grade according to a user’s answers. The second part consisted in three essay questions where the user could express his/her opinion: a question to enumerate the main advantages, another to enumerate the main disadvantages and a final one to write some comments that the user felt could help improve the prototype.

4.2 Results
The current section exposes the results we got from our user tests. As expected, the results were divided into three different sub-sections: the results from the tasks performed by the users, the results from the SUS set of questions and the results from the open answer questions of the second part of the questionnaire.

Test Results
The results for the Usability Tests are displayed on table 1. As depicted before, the tasks were divided into groups meant to test different things. For instance, task 2, 5 and 10 were plugin configuration tasks and, by examining table 1, we can observe that the mean time to perform the tasks is decreasing from task to task, what might indicate that users become quite proficient very quickly in this type of tasks.

We found another interesting result regarding the tasks focuses on testing the effectiveness of the visualizations (tasks 3, 12, 13 and 16). The first three tasks were quite obvious and only required some attention. As a consequence, the results for these three tests are quite similar. On the other hand, tasks 16 took considerably more time, errors and assists to be completed. This difference can be explained by the fact that task 16 required the user to interact and look for the information: the information was not immediately available, the user had to look for it.

In order to study this group of tasks, we performed an ANOVA test and found the existence of statistically significant differences (for p<0.05) among the group. Further Tukey’s tests allowed us to conclude that this difference only exists thanks to task 16: this task has significant differences (for p<0.05) when compared to any other of the tasks in this group. This result finally led us to the conclusion that a visualization that requires interaction may have a cost associated. An interactive visualization can hold much more information than a static one but that might affect the usability of that visualization in terms of time needed to perform a task. This is an important fact to take into consideration at the moment of choosing the visualization technique to use. Nevertheless further tests, with more tasks involved, may be necessary to prove this theory.

During the Case Studies, users were able to find interesting things and we had some interesting situations. One user for instance, had just commemorated his birthday the day before. When he added the Who&How plugin he immediately noticed this fact on the visualization he just added. As this plugin shows user’s interaction with friends via Gmail, Facebook and Twitter, this user had a lot off small contributions via Facebook: these were the “happy birthday” posts from the day before. Figure 13 is a print screen of the resulting visualization, compare it with figure 6. Notice that the figure 13 has a lot more contacts represented, due to the abnormal amount of wall comments that a user receives in his/her birthday. Notice the pattern created in each case, notice how different they are and what that difference means. This is exactly the kind of thing that Personal Information Dashboard aims to reveal.

Another funny situation occurred, while using FriendsMap, when one of our users noticed that one of his friends had mis-configured its current living place. As a consequence of existing different locations with the same name, his friend had configured its location to the wrong one. This situations highlights an important idea of our work: a visual representation of data is much more effective than a text one. Notice that the information provided by FriendsMap is easily accessible via the Facebook website but with two limitations: first, the locations are not shown on a map, they are just text; and second, the user cannot see all his/her friends in just one map/place. In both situations the information is there, but the way it’s shown makes all the difference.
Table 1: Usability Tests results

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Time</th>
<th>Errors</th>
<th>Assists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>¯ x</td>
<td>σ</td>
<td>Max</td>
</tr>
<tr>
<td><strong>Configuration Tasks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>14.13</td>
<td>3.96</td>
<td>20.00</td>
</tr>
<tr>
<td>Task 2</td>
<td>16.25</td>
<td>3.98</td>
<td>21.00</td>
</tr>
<tr>
<td>Task 3</td>
<td>18.13</td>
<td>3.98</td>
<td>24.00</td>
</tr>
<tr>
<td>Task 4</td>
<td>19.44</td>
<td>9.28</td>
<td>48.00</td>
</tr>
<tr>
<td>Task 5</td>
<td>20.50</td>
<td>3.39</td>
<td>28.00</td>
</tr>
<tr>
<td>Task 6</td>
<td>24.31</td>
<td>10.33</td>
<td>50.00</td>
</tr>
<tr>
<td><strong>Visualization Tasks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td>35.25</td>
<td>12.64</td>
<td>60.00</td>
</tr>
<tr>
<td>Task 2</td>
<td>34.81</td>
<td>11.87</td>
<td>52.00</td>
</tr>
<tr>
<td>Task 3</td>
<td>18.81</td>
<td>15.26</td>
<td>74.00</td>
</tr>
<tr>
<td>Task 4</td>
<td>19.44</td>
<td>9.28</td>
<td>48.00</td>
</tr>
<tr>
<td>Task 5</td>
<td>18.13</td>
<td>3.98</td>
<td>24.00</td>
</tr>
<tr>
<td>Task 6</td>
<td>28.50</td>
<td>9.41</td>
<td>49.00</td>
</tr>
<tr>
<td>Task 7</td>
<td>20.50</td>
<td>3.39</td>
<td>28.00</td>
</tr>
<tr>
<td>Task 8</td>
<td>26.31</td>
<td>8.11</td>
<td>44.00</td>
</tr>
<tr>
<td>Task 9</td>
<td>24.31</td>
<td>8.27</td>
<td>40.00</td>
</tr>
<tr>
<td>Task 10</td>
<td>7.00</td>
<td>3.08</td>
<td>15.00</td>
</tr>
<tr>
<td>Task 11</td>
<td>21.94</td>
<td>5.73</td>
<td>34.00</td>
</tr>
<tr>
<td>Task 12</td>
<td>21.63</td>
<td>4.96</td>
<td>34.00</td>
</tr>
<tr>
<td>Task 13</td>
<td>24.38</td>
<td>10.43</td>
<td>50.00</td>
</tr>
<tr>
<td>Task 14</td>
<td>54.08</td>
<td>45.28</td>
<td>126.00</td>
</tr>
<tr>
<td>Task 15</td>
<td>25.50</td>
<td>21.62</td>
<td>76.00</td>
</tr>
<tr>
<td>Task 16</td>
<td>36.06</td>
<td>8.64</td>
<td>80.00</td>
</tr>
<tr>
<td>Task 17</td>
<td>32.56</td>
<td>10.47</td>
<td>50.00</td>
</tr>
<tr>
<td>Task 18</td>
<td>45.38</td>
<td>37.39</td>
<td>150.00</td>
</tr>
</tbody>
</table>

Figure 13: The Who&How of a user that just recently commemorated his birthday.

4.2.1 User’s Feedback

The user’s feedback was extremely positive. Users mentioned that the prototype was easy and fun to use. As positive aspects, most of the users mentioned the ability to have all their information in just one place. Some users also mentioned the ability to cross-referencing information from two or more sources making all the information more cohesive. The following quote is one aspect point mentioned by one of our users:

*I can obtain a “big picture” of the use of multiple platforms and contact with several people.*

The users also really liked the plugin intercommunication mechanism as a way of filtering and cross-referencing information among several plugins. The following quote is from a user that considered this mechanism as one of the most positive aspects of our solution:

*The communication between plugins. I can see how the information from different origins is connected. I can click on an email and see where that person lives. It’s pretty cool.*

Users seemed pleased with the sources of personal information that our project currently supports but a couple of them mentioned that Personal Information Dashboard could also be a place to create information that would be propagated to the other sources:
I see that I received an email from a person and I want to reply. It would be nice to reply directly from the dashboard without having to go to my email.

This is a great idea, it’s however currently, a little out of the context of our project. Personal Information Dashboard is all about showing information. Therefore, creating new information is not a top priority.

Finally, following the scoring method described in [2] we were able to calculate the SUS score for each user and then obtain the average SUS score and it’s standard deviation. We obtained an average SUS score of 74.84, which indicates a very good usability degree perceived by the users. The obtained standard deviation was a small 6.09, which indicates that each user’s scores are clustered closely around the mean meaning that there’s no big discrepancy between user’s scores.

5. CONCLUSIONS
In this paper we’ve presented Personal Information Dashboard, a dashboard like application that show user’s personal information from several perspectives and in more cohesive way. Currently, the information is retrieved from five different sources of personal information (Gmail, Facebook, Twitter, Flickr and Panoramio) but the architecture is prepared to support new sources in the future.

Our tests showed that users had no major problems learning and using Personal Information Dashboard. The Usability Tests were important to detect potential problems (or room for improvement) and to get a sense of the system’s real effectiveness to transmit the information. The Case Studies were also fundamental to have a better idea of how the real user will use the system in the “real world”. The tests results were positive with users being able to find interesting things and getting pleased about using the system.

6. REFERENCES