Suggestion of Web 2.0 Mashups for Human Resource Management

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Abstract—The paper presents the intriguing idea to use mashups and Web 2.0 technologies for Human Resource Management (HRM). It first discusses current use of Web 2.0 used in HRM. Then, the authors do some case study to verify that mashups can provide solutions and additional identical capabilities for HR managers. The authors created four mashup applications (people search, email validation, web site visitors on map and local search engine) developed in Open Kapow and Yahoo Pipe mashup editors for the admissions unit for postgraduate studies at a Malaysian university which performs common staffing functions. Corresponding managers worked with the mashups and their inputs are analyzed. Therefore, the main contribution of this paper is: (1) The paper focuses on the relationship between Mashups and HRM, which is quite new. (2) This paper provides a comparative platform for future research on the similar area. (3) It gives some suggestions for organizations to adapt Web 2.0 mashups.

Keywords—Mashups, Web 2.0, Human Resource Management, Information Systems

I. INTRODUCTION

Web technologies have spurred a lot of changes to both business and end users. Specifically speaking, Web 2.0 has come with the distinguished changes mainly in empowering end users, from being passive participant to being active contributor.

A new technology and concept of Web 2.0 which are mashups have been around for few years. Now people are mixing different sources of content on the Web to create new applications where even non-technical users can build their own solutions.

When a new technology exists, there are possible influences of this technology on organizations as claimed in [1]. When considered the significant impact of Web 2.0 on business, we strongly believe the necessity of investigating possible changes by a new Web 2.0 technology, mashups, in HRM. It suffices to say that the significant role of HR arises from its contribution to establishing effective workforce which leads to achieving organizational objectives [2, 3].

Besides, global competition among organizations takes its place as another dynamic factor for them to look for innovation [1]. Specifically speaking, today in HR field utilizing the Web regardless of the size of organizations has caused a war for grabbing qualified talents.

For today, it is remarkably important to take consideration on changes in behavior and a communication habits of younger generations (Net-generations, born after 1982) who take important place in human resources and use ICT (Information and communication technologies) as common way to communicate and learn.

As a brief statement, from our perspective the contribution of mashups to HR activities might be as a catalyst for the mentioned change needs of organizations by proving a platform of innovation implementing distinguished mashup characteristics. Thus, this study will supposedly give insight for managers who understand the need for management innovation in HR and consider Web 2.0, particularly mashup solutions, as a potential catalyst of the change. Also that so far there has not been any similar work studying mashups for HRM makes this study a base line for prospective interested researchers. For mashups are considered as a simple of Web 2.0 and their uses involve varying Web 2.0 technologies, the study will first deliver a review of Web 2.0 in HRM.

II. HRM AND WEB 2.0

HRM can be defined as management of activities undertaken to attract, develop, motivate, and maintain a high-performing workforce within an organization [1]. Organization’s employees play important role in gaining and maintaining a competitive advantages [3]. The functions HRM covers are [2]:

- Staffing
- Human resource development
- Compensation and benefits
- Safety and health
- Employee and labor relations

Examples of Web 2.0 use in HRM can be seen in social network sites such as LinkedIn, Facebook and MySpace which may be used to attract or recruit employees [5] and relieve overhead of print ads. And virtual world networks such as Second Life allow managers to conduct virtual career fairs and online interviews. Moreover, podcasts are used to support in embedding of learning and sharing of information. Specifically speaking, the speed and expanded pool offered by the Internet help make the recruiting process efficient and cost effective [2].

III. MASHUPS

Mashups are applications that reuse and combine data and services available on the Web and they are developed in a rapid, ad-hoc manner to automate processes and remix information [7]. Mashup development encourages quick, easy, and affordable application development by reusing something that has already been built, tested, and paid with the vast amount of raw material being placed on the Web 2.0 [6]. Mashups use a basic level of Web platform for the universal exchange of data and knowledge.

It is noted here mashups are situational applications. They are to solve ‘the long tail’ issues which sit on where there are big amount of unmet demands because of not
enough resources and that the traditional IT cost structure overwhelms simple application ROI (Return On Investment) [9]. Nonetheless, for business, mashups have distinguished capabilities as following [8]:

- Mashing together internal and external functionalities gives organization the ability of rapid creation of new business capabilities and evolving solutions.
- Using mashups and utility computing reduces cost of fielding and changing functionality.
- Mashing together internal and external information and collaboration tools users require increase productivity.
- Lower operational cost and more agile business increase the value that can be harvested from market.

[10] asserts that researches on mashups in general fall under two themes. The first one is information systems (IS), where mashups are built in response to a specific need like map synthesis, enterprise information integration, or web service tracking. In this case, the center of attention is on identifying the relevant sources and extracting the most useful information in order to fulfill the IS requirement. The second theme is end-user programming (EUP). The goal of EUP research is to allow “end-user programmers”, people who may write code but are not professional programmers, to use programming techniques as part of accomplishing their task goals. To be more specific, it is noted here the theme this study focuses on is the former one which is approaching mashups from being a potential IS contributor.

IV. USING MASHUPS IN HR

When it comes to possible uses of mashups in HRM, we believe that mashups can support staffing process because of their fitting features to it. Staffing consists of

- job analysis
- human resource planning
- recruitment
- selection

When having a closer look to each process above, it is realized that recruitment and selection fit mashup use properly compared to the rest. These two have plenty of usage examples involving the Web. Therefore, corresponding issues and solutions that mashups provide are narrowed in recruitment and selection only. In definition, the recruitment process is aimed for finding a pool of applicants and verifying basic conditions. And the basic goal of selection is to hire the employees who are most likely to attain high standards of performance [1].

In HRM area, mashups can assist to organizations by implementing its capabilities in a manner as following:

- Searching: Searching for additional information of a candidate in Social Networks like Facebook and in search engines by key words such as email and/or full name by facilitating related APIs of the sites. Mashups can aggregate the results from the search into one page for convenience.
- Visualization: Visualizing any raw data fetched from the Web and organizational sources into an enhanced interactive user interface or on dashboard-like reports. In order to exemplify this process, let us say it is possible by mashups to show any applicant information along with the location grabbed from predefined Web pages on Yahoo Map.
- Real-time data view: Monitoring sources of data in real time basis. As an example, it is possible for mashups to extract an applicant’s defined data from an employee Web site then reformattting it in a RSS feed. The mashup can repeat this process for more Web pages as many as desired. At the end, it may combine the created RSS feeds into another feed for a packed real time data set of the applicant.
- Personalization: Personalizing corporate Web site by existing widgets on the Web such as facilitating Google Calendar specific to each registered user, then combining the data provided by these users for a further purpose.
- In-situ use: Tailored approach to recruitment and selection process which must depend on the target audience. Let us say it can be accomplished by mashups to show up related ads of positions in a company on a corporate Web site of it based on IP address location of online visitors.
- Aggregation: Aggregating more than one employment Web sites, let us say, Monster.com, HotJobs.com, and CareerBuilder.com in one mashup page in order to reach candidates’ information into one platform instead of visiting those web pages manually one by one.
- Designing workflow process: Especially in selection process, designing workflows and, if desired, delivering the ability of tracking current progress of selection process by applicants can be done by a mashup.
- Linking information semantically: Ability to infer relationships between data in different applications or in different parts of the same application [4]. To be exact, let us say if a user has an e-mail address in one Web application, like Facebook, and we determine that another Web application, for instance Flickr, has this same email address, we could infer that the information in Facebook describes the same person as in Flickr.
- Controlling information: Before presenting any information mashups may apply filtering, sorting,
merging and such sort of operations, let us say, to
resumes.

- Automation: Automating and aggregating manual
tasks of managers. As an instance, searching for a
candidate for a particular job automatically, then
storing the results in a database, instead of doing
these steps part by part and manually in other case, is
an ability of mashups. Technically speaking, when a
position in a company becomes available a mashup
can dynamically realize actions initiated by the
corresponding managers then it can trigger a search
process crawling on predefined Web pages, finally
populate related fields of the database with coming
results.

Thus, mashups can be a way of solutions for some issues
of the HRM by implementing these stated examples. Apart
from this, with their identical features, they can give
distinguished advantages to HRM. It is worth saying that
other use combinations of mashups for HR are always
possible.

V. CASE STUDY

After having a proper understanding of what mashups
can do, evaluating mashups’ effectiveness for managers in a
particular example will help us have general insight in
expected contributions of mashups and possible issues with
them in the HRM domain. For this purpose, the SPS
Admission Unit for postgraduate students which performs
common staffing functions was chosen to experiment some
developed mashups.

In the analysis phase of the mashup application
development, interviews and written questionnaires have
been formally conducted to get the SPS managers’ current
problems that mashups can solve and to know other
improvements that mashups are capable of providing
additionally. During this phase semi-structured questions
were directed to 3 managers. In forming interview questions
plus to having the conventional perspective of the traditional
system development analysis, mashups’ unique capabilities
were taken into consideration. Therefore, the questions
cover prospective creative idea implementations as well.
After the analysis process, the analysed issues faced by the
SPS Admission Unit managers were gathered and are listed
below:

- Information on application form is sometimes wrong
  intentionally or unintentionally. Wrong email and
  post addresses are the common ones.
- There is no proof for the information given on the
  application forms.
- Some manual tasks consume time much for
  operators and managers.
- There is lack of information about applicants, their
  countries and universities for the decision of intake.

However, different from the conventional system or
application development, mashups:

- Do not have an approved mashup development
  methodology.

- Are new technologies so that what they can do for a
  particular requirement can not be certain unless it is
  tried to develop the application. This requires
  iterative development for mashups.
- Are different in capabilities. Thus they can
  contribute to end users from hidden angles.
  Discovering a new use of data can influence the way
  of development.

Considered above-mentioned points in the mashup
devolvement, the application development and requirement
gathering were performed concurrently until reaching a
satisfactory level of maturity of the design. Plus, apart from
solving users' current issues new creative ideas were also
integrated into development process for improvements when
possible.

At the decision point for the development tools, both the
requirements of users and the capabilities of mashup tools
were considered together in order to see how mashups fulfil
the specific needs. Even though there are above existing 20
mashup editors on that time, for 10 of them there was chance
to investigate, yet at the end 2 of them were used to develop
particular mashup applications. Some of the editors were
omitted as there are commercial, whereas some of them
require deep scripting skills of developers. Plus, the rest are
not useful for the targeted application development in terms of
capability and maturity.

A. Developed Mashups

In this particular experiment of mashups with the SPS,
we developed four independent mashup applications listed in
Table 1 in order to fulfill SPS managers' requirements and to
give them additional capabilities.

<table>
<thead>
<tr>
<th>Mashup Name</th>
<th>Description</th>
<th>Editor Used</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>People Search</td>
<td>Search for people in well-known social networks through</td>
<td>Open Kapow,</td>
<td>Search, Aggregation</td>
</tr>
<tr>
<td></td>
<td>provided APIs of the sites</td>
<td>Yahoo Pipes</td>
<td></td>
</tr>
<tr>
<td>Email Validation</td>
<td>Validate a number of email addresses in one click to check if they exist or not</td>
<td>Open Kapow</td>
<td>Automation, Data Quality Enhancement</td>
</tr>
<tr>
<td>Web Site Visitors on Map</td>
<td>Show the location of the SPS web site visitors on Yahoo map to visualize potential interested people in studying at UTM</td>
<td>Open Kapow, Yahoo pipes</td>
<td>Visualization, Real-time data view, Personalization, In-situ Use, Providing a platform for innovation, Aggregation</td>
</tr>
<tr>
<td>Search Engine</td>
<td>Search for a given key word on Google, Yahoo, Live Search engines and Youtube</td>
<td>Yahoo Pipes</td>
<td>Search, Aggregation, Visualization</td>
</tr>
</tbody>
</table>
For People Search Mashup, reviews on [1] have already manifested the fact that people participating in an interview are influenced by a candidate’s personal appearance. Considering this and supporting the managers by additional information, we developed the first mashup to find out information that people drop on the Web especially on social networks like Flickr. The information can be used in supporting recruitment and selection processes in terms of additional consideration. Retrieving this public information can be done by using APIs which are provided by most of social networks. To do so, two pieces of mashups are developed in Open Kapow and Yahoo Pipes for the same goal which take an email address, full name and/or user name as search key inputs and search for a particular person in the social Web sites. The Web sites covered and their search key input types are listed below.

- Youtube (User name)
- Live Space (User name)
- Blog (Email, Full name, User name)
- Digg (User name)
- Twitter (Email)
- Flickr (Email)
- Upcoming (Email)
- Last.fm (Email)
- BrightKite (User name)
- Ohleh (Email)
- Dailymotion (User name)

Specifically speaking, for People Search Mashup e-mail address is unique for anybody who has it whereas same full name can belong to different persons. Therefore, email address has the highest priority to get accurate results of a person and full name has the second. Another search key input for the application can be user name. It has the last priority because of its natural hardness to guess or find. However, it is regarded as an input with the consideration of that if a user name is grabbed by using one of other inputs then the same user name can be used for a further investigation of the person on other social network sites. On the other side, each web site takes only one input to search with respect to input priority order of inputs. Higher priority is preferred. Although some Web site APIs let developer find users by their unique ID, they are not preferred and not used at all for there is almost always no relationship between ID numbers of a user on different Web sites. Moreover, even though Facebook and Hi5 are available to make search by email address, it could not be accomplished to implement for these two in the mashup, leaving them for a further study.

The second application, Email Validation, emphasizes on data quality enhancement, in this case email address data, as the SPS performs mainly data-driven functions. Basically speaking, using email is one of common and conventional communication means for the SPS. Meanwhile, it is critical for the organization to know whether the emails they are given exist or not. Non-exist emails are mainly a result of typing mistake as the SPS still uses hard application forms optionally.

For current time, the SPS does not have any application to validate emails they have. However, there are some email address validation Web services that can be implemented in a way having multiple email addresses and getting the results back in one time. The solution by the mashup is an automated system which takes a group of emails as input and then calls an email validation web service as many times as number of emails in the file and showing results back the users in seconds. For this particular case, email address sources can be a local file or an online file.

The third application, Web Site Visitors on Map, shows SPS web site visitors’ exact location on a friendly interfaced interactive map, Yahoo map. For the admission unit managers, this information manifests the interest of the people over the world and allows getting sense of hidden facts about each country people who show their interest to UTM by visiting their official web site. Grabbing this information may help UTM arrange seminars and formal visits to interested countries more effectively.

Lastly, when talking about getting information of an item from the Web, a search engine that collects links from well-known sites is a must. Even though Google, Yahoo and some other web search engines do the same, the point for the fourth, the last, mashup is the advanced unique abilities differentiating it from the conventional ones. The mashup can retrieve relevant results from predefined multiple search engines into one page that can be reached by a simple interface. Appropriate interface types (map, list, RSS and picture list) for results automatically appear and accompany the users.

B. Case Study Results

When it comes to user acceptance testing for evaluation of the developed mashups, the users have been asked through written questionnaires after demo presentations of the applications to evaluate them in terms of effectiveness, usefulness for their work, uniqueness and hardship of use. The results listed below are highlighted ones mostly pertaining to developed mashups themselves:

- All participants agreed that the developed mashups are easy in use, they can give benefits to the organization and the organization can get competitive advantages as they are unique applications for their positions.
- Qualifying data in advance with mashup services is beneficial to the managers to save their time from dealing with wrong data as done in Email Validation Mashup.
- For the proof of information given in application forms the Web can not be a reference for official use as in People Search Mashup.
- People are usually tent to put their content on social Web pages in their mother languages. This may likely decrease the contribution of the mashup.
applications; nevertheless, at least many Web page interfaces are in English today.

- There is no assurance of having a standard format for every applicant’s information on the Web. And it is not certain whether the results coming from Web service executions are right or not. This is mainly the case in People Search and Email Validation Mashups.
- The tendency to make the data fit the presentation surface causes loss of data fidelity in displaying as happening in Search Engine and Web Site Visitors on Map mashups.

There are some other results that have been observed and inferred by the researchers and concluded from the case study indirectly. They are covered in the next title. Plus to this, all the other parts of the study and opinion of one of IT security lecturers at UTM about the applications have been reviewed in the next title as well in order to generalize investigation results of mashups for HRM.

VI. SUGGESTION OF MASHUP FOR HRM

The ultimate aim of this paper is to determine the way of appropriate uses and issues of mashups for HR managers who have similar characteristic with those in the case study. In the particular case study, the managers have functions similar to staffing. Even though mashups have not been adapted in all possible fields of management or all mashup editors have not been tried, we believe that there is still a possibility of generalizing mashups for HR managers at a certain extent. Some suggestions in adapting Web 2.0 mashups in HRM are given as following:

- Organizations in adapting mashups should consider organization culture, ethics and regulations of government. For instance, British data protection act prevents any organization from the use of any software that screens candidate for qualification [1].
- Online databases have significant advantages over desktop databases. A proper transfer to online database can foster a better platform for mashup use.
- Mashups should not make a final decision to hire. They must be supportive instead.
- Do not vet candidates during the recruitment and selection processes based on the retrieved Web information.
- Consider mashups as a platform leading to Web 3.0 advantageous benefits rather than only an application.
- Organizations should consider the skills, opportunity and ability of HR professionals to bring together groups of people across the organization to explore mashups strategies that can be applied to deliver the organization’s strategic priorities.

On the other hand, organizations and corresponding decision makers for mashup adaptation should consider the following as vulnerabilities and issues of mashups:

- In mashup case, organizations integrate external web sources which are out of the control of organization. Therefore, any unexpected changes will likely affect manager processes directly or indirectly.
- They are heavily dependent on the Internet connection and services used. This may cause mashup-based processes become not functioning in an unexpected time.
- Even though mashups are easy in use compared to conventional applications, for businesslike solutions adequate effort must be paid by business analyst and IT people when training.
- Mashups are not still mature enough to rely on for vital processes of managers.
- For further references for mashups, as time being, there are insufficient sources.
- Security and privacy for mashups regardless of domain of the use are still big vulnerability.
- Empowering managers by mashup use may create rooms for information privacy issues in organizations as managers control what information to include in mashup applications.
- It can be easy to create initial mashups, but longer term maintenance of mashups is usually tended to be overlooked.

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