A Framework for Recommender Systems in Online Social Network Recruiting: An Interdisciplinary Call to Arms

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Abstract

I sketch an interdisciplinary framework for recommender systems searching online social networks for future employees. In contrast to previous approaches my framework covers the whole person-organization environment (P-OE) fit, and so it also includes crucial social components (e.g. workgroup fabric, and organizational culture). In a rudimentary way I show how information extracted from online social networks can be used to determine the P-OE fit. Due to a more accurate way of calculating the P-OE fit my framework facilitates higher quality recommendations. Furthermore my framework enables a better understanding of the P-OE fit problem.

1. Introduction

Human Resource Management (HRM) has seen a recent influx of electronic support tools and systems [1]–[3]. In this paper I focus on e-recruiting as one of the most important electronic-HRM (e-HRM) activities [3]. Existing e-recruiting Recommender Systems (RS) mainly focus on the problem of matching job demands and candidates’ abilities. For the person-organizational environment fit (P-OE fit)1 highly relevant social interactions between the potential employee and future colleagues at work (e.g. [4]–[18]) are not sufficiently taken into account. To predict such interactions various inputs are required (e.g. the organizational culture, the workgroup’s social communication styles and means, a candidate’s personality and role behavior). A very promising development in e-HRM is the incorporation of Online Social Networks (OSN). During the last years electronic recruiting in OSN (OSN-Recruiting) – envisioned a quarter of a century ago by Macdonald [19] – has emerged as a field of scientific research [20]–[22]. But even these approaches only address the matching problem of job demands and a candidate’s abilities (person-job fit), which has become known as the expert finding problem. However, rating the person-job fit is just one part of the whole P-OE fit, e.g. [12,14]. Other crucial evaluation parts such as the matching of the applicants’ personality to the organizations’ culture or the candidates’ role behavior to the workgroup fabric are largely ignored by both Information Systems (IS) research as well as practical e-recruiting solutions.

However, the underlying problems of these currently widely ignored social matching phenomena receive much more attention in sociology, psychology and their related disciplines. Thus, incorporating sociological studies such as Social Capital Theory [23]–[27] and Social Network Analysis (SNA) [28]–[33], psychosocial studies on group dynamics [4]–[9], psychological investigations of personality traits and Internet/OSN use [34]–[46] as well as cultural influences on Internet/OSN use [47]–[50], combining human resource management and occupational and vocational studies [10,12]–[15,51]–[57] into IS research is promising.

In this conceptual paper I sketch an interdisciplinary framework for OSN-Recruiting based on an extensive, though by no means complete, review of the available literature. Implementing this framework will facilitate recommendations to be made to recruiters. Furthermore such a framework allows deeper interdisciplinary investigations of the P-OE fit problem, which is longstanding and well-known in HRM.

The rest of the paper is organized as follows: Next I study candidate evaluation and selection from a HRM perspective in order to analyze the conditions for the best P-OE fit. Then I show how relevant data can be extracted from OSN, before I take a preparatory step for designing OSN-Recruiting RS by mathematically formalizing the P-OE fit. I conclude with a discussion on the potential, limitations and the further applications of my framework.

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1. The P-OE fit concerns all aspects of the fit between a job candidate and a vacancy within the recruiting organization, cf. 2.
2. Candidate evaluation and selection

A review of current empirical work on e-HRM can be found in [1], and the most recent theory-based e-recruiting review has been provided by Maurer and Cook [3]. In the latter study, the authors emphasized the key role of the P-OE fit in order to recruit high quality job applicants. Meta-analysis investigations showed significant positive correlations between the P-OE fit and job performance, job satisfaction, organizational commitment and employee turnover [12]–[17]. The P-OE fit can be broken-down into sub-fits, with the most appropriate consisting of three all but disjointed sub-fits, which together almost cover the whole notion of the P-OE fit [14]. These sub-fits are the Person-Organization (P-O) fit (between candidate personality and organizational culture) [12], the Person-Group (P-G) fit (matching of individual and group roles and interactions) [9] and the Person-Job (P-J) fit (between a candidate’s skills, knowledge, and abilities and job demands) [11]. An overview of investigations into these and further P-OE sub-fits can be found in [14]. Thus we can formulate the following:

\[\text{P-O fit} \oplus \text{P-G fit} \oplus \text{P-J fit} \rightarrow \text{P-OE fit}. \quad (1)\]

The relative importance of these sub-fits depends on the concrete vacancy. Kristof-Brown [51] empirically showed that recruiters actually distinguish between these sub-fits. Sekiguchi and Huber [58] recently investigated the weighting of the P-O fit and the P-J fit when hiring decision-makers to evaluate job candidates. For instance the longer a recruiter expects a candidate to stay within the organization the more important the P-O fit becomes. The shorter the envisioned stay the more important the P-J fit becomes, since skill and knowledge acquisition on the job become inefficient for relatively short stays within the organization. For a formalization see Eqn. (2).

2.2. Person-group fit

Interpersonal interactions within a workgroup (e.g. subordinates, coworkers and supervisors) are in certain circumstances more important to team performance than technical job skills [7,8]. The P-G fit concerns social interaction aspects of the matching of a job candidate to the workgroup (meso-perspective). This matching has two parts, a supplementary one (similar qualities of group members) and a complementary one (distinctive qualities or characteristics) [9]. Measuring the P-G fit requires (a) an analysis of the candidate’s social interaction characteristics and (b) an investigation of the group’s social fabric.

Individual interaction characteristics are partly determined by personality traits [6], and these have been used to forecast team performance directly, cf. [6,7]. Mount et al. [6] showed by conducting a meta-analysis that agreeableness, emotional stability, and conscientiousness are positively correlated with team performance. Kristof-Brown et al. [53] revealed that teams are more attracted to an individual with an extraversion score that is complementary to the groups’ extraversion score (i.e. high individual-low team or low individual-high team levels).

Werbel and Johnson proposed a process to analyze the workgroup [9, pp. 234]: (1) Investigate group interaction processes (e.g. time orientation, styles and means of communication: e-mail, phone or meetings).
and furthermore identify critical group norms (e.g. individualism or collectivism [62]). (2) The next step is to investigate the performance of the team already in place, as this allows the defining of the work role(s) to be filled in order to improve team performance (complementary aspects). Critical task roles within a team such as initiator-contributor, coordinator, elaborator, information seeker or information giver, and critical maintenance roles such as compromiser, encourager or follower were delineated by Benne and Sheats [4]; boundary spanning roles such as scout, ambassador, sentry and guard were identified by Ancona and Caldwell [5]. (3) The last step is to calculate the P-G fit using both the supplementary (1) and the complementary (2) P-G fit.

2.3. Person-job fit

The P-J fit generally describes the micro-perspective matching between a candidate’s characteristics (such as abilities or preferences) and job demands/supplies of the recruiting organization. Edwards [11] emphasized two basic conceptualizations of the P-J fit. The so-called demands-abilities fit compromises the matching of a candidate’s Skills, Knowledge and Abilities (SKA) on the one side and job requirements on the other side. The often labeled needs-supplies or supplies-values fit refers to the question of whether the employee’s needs, desires or preferences are met by her job. The last type of fit is mainly discussed within various theories of adjustment, well-being, and satisfaction [14, pp. 284]. Since these two conceptualizations can be seen as two sides of the same coin, I will only focus here on the demands-ability fit.

To measure the P-J fit several tests have been developed (e.g. P-J fit scale, Global Self-Report Measure [52]). Following [12, p. 8] the P-J fit should be evaluated relative to the job tasks and not relative to the employing organization. Hence, besides the most widely used inventories – which are questionnaire-based – direct examinations of a candidate’s CV, testimonials and letters of reference together with the job description – provided by the recruiting organization – can also be used to calculate the P-J fit.

In summary, I investigated in the above section the conditions for the best fit between a job candidate and the recruiting organization and identified the triad of P-O fit, P-G fit and P-J fit as crucial. These fits correspond to the well-known macro-, meso- and micro-perspective of SNA (Fig. 1).

3. Information extraction from online social networks

In order to infer the job candidate’s personality traits and SKA, the social fabric of the workgroup and the organizational culture, the relevant data about OSN users, their social environments and their interactions have to be extracted. Recent work (e.g. [64]) shows that the information stored in large-scale OSN (e.g. LinkedIn) is more truthful compared to simple manually generated/manipulated CVs.

3.1. Aspects of social network analysis

To address the problem of assessing the integration of a person p in a social network (SN), connectivity and centrality measures cf. [31,65,66] have been studied intensively. One of the most basic measures to assess the importance of a node is the degree centrality measure of Shaw [28]. The degree centrality of a node n is defined as the number of neighboring nodes. The closeness centrality measure [29,30] focuses on the distance between nodes. Nodes contained in many short paths between nodes can efficiently propagate information or considerably impede the flow of information. A further classical notion of centrality is related to a node’s ability to influence the flow of information. By way of illustration I mention the betweenness centrality measure [28,31], which is calculated as the number of shortest paths a nodes is part of divided by the overall number of shortest paths in the network. Milgram had already demonstrated in 1967 that between almost any two nodes in an SN there is a short path linking
them [23]. Furthermore he showed that short paths can be found without too much effort. These results have been found to also hold for OSN [67]. Although computing the distance between users in large OSN is an NP-hard problem, users can find short paths connecting them to other users [68,69]. Granovetter [24] showed that weak ties can be highly beneficial as they provide connections to “distant clusters”. In particular, weak ties are valuable for learning about vacancies [24, p. 1371]. Burt [26] did not focus on the strength relationships but on the absence of links in an OSN. He coined the term structural hole to describe missing connections between groups in an SN. This notion proved to be highly influential and enabled many important developments [27].

SNA has been applied to investigate individual performance as well as group performance, e.g. [70,71]. The results show correlations between certain centrality measures and job and group performance. Baldwin et al. [70] reported that communication centrality was linked to student’s grades (i.e. performance). Sparrowe et al. [71] found that group performance was negatively related to hindrance network density.

3.2. Online social networks

OSN such as Facebook, LinkedIn or Xing have become a part of every day life. In turn OSN have already become an important tool for recruiters [22,73]. The scientific investigations of OSN [72]--[74] date back about one and a half decade [75] and the focus of the research is diverse, including investigations into user groups, use of OSN, data privacy and protection, social structures in OSN, graph theoretic properties of OSN, comparisons between OSN and real-world SN. Data generated by OSN users has drawn considerable business interest, of which [76] provides an overview. The value of social information stored in OSN, which is key in my approach, has already been noted and exploited by the RS community [77].

To transfer insights from SNA gained by studying notions such as structural hole, degree and centrality measures to OSN, only the underlying graph structure of the OSN has to be known. To model weak and strong links in OSN the notion of an activity network has been introduced. To distinguish between a good friend and a mere acquaintance the frequency of interactions can be measured. Although the activity network of Facebook, made up of the regularly interacting users, is a priori of a different shape and form than the whole network, Viswanath et al. [78] reported that the activity network graph-theoretically resembles the whole network. In OSN weak ties also play a crucial role for the transfer of knowledge [79,80], in particular for job searches (cf. [24]).

3.3. Personality extraction from online social networks

Inferring personality traits from Internet/OSN use is an emerging area of research. I will here highlight some more relevant findings for our purposes by restricting our attention to the FFM. A good starting point is the work of Ryan et al. [45] containing a well researched state of the art overview on how personality traits influence behavior on Facebook and other OSN. Before going into details I remark that the hypothesis that OSN profiles are created to escape reality or to compensate for perceived personality flaws has been found to be in general false for Facebook users [42,43]. These findings support the idea of personality extractions from OSN. In fact, recruitment and selection professionals regularly use OSN such as LinkedIn and Facebook and they state that they are able to draw conclusions on personality traits from an applicant’s profile and network [22]. Gosling et al. [46] showed that Facebook-based personality impressions have some consensus and accuracy for all FFM dimensions, with particularly strong consensus for extraversion, but with the exception of accuracy for neuroticism.

Ross et al. [38] studied user behavior on Facebook via self-reports and found a weak connection between the personalities of the users and their behavior. Furthermore they reported that extraversion was not significantly related to the number of Facebook friends (in agreement with findings in [81]) nor was the time spent online thus related. But they found that individuals in the high Extraversion group reported membership in significantly more Facebook groups. Amichi-Hamburger and Vinitzky [39] replaced the self-reports of Ross et al. [38] by more objective criteria and found a strong connection between personality and Facebook user behavior. Tong et al. [37] found a quartic relationship between the number of Facebook friends of a user and perceptions of the individual’s extraversion. Krämer and Winter [36] investigated the relationship between self-reported (offline) personality traits and (online) self-presentation in the German OSN.

2. The literature distinguishes in particular between OSN and Social Network Sites (SNS). The former takes a sociological perspective on electronic networks while the latter emphasizes the user interaction with a website, cf. [72]. For my purposes both approaches are relevant, however I will here only use the term OSN.

3. LinkedIn reports having more than 200.000.000 users as of April 2013, Xing reports 13.000.000 users in December 2012 and Facebook round about 1.000.000.000 as of April 2013.
StudiVZ. Their content analysis of the respondents’ profiles showed that self-efficacy with regard to impression management (an aspect of extraversion) is strongly related to the number of virtual friends, the level of profile detail, and the style of the profile photo. Extraverted users tended to present themselves in a less restrained manner choosing less conservative pictures of themselves. Recent studies (e.g. [40]–[42]) confirm the strong link between extraversion and OSN usage.

Ross et al. [38] found a correlation between neuroticism and the usage of Facebook apps. Individuals with high neuroticism score were more likely to declare the wall to be their favorite app whereas people with a low score were more likely to prefer photos. Individuals with a high score in agreeableness were found to be more likely to be selected as a friend, cf. [44]. Individuals that have high scores in openness to experience and in neuroticism were found to be more likely to be bloggers [35]. Karl et al. [48] analyzed the relationships between personality differences and faux pas posts in Facebook. Their results showed that those who score high on conscientiousness, agreeableness and emotional stability post significantly fewer faux pas on their profile.

Interestingly the line of research assessing character traits of an individual given the profile and information about friends has been inverted. Denissen et al. [34] found that the user profiles of an individual’s friends can be used to infer character traits of the individual. Results from [44] suggest that a friendship link between users is more likely if they have similar scores in agreeableness, extraversion and openness.

3.4. Organizational culture extraction

Organizational culture can either be measured manually by conducting a questionnaire-based investigation of the organizations’ members or it can be inferred from their OSN use. The most common instrument for manual evaluation is the Organizational Culture Profile (OCP) developed by O’Reilly, Chatman and Caldwell [63]. The OCP is a Q-sort instrument containing 54 value statements. The idea of an automated culture extraction from OSN is supported by the fact that the organizational culture is reflected by the members’ personal values and roles [10,12,13,55,56]. The automation of an OSN-based culture evaluation is promising since strong indications for culture dependent OSN use have already been found (e.g. [47]–[50]). Yang et al. [50] showed that culture traits can be inferred from people’s social question and answer behavior in OSN. Pfeil’s et al. [47] findings suggest that cultural differences within the physical world also exist in the virtual world. They show correlations between Hofstede’s [62] culture dimensions and use of Wikipedia (e.g. a correlation between the masculinity index and adding/clarifying information behavior). Callahan and Herring [49] also observed a systematic cultural bias in Wikipedia use. Karl et al. [48] analyzed faux pas posting in Facebook profiles of US and German students. US students were more inclined than German students to post faux pas to their Facebook profile. The authors discussed possible cultural reasons (specifically that US citizens tend to be more individualistic and lower in uncertainty avoidance than Germans). In summary there is a growing body of evidence to suggest that it is possible to automatically infer organizational culture traits from OSN.

3.5. Communication style extraction from online social networks

Investigating communication styles from Computer Mediated Communications (CMC) is an emerging area of research. In a first step it can be checked whether an OSN profile is linked with further communication tools such as Skype, ICQ, or Twitter. For instance, if an OSN profile is linked to a twitter account, it is possible to learn twitter use characteristics (e.g. messages sent, following users, other users followed, retweeting frequency and so on) [82]. Communication intensity can be derived from blogging and tweeting intensity or wall use in Facebook [38]) and time orientation can be inferred from online times.

Business interests in this area have also begun to emerge. The importance of an individual’s communication style for recommending items to her has been noted and subsequently patented (US 2011/0054985A1) by Cisco. Social Behavior Analysis (SBA) is the basis for two similar patterns granted to Yahoo! that use SBA for generating recommendations (US 2009/0164400A1 and US 2009/0164897A1).

3.6. Role extraction from online social networks

Since personality mainly predicts potential roles of group members (e.g. [83]) we can infer these roles from personality traits data extracted from OSN. As an example consider the “initiator-contributor”-role identified by Benne and Sheats [4] as a critical task role in every group. This role is characterized by entrepreneurial attributes (such as suggestions of new ideas and solutions to the group, (re-) definition of group problems and goals, organizing the group for the task ahead, handling difficulties the
group encounters, etc. [4, p. 43]). Zhao et al. [83] meta-analytically summarized the relationship of personality traits and these entrepreneurial attributes. A broad range of personality scales were categorized into a set of constructs using the FFM of personality. Their results showed that four of the five FFM dimensions were associated with entrepreneurial intentions and entrepreneurial performance. The ability to fill the “information seeker” role [4] could be inferred for instance from Facebook use [84] or from following numerous Twitter users, while similarly the “harmonizer” role can be inferred from the use of the group feature [84].

3.7. Extraction of skills, knowledge and abilities from online social networks

Measuring SKA has been a hot scientific topic [11,12,51,52,58,85]. HR-XML is a current common standard for expressing SKA in machine-readable format. Today HR-XML is extended and maintained by a non-profit consortium and has also made its way into practical applications in real world labor markets. For instance, the German employment agency (BA) has adopted this format and developed a specification called HR-BA-XML. It is my firm view that it will only be a matter of time before (business) OSN adopt a generally accepted fully machine-readable standard for uploading CVs, testimonials and letters of reference. The problem of finding a person possessing certain SKA (i.e. an expert) to solve a concrete problem or task has scientifically been studied and is known under the label expert finding or expert location. SN have proved to be a fertile ground to search for experts. Search strategies for expert finding in SN were evaluated in [21] and the state of the art has been reviewed in [86].

3.8. Legal aspects of data extraction from online social networks

In practice we cannot assume that all information stored in OSN is freely available. In general accessibility of data is limited by user settings, by data protection and privacy laws and the OSN terms and conditions. Projecting current trends suggests that these laws are only set to tighten. For the foreseeable future however I believe that (future) laws do not render OSN-Recruiting unfeasible. I foresee two possible approaches to maintaining recruiting RS searching OSN data even under tightened rules and regulations. One is that privacy-preserving data mining techniques [87] can be applied, see [76] for a current state of the art overview of data anonymisation techniques). Secondly, micropayments can be made to OSN users and/or the OSN provider for the right to extract data.

It is possible that current trends will reverse and users of OSN will explicitly want their profiles to be public to further business opportunities and career advancement. It is plausible to conjecture that users of business OSN (e.g. LinkedIn and Xing) will prefer to follow the latter trend.

If and how personalities may be measured and subsequently legally used in a recruiting process is a complex legal question. Different laws (in particular the ever changing labor and anti-discrimination laws) and legal systems have given different answers which vary by country and also over time, cf. [88].

4. Recommender systems for online social network recruiting

The design of (OSN-)Recruiting RS is an emerging area, cf. [20,21,77,85]. But the existing RS only address the P-J fit with the exception of Malinowski et al. [85] who took both the P-J and the P-G fit into account. However they completely ignored the P-O fit and focused only “on a company-internal team staffing scenario” [85, p. 431].

Here I consider the design of content-based and collaborative RS for OSN-Recruiting. Content based RS estimate the utility a user obtains from an item depending on other items the user has previously rated which are similar to item i. Collaborative approaches differ from the above by recommending items to a user based on ratings or recommendations by users which are similar to user u. It is feasible to design content-based recruiting RS searching OSN based on a similarity notion between candidates and an assessment of selected candidates. Such collaborative RS can be designed using recruiting strategies from organizations similar to the recruiting organization, and such strategies can be obtained from (industrial) espionage or less clandestinely by monitoring job ads and portals, or, more in line with my topic, by monitoring OSN. Given that content based and collaborative approaches are possible hybrid RS are conceivable.

Before an RS can recommend candidates which have not been assessed by the user the problem of how a given candidate is evaluated has to be addressed. Formally such a utility function is given by the P-OE fit, which can be represented by a function \( F_{P-OE} \). \( F_{P-OE} \) takes as inputs a vacancy V within an organization and a candidate C and returns a real number. This function may be decomposed into three sub-functions: \( f_{P-O}, f_{P-G} \) and \( f_{P-J} \) (representing the P-O, the P-G and the P-J fit) and an aggregation...
function $A$. $A$ combines these sub-functions by an aggregation of the relative importance placed on the sub-fits, cf. 2. We can thus formulate the following:

$$F_{P-OE}(C, V) = A(f_{P-O}(C, V), f_{P-G}(C, V), f_{P-J}(C, V))$$

(2)

Determining the aggregation function $A$ constitutes a Multi Criteria Decision Making (MCDM) problem. One main challenge in MCDM is the above commensurateness problem, i.e. if, and if so how, a low score in one criterion can be compensated by a high score in another criterion. The Choquet and the Sugeno integrals [89] are methods that are widely adopted by the MCDM community to address this problem. The RS community is well aware of multi-criteria phenomena and has developed RS based on multiple evaluation criteria [90].

Do note that the P-G fit only depends on certain aspects of a vacancy. Indeed only the social fabric of the workgroup $SFWG_V$ is relevant while for instance required skills are completely irrelevant for determining $f_{P-G}$. Similarly not all properties of a candidate $C$ matter for calculating $f_{P-G}$, as only the candidate’s social interaction patterns $SIP_C$ are required. We can hence formulate $f_{P-G}(C, V) = f_{P-G}(f_{comp}(SIP_C, SFWG_V), f_{supp}(SIP_C, SFWG_V))$ where $f_{comp}$, $f_{supp}$ are the complementary respectively supplementary P-G fit. Likewise the P-O fit only depends on the organization’s cultural values $V_C$ and the candidate’s personality $P_C$ whereas the P-J fit only depends on job requirements $JR_V$ and a candidate’s skills, abilities and knowledge $SKAC$. We hence reformulate equation (2) as

$$F_{P-OE}(C, V) = A(f_{P-O}(P_C, V_C), f_{P-G}(f_{comp}(SIP_C, SFWG_V), f_{supp}(SIP_C, SFWG_V)), f_{P-J}(SKAC, JR_V)).$$

(3)

The challenges posed to the RS community compromise more than the development of RS estimating $F_{P-OE}(C, V)$ based on equation (3). Due to the high complexity of modern work environments recruiting decisions are made under uncertainty [57]. It appears reasonable to use a structure that relies on the same formal model of uncertainty for all three fits, which might be phrased in quantitative (probabilistic), qualitative or linguistic (fuzzy) terms. Figure 2 graphically summarizes the proposed framework.

5. Conclusions

I have developed an interdisciplinary framework for OSN-Recruiting. Adopting a business HRM perspective I identified the P-OE fit as crucial in the assessment of the suitability of job candidates to a given vacancy. As shown, the P-OE fit can be broken down into the P-O fit, the P-G fit and the P-J fit, cf. Eqn. (1). In contrast to previous approaches I hence included in my framework the macro-perspective (P-O fit) and the meso-perspective (P-G fit). For the calculation of all these sub-fits I identified the relevant inputs (e.g. personality, organizational culture) and I showed that these inputs can potentially be inferred from OSN with the sole exception of the job description. Finally I took a preparatory step for designing OSN-Recruiting RS by mathematically formalizing the P-OE fit (Eqn. (3)). This equation can then be used to forecast the P-OE fit between an OSN user and a vacancy.

My main contributions are (a) illustrating a way to improve existing recruiting RS and (b) providing a platform for interdisciplinary research thereby enabling further discoveries in various areas of research.

5.1. Limitations

The business potential of my framework for OSN-Recruiting appears enormous, however there are several limitations: (i) There are sociopolitical, legal and psychological barriers/reservations concerning disclosing, mining and processing of personal information. Privacy concerns can be addressed via privacy-preserving data mining technologies or by market mechanisms for data extraction from OSN in return for rewards, cf. 3.8. (ii) Inferring social characteristics of organizations, groups and individuals based on data extracted from OSN has not yet matured into a broad and consistent area of research. However recent research converges, for instance see 3.3 for extraversion. (iii) My framework is limited by the models I used, such
as the P-OE fit model, the FFM, workgroup models etc. However I used the most accepted and advanced models to represent the state of the art, cf. 2. Further developments of the underlying models can be used to enhance my framework. (iv) Finally at present my framework is curtailed due to a missing evaluation (e.g. by prototypes, field studies, tests), cf. 5.2.

5.2. Future research

For a successful development and implementation of an OSN-Recruiting RS based on my framework several interesting open interdisciplinary problems need to be addressed. In particular I identify: (i) studying organizational culture extraction from OSN, (ii) mining OSN for the social fabric of a workgroup (group role detection, communication style extraction), (iii) inferring personality traits based on OSN data, (iv) improving models predicting on-the-job behavior based on data extracted from OSN, cf. [48, p. 182], (v) designing and implementing a fully machine-readable standard for CVs, letters of references and testimonials, (vi) developing mechanisms for trading OSN data, (vii) implementing and evaluating of real-world OSN-Recruiting RS, and (viii) studying of users of such RS.

Completing this research program does not only supports recruiters but may also yield a better understanding of the P-OE fit problem. This deepened understanding enables further contributions to sociology (group dynamics, SNA), psychology (personality research, OSN use), computer science (data mining and design of OSN/RS) and economics (organizational behavior research).

Finally my framework may also be applied to other HRM problems such as organizational development, personnel development and retention management.

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