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Forming Enterprise Recruitment Pattern Based on Problem-Oriented Conceptual Model

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Abstract

Technological advances combined with the tightest labor market have led many organizations to change the range of tactics used to recruit new talent. Recruitment patterns can help analysts to tackle repetitive and piecemeal recruitment problems. However, they have been criticized for being applied in isolation and not easy to integrate. Therefore, enterprise recruitment pattern is recommended when building recruitment systems. When defining such pattern, support from enterprise recruitment architectures (ERAs) is needed to facilitate the reuse of that pattern in different recruitment development processes. For this reason, we present a problem-oriented conceptual model developed by the authors with the purpose of addressing the key architectural elements of the recruitment system, as well as their interdependence, in a high level of abstraction. The essence of the model is that when such architectural elements and their relationships are combined in a coherent manner, enterprise recruitment patterns can be formed based on this. The pattern here is defined by using a template where its elements correspond to the elements of the ERA depicted in the conceptual model. Our approach is demonstrated via application to an exemplar.

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1. Introduction

The increasing importance of human capital, combined with a higher educational level of the new generations, strong economic situations and a low unemployment rate, has made recruitment a top priority of many organizations[1]. The Internet-led labor market has become increasingly competitive forcing many organizations from different sectors to harness e-recruitment[2]. This nature of labor market has dramatically altered the ways organizations use to recruit and that individuals use to seek new employers.

In recent years, many organizations have unsurprisingly experienced problems filling vacancies with the required number and quality of applicants[3]. To build a recruitment system that tackles these problems and supports business, organizations should seek support from enterprise recruitment architectures (ERAs) and use some supportive methodologies. The objective of ERA is to provide a conceptual description of the recruitment system and link its components as one cohesive unit[4]. For example, the ERA should determine whom to recruit (potential applicant), what types of information to be conveyed and when, and what types of systems produce these information. In terms of methodology, pattern-based methodologies have been recommended when creating or evolving information systems being supportive and leading to strong ERAs.

The research on recruitment implies that there are many recurring problems and related patterns to capture their solutions[5]. Most of these patterns are devoted to support the design of operational aspects[6]. However, the literature has addressed some limitations of these patterns as being piecemeal and fragmented, failure to integrate organization and applicant perspectives, and failure to link recruitment-related practices (policies, mechanisms and procedures) with applicant-related practices (perceptions, intentions and attitudes), and subsequently link both with organizational outcomes[3].

To overcome these limitations, we define enterprise recruitment pattern that integrates both structural and operational aspects of the recruitment system in a comprehensive way to support the design of ERAs as a whole. When solving a recruitment problem, recruitment analysts could use enterprise recruitment patterns in order to select a global recruitment strategy, providing optimal and proven recruiting guidelines and so standardize the design and building of the ERA for that problem. To enable the reuse of this pattern, we base the construction of it on a conceptual model already developed[7]. The model was built using Checkland's SSM[8] to capture the different worldviews (systems) of recruitment and develop root definitions. The definitions, subsequent analyses, and construction of model were drawn from different case studies of recruitment in defense and education. In this paper, we refined this model and called the Problem-Oriented Conceptual Model to represent the ERA, and to describe and identify a set of problems that can be solved by enterprise recruitment patterns. To define enterprise recruitment patterns, a template that is well-known and widespread is used[9]. This specific template is used to define and document the pattern which associated with the ERA elements. The template provided here is the main focus for defining the enterprise recruitment pattern. Therefore, sections of this template are defined with the aim of incorporating the ERAs elements. We also give insights into the application of this template through the recruitment process in a military environment.

The rest of this paper is organized as follows. Section 2 provides a brief definition of the recruitment system and its related components. Section 3 outlines a brief description of the problem-oriented conceptual model and the elements included. Section 4 defines the template used to document enterprise recruitment pattern. Section 5 shows an example of the pattern. Finally section 6 presents some conclusions and future work.

2. Recruitment system and its components

The focus of this paper is on the external recruitment of individuals. Based on our extensive research conducted over a number of case studies from different industries, we define a recruitment system as a configuration of information conveyed, timings, and recruitware created with the purpose of influencing the interest of potential job candidates who do not currently work for the organization to: apply for a job opening, interact until being offered, and finally accept a job offer, thereby filling vacancies with the required number and quality of applicants. There are three essential components of the recruitment system: information, timings, and recruitware. When combined and managed well, the effectiveness of recruitment system will be high, but if not they will lead to problems (i.e. no application, withdrawal, and offer rejection) that result in low overall effectiveness. Hence, we focus on these

components and define their related elements and quality features. Table 1 describes the three components of recruitment system and lists a number of typical elements and quality features to be considered in the design process.

As depicted in Table 1, it is notable that the element of each component can be further classified into single elements. The required level of a certain quality feature (e.g. attractiveness) may be influenced by multiple elements of different components. However, the level of impact of a set of elements upon a certain feature can vary

Table 1. Recruitment system components.

Main components	Elements included	Key quality features
Information	Organization characteristics (e.g. industry, activities, etc.), job characteristics (e.g. type, salary, location, etc.), application information (e.g. time, location, etc.), selection information (e.g. criteria, considerations, etc.), offer information (e.g. type of offer, embarkation time, etc.), and notifications (e.g. notice of interview, notice of offer, etc.)	Attractiveness, completeness, availability, realism and accuracy
Timings	Vacancy-based timeframe (e.g. pre-vacancy, post-vacancy, and pre-post vacancy), qualification-based timeframe (e.g. pre-result, post-result, and pre-post result), and process/activity time	Availability, responsiveness and attractiveness
Recruitware	Hardware (e.g. instruments, sites, infrastructure, etc.), software (e.g. procedures, decision rules, etc.) and humanware (e.g. recruiter, interviewer, etc.)	Accessibility, usability, attractiveness and responsiveness

according to an applicant's perspective. For example, when considering attractiveness feature, the conventional wisdom is that job characteristics are more important to job applicants than other recruitment elements[10]. Hence, these quality features need to be planed and addressed by recruitment policies (i.e. management directives) at the earlier stages of building a recruitment system. A recruitment engineer, in turn, has to consider many recruitment policies of different types of quality features, such as completeness policies, availability policies, responsiveness policies, etc.

In terms of information component, we define a list of informational elements that are critical to influence a potential applicant's interest in different stage of recruitment. Job characteristics are the most important elements. Organizational information helps to assess person-organization fit, application information is necessary to guide applicants to job opening, selection information enhance transparency and fairness thereby increasing attractiveness, and notifications are important for communication. Any failure to convey these informational elements can negatively influence an applicant's interest. With regard to the timings component, the timing of recruitment is often influenced by two types of events: the event by which the required academic results of potential applicants are posted and the event by which a vacancy is activated. To communicate the impact of these events upon the corresponding quality features, we define all possible cases at which each event is triggered within recruitment timeframe. For example, elements with *pre-* imply that the recruitment process ends by the (dis)match of the conditional job offer provided by the corresponding event. In contrast, elements with *post-* imply that the recruitment process is enacted by the respective event. Elements with *pre-post* imply that the respective event is triggered at the middle of recruitment process. In this way of classification, recruitment timeframe results from a combination of two elements (i.e. a single vacancy-based element and another single qualification-based element), and the length of process time mediate the impact of the resultant timeframe upon the corresponding quality features. Given the fact that recruitment research has been commonly limited to post-vacancy and post-result timeframe, our research conducted within large-scale organizations (e.g. military) has demonstrated that different combinations of vacancy and qualification timeframes are applied.

The third component of the recruitment system is recruitware, representing its hardware, software, and human resources, namely 1) instruments, hosting sites, and recruitment technologies, 2) recruitment procedures for administrating these instruments and infrastructure, and processing information, and 3) people using the hardware and applying procedures. There are several more reasons why these elements of recruitware need to be well-combined to produce good results. For example, recruitment technologies are the tools that only provide the desired level of a certain quality feature (e.g. accessibility); they do not add to the system's functionality. A well-chosen procedure can add value to these technologies so that the art of design is to maximize this added value. Human element should not be ignored. Good recruitment tools in the hands of less qualified people cannot be expected to produce good results.

3. Problem-oriented conceptual model

The objective of this model is that when enterprise recruitment architecture is conceptually described as a cohesive unit including its elements and relationships, building enterprise recruitment pattern based on it is possible. Defining an enterprise recruitment pattern using a template whose elements are associated with the ERA elements supports the reuse of that pattern and increases its value in defining the problems and capturing their solutions. The model is described in Fig. 1. For more details about the concept of model and its notations, we refer the reader to a recently published paper[7].

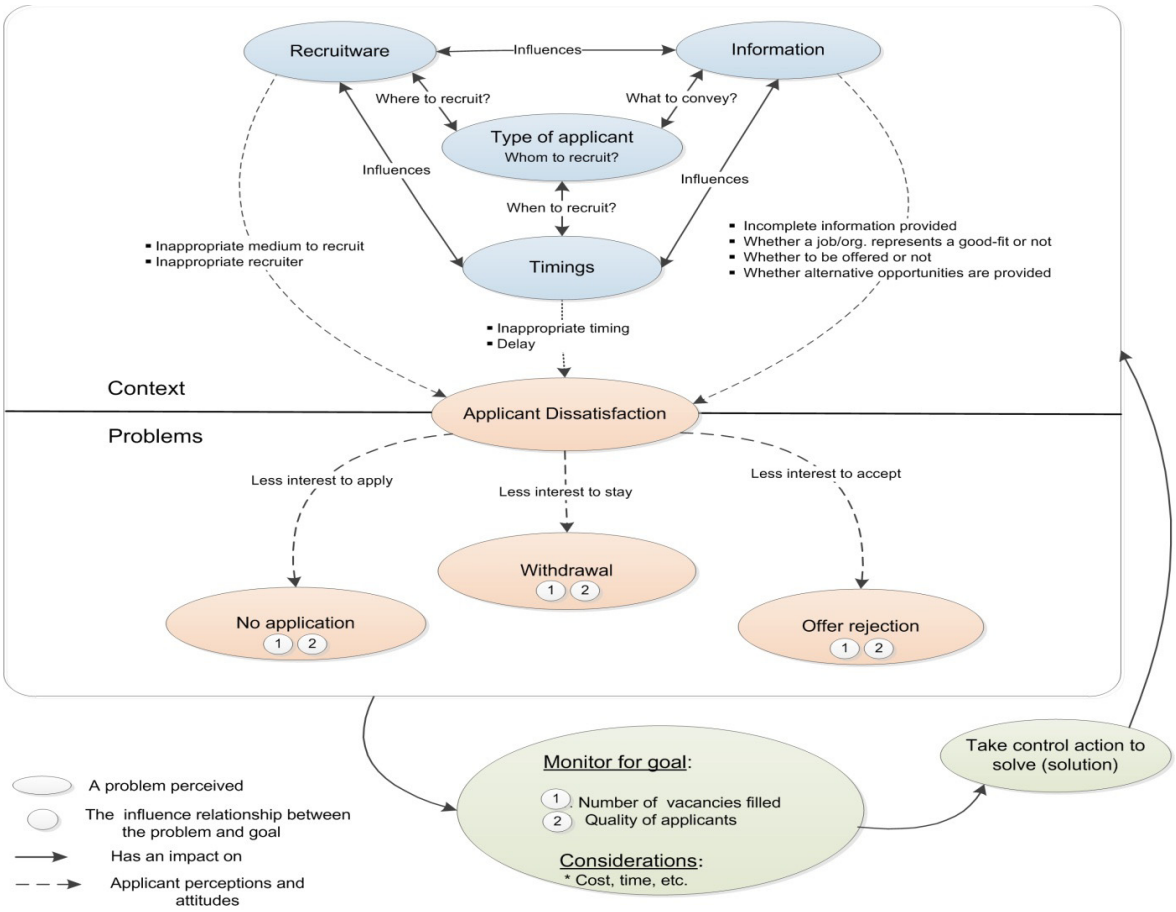

Fig. 1. Problem-oriented conceptual model

The model is problem-oriented since we believe that the optimum solution of a recruitment system should result from solving all problems embedded in its components. In this section, we focus on the key architectural elements of recruitment system for which the enterprise recruitment engineer must take into account, and we provide a brief description of them. These are the goal to achieve with the system, the context (environment) where the system will be built and used, the problems that the system need to solve in this context, the solutions to design and operate within the system, and finally the considerations of stakeholders and other systems involved.

3.1. Goal of system

The increasing importance of human capital, combined with continuing concerns about labor shortages, has made applicant attraction and recruitment more important than ever. Job seekers have become more selective in their job choices especially those have high qualifications. Hence, the goal of an organization in terms of recruitment should focus on filling its vacancies with the required number and quality of individuals. Achieving this goal requires a careful configuration and alignment between the architectural components of recruitment system. Fig. 1 shows how this goal is monitored and maintained.

3.2. Context

When building recruitment systems, the recruitment context which is the balance between potential opportunities and risks should be defined. This context is the result of decisions made from the analysis of internal and external factors. Fig.1 describes these decisions that form the recruitment context. Recruitment policies related to quality features serve as the guidelines for this context. The resultant architecture is a configuration of system components to achieve the recruitment goal within the boundaries of the recruitment context.

As described by the model in Fig. 1, the context of ERAs consists of recruitment domains (i.e. information, timings, and recruitware) which are associated with a potential applicant's satisfaction levels (i.e. perceptions). These satisfaction levels are defined by the recruitment policies in each domain and by the set of recruitment elements, mechanisms, and techniques used in it. These levels then form the "whole interest record" of a recruitment system from an applicant's perspective. When classifying the recruitment domains, we shall take into account two issues: the type of applicant sought by organization (e.g. level of skills, education, diversity, experience, etc.) and the dependencies between domains. In terms of the type of applicant, depending on whom to recruit, the recruitment policies, mechanisms, and techniques to apply to each domain could change. With regard to domain dependencies, a policy applied in one domain to satisfy an applicant can complement or contradict another in different domain. For example, attractiveness-related policies are almost complementary whereas accessibility-related policies may contradict with completeness-related policies or time availability polices.

3.3. Problems

As shown in Fig. 1, the attitudes of applicants are the outcomes variables which affect the achievement of system goal. These attitudes are the reactions to the recruitment system's interest record. Bad attitudes, such as no application, withdrawal, and offer rejection, are the results of a system's low interest record. When building recruitment systems, organization should consider the type of applicants sought and the domains' quality features influencing their satisfaction in order to increase the interest record thereby solving these problems.

3.4. Solutions

There are many solutions that assist in solving the problems abovementioned and then achieving the goal of recruitment system. These are information-related solution, timing-related solution, and recruitware-related solution. Given that recruitment domains have logical and discrete elements, the optimal solution should standardize enterprise recruitment in order to achieve good results. The model in Fig.1 addresses the relationship between the solutions and the goal of the system.

3.5. Stakeholders and systems

The interests and concerns of the stakeholders that will build, use, and maintain the recruitment system are all addressed in the model as considerations in Fig. 1. Taking into account these considerations, the organization and applicant perspectives are both combined and linked to the recruitment outcomes.

4. Enterprise recruitment template

In the previous section, we have described a conceptual model and defined a template representing the enterprise recruitment pattern. The rationale is that when enterprise recruitment patterns used in a recruitment methodology, we are incorporating the recruitment elements of an ERA within the development process. The elements of template almost correspond to the sections provided by Buschmann et al.[11], and we add some new sections that are important when building ERAs e.g. *known cases* and *considerations*. The template is described in Table 2.

Table 2. Enterprise recruitment template.

Sections	Description
Name	The name of pattern should represent the problem to be solved. The name must be also unique and within the scope of this type of pattern
Context	This section describes the generic environment under which the enterprise recruitment pattern should be applied. This may include: (a) the type of applicant to recruit (quality, experience, diversity, etc.); (b) the general features of the domains used to attract this type of applicant; (c) the set of stakeholders involved. This context can be specified by context diagram and problem frame.
Problem	This section describes the situation that has led to the necessity to apply a series of recruitment mechanisms, including the risks that cause the situation and the forces that guide the solution. The problem section should also consider the type of applicant because this will affect the recruitment mechanisms of the solution.
Known cases	This section describes the real cases of known recruitment incidents related to the problem.
Solution	This section describes how the ERA could deal with the problems associated with potential applicant attitudes. The solution can be described by the MDA model[12].
Considerations	This section describes the range of considerations associated with the solution including performance measures to achieve recruitment objectives (e.g. cost, time, etc.), complexity of stakeholders, and diversity.
Consequences	This section discusses the benefits and drawbacks of the solution in relation to the forces found in the problem.
Known uses	This section describes existing ERAs where the solution provided in this pattern has been used.
Related patterns	This section gives references to enterprise recruitment patterns that solve similar problems, consider similar contexts, or complement this pattern.

5. An example of enterprise recruitment pattern

To support the enterprise recruitment pattern, we provide here a short example of pre-result recruitment pattern that could be used by large-scale organization. We discuss in the following texts each of sections included in the pattern template.

- Name: Pre-result recruitment
- Context: Referring to the model described in Fig. 1, potential applicants associated with this pattern are those who have not yet attained their academic qualifications required for recruitment, such as university and secondary schools students. In terms of information, informational elements can be all available when recruitment starts except the academic qualification which may lead an organization to delay the selection stage, or either to use a substitutive qualification. Using a substitutive qualification may not reflect the real qualification needed for a job so that realism and accuracy of information component are affected. However, when a conditional offer provided that the real qualification is obtained at the result time is extended, this may assist an applicant to be more focused in his study towards this offer and attractiveness may then increase. In terms of timing, this timeframe increase the time available for an applicant to decide, apply and interact, and so on. Thus, availability is increased and subsequently the attractiveness of an organization may also increase. In this timeframe, delay (i.e. responsiveness feature) may be tolerated since the peak time at which the results are posted has not arrived yet. With regard to recruitware, e-recruitment may support all quality features needed.
- Problem: Post-result recruitment timeframe is very critical to less attractive organization, and demands high responsiveness to an applicant's job need. Delays in the notifications (e.g. for interview and job offer) are very risky and may lead an applicant to disregard the job opening. In large organizations where a large number of applicants received, responsiveness may decrease and then required attractiveness of an organization may also be affected.
- Known cases: A case study of military enlistment is discussed in another paper[7].
- Solution: Since pre-result timeframe increases the time available for applicant, services such as re-application, re-assessment, and re-offer can be all supported. Conditional offers can be extended. Different selection stages, cutoffs, and batches can be applied. Organizations are able to recover incidents such as withdrawal and offer rejection in a simple way. A strong relationship with applicants can be built using communication tools over time. Other fallback services such as the upgrade of offer when higher qualifications than needed are obtained, or providing alternative offers when the conditional offer is mismatched.
- Considerations: there are many considerations to take into account when adopt this pattern: costs incurred by the large number of applicant received, interventions with vacancy-based timeframes, and so on.
- Consequences: the solution provides a set of benefits to an applicant such as time available, early job confirmation upon the arrival of results, and a range of alternative opportunities. However, the uncertainty associated with applicants (e.g. whether to match the conditional offer or not, whether to be upgraded, whether to be supported with other options when fail, etc.) seems the most undesired feature which may lead to an applicant's disinterest.
- Known uses: UK's Universities and Colleges Admission System (UCAS) is currently using this solution offered in this pattern to attract undergraduate students.
- Related Pattern: none.

6. Conclusions and future work

Recruitment patterns are not applied properly when building ERAs because engineers have problems in selection and applying them in the right place. Enterprise recruitment patterns could improve the application of the patterns by incorporating them in a more comprehensive pattern that may deal with many problems. There are few approaches that define recruitment patterns with different templates and elements in different stages of the development process, none of them have addressed the architectural elements of enterprise environment. In this paper, we addressed the key architectural elements using a refined conceptual model. Based on this model, we have defined a template related to ERA in which the recruitment elements are embedded with the purpose of building recruitment systems

for enterprises. Given that the model has been validated through a number of case studies in the recruitment domain, the validation of template is still needed to improve, update, and add new elements of it.

It is notable that the complexity of ERA as well as its elements and relationships, cannot be comprehensively addressed in one model. Thus, we restricted ourselves to describing the main architectural components including their elements, features and their relationships, and incorporating them in a template. Given the template being the main focus of this paper, the future work will focus on the implementation of enterprise recruitment patterns and their aspects supported by models and automatic transformations. Hence, a recruitment methodology that is based on this template can be further developed and validated.

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