Continued Involvement in Software Development: Motivational Factors

Conference or Workshop Item

Continued Involvement in Software Development: Motivational Factors

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ABSTRACT
Software practitioner motivation has been recognised as a key factor in system quality, yet much of what we know about practitioner motivation is based on research conducted decades ago. In this paper, we present the analysis of data collected from 23 current practitioners at a workshop on motivation. This is the third in a series of workshops, each aimed at investigating the motivational factors in current software practice. We found that people factors are those most often cited, and this reinforces the findings from the two previous workshops.

Categories and Subject Descriptors
D.2.9 [Management] *Productivity, Programming Teams*

General Terms: Human Factors

Keywords: Motivation, Software Development

1. INTRODUCTION
Software Development has been an expanding market for over 40 years, and it is estimated that the global software market grew by 6.5% in 2008 and is now valued at $303.8 billion [5]. It is also predicted that by 2013 the global software market will be valued at $457 billion [5]. Motivation has been identified as a key factor affecting many important aspects of software development. Such factors include productivity, adherence to budgets, increases in staff retention and reduced absenteeism [7]. The implications motivation may have on a $300+ billion dollar industry makes the management and identification of key motivational factors crucial for the future improvement of software development and personnel satisfaction.

A predominant perspective in motivation research is that of the organisation, focusing on issues such as turnover, performance and absenteeism [7]. Only a small number of previous studies identify what is specifically motivating about Software Engineering, and we have found no research focused on understanding the motivation to stay in Software Engineering as a profession [1]. In this paper we present the results of an investigation with experienced software professionals which explored why software practitioners stay in the profession. The next section describes the research method, section 3 presents the findings, section 4 summarises the results and section 5 discusses them together with limitations and future work.

2. RESEARCH METHOD
The data was collected during a workshop at the 2009 ACCU conference. Attendees were asked to complete a set of questions, interspersed with small-group and plenary discussions. The groups were created based on the attendees self-selected roles: Developers; Technical Managers; Consultants.

Where questions were discussed within a group, each attendee filled out their own form with their own individual answers. The intentions of the discussions were to generate and inspire a greater thought process before giving a response to the question.

Responses were themed using simple categorization where the categories emerged from the data itself.

2.1 Respondent Questions
The questions were focused on *what makes you continue to be a member of the software engineering sector*. The questions were:

6. *What aspects of your job do you get most satisfaction from?*
7. *What are the features of a project that make you stay in your job?*
8. *What factors keep you in software engineering?*
9. *What makes developing software worthwhile to you?*
10. *Please write down YOUR three most important motivational factors that keep you involved in developing software:*

3. FINDINGS
The data presented in this section will be displayed in a range of formats. There were 23 useable questionnaire responses ranged over the three roles: developers (15), technical managers (5), and consultants (3).

3.1 Consultants
Detailed in figure 1 are the common categories of responses to motivational factors in software engineering for consultants. Note that there were only three consultants in this group.

Figure 1 shows that there was only consensus between all three consultants on one factor, which was *People*. All three of the consultants listed *People* as a response to one of the 5 questions, and it was listed a total of 7 times. Other commonly listed factors included *Developing*, *Challenging*, *Creative* and *Interesting.*

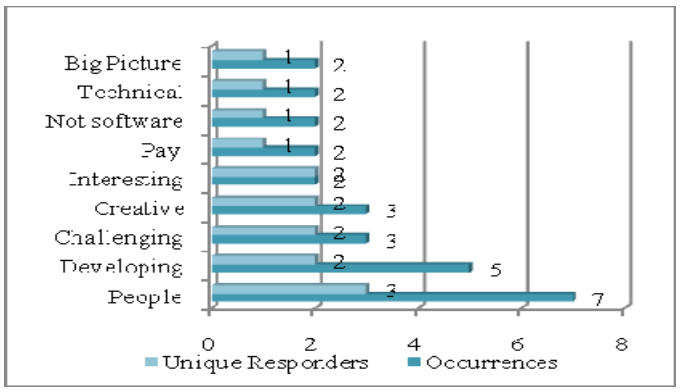

Figure 1. Consultant Motivational Factors

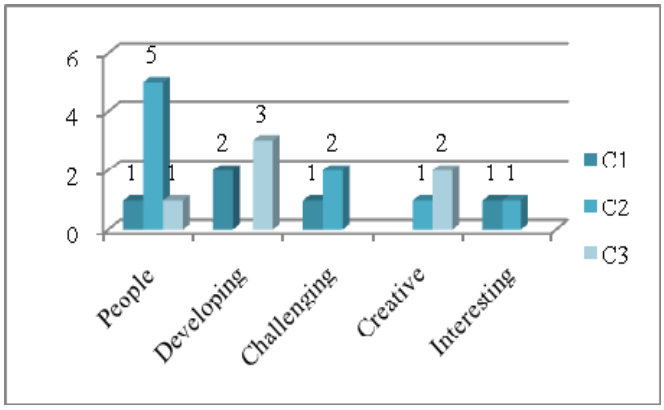

Figure 2. Consultant Motivational Factors by Consultant

Figure 2 shows the number of times each category was mentioned by each individual consultant. *People* was heavily mentioned by "C2", but also gained one mention from the other two consultants. The inherent limitations of only three respondents make a non-unanimous majority a less powerful indicator of a pattern than it would in a larger group of consultants.

3.2 Technical Managers

Detailed in figure 3 are the most factors motivating technical managers to continue being a software engineering professional.

The most commonly listed factor, *People* is not listed by all respondents. *Problem Solving*, *Financial*, and *Challenge* are listed by 4 of the 5 technical managers while *People* is only listed by 3 different technical managers although it occurs 7 times.

Figure 4 shows which Technical Manager listed which of the top four factors, and how many times they listed this factor. You can see that 'TM3' listed all of the top 4 factors, and listed *People* 3 times, where as 'TM1' only listed one of the top four factors, and only once, which was *Financial*.

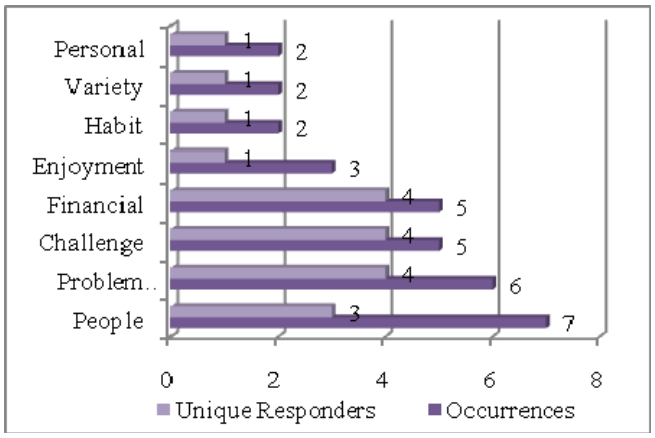

Figure 3. Technical Manager Motivational Factors

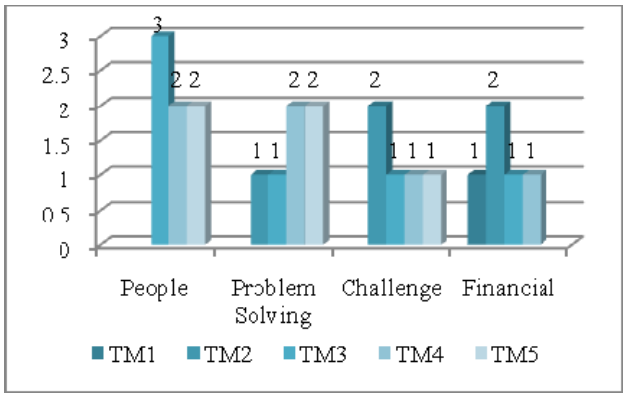

Figure 4. Technical Manager Motivational Factors by Technical Manager

3.3 Developers

Fifteen attendees classified themselves as 'developers'.

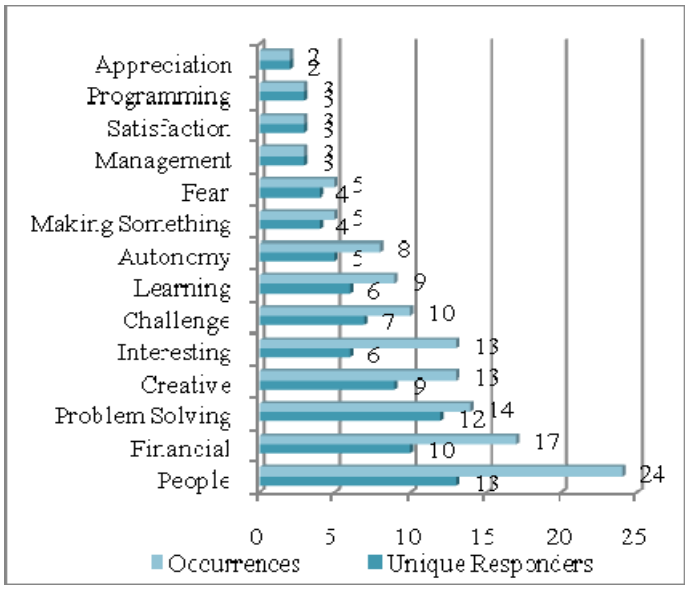

Figure 5. Developer Motivational Factors

Figure 5 summarises the response categories. The most commonly listed category was *People* with a total of 24 recorded

responses, but the number of different attendees mentioning it is similar to the other common responses. *Financial* has the second most occurrences with 17, but is the third most unique occurrence with 10 compared to *Problem Solving* which is mentioned 14 times, 12 of which are unique, giving it only one less unique response than *People* which indicates that although it is not mentioned as many times, it is important to a large majority of these developers.

Figure 6 shows which question the developers most commonly gave a similar answer for. Some answers are spread across all 5 questions, for example the *Interesting* category appears as a response to all 5 questions. *Problem Solving* only appears as an answer to two questions, and is not spread at all with it appearing 11 times as a response to question 6, making it the most commonly used response to a specific question.

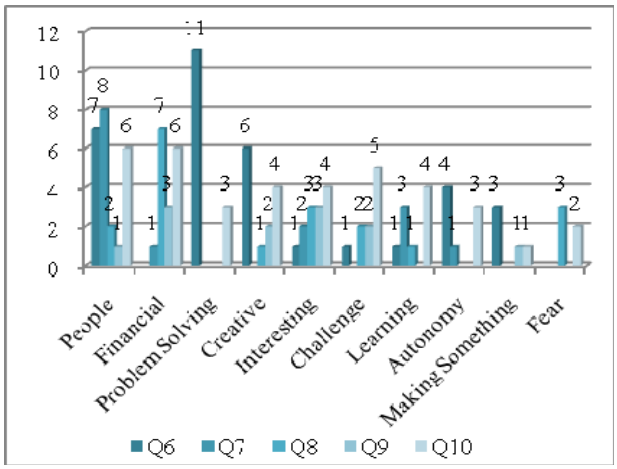

Figure 6. Developer Motivational Factors by Question

3.4 Combined

From the combined data it is clear that "*People*" was the most commonly listed motivational factor, occurring a total of 38 times as a response to the 5 motivational questions, and gaining a total of 19 unique responders. This means that 19 out of 23 attendees gave a response in the *People* category as a key motivational factor to them continuing to work in software engineering. Figure 7 displays this graphically as a percentage.

4. RESULTS SUMMARY

4.1 Consultants

The single commonly found factor for all Consultants was *People*. This factor was listed by all consultants; however deeper analysis showed that it was listed 5 times by one consultant and a single time for each of the other two consultants. The text behind these responses focused on helping individuals, with statements such as *"Helping others make improvements in their lives"* and "*Making others more successful"*.

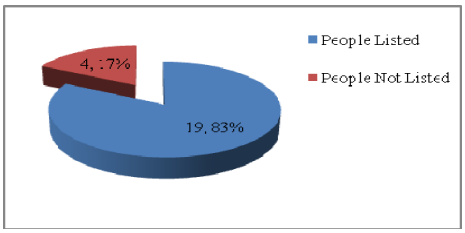

Figure 7. Combined Total Respondents Listing People

Such responses show a much more personal and helpful ideal behind their motivation to develop software. The other highlighted factors include *Developing, Challenging, Creative* and *Interesting*, which focus on personal motivational needs to be creative, do something that is interesting and to be challenged. Developing is an interesting response with one answer being "*Developing the discipline*" which suggests a much deeper involvement in the sector rather than just being interested in themselves or their own wellbeing.

It's possible one of the reasons software engineering is a vastly and rapidly changing environment is related with the attitudes of its employees who are constantly looking to be challenged and engage in interesting and creative work which subsequently develops software engineering as an entire sector.

4.2 Technical Managers

The Technical Managers showed a large number of responses relating to people, however these response were split between the personal interactions with individuals and helping them, with responses such as "*Working with good people*", "*Improving Customers' lives*" and "*Being part of a team and organisation that is excellent*". *People* is only mentioned by 3 out of the 5 Technical Managers. *Problem Solving, Challenge* and *Financial* were all mentioned by four Technical Managers.

Financial is a hygiene factor. According to Herzberg [8] the presence of hygiene factors prevents dissatisfaction but does not in itself promote satisfaction. All the responses in this category stated "*Money*".

4.3 Developers

The most common factor identified for developers is *People*, gaining 24 occurrences from 13 different developers. It is closely followed by *Financial, Problem Solving* and *Creative*. Although all three of these factors have significantly fewer occurrences, the unique number of respondents is very similar.

Interestingly *Problem Solving* is a common response to question 6, where it gains 11 of its 14 occurrences, and where it gains 4 of its 6 occurrences as a motivational factor for Technical Managers.

4.4 Combined

When the results are combined the common answers identified above are still present. There is a significant majority of 19 out of the 23 attendees stating *People* as a key motivational factor, but also *Financial* and *Problem Solving* occur often.

People, Financial and *Challenge* occur throughout all three different types of software engineers present, and this is significant as it shows a potential trend through the software engineering sector generic to all types of engineers. It might have been expected that *Problem Solving* would have been a consistent answer, and it did gain the second highest number of unique

respondents with 16 but was only present for Developers and Technical Managers.

It could also be suggested that *Problem Solving* and *Challenge* are essentially both from the same ancestor and should be combined at this level of analysis. They have been kept separate due to the responses being so specific to one word or the other, but combining them would create the largest most commonly occurring and uniquely used response with a total of 38 responses over all 3 groups containing 19 unique respondents, making it as uniquely identified as *People*.

5. DISCUSSION

The data reported here indicates that software engineer practitioners share similar beliefs about what motivates them to continue developing in this sector. The ever-changing nature of software engineering suggests that the results of any study on this sector is likely to vary over time, and will differ from previous and future studies.

It has long been established that software engineering focuses on *solving problems* [13] so the discovery of *Problem Solving* being a commonly listed factor is expected. Hall et al. [7] also shows *Challenge* and *Problem solving* as a software-engineering-specific motivator. They also identified *Team work* and *Benefit* (developers create something to benefit others or enhance well-being) as two commonly listed categories. Finding that *People* is the most commonly listed motivational factor is surprising, as it is not listed in the reviewed literature [1] although it was identified in the earlier workshops in this series [10, 11].

Franca & da Silva [6] found that the factor with the most *motivational force*[1] was *Work with people***,** followed in 3rd place by *Problems resolution*. This shows a changing trend when compared to previously identified factors, and the inclusion of *People* is new to the field as an important and powerful motivational factor.

5.1 Limitations

The most significant limitation for this study is that participants self-selected to attend the session. Hence they are not a representative sample from the population of software practitioners. The number of participants is low and the results can only be taken as indicative.

5.2 Future work

The inclusion of *People* and social factors in recent research and this workshop presents an interesting possibility that the previously believed autonomy of developers as reported by Couger and Zawacki in 1980 [4] is becoming less important. It certainly provokes the question of whether the sector is adapting, or are the employees adapting and taking the sector with them. Further investigation of these motivational factors is warranted.

Another future research direction would be to compare the personality types of software engineering personnel now to what they were reported to being in previous research, as personality studied on software engineering personnel between 1985 and 2004 differ significantly in the reported personality types [2, 3, 9, 12].

[1] Factors exerting the most influence on individuals.

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