Integration of Scrum with Win-Win Requirements Negotiation Model

Umar Zali Khan, Fazal Wahab and Saqib Saeed

Department of Computer Sciences, Bahria University Islamabad, Pakistan

Abstract: Requirements engineering is an important activity in software development process. Software engineers have to face conflicting requirements. Win-Win Negotiation model is one of the most common models to resolve requirement conflicts. In this paper, an agile framework is proposed to resolve conflicts between stakeholders and provide observational results based on formal negotiation process. It is also proposed to integrate scrum methodology in Win-Win requirements negotiation model to bring agility. In order to support this proposed model, pre and post surveys were carried out for data collection from different public and private ICT organizations [9,11,12,13].

Key words: The Win-Win · Requirements Negotiation · Agility · Scrum · Simulator

INTRODUCTION

Conflicts in requirements are very obvious part of any requirement-engineering project. Requirement negotiation (RN) is the process of resolving disagreements among stakeholders by reaching an agreement. In this phase reconciliation and collaborative approaches are adopted. In literature many negotiation models such as the Win-Win negotiation model, the Easy-Win-Win model and the Win-Win-Spiral model are discussed.

Objective of the Win-Win negotiation model is to ensure that all stakeholders achieve their goals [1-4]. This model consists of four artifacts win conditions (requirements), issues, options and agreement [5,10]. The output of Win-Win negotiation model comprise of agreed pre-requirements and unresolved issues. Easy-Win-Win requirements negotiation process model focused on continuous communication process [6,3]. The different activities and purpose of Easy-Win-Win requirements negotiation process model are to elaborate issues and options, identify conflicting requirements and reveal options to resolve identified issues. These all activities allow stakeholders to have better understanding of the requirements problem [6,7,4]. The Win-Win spiral model enhances traditional spiral model by including Theory W activities. This approach is generally used when you have time-bound releases [5].

Although many models exist to resolve conflicts in RN, but they lack effectiveness. In this paper we address the problem of resolving requirements conflicts among stakeholders and introduce a new requirements negotiation model for conflicts resolution to bring agility by using scrum methodology. Section 2 discusses the pre-survey and is followed by integration of Scrum with Win-Win model in section 3.

PRE Study: In order to understand the requirements negotiation issues in software industry in Pakistan a pre-survey was conducted. For pre-survey, public and private software organizations of Pakistan were selected. These were Telenor Pakistan, Pakistan Computer Bureau, National Engineering and Science Commission, Informatics Complex and Pakistan Tele Communication Ltd etc. For this research 55 respondents contributed and there were 14 questions in our survey form (shown in Table 1). There were multiple choices like Strongly Agree, Agree, Disagree, Strongly Disagree and Don’t Know for each question. All the users had prior knowledge of software requirements and development.

In our result we found that 70% of respondents claimed to have no understanding of the Win-Win Requirements Negotiation Models and using Ad-hoc based Requirements Negotiation. Only 30% of the respondents were using the Win-Win Requirements Negotiation, the Easy Win-Win Requirements Negotiation
Table 1: Models Representations

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win-Win Requirements Negotiation Model</td>
<td>Model1(M1)</td>
</tr>
<tr>
<td>Easy-Win-Win Requirements Negotiation Model</td>
<td>Model2(M2)</td>
</tr>
<tr>
<td>Spiral Win-Win Requirements Negotiation Model</td>
<td>Model3(M3)</td>
</tr>
<tr>
<td>Ad-hoc based Negotiation Process</td>
<td>Model4(M4)</td>
</tr>
<tr>
<td>Integration of Scrum with Win-Win Requirements Negotiation Model</td>
<td>Model5(M5)</td>
</tr>
</tbody>
</table>

Fig. 1: Integration of Scrum with Win-Win Requirements Negotiation Model

and the Spiral Win-Win Requirements Negotiation Model. No one from the respondents described usage of Agile (Scrum) methods for negotiation. Table 1 and Fig. 1 Illustrates the usage of different requirements negotiation models in software houses.

Although these traditional negotiation models are used widely in many conflicting situations internationally like peace, industrial dispute and software engineering [8] but there is lack of Agility approach. The limitations of the traditionally approaches are:

- Slow delivery of working task taking months rather than weeks
- Dissatisfaction of customer due to more budgets and duration
- Changes in requirements at implementation time which increase difficulties
- Less collaboration, cooperation and communication between stakeholders
- Face-to-face conversation are difficult because of distributed teams
- Regular adaptation is hard to changing circumstances

Integration of Scrum with Win-Win Requirements Negotiation Model: A new requirements negotiation model is proposed to reduce the previously discussed weaknesses. This section explains and describes the process of developing the integration of scrum with Win-Win requirements negotiation model into the context of requirements engineering. In doing so, this explains the methodological approach of the framework development and justifies the reasons of having a transparent, rigorous and systematic development process. In our model following roles are important.

- Requirements Negotiation Owner
- Negotiation Master
- Requirements Negotiation Team

Similarly to improve the effectiveness of process the following meetings are conducted in requirement negotiation process.

- Requirements Negotiation Sprint Planning Meeting
- Requirements Negotiation Sprint Review Meeting
- Daily Requirements Negotiation Meeting
Similarly following artifacts are developed in requirement negotiation process.

- Prioritized List of Conflicting Requirements Backlog
- Requirements Negotiation Sprint Backlog
- Delivered Negotiated Requirements

We have defined the roles, meeting types and artifacts to be developed in our proposed process. A post survey was conducted using a form, similar to the form used in pre survey.

The participants were from the same organizations. A comparison of the proposed model with the existing models was also made after post survey as shown in Table 1. We have defined the roles, meeting types and artifacts to be developed in our proposed process. We advocate for following advantages of proposed model.

- Projects or huge tasks are divided into subtasks, known as negotiable sprints, which are typically 2-4 weeks in duration
- Working task is delivered frequently
- Customer satisfaction
- Even late changes in requirements are welcomed because of agility
- Self-organizing and Self-managing teams because of Scrum
- Regular adaptation to changing circumstances

Table 2: Mean, Percentage and Variance comparisons of all models

<table>
<thead>
<tr>
<th>S.# Attributes</th>
<th>Mean</th>
<th>Percentage</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M1</td>
<td>M2</td>
<td>M3</td>
</tr>
<tr>
<td>1 Easy to understand</td>
<td>4.3</td>
<td>2.5</td>
<td>3.6</td>
</tr>
<tr>
<td>2 Reliability</td>
<td>3.3</td>
<td>2.3</td>
<td>3.1</td>
</tr>
<tr>
<td>3 Explicitly defined</td>
<td>3.3</td>
<td>2.4</td>
<td>3.4</td>
</tr>
<tr>
<td>4 Stakeholder participation</td>
<td>3.3</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>5 Stakeholders Satisfaction level</td>
<td>3.3</td>
<td>2.7</td>
<td>3.6</td>
</tr>
<tr>
<td>6 Transparent</td>
<td>3.3</td>
<td>2.9</td>
<td>3.6</td>
</tr>
<tr>
<td>7 Efficiency</td>
<td>4.3</td>
<td>2.8</td>
<td>2.5</td>
</tr>
<tr>
<td>8 Cost Effectiveness</td>
<td>3.7</td>
<td>2.9</td>
<td>3.1</td>
</tr>
<tr>
<td>9 Maintainability</td>
<td>4.7</td>
<td>2.7</td>
<td>3.3</td>
</tr>
<tr>
<td>10 Adaptability</td>
<td>3.7</td>
<td>2.7</td>
<td>3.1</td>
</tr>
<tr>
<td>11 Feedback</td>
<td>4.0</td>
<td>2.4</td>
<td>3.4</td>
</tr>
<tr>
<td>12 Robustness</td>
<td>3.0</td>
<td>2.4</td>
<td>3.0</td>
</tr>
<tr>
<td>13 Convenience</td>
<td>3.3</td>
<td>2.4</td>
<td>3.3</td>
</tr>
<tr>
<td>14 Overall-satisfaction</td>
<td>3.7</td>
<td>2.4</td>
<td>3.1</td>
</tr>
</tbody>
</table>

After analysis the above data it was found that most of the respondents were unaware from Requirements Negotiation (RN) processes and using Ad-hoc methods. No one was using the agile techniques like extreme Programming (XP), DSDM and SCRUM etc. So the above Model is proposed using Scrum and after post survey, Table 1 and Fig. 2 illustrates the results of requirements negotiations via comparison. In table 1 more mean values of M1, M2 and M3 in comparison to our model (Integration of Scrum with Win-Win Requirements Negotiation Model), highlight that in certain points like Easy to understand, Efficiency, Cost Effectiveness, as in Fig.1 Win-Win requirements negotiation model shows better results but this could be due to low population size, so there is need to further experimentation.

The good and fair comparison has been attempted between the Ad-hoc based Requirements Negotiation Method and the proposed model due to enough sample data. In most of the points like Easy understand, Reliability, Explicitly defined, Stakeholders Satisfaction level, Transparent, Cost Effectiveness, Adaptability and Feedback etc, of the proposed model shows good results in the average, percentage and variance than those of the Ad-hoc based process. Although in certain points like Stakeholders Participation and Maintainability the proposed model shows weak results than those of the Ad-hoc Based Requirements Negotiation process as shown in the table 1.
CONCLUSION

It is concluded that there are many existing models for requirements negotiation for different large and small projects. These models were developed between 1989 and 2010. Ad-hoc process is still pre-dominantly used in Pakistani industry. There is some partial usage of Win-Win and Spiral Win-Win, as shown in the table 1 and Fig.1. It is very easy to integrate requirements negotiation practices with scrum on a small and large distributed system. This can improve software productivity, reduce project failure risk and increase collaboration among stakeholders.

REFERENCES