Abstract— The purpose of this research is to discuss about the requirement elicitation techniques and issues. Some issues are discussed in the paper that is in the requirement elicitation process and solving these issues is important for the implementation of requirements. The paper also provides an overview of the importance requirements elicitation to study the nature of the process. Requirement Elicitation is important for developing any new system or extendable system. The paper includes the discussion about all the major activities starting from requirements elicitation till their management.

Index Terms— Elicitation, CMMI model, volatility, NFR (non-functional requirements), cognitive techniques

I. INTRODUCTION

Today is the age of information and technology that’s why the demand of software is increasing day by day and its development mainly depends on requirement engineering process.

Requirement engineering most important phase is requirement elicitation. Success of software depends on the user satisfaction. If the user is satisfied than the project success is 100% guaranteed and the user satisfaction mainly depends upon the requirement elicitation process. Collecting the requirements from stakeholders using different techniques is called requirement elicitation. Requirement elicitation process is one of the important phases in software development. Initially many software failed due to the problems of requirement elicitation process.

The aim of the paper is to discuss the issues faced during requirement elicitation process.

II. SURVEY PAPERS SUMMARIES

A. A New Approach for Software Requirements Elicitation

Requirement elicitation is the most crucial phase in software development. Any error in elicitation can lead project to a complete failure. Traditional requirement elicitation has many problems which are “problem in defining the scope, problem in understanding the need of the stakeholder and problem of volatility”. To overcome problems in requirement elicitation some new techniques can be used i.e. training the stakeholder so that they can know the limitations of system, highlighting the keywords and mapping it correctly, pictorial representation to avoid language barriers, quality function deployment can be done to check whether the requirements are according to system functionalities or not and to check consistency of requirements, check the risks according to the “CMMI model” and eliminate them.

B. Successful Requirement Elicitation by Combining Requirement

Now a day stakeholders play a very important role in requirement engineering process. There are many techniques to elicit requirements but to get correct requirements combination of requirement engineering tools are used to elicit requirements like interviews, workshops and feedback. To maintain product quality it is important to involve stakeholders in every phase of requirement engineering process so that requirements can be taken correctly and the end product is according to the stakeholder needs and expectations. During requirement elicitation first interviews are conducted to gain requirements than the needs are analyzed by the requirement engineers through meetings and
brainstorming. After this business expert find the problems and there solutions. After this workshops are held to prioritize, refine and to negotiate. At the end iterative development is done so if there is any new need of customer that can be fulfilled.

C. A Survey on Issues in Non-Functional Requirements Elicitation

NFR are the most important constraints to be fulfilled. Inconsistency in NFR can result in failure of software that’s why NFR should be considered in every phase of development. Now a day in industry in initial stages NFR are not given attention that’s why starting phases do not replicate NFR because of which resultant product do not fulfill all the expectations of user. Eliciting NFR is difficult because they are not clearly specified and are difficult to adjust because functional requirements are dependent upon NFR. Issues that are faced only by NFR which are integrating NFR with functional requirements, conflict in requirements, vague specifications of system’s features.

D. Guidelines for the Selection of Elicitation Techniques

Selection depends on the priorities and needs of the project also select the parameters. Some techniques are analyzed for the selection and then decided which technique to use. Workshops, interviews and scenarios are good techniques for almost every project. Combination of techniques should be used to make it effective. Parameters can be adjusted for projects. This method will help engineer for selecting elicitation techniques.

E. Requirements Elicitation: Issues and Challenges

There are some major issues faced during requirement elicitation process. In traditional way of elicitation there occur many issues like there are statements during interview which contain some confusion. Sometimes interviewer doesn’t get response according to its requirements because of which elicitation process is useless. Combination of elicitation techniques is used to make elicitation effective but there are some issues like politics within the organization, as some stakeholders are not technical so they are not able to elicit requirements effectively. Elicitation can be done through observation but it is not good technique when we don’t have much time and for observation we need a conductor which have knowledge about observation domain if he is not available the project may suffer. Innovative techniques are used which is modern prototyping technique which is used for visualizing the product or we can say user interface but it is not useful for big projects.

F. Modern Trends towards Requirement Elicitation

Elicitation is a phase in RE process which is used to assemble the needs of stakeholders. It is the most difficult task in building software if there comes in issue in elicitation it may lead project to failure. There are four basic types of requirement elicitation “conversational method, observational method, analytical method and synthetic method”. There are some restrictions for engineer like time and cost in order for success of project following strategies will be helpful i.e. interviews are effective for improvement of the old software, checklist is applicable when we have fewer requirements, JAD/RAD is applicable when we have multiple stakeholders, scenarios and storyboards are effective when the time is limited and budget is low, ethnography is effective when we have to update the system, more than one techniques are used to elicit requirements and work should be done in two groups because one person cannot do all this. One group will gather the information and structure them and the other will do validation work.

G. Investigation and Discovery of Core Issues Concerning Requirements Elicitation in Information Technology Industry and Corresponding Remedial Actions (An Inductive Case Study of Pakistan’s IT Industry)

Many failures in IT industry are due to issues faced during elicitation These are the issues in elicitation are problem of scope means un clarity about the exact features, “problem of understanding” means problem in understanding the needs because of language barrier or some other reason and “problem of volatility” means the user requirements changes with which is difficult to handle. There are some recommendations to solve these problems. Analyze the context deeply, Manage the change of requirement properly, staff should be experienced and have knowledge about the work, all the stakeholders should be involved, prototype the system and validate it from stakeholders, check that implementation is according to the requirements, iterative approach should be used so the errors can be correctly easily, QFD should be adopted for the better understanding of requirements.

H. Requirements Elicitation and Elicitation Technique Selection: A Model for Two Knowledge-Intensive Software Development Processes

“A Model for Two Knowledge-Intensive Software Development Processes “is used for selection of requirement elicitation can. This model helps in identifying the technique used for elicitation based on some knowledge. Mangers will have clear knowledge about the elicitation technique and analyst can compare results with other techniques. Analyst can make changes in the existing techniques it will help to modify technique according to their situation. They can easily make new technique according to the situation.
I. Non-formal Techniques for Requirements Elicitation, Modeling, and Early Assessment for Services

Elicitation gives important contribution in software development and for successful elicitation it is important that stakeholders easily understand techniques. There are some stakeholders who are non-technical so they cannot easily understand formal techniques of elicitation, so non-formal techniques play an effective role during elicitation.

J. A New Perspective on Requirements Elicitation Methods

The Requirement engineering discipline sought an answer to the problem, but opened the community to face a new problem that how to elicit the requirements of wide audience end-users. For this new view point of requirements elicitation, the suggestion is to use the methods originating from the three categories of requirements elicitation: group elicitation, contextual, and cognitive techniques.

K. International Journal of Advanced Research in Computer Science and Software Engineering

Requirement engineering will play an important role in software development. Requirements engineer are very difficult and complex task to gather proper. Some issues that are difficult to understand in requirement engineering process are confusion of project scope, inadequate stakeholder’s involvement, communication and negotiation skills, ineffective techniques, time constraints, improper documentation, lack of requirement management and inconsistent requirements. Solving these issues is the necessary part for the success of the software implementation of requirements.

L. Eliciting and Specifying Requirements with Use Cases for Embedded Systems

By implementing elicitation techniques it has been observed in requirement engineering, that the requirement elicitation is the initial process towards creativity and based for making any software. Requirement elicitation technique is great importance in all aspect because these techniques are very important and necessary for the success of any developing system. Requirement elicitation can deal with fact-finding, information gathering and getting the requirements. Most of the requirement problems are because of wrong implementation of elicitation techniques.

M. A Feature Modeling Approach for Domain-Specific Requirement Elicitation

The stakeholders that are involved in the requirement elicitation are from different disciplines, with different backgrounds, and with different levels of experience in software development. This thing can make the process of requirement elicitation difficult. This approach is based on Feature Modeling. The issue to consider for a particular domain during requirement elicitation is modeled by means of a feature model. The approach has been demonstrated for two different domains, one is domain of serious games for children and the other is domain of e-shop web applications.

N. Requirement Elicitation Technique: - A Review Paper

Requirement Elicitation is important for developing any new system. Due to wrong elicitation decision most of the system does not work. It is not possible to find out requirements and the needs of the users without help of elicitation technique. The most important challenge for analysts during elicitation process is to ensure effective communication between analyst and the users. Most of the complexity comes in the system because of bad communication between user and analyst.

O. Elicitation Technique Selection: How Do Experts Do It

For each elicitation technique, there is a specific, unique, small set of predicates concerning situational characteristics that can be drive experts to seriously consider that technique. We can say them the “Major Drivers. For each elicitation technique, there is a set of additional predicates which are important if true cause experts to alter their primary choice. We can say them “Anomalies.” This paper will be helpful in understanding the techniques that experts use during elicitation and the situational factors they consider when choosing those techniques. Future research allows the extension of these conclusions to a wider range of experts, techniques and situations, provide specific guidance to practicing analysts, and ultimately make the state of the practice in requirements elicitation better.

P. Systematic Review of Requirement Elicitation Techniques

According to the research paper, by implementing elicitation techniques it has observed in requirement engineering, requirement elicitation is like and backbone. It is the first step towards creativity and based for making any software. Requirement elicitation deals with different techniques to gather information. There is no technique which can accomplish all the demand of requirement elicitation and information gathering but it is important to keep in mind that success of requirement elicitation didn’t depend upon number of techniques used.

Q. Persistently Effective Query Selection in Preference Elicitation
In this paper the discussion is about the whole process of requirement engineering by discussing all the major activities starting from requirements elicitation till their management. The paper also includes the detailed description of various elicitation techniques. The provisions have also been made for suitable placement of the elicitation techniques to be proposed in future by the researchers in the related area. These elicitation techniques are based on well-defined parameters.

R. A Model for Eliciting User Requirements Specific to South African Rural Areas

The critical evaluation of requirements elicitation techniques may contribute the improvement of the requirements elicitation process, every requirement elicitation technique have its own set of advantages and disadvantages. These advantages and disadvantages will vary depending on the context within which the techniques that are applied. Thus, there are greater values in defining a methodology to hold up the application of requirements elicitation techniques, By providing a dynamic and accommodating framework for user requirements elicitation will be adapted according to the stages of the software development lifecycle.

III. ANALYSIS

In table 1 the parameters that are discover in the twenty research papers are elicited. The research papers are evaluated on the basis of 10 parameters listed in the table 1. Table 2 provides the result of analysis.

Requirement elicitation process can be enhanced by using some techniques. Solutions are introduced to make the requirement elicitation process successful in A. Yazici et al [1], R. Lee et al [7], A. Sajid et al [8], C. van der Veer et al [3]. Issues and challenges in requirement elicitation have been discussed in A. Yazici et al [1], S. Ullah et al [2], C. van der Veer et al [3], R. Lee et al [7], A. Sajid et al [8], S. Sharma et al [9]. Formal techniques are difficult to understand by non-technical users so non-formal techniques can be used for eliciting requirements. Non-formal techniques for elicitation have been introduced in C. van der Veer et al [3]. Non functional requirements plays very important role in development of software. Issues in non functional requirements have been discussed in S. Ullah et al [2], M. Davis et al [16], T. Tuunanen et al [11], E. Janssens et al [14] and G. Huzoori et al [12] considers issues that are faced during software development, in their papers. Issues are necessary to solve to implement the elicitation techniques. E. Nasr et al [13], M. Davis et al [16], S. Khan et al [20], W. Fleming et al [18] and S. Flowerday et al [19] discuss about the requirement elicitation techniques in their paper, T. Iqbal et al [17], W. Fleming et al [18] and E. Nasr et al [13] these papers deals with fact-finding, information gathering and getting the requirements. E. Janssens et al [14] in this paper discussion is about feature modeling. E. Janssens et al [14], E. Nasr et al [13] S. Cruzes et al [15], W. Fleming et al [18] and T. Iqbal et al [17] these papers give the guidance about the elicitation techniques. S. Cruzes et al [15], M. Davis et al [16], T. Iqbal et al [17], W. Fleming et al [18], T. Tuunanen et al [11] and E. Nasr et al [13] these papers include the complexity factor that involves during the developing of system software.
### Table I: Evaluation Parameters

<table>
<thead>
<tr>
<th>Sr#</th>
<th>Parameters</th>
<th>Definition</th>
<th>Possible Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Case study</td>
<td>The analysis of a person that can be used as a help scenario in a research.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>2</td>
<td>Ambiguity</td>
<td>Something that is difficult to understand and does not have a clear meaning.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>3</td>
<td>Integration</td>
<td>To join NPR with functional requirements in order to work functional requirements properly.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>4</td>
<td>Tools</td>
<td>Pre-designed apparatuses used to carry out different experimentation to achieve the organizational goals.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>5</td>
<td>Feasibility</td>
<td>Ability to do something easily.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>6</td>
<td>Model</td>
<td>The sets of instructions those act as standards to complete processes.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>7</td>
<td>Effectiveness</td>
<td>The degree to which something is successful in producing a desired result.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>8</td>
<td>Complexity</td>
<td>The state and quality of being difficult and complicated.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>9</td>
<td>Effective communication</td>
<td>Effective Communication is getting a message across in a clear and understanding way, and making sure that message is received and understood properly.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>10</td>
<td>Methodology</td>
<td>A set of methods, rules, or ideas those are important in a particular area of study or activity.</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

### Table II: Analysis of Parameters

<table>
<thead>
<tr>
<th>Sr#</th>
<th>Case study</th>
<th>Ambiguity</th>
<th>Integration</th>
<th>Feasibility</th>
<th>Model</th>
<th>Tools</th>
<th>Effectiveness</th>
<th>Complexity</th>
<th>Effective communication</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A. Yazici et al, 2008</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>S. Ullah et al, 2011</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>C. van der Veer et al, 2011</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>A. Ahsan et al, 2010</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>A.M. Hickey et al, 2002</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>S. Kausar et al, 2010</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>R. Lee et al, 2005</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>A. Sajid et al, 2010</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>S. Sharma et al, 2013</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>10</td>
<td>T. Tuunanen et al, 2003</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>11</td>
<td>G. Huzooree et al, 2015</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>E. Nasr et al, 2002</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>13</td>
<td>E. Jansens et al, 2014</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>
IV. CONCLUSION

In this paper different elicitation techniques are discussed. According to the paper by implementing requirement elicitation techniques it has been observed that requirement elicitation is the most important and the initial step towards making new software. Requirement elicitation techniques are the key to success in developing any new software. Selecting the right technique is important but there is no technique which can accomplish all the demand of requirement elicitation because there are so many issues like confusion of project scope, inadequate stakeholder’s involvement, communication and negotiation skills, ineffective techniques, time constraints, improper documentation, lack of requirement management and inconsistent requirements.

There are some issues that are faced when you implement the elicitation techniques and that issues are necessary to resolve so that you can make software. After the discussion about the elicitation techniques and issues the results gathered were analyzed using various parameters. For the future work, hopefully after some time a systematic strategy will be available to select the best and appropriate techniques so that the software will easily developed.

REFERENCES