

An Overview of Requirement Elicitation Techniques by Taking ART SCENE as One of Base Elicitation Tool

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Abstract: Requirements elicitation is the way toward looking for, revealing, getting, and describing requirements for computer-based systems. It is by and large comprehended that requirements are inspired instead of just drawn together. This suggests there are discoveries, growth, and advanced components of the elicitation procedure. Requirements elicitation is a complex procedure, including various exercises with a collection of available systems, methodologies, and instruments for completing them. The paper introduces a thorough study of the essential parts of the strategies, methodologies, and instruments for requirements elicitation, and inspects the ebb and flow issues, patterns, and difficulties looked by analysts and professionals in this field.

ART SCENE is a tool-supported contextual method for requirements elicitation and is created to gather requirements in a more detailed, complete and efficient way. It uses important aspects of other requirements elicitation techniques like contextual inquiry and scenario-based techniques.

Keywords: ART SCENE CoRE, Challenges, Requirement elicitation, Techniques and tools.

I. LITERATURE SURVEY

Requirements for information systems can be revealed using several methods like stakeholder interviews, joint requirement development sessions, use cases or more traditional way of representing lists. Although these methods have proven to be successful, still they have few disadvantages. ART SCENE combines the best aspects of Joint Requirements Sessions and scenario-based techniques. It differed from the other requirements gathering techniques, while it bases its sessions with stakeholders on possible scenarios [1]. Case studies have shown the effectiveness of ART-SCENE for discovering requirements for software systems, such as those used in air-traffic management.

ART-SCENE CoRE has successfully been used in practice within the SemWay project, which is a project of the Technical University of Vienna and other technical partners to develop electronic navigation support from numerous companies [2].

The requirements elicitation speaks of a before time, yet consistent and basic stage of the improvement in software systems. The requirements for a software system might be spread crosswise over several sources [3].

These incorporate the proprietors having a problem, the stakeholders, certification, and other presentation systems. In view of the correspondence wealthy nature of requirements elicitation exercises, a significant number of the most successful procedures don't start from the conventional regions of software designing or computational science research [4].

II. INTRODUCTION

One of the primary setbacks confronting software development project groups is communication gap and advance promise relating to the requirements. The fundamental principle is that ideas which are properly understood by one group can be altogether obscure to the individuals of another group. The procedure regularly goes unnoticed over the span of elicitation till they arrive at some conclusion for a particular problem. Data arising out of different recognized stakeholders is accumulated. The Requirements Analyst derives data from each of these data collections for the requirements of the application and about their anticipation with regard to achievement from the application.

In view of the numerous stakeholders included, the catalogue of requirements accumulated by this procedure could keep running into pages. The level of detail of the requirements catalogue is based on the number and size of client gatherings, the level of complication of business forms and the reach of the application. It includes a treatment of many issues like:

- Ambiguous comprehension of procedures.
- Inconsistency inside a solitary procedure by different clients.
- Insufficient contribution from stakeholders.
- Contradictory stakeholder interests.
- Alterations in requirements after the project has started.

A Requirements Analyst needs to connect intimately with a number of work-gatherings which usually have the incompatible

objectives to reach an original requirements list. Solid correspondence and relationship building abilities along with sound programming information are essentials for a specialist Requirements Analyst. The requirements elicitation process incorporates Interviews, Questionnaires, User Observation, Workshops, Brain Storming, Use cases and Prototyping, done through stakeholder gatherings or meetings. For instance, an imperative first gathering could be between software engineers and clients where they talk about their viewpoint of the requirements.

Requirements are gathered by an ongoing elicitation procedure before they can be analysed, presented or established. Requirements elicitation is a part of the requirements engineering process, as a rule took after by examination and determination of the requirements. The paper is categorized into following sections: Section 2 represents brief overview of Requirement elicitation including its process, techniques and tools of elicitation. Section 3 describes issues related to elicitation techniques and their benchmarks. It also defines comparison of existing approaches and methodology based on requirements elicitation techniques. Section 4 implements a brief study on development of mobile application for restaurant waiters by using ART SCENE tool. Section 5 gives the conclusion of the following paper.

III. REQUIREMENT ELICITATION

Requirements elicitation is associated with studying and comprehending the necessities of clients and project supports with a definitive point of imparting these requirements to the system engineers. A generous piece of elicitation is devoted to revealing, extricating, and materializing the needs of the potential stakeholders. In Requirements Engineering, 'Requirements Elicitation' is the act of getting the requirements of a system from clients, clients and different stakeholders. This act is many times called as *Requirements Gathering*.

The term Elicitation is defined in books and research work as not to depend on the client totally for great requirements, but to presume by various intellectual methods the pre-requirements of the client in advance, as would be demonstrated by the name requirements gathering. Requirements elicitation is non-insignificant on the grounds that you can make sure you never get all requirements from the client or by simply asking them system to find out the requirements. It is a large intellectual work, which is to be done before the system is devised properly.

A. Requirement Elicitation Process

The requirements elicitation process incorporates an arrangement of activities that must contemplate correspondence, prioritization, exchange, and facilitated exertion with all the relevant stakeholders. It should similarly give a solid ground to the growth, exposure, and creation of requirements as a major characteristic of an exceptionally intelligent elicitation process. Indeed, there is rare stability in the research and writing work on giving the names of the exercises regularly performed amid

requirements elicitation. However, the most recognized part is that elicitation is the underlying stage inside the RE procedure though an iterative and incorporated one. The typical activities of the requirements elicitation process can be separated into four major types as depicted underneath:

- *Understanding the Application Domain:* It is vital while starting the procedure of requirements elicitation to research and analyze clearly the circumstance or "real world" in which the system is going to eventually live. Present work forms and the corresponding problems to be settled by the system should be portrayed regarding the key business objectives and materials.
- *Identifying the Sources of Requirements:* Requirements might be extended crosswise over many sources and exist in an assortment of organizations. In all software development projects various conceivable sources for requirements might be distinguished. Stakeholders speak to the clearest wellspring of requirements for the system. Clients and topic specialists are utilized to supply point by point information relating to the problems and client needs.
- *Analyzing the Stakeholders:* Stakeholders are individuals who have an enthusiasm for the system or are influenced somehow by the expansion and usage of the system and subsequently should be consulted amid requirements elicitation. Regularly stakeholders incorporate gatherings and people inward and outside of the organization.
- *Selecting the Techniques, Approaches, and Tools to Use:* Though few may defend that only one elicitation strategy or a solitary methodology is adequate and might be connected to all cases, it is by and large recognized that an individual requirements elicitation system or approach can't in any manner, shape or form, be reasonable for all projects. The selection of methods to be used is subjective to the particular setting of the project and is commonly a basic factor in the achievement of the elicitation procedure.

These integrate (a) the procedure selected is the only one the assessor knows, (b) the approach selected is the expert's top choice, (c) the selected system is the one prescribed by a particular philosophy that is being taken after for the system development, and (d) the result of the method is administered specially by the instinct of the investigator to be productive in the present context [5].

B. Techniques and Approaches of Requirement Elicitation

They are listed below:

- a. *Interviews:* They are likely the most customary and usually utilized method for requirements elicitation. Since interviews are basically individual based social exercises, they are intrinsically informal and their viability relies significantly on the nature of the connection between the members. Interviews give a proficient method to gather a lot of information rapidly. Unstructured interviews are conversational in nature

	Interviews	Questionnaires	Task Analysis	Introspection	JAD	Ethnography	Prototyping	Viewpoints	
Selecting techniques and approaches		X	X	X					
Eliciting the Requirements		X	X	X	X	X	X	X	X

A. Elicitation Techniques Based on Methodology

Methodology and model driven approaches give methods for speaking to the current or future procedures and systems utilizing expository strategies with the goal of examining their qualities and degrees of restriction. Objective, situation, and specialist based modeling systems likewise utilized for requirements elicitation apart from the two methodologies portrayed below.

- a. Structured Analysis and Design (SAD) exists since the mid nineteen seventies and is mostly function based.

It contains a gathering of procedures, for example, Data Flow Diagrams (DFD) which explains the functional decomposition with the accentuation on the data all through the system and connected segments, and Entity Relationship Diagrams (ERD) that encourage the portrayal of system substances, their characteristics, and their associations to each other.

- b. Object Oriented (OO) approaches, and particularly the Unified Modeling Language (UML) contain a few methods frequently utilized for requirements elicitation to set up yet adaptable documentations and configurations, for example, Use Case diagrams, Use Case depictions, and Class Diagrams [9].
- c. Soft System Methodology (SSM), is about organizational problems and change, and Quality Functional Deployment (QFD), concentrates on accomplishing consumer loyalty in the course of quality based development.

V. ART SCENE ELICITATION TOOL

ART-SCENE CoRE method could be divided into five main activities as given below:

- a. *Preparation and Design*: It is executed by the requirements engineer, where the main deliverable is the list with stakeholders and corresponding use cases, which are influenced by the new system. First of all, this includes the identification of the involved stakeholders that will be affected by the implementation of the new

system. Then the tasks must be identified for each of the stakeholders that are related to the new system and must be transformed into use cases and their corresponding use case specifications.

- b. *Preparation of Data*: It is also performed by the requirements engineer, and is about selecting stakeholders and creating a scenario list for the on-sitewalk through. The requirements engineers will then key out the scenarios which are suited for on-site walk-throughs, meaning that the scenario must be evident and cannot be easily assessed off-site. Another criteria for the scenarios is the possibility of interruption, where stakeholders can be stopped in their process to ask them about exceptional situations.
- c. *On-site Scenario Validation*: It validates and updates the previous decisions taken by stakeholders. Interviewers are recommended to do an on-site scenario validation before starting the scenario walk-through, to avoid irrelevant questioning and to identify more elaborating questions as an addition to the automatically generated questions. This validation can for instance be done by observing stakeholders' work [10]. After this validation the scenarios can be corrected by the interviewer and can be complemented by more specific, in-depth questions.
- d. *On-site Scenario Walk-through*: The main goal of the interviewer here is to define requirements for the new system.

In the last phase, 'analysis and follow up', the actual requirements are put together with the requirements engineer in the final deliverable: the requirements list.

The interviewer then will during the scenario walk through have the task of observing and interviewing, and makes notes on every aspect of the scenario that could be relevant for the eventual system design.

- e. *Analysis and Follow-up*: The validation of the requirements, then is discussed during workshops, where a large number of stake holders and requirements engineers are being involved in.

TABLE II: ACTIVITY TABLE OF ART SCENE ACTIVITIES

Activity	Sub Activity	Description
Planning and Design	Identify stakeholders	All STAKEHOLDERS are identified that will be affected by the system by the requirements engineer.
	Define use case Specifications	For each of the STAKEHOLDERS the USE CASE Specifications are defined by involving all stakeholder tasks that are affected by the system.

<i>Activity</i>	<i>Sub Activity</i>	<i>Description</i>
Walk-through Preparation	Generate scenarios	For each of the defined USE CASES all the difference, Relevant SCENARIOS must be identified and listed. This can either be done by hand during workshops, or by automatic generation using a tool.
	Create scenario list for on-site walk-through	Of all the defined SCENARIOS, the ones that are feasible for on-site walk-through must be selected and summarized in a SCENARIO LIST per STAKEHOLDER.
	Select interviewees	The STAKEHOLDERS are selected, that are needed to be involved in the on-site inquiry. This assessment is based on the agents and actions as described in the USE CASE SCENARIOS selected in the previous sub activity.
On-site Scenario validation	Identification of misleading / missing scenario events	The occurrence and sequence of scenario events in daily work practices must be confirmed by the interviewee. Also, any unrecorded scenario events recalled by the interviewee must be considered and added to the SCENARIO.
	Update scenario list	The interviewer must alter the SCENARIOS LIST adding the newly discovered scenario events.
On-site scenario walk-through	Perform conventional interview	The interviewer introduces herself to the interviewee, explains the outline and goal of the interview and discusses with the interviewee which USE CASES will be evaluated during the inquiry.
	Perform a scenario walk-through	The interviewer observes the STAKEHOLDER and asks questions based on the different SCENARIOS for each USE CASE. The interviewer and STAKEHOLDER together discuss the performed tasks and identify new requirements.
	Documentation of requirements and inquiry comments	The discussed REQUIREMENTS are recorded along with extra notes that also could be of relevance for the systems design. This can be done by capturing a task on video, making audio recordings of discussions or by creating text-based information cues.
Analysis and follow up	Combine results and create requirements list	The gathered information from all the inquiries is analyzed and transformed into one LIST OF well-defined REQUIREMENT statements.
	Validate the requirements list in workshop	The LIST OF REQUIREMENTS is then validated during Workshops with a large group of stakeholders.

A. Example to Implement ART SCENE Tool

The paper elaborates the concept of ART SCENE tool by taking an example of the development of mobile application for restaurant waiters to book customer orders and communicating with them.

During the first activity the stakeholders are selected that are affected by the new system. In this case this could be a restaurant manager, call center operators and waiters. For each of these stakeholders the tasks and use cases are defined that are somehow related to the new system.

Examples of use cases for waiters could be calling for backup for providing a home delivery system or checking available cuisines.

For the second activity the possible scenarios are defined for each of the use cases. This can either be done by hand, or by using a scenario generator as included in the ART-SCENE CoRE tool. For “calling for backup” this could be done by

asking several what-if questions. For example “what would happen if there is no backup available?” or “what if the radio signal is blocked?” Then scenarios are evaluated whether they are suitable for on-site walk-through validation and verification.

Then the actual on-site part takes place, where first the interviewees are asked to confirm the relevance of the generated scenarios and if possible to come up with unmentioned scenarios. The waiter, for example, could mention that it is not relevant to ask him about “what to do when no backup is available”, because these types of problems are handled by the hotel manager. The task of waiters is to deliver at the customer’s destination.

VI. CONCLUSION

The primary aim of Requirements Engineering for the data warehouse is to identify the informational needs of the decision-makers as it purports to identify the informational needs of the

decision-shapers, hence relieving the cost and time which was incurred before in extraction, cleaning and filtration of the needed information. The procedure of requirements elicitation, comprising the selectable methods, approach, or apparatus to utilize while evoking requirements, is dependent on numerous factors such as, for example, the kind of a generating system, the phase of the project, and the application domain. In light of the relative qualities and shortcomings of the accessible strategies and the kind of information they provide, actually in all projects a mix of a few distinct methods will be important to accomplish a fruitful result. The greater part of the approach requires a noteworthy stage of aptitude and skill of the expert to be utilized adequately. However, deriving out of the scope of existing procedures, varieties of interviews, gathering workplaces, perception, objectives, and situations are as yet the most generally employed and victorious in practice.

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