Chapter 5
Adequacy of Elicitation Techniques
5.1 Introduction

As mentioned in earlier chapters, after establishing and defining the key attributes for technique selection, we have to determine the adequacy of using each technique for each attribute value. In this chapter, we present an analysis of the adequacy of the elicitation techniques that we will use as baseline information for the proposed framework. Figure 5.1 shows the location of this information in the selection procedure.

The elicitation techniques considered in this study are a broad set of the existing universe of techniques. This is not a definitive subset, and new techniques can be added to the framework at any time provided their adequacy values can be justified. The elicitation techniques used in this research are described in Appendix A.

To determine the adequacy of the techniques, we reviewed the related literature to arrive at a recommendation on the use of techniques for a particular influential attribute. Analysing the sources of this information, i.e. books and articles on requirements, we were able to establish two types of evidence: expert opinion and empirical studies. Expert opinion is a proposal made by an expert in the field that suggests a prescription for technique use. Empirical studies output adequacy values that are the product of experimental results.

The key significance of this research is its contribution to software engineering practice, forming a grounded body of knowledge for properly choosing techniques for the elicitation process. This knowledge is formalized as an elicitation techniques prescription, which is based on arguments establishing relative reliability. This reliability is scalable, that is, each level has a greater weight than its predecessor. This way, we establish a scale in ascending order of reliability. These scales are based on the relevance of the underlying justification. Table 5.1 shows the reliability levels output for each attribute/technique pair. The possible scales are:

![Figure 5.1. Adequacy Values of Elicitation Techniques in the Proposed Framework.](image-url)
Table 5.1. Table of Reliability Levels for Attribute/Techniques.

- **Expert Opinion**: Opinion of experts in the field who, according to their experience, suggest when or give instructions on how it should be used (shaded light grey).
- **Empirical Sign**: Existence of an experiment or empirical instrument that validates the adequacy proposals for a particular technique under particular circumstances (shaded dark grey).
- **Empirical Evidence**: Existence of two or more experiments ratifying the recommendation on technique adequacy (shaded with oblique lines).
- **Logical Foundation**: Reasoning based on logic developed by the author of this PhD thesis, which is based on the intrinsic characteristics of each technique (unshaded).

We analyse the prescription for technique use for each attribute. It would be unrealistic to try to run an analysis for each technique considering every possible configuration of the values of all the attributes at the same time. On this ground, we set out to isolate each attribute. In other words, we examine each technique to establish the values of a specific attribute. We will use a selection procedure to output the recommendation for a real case that matches a specific configuration of attributes (that is, each attribute has particular values). The selection procedure establishes how to combine the particular prescriptions of each technique/attribute pair. This procedure is presented in Chapter 6.

Table 5.2 illustrates the different recommendations for each technique/attribute pair using the following notation:
### Table 5.2. Adequacy of the Set of Elicitation Techniques.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Attributes</th>
<th>Values</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Low</td>
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<tr>
<td>Elicitor</td>
<td>Training in Elicitation Techniques</td>
<td>–</td>
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<tr>
<td></td>
<td>Elicitation Experience</td>
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<td></td>
<td>Experience with Elicitation Techniques</td>
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<td></td>
<td>Familiarity with Domain</td>
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<td></td>
<td>People per Session</td>
<td>–</td>
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<tr>
<td>Informant</td>
<td>Consensus among Informants</td>
<td>–</td>
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<td></td>
<td>Informant Interest</td>
<td>–</td>
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<td></td>
<td>Expertise</td>
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<td>Articulability</td>
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<td>Availability of Time</td>
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<td></td>
<td>Location/ Accessibility</td>
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<tr>
<td>Problem Domain</td>
<td>Type of Information to be Elicited</td>
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<tr>
<td></td>
<td>Availability of Information</td>
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<td>Problem Definedness</td>
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<td>Process</td>
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<td>Process Time</td>
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**Values:**
- **v:** This technique is recommended for use for the attribute value in question. This means that the results of using this technique in the session would be better than using another that is not specifically recommended. Therefore, this technique should be given priority during selection over indifferent techniques.
- **–:** The use of the technique is indifferent for the attribute value in question, that is, there is no guarantee that, if applied, this technique would achieve better results.
than another. While this technique can be selected, a technique that is recommended for this attribute value would be preferable.

**: This technique is not recommended for use for the attribute value in question. The use of the technique is likely to produce worse results than other techniques.

In the following we present the proposed adequacy values for the elicitation techniques considered in the research. A recommendation on whether or not the technique should be used is made for each influential attribute value.

### 5.2 Training in Elicitation Techniques

The attribute considers **what type of training (theory or practice)** the elicitor has previously received in the respective elicitation technique. Note that the established values are: **High**, formal and practical training; **Low**, training without practice; and **Zero**, no training in the technique.

#### 5.2.1 Open-Ended Interview

As this is an interactive activity, where effective communication takes priority, the elicitor will have to develop the session fluently, assuring there are no lapses likely to distract the informant’s attention from the topic. If an informant takes too long over his or her explanation, he or she should be given appropriate prompts to help him or finish his or her train of thought.

The logistics of moderating the session requires knowledge of some theoretical aspects on timing, a proper preparation of a script and objectives, the necessary detail level, informant-adapted setting and language. In other words, a good enough theoretical knowledge of these aspects make for a successful session; however, a practical training in the technique is what guarantees more effective elicitation.

This means that an elicitor will be surer about moderating the session if he or she has received some sort of practical training in the elicitation technique. If his or her training is merely theoretical, he or she will not know how go about many aspects of interviewing, which he or she will only discover and master with practice.

On the other hand, an elicitor unacquainted with the elicitation technique could hold an open-ended interview because its theory is not complex. Generally, people are indirectly familiar with the technique because it is commonly observed in our social environment. This makes it possible for an elicitor unfamiliar with elicitation techniques can apply the open-ended interview in his or her early projects, even though there is no guarantee that the results of the session will be acceptable.

In their elicitation technique characterization proposal, Batista and Carvalho [2003] propose a medium value for the developer training facet with respect to interview techniques.

This way, we **recommend** the use of the technique when the elicitor has a **High** level of training. If his or her knowledge of the open-ended interview technique is **Low** or **Zero**, the use of the technique is considered **indifferent**. That is, the results will be optimum if the elicitor has formal training in the technique, although it can also be applied without training or with low training.

#### 5.2.2 Structured Interview

This type of interview requires more pre-session preparation, as the elicitor has to prepare the questions that he or she will be put to the informant. To do this, the
elicitor should be familiar with the aspects related to the logistics of applying the technique, and estimate the length of the session required to achieve the session goal.

Theoretical training about the technique may be enough for the technique to be effective. Practice will boost the elicitor’s confidence, although it is not as necessary as in the case of the open-ended interview. The pre-defined structure of the future session means that there are less chances of it going off course, and therefore the elicitor will not need to intervene as often to moderate the interview. Compared with the open-ended interview, there is less chance of the elicitor requiring the skill learned by practice to solve emerging problems.

This means that at least some training in the technique appears to be necessary to assure the successful use of this technique, although practice is not absolutely mandatory.

On the other hand, if unfamiliar with the technique, the elicitor may be unable to decide what content to deal with, in what depth and assess other preparatory issues, meaning that there is no guarantee of the quality of the results of using the structured interview in this case. This handicap is offset by the fact this is a technique with which elicitors are indirectly very familiar, and it can therefore be applied without much previous training.

In their elicitation technique characterization proposal, Batista and Carvalho [2003] propose a medium value for the developer training facet for interview techniques.

On the grounds of the above, this technique is recommended for use when the elicitor has a High or Low level of training in the elicitation technique. If the elicitor’s knowledge of this technique is Zero, its use is classed as indifferent. That is, it is preferable, but not strictly necessary for the elicitor to have some training in the technique to use it.

5.2.3 Task Observation

In this technique the elicitor passively intervenes in the environment where the function is executed or the informants operate. This is an interfering and prying activity, meaning that the elicitor needs to have at least some knowledge of what he or she should or should not do. The elicitor can briefly interrupt the informant to enquire about a particular point, but should not distract him or her too much from task performance. As they are being observed, subjects may change their behaviour and normal procedure. For this reason, it is worth learning the basic rules to assure that the elicitor’s presence goes unnoticed or try to execute the session using other technical resources.

Although training about these aspects of the technique can help the elicitor to apply the technique, it is preferable for him or her to have practised how to do this. This training would give him or her a more realistic idea of the circumstances of the actual observation, recognizing situations that are at variance and reacting adequately to prevent the session results from being biased.

Even if elicitors were totally unfamiliar with the technique, it would not prohibit its use, as it is a simple technique to apply. It is an instinctive technique for human beings and can be applied by novice elicitors, but there is no guarantee of session success.

In their technique characterization, Maiden and Rugg state that the technique is simple to apply and does not require much training or preparation [Maiden and Rugg 1994]. In their elicitation technique characterization proposal, Batista and
Carvalho [2003] propose a low value for the developer training facet for the observation technique.

For this reason, we recommend its use in cases where elicitors have had some sort of training, that is, values High and Low. For the attribute value Zero, its prescription is indifferent. That is, it is preferable but not strictly necessary for the elicitor to have had some training in the technique to use it.

5.2.4 Critical Incident Technique

This technique is a mixture of structured interview and protocol analysis. Essentially, it is based on a well-defined script. The elicitor interacts with the informant to identify occasional or critical events or situations, delimit the conditions of these situations or other normal situations, change the environment conditions, etc. If the elicitor is familiar with these aspects, he or she can confidently and straightforwardly conduct the session, feeding off what the informant says and referring back to the pre-defined questions.

As this is a rather rigid technique, practical exercise is not so influential for its application, meaning that some theoretical knowledge of the technique is sufficient for the elicitor to be able use it in his or her elicitation processes.

On the other hand, elicitor unfamiliarity with the technique is not an obstacle to its use, as the basics of the technique are easy to understand and an elicitor untrained in the technique can try his or her hand at applying it. In this case, however, session results may tend to be incongruent, and there can be no guarantee of its effectiveness.

This way, when the elicitor has a High or Low level of training in the Critical Incident Taking technique, it is recommended for use. It will be indifferent in the case of Zero familiarity with the technique. That is, it is preferable but not strictly necessary for the elicitor to have some training in the technique to be able to use it.

5.2.5 Concept Ranking/Laddering

These techniques are generally related and are applied together. Additionally, they are both associated with the application of other techniques, meaning that their results are likely to influence the elicitation plan. In these techniques, the elicitor has to interact with the informant using a pack of cards that represent concepts. For the informant to be able to correctly associate the concepts, the elicitor must conduct the session self-assuredly, knowing what to ask at any time and altering the questions depending on the goals to be achieved.

This way, it will be extremely beneficial for the elicitor to have trained in these elicitation techniques, because, this way, he or she will be able to define the goals of the session, adjusting them appropriately throughout the session to gather information that is useful for putting together the requirements or for use in later sessions with other techniques.

These techniques are not very complex but they do require the elicitor to be clear about the goals and sure about moderating the session. Although theoretical knowledge empowers elicitors to use the techniques, only practice can guarantee utmost effectiveness.

Through practice, elicitors gain the skill required to assure session continuity and consistency, ruling out hold-ups or unexpected changes that may throw the informant off track. This way, elicitors with training but without practice in the
techniques can run into trouble during the session and not achieve the expected goals.

On the other hand, if the elicitor has no training whatsoever in the techniques, the session runs a huge risk of failing. The technique requires a lot of concentration and reasoning on the part of the informant, and elicitor unfamiliarity with the technique can lead to biased, wrong or contradictory results. For this reason, it should not be used in such cases.

In summary, the technique is **recommended** for use for elicitors with **High** training, and is **indifferent** for a **Low** training value. Additionally, the technique is **not recommended** for use if the elicitor has **Zero** training in the concept ranking technique. In other words, the technique will only be applied if the elicitor has some training in the technique.

### 5.2.6 Questionnaires

This technique is similar to the structured interview, but without *in situ* interaction. For this reason, it depends not so much on practice but on the characteristics of its preparation and analysis. The elicitor should know how to create questionnaire apt for achieving the set information goals, what type of and how many questions to include, how to administer the questionnaire and how to analyse the responses.

Thus, any training whatsoever, albeit without practice, in the technique would help to improve the results of administering a questionnaire.

On the other hand, elicitors who have no training whatsoever in the technique could likewise administer the questionnaires, as it is a common and everyday technique in all branches of social research. However, unfamiliarity with the basics of its application may bias the results.

In their elicitation technique characterization proposal, Batista and Carvalho [2003] propose a high value for the developer training facet for questionnaire techniques.

In view of all this, this technique is **recommended** for use in cases where elicitor training is **High** and **Low**. For cases of **Zero** training, its use is **indifferent**. That is, it is preferable but not strictly necessary for the elicitor to have some training in the technique to use it.

### 5.2.7 Protocol Analysis

Protocol analysis is useful for identifying tasks and processes but also for retrieving information and reasoning on procedures. The elicitor should interact with the informant, asking him or her to explain aloud how to perform a task or solve a case. He or she should moderate the session to assure that the informant keeps going, but he or she plays a minor role. However, the elicitor must know how to analyse the information gathered from the session.

For this reason, this technique, primarily the later processing and analysis of the session, requires training in the technique, and the elicitor must practise to achieve effective results.

Elicitors with theoretical training only could apply the technique, but the later analysis could be fruitless and turn up inaccurate or useless information.
Because of its complexity, an elicitor untrained in the technique should not apply this technique, as it requires at least some knowledge about how to moderate the session and analyse the retrieved information.

Holsapple and Raj [1994] claim that elicitors require analytical skills to reconstruct the solution from verbal protocols. This skill should be acquired through in-depth training.

This way, we recommend its use only when elicitor training in the elicitation technique is High. Its use is indifferent if the training level is Low, and its use is not recommended if the elicitor has Zero training.

### 5.2.8 Repertory Grid

Repertory grid is a technique where the informant is called upon by the elicitor to rate a set of elements and characteristics. Where the elicitor requires more knowledge, however, is in the information analysis stage. In this stage, complex methods are used to establish relationships between data. Both the session and analysis procedures require not only theoretical knowledge but also at least some experience of how to apply them in practice.

Therefore, the use of the technique would be more effective if the elicitor had previous training in the technique with a practical slant. Without practical training, that is, with only theoretical knowledge of the technique, the elicitor could apply the technique, but could make mistakes in the analysis or interpretation of the data, as well as with the method for outputting the constructs for rating. On the other hand, due to the intrinsic complexity of the technique, an elicitor without any training whatsoever should not apply the technique.

This way, we recommend its use only when elicitor training is High. Its use is indifferent if the training level is Low, and it is not recommended for use if the elicitor has Zero training.

### 5.2.9 Brainstorming

Brainstorming is a technique where a group of people, i.e. development project stakeholders, interact to generate ideas about some aspect of the project. In the session, the elicitor plays the role of facilitator, managing interventions and results. This is not a very complex activity, but does require the elicitor to be familiar with the procedure and the analysis of the generated results. For this reason, some training, if not practice, in the technique should be qualification enough for him or her to get good results in the session.

On the other hand, if the elicitor is not familiar with the technique it can be applied anyway, as it is a popular technique. There will, however, be no guarantee of its results, as the elicitor has to know what to do if he or she loses control or the topic of debate is diverted towards other irrelevant questions.

In his analysis of the technique, Isaksen treats facilitator training as a critical success factor [Isaksen 1998]. In their elicitation technique characterization proposal, Batista and Carvalho [2003] propose a medium value for the developer training facet for this technique.

Offner and colleagues found that sessions having a trained facilitator generated significantly more ideas than those without [Offner et al. 1996]. In another study, Oxley and colleagues [1996] found empirical evidence that facilitator training in the technique has a positive impact on technique performance.
In view of this, if elicitor training in the techniques is **High** or **Low**, its use is **recommended**. Its use will be **indifferent** if elicitor training is **Zero**.

### 5.2.10 Nominal Group Technique

Although also a discussion technique, it is quite a lot more structured than brainstorming. The elicitor plays more of a logistic role keeping the speaking order and administering the results. Being less dependent on the elicitor’s discretionary intervention, it does not necessarily require practical exercise. In other words, the general procedure is detailed enough for the elicitor to be able to apply it in an elicitation session, even if he or she has no previous practice.

An elicitor with training in session procedures, be this coordination of rounds or voting, can get good results with the technique. Therefore, the technique requires theoretical training, with or without practice, on the part of the elicitor to guarantee technique effectiveness.

If the elicitor is unfamiliar with the technique and its procedures, its application would be very risky. The session runs the risk of becoming a brainstorming session, which detracts from its purpose.

Therefore, the technique is **recommended** for use in cases where elicitor training is **High** or **Low**. On the other hand, it is **not recommended** for use when the elicitor has **Zero** training in the technique.

### 5.2.11 Delphi Method

This technique is based on a well-structured procedure for administering questionnaires to a group of people and analysing their results iteratively. The elicitor must state a set of well-formulated questions to reach consensus on responses in several consecutive rounds. Because of the procedure’s structuredness, the elicitor must be familiar enough with the technique to be able to use it satisfactorily. However, theoretical knowledge of the technique will be insufficient, as practice is necessary to find out how to analyse, interpret and handle results for feedback in successive rounds.

Therefore, an elicitor with training and practice in the technique can use it effectively in any elicitation process. If he or she has theoretical training only, the elicitor could apply it as he or she can follow the procedure like a script. However, the analysis could be wrong, where the report drafted to be forwarded to participants may be inadequate and not help to reach consensus.

On the other hand, because of the complexity of the procedure, an elicitor that decides to apply the technique without any training whatsoever in the technique runs a high risk. The results of applying the technique are unlikely to be cost effective.

On these grounds, its use is **recommended** only if elicitor training is **High**, and its use will be **indifferent** if his or her level of training is **Low**. It is **not recommended** for use by elicitors with **Zero** training in the technique.

### 5.2.12 Participant Observation

This technique envisages the elicitor getting involved in domain functions to retrieve real information. The elicitor plays an active role in the organization, enabling him or her to get a first-hand experience of everything related to the process in question. Although not overly structured, previous knowledge of the technique could
help to adequately focus the technique, preventing problems of unstipulated behaviour. It is not absolutely necessary to have practical training, as the functions or domains, which can vary from one case to another, are the key factor.

This way, if the elicitor is trained in the technique, with or without practice, he or she will be able to apply it effectively.

On the other hand, as the technique is quite instinctive to use, an untrained elicitor will be able to apply it, although there will be no guarantee of achieving satisfactory results.

Therefore, it is recommended for use in cases where elicitor training is High or Low, and its application will be indifferent if the elicitor has Zero training.

5.2.13 Prototyping

The prototyping technique provides the elicitor with an object for analysis, enabling him or her to effectively retrieve information on requirements. Previous knowledge of the technique will enable him or her to define and conduct elicitation in line with the session goals. Through practice in using the technique, the elicitor will gain the skill required to handle situations of conflict and redirect the process if it runs off track.

This way, although practice is not strictly necessary, it is the only way of assuring that the elicitor is confident about applying the technique. The lack of practical knowledge could compromise the purpose of the session.

Likewise, even if the elicitor has no training whatsoever in the technique, he or she could apply it, as his or her professional training is likely to compensate for inexperience during prototyping. However, the session could get sidetracked, and the informant give too much inapplicable and unforeseen information without the elicitor managing to correctly regain control of the session. In this case, there is no guarantee of the effectiveness of the technique.

In their elicitation technique characterization proposal, Batista and Carvalho [2003] propose a high value for the developer training facet for this technique.

For this reason, the technique is recommended for use only if the elicitor training is High. In cases where there are elicitors with Low and Zero training, its use is considered indifferent.

5.2.14 Focus Group

This technique includes a standard operating procedure for developing the session. During the session, the elicitor must self-assuredly and skilfully conduct the interview. This way, elicitor participation is vital for session success. But not only does theoretical knowledge guarantee effectiveness. Enacting the process requires knowledge of the practical mechanics of the technique, meaning that the elicitor must be practised at using the technique. For this reason, training without due exercise does not guarantee reliable results in the use of the technique.

On the other hand, if the elicitor does not have any knowledge whatsoever of the technique, he or she will find it very difficult to apply due to its complexity. In these cases, the interview could easily run off track, and the elicitor could gather very diverse and confusing information. The elicitor would not even know how to moderate the session properly, which could degenerate into brainstorming on a wide range of
different topics. This way, this type of technique should not be used unless the elicitor has training.

In the Respect project review of techniques [Respect 1997], the academics stated that this technique requires special facilitator training to keep the meetings focused.

In summary, if elicitor training is **High**, the technique is **recommended**. If elicitor training is **Low**, technique use is **indifferent**. When the elicitor has **Zero** knowledge of the technique, its use is **not recommended**.

### 5.2.15 JAD

This technique involves a sizeable number of people associated with the organization. The stakeholders have different statuses within the organization and diverse knowledge. For this reason, the elicitor has to be very confident about running the session and focus the discussion. Additionally, the technique requires considerable logistic efforts and knowledge to combine the results of the session. This way, if the elicitor has been trained in and, also, has practised applying the technique, he or she can get good results. If he or she only has theoretical knowledge of how to apply the technique, the results of its use are likely to be questionable.

On the other hand, if the elicitor has no knowledge whatsoever, the risks of using the technique are high, as it can confuse participants and cause unfortunate clashes. The confrontation of ideas among informants of different statuses can lead to serious conflicts and unexpected decisions. This way, the technique is rejected for use in these cases.

In their elicitation technique characterization proposal, Batista and Carvalho [2003] propose a high value for the developer training facet for this technique.

In view of all this, the technique is **recommended** for use by elicitors with **High** training. If training is **Low**, its use is **indifferent**. Its use is absolutely **not recommended** if elicitor knowledge is **Zero**.

### 5.2.16 Scenarios/Use Cases

This technique is quite easy to understand. The elicitor interacts with the informant to output and develop the different processes that are involved in the problem domain. Although it requires little theoretical knowledge on the part of the elicitor, practical training especially is necessary to achieve effective sessions. Practice would give elicitors the fine-tuned skill and knowledge of how to run the session. This way, only if the elicitor has practical training in the technique can the success of its application be guaranteed. If he or she has no practical training, he or she could interpret the actions mistakenly and misrepresent the processes.

On the other hand, if the elicitor has no training whatsoever, he or she could apply the technique, as it is relatively easy to understand. However, it will be difficult for him or her to get good results, and the retrieved use cases would contain biases and errors that can be passed on to later stages in the development process.

The experts Sommerville and Sawyer characterize the use of this technique as dependent on previous training [Sommerville and Sawyer 2004]. In their elicitation technique characterization proposal, Batista and Carvalho [2003] propose a medium value for the developer training facet for this technique.
Therefore, the technique is **recommended** for use when elicitor training is **High**. If his or her training is **Low**, its use is **indifferent**. And if the elicitor has **Zero** training, the technique is **not recommended** for use.

### 5.3 Elicitation Experience

This attribute refers to the **number of previous projects** in which the elicitor has conducted elicitation activities. The values that we established for this attribute are: **High**, over 5 elicitation projects; **Medium**, from 2 to 5 elicitation projects; and **Low**, fewer than 2 elicitation projects.

#### 5.3.1 Open-Ended Interview

The open-ended interview is the most popular elicitation technique on the grounds of its simplicity. In this technique, the elicitor has to lead and manage the session. The elicitor has to direct the interviewee by interrupting him or her when he or she goes into a topic in unnecessary depth or switches from one topic to another irrelevant one and by repeating the same question if the answer is not forthcoming. To manage an interview correctly, an elicitor requires experience to confidently apply the technique.

For fear of interrupting an informant, a novice elicitor tends to let him or her ramble on. This leads to less effective interviews, as generally the respondent knows nothing about software development and does not know what information is required when. A shower of interesting information at the start of elicitation, when the elicitor still does not even understand the domain, is a waste of time as his or her mind is not yet ready to assimilate it all. Knowing how to control these situations, knowing what to look for at any time, knowing when the interviewee is supplying the right information is expertise that is gained with experience.

Therefore, the effectiveness of the open-ended interview appears to correlate positively with the general experience of the elicitor in the elicitation process, as he or she will be able to conduct the session more skilfully with more experience. As this technique is not especially complex, it will not take very long to gain the experience to be able to apply it successfully. Novice elicitors can use the technique, although it will be less effective.

Pan and other experts prefer interviews to be conducted by people experienced in detecting user needs [Pan et al. 1997].

Lloyd [Lloyd 2002] ran an experiment to measure the effectiveness of some techniques. This experiment turned up some evidence of relationships between requirements elicitor experience, requirements specification document quality and open-ended or unstructured interview effectiveness.

In summary, the technique is **recommended** for use for **Medium** and **High** experiences, and is **indifferent** for the case of **Low** experience.

#### 5.3.2 Structured Interview

The structured interview requires the elicitor to prepare a script of questions to elicit from a stakeholder with information about requirements. But for this interaction to be successful, the elicitor not only has to produce a consistent set of questions aligned with the session goal, but also has to have the skill to moderate the interview, stopping the informant from getting sidetracked by other questions or delivering
incomplete or irrelevant information. This way, it looks as if at least some experience is helpful for preparing and moderating the session and confirming the possible results of a structured interview.

On the other hand, a novice elicitor is equally capable of applying the technique, basically because it is a simple technique to understand and is less flexible than other types of interview. However, there is some risk of inexperience detracting from session moderation, which would make the results less reliable.

This ties in with the experiment by Agarwal and Tanniru [Agarwal and Tanniru 1990] who found that elicitation improved compared with other interview types when less experienced elicitors applied the technique, although their results were not conclusive.

For this reason, it is recommendable to use the technique with Medium and High elicitor experience, and is indifferent if experience is Low.

5.3.3 Task Observation

This technique is fairly simple, almost instinctive, to apply. The elicitor has to observe what goes on in the organizational environment or problem domain to find out in situ the information about requirements. The activity calls for passive elicitor involvement in the observable processes, as he or she can only occasionally ask a question or intervene in the development of actions. Also, observation can be done using less conspicuous methods, like cameras, thereby avoiding the inconvenience of the elicitor having to be present, although they have other drawbacks. At any rate, the elicitor does not require any particular skills to apply this technique. Thus, although desirable, previous elicitor experience in elicitation activities does not appear to be an absolutely necessary requirement for successfully going about observation.

A novice elicitor could apply the elicitation technique with no trouble at all. In actual fact, the technique can be very useful in projects where, precisely because of the elicitor’s lack of experience, he or she does not feel at home or sure about using another more interactive technique and prefers to use less participatory resources to form an idea about the domain.

This way, previous elicitor experience in elicitation activities is not a requirement that conditions the use of the technique, that is, it can be applied in all cases.

Therefore, it is recommendable for use for any of the experience values: High, Medium and Low.

5.3.4 Critical Incident Technique

The critical incident technique focuses on capturing information on what is considered to be an extreme case in the domain. The session is led by the elicitor who tries to capture deeply buried information. To do this, he or she complicates the informant responses by suggesting unforeseen conditions or limiting the problem-solving possibilities. The informant may not know how to make out the cases that the elicitor is looking for and even assume that he or she knows different information. Some experience in elicitation would give the elicitor the necessary confidence to know how to best complicate or condition the cases devised to gather new and relevant information.
Consequently, due to the technique characteristics, it is clear that some previous elicitation experience is required to be able to successfully conduct the session and be able to achieve good results.

An elicitor with hardly any experience might try his or her hand at the technique, as it is relatively easy to develop. However, inexperience could bias technique effectiveness. He or she might not know what variables to alter or add, or what conditions to assume in the cases stated by the informant, thus overlooking relevant information.

Therefore, the technique is recommended for elicitors with Medium and High previous elicitation experience. The use of the technique is indifferent for Low elicitor experience.

5.3.5 Concept Ranking/Laddering

This technique requires a lot of participation on the part of the elicitor. The elicitor has to interact with the informant to organize information. To do this, he or she has to enquire about the criteria and conditions for clustering related concepts. Thus, the elicitor should be confident enough to manage informant actions agilely. An elicitor can gain this confidence and skill in preparing and moderating sessions, in asking the informant to justify the presented sets of concepts or even quickly improvising in the course of a session, from experience of some kind of previous activities.

Therefore, an elicitor with medium previous elicitation experience can apply these techniques expertly and get positive results, guaranteeing their effectiveness.

On the other hand, an inexperienced elicitor could apply the technique, as it is easy to understand the procedure. However, the results are likely to be unpredictable. A not very experienced elicitor could get mixed up about the purpose of the technique and convert it into an interview about the characteristics of each concept. Additionally, he or she could be overwhelmed by the burden of leading the procedure, and the session could lose consistency with frequent hold-ups or time-outs. This may discourage the informant, who may end up delivering incorrect information.

Consequently, the technique is recommended for Medium and High experience, and is classed as indifferent in the case of Low previous elicitation experience.

5.3.6 Questionnaires

The questionnaire is a sort of structured interview without the face-to-face component, meaning that it has similar elicitor experience conditions as that technique. With sufficient previous elicitation experience, the elicitor can conceive ideas about how to focus the preparation of the material to get the expected information.

Previous experience can be a relevant asset in face-to-face interaction, giving the elicitor the confidence required to conduct the session. Although, in this case, a questionnaire avoids synchronous face-to-face interaction, experience is important for putting together a consistent and complete questionnaire to achieve the goal.

This means that if the elicitor has little or no previous experience, he or she could apply the technique anyway, as it is quite familiar to everyone, but he or she might be tempted to prepare a questionnaire containing lots of questions but omitting
information that could clarify a particular topic. This calls into question the possible results of the questionnaire and therefore the effectiveness of technique application.

Thus, it is recommendable to use the technique with Medium and High elicitor experience, and technique use is indifferent if elicitor experience is Low.

5.3.7 Protocol Analysis

Protocol analysis requires elicitor input for both preparing and conducting the session and for processing the information captured from the informant. Previous elicitor experience can be helpful for him or her to conduct the session, guiding the informant’s train of thought and stopping him or her from deviating from the topic or running dry. For session analysis, it is also important to be able to differentiate useful information and relate it correctly to produce requirements.

This way, previous experience in elicitation activities is very important for effective technique use. If the elicitor is not very experienced, the technique can produce unpredictable results. The elicitor can make mistakes that bias the requirements information.

On the other hand, low or zero elicitor experience would be very troublesome for correctly applying the technique. A lack of confidence could be a handicap for trying to properly guide the informant. Additionally, the elicitor would not know how to analyse the session transcription to get the product requirements. In this case, the risk is fairly high and would seriously compromise technique effectiveness.

For this reason, the technique is recommended for use if elicitor experience is High. For Medium experience its use is indifferent, and it will not be recommended for use for Low experience levels.

5.3.8 Repertory Grid

Repertory grid requires skill on the part of the elicitor to elicit the elements from the informant and build the grid. Previous elicitation experience would give the elicitor the confidence to get the informant to identify and relate the elements or concepts in order to output the characteristics to be studied. An experienced enough elicitor would be able to interpret the results and associate the information with the requirements to process and interpret the grid. To do this, the elicitor would need enough experience to apply the technique with some prospects of success in order to gather information for quality requirements.

On the other hand, a not very experienced elicitor’s ability to correctly capture the target concepts required to put together the requirements would be limited. Similarly, an inexpert elicitor could get the analysis of the gathered information wrong. This would prevent him or her from identifying requirements information. Even so, the technique can be applied in this case, as it is partly well structured. However, the results may be unreliable.

Consequently, the technique is recommended for selection when there is High or Medium elicitor experience in elicitation activities. With Low experience, its use is indifferent.

5.3.9 Brainstorming

The brainstorming technique is operationally simple to prepare. However, it takes skill and, especially, a mastery of group dynamics to conduct the session and
get good results. The elicitor must lead the group, and, although he or she plays a rather passive role, his or her interventions are important for encouraging the generation of pertinent ideas. For this reason, the elicitor needs to be experienced enough in elicitation to be able, in the course of the session, to motivate, lead and refocus, if necessary, the opinions of the group of informants.

Poor elicitor experience could bring the session to a standstill and leave the elicitor clueless as how to reactivate the interaction. Additionally, participants are allowed to move topics for debate at any time and in any order, which could revolutionize the session, ending up with chaotic idea generation.

Accordingly, the technique is recommended for application for High and Medium elicitor experience in elicitation activities. In cases of Low experience, its use is considered indifferent.

5.3.10 Nominal Group Technique

Like brainstorming, this is a technique for generating ideas, but discussion is more structured and limited. In other words, it requires less group management skill, as the elicitor should follow a well-defined and delimited script. The session reduces face-to-face informant confrontation to a minimum, which means that the elicitor does not have to be confident about intervening to moderate or redirect the debate. The activities in the technique procedure are well established. For example, informants orderly and equitably expound their ideas, and final voting is clear and definitive.

On this ground, previous elicitation experience does not appear to be a requirement for applying the technique. If the elicitor is experienced, results will be better, but it can also be an effective technique if used with novice elicitors in elicitation, if they have adequate values for other attributes (like knowledge of the technique, for example).

Consequently, the technique is recommended for use for cases where the elicitor has High, Medium and Low elicitation experience.

5.3.11 Delphi Method

This technique uses a procedure where there is no intensive face-to-face interaction. The elicitor does meet the informants face to face, but interacts with them through questionnaires that they answer successively. The elicitor must analyse the responses statistically and feed the results back into the next round.

As the participation of the elicitor, questionnaire administrator and analyst tends to be mechanized and structured, expertise has no relevant impact. This way, there are no instances where the elicitor has to intervene decisively and, therefore, experience does not appear to be an attribute that has an influence on the application of this technique.

For this reason, the technique can be applied successively if used by an elicitor with or without previous elicitation experience. That is, the effectiveness of this technique is likely to be similar no matter how experienced the elicitor is.

Consequently, the technique is recommended for use for all elicitor experience values: High, Medium and Low.
5.3.12 Participant Observation

In this type of activity, the elicitor takes part in the domain functions and tries to learn in situ the baseline information for requirements. The elicitor not only observes what happens but can also perform the functions, interacting with the informants and asking what to do. As it is a learning activity, the elicitor does not need to have any special requirements or skills. All he or she has to do is pay attention, repeat actions or operations, ask until he or she is able to satisfactorily perform procedures.

To do this, he or she has no particular need for previous experience in elicitation for the technique to bear fruits. In actual fact, it is very suitable for use when the elicitor has no elicitation experience, as he or she will be able to gather information first hand without having to run sessions that will call for other session management skills.

For this reason, the technique is recommended for use for all elicitor experience values: High, Medium and Low.

5.3.13 Prototyping

Prototyping sessions try to retrieve well-defined information on the future software system, meaning that the elicitor should be somewhat clear about what type of information is to be captured. The informant may get over-enthusiastic about the prototype and try to establish requirements outside the scope of the session. In this case, the elicitor will have to set limits and, when necessary, put the informant back on track, making sure that one topic is completely cleared up before passing on to the next.

For this reason, the elicitor should preferably have some previous experience in elicitation activities. This will help him or her to focus the right requirements information and not get sidetracked by other questions. An experienced enough elicitor would be able to use prototyping properly and satisfactorily with all informant types.

On the other hand, an elicitor with little previous experience of elicitation would not know how to keep to the information on one type of requirements, giving the informant the chance to mix up knowledge or opinions with respect to their needs. Even if the elicitor is familiar with the technique and finds it easy to apply, inexperience could raise question marks about the session results.

In view of this, this technique is recommended for use for High and Medium elicitor experience. Its use is indifferent for elicitors with Low experience in elicitation.

5.3.14 Focus Group

As with other similar techniques where the elicitor plays some sort of a facilitator role, the elicitor should lead the discussion among the participants about definite aspects of the system, supported by the presence of a mock-up or some intermediate element or product. As this is a less structured technique, elicitor participation is more important, as he or she is responsible for encouraging the exchange of opinions, motivating discussion and agreement, putting the discussion back on track if it runs off course, and giving the more timid people or members with a lower status a say. However, he or she should intervene as little as possible and try not to condition or bias the discussion with his or her own forthright opinions.
This way, the elicitor must be confident enough to lead the session and focus on the set requirements goals. To get the best results, therefore, elicitors should be experienced enough in elicitation activities to guarantee the effectiveness of the use of the technique to capture the correct information.

On the other hand, if the elicitor has little or no previous elicitation experience but is familiar with the technique, it could be applied. Inexperience can, though, be a handicap if the discussion is complicated or the informants are tempted away from the focus of the discussion. In this case, the results may be mixed.

On the above grounds, the technique is **recommended** for **High** and **Medium** elicitor experiences, and its use is **indifferent** for **Low** experience in elicitation activities.

### 5.3.15 JAD

The technique places high demands on the elicitor. The elicitor must adapt the session to the project in question, prepare the required documentation, establish roles and commissions and accurately put together the information gathered. But, mainly, he or she must lead the session masterfully and confidently, showing that he or she is clear about the goals of the session. As this technique calls for a sizeable group of people playing different roles and having different statuses within the organization, the elicitor needs to have the skill to lead the session and warrant the required logistical expenses. The potential aspects to be dealt with are wide ranging, and he or she must therefore have the skill to focus the discussion on a set topic and gather all the opinions for the record.

On all these grounds, the elicitor should be quite experienced in elicitation to shore up his or her skill in group leadership. Insufficient experience can be ineffective, and discourage and confuse the organization's representatives.

On the other hand, the risk of a novice elicitor using this technique is high, as poor group leadership can be disastrous and jeopardize not only the results of the session but also threaten project continuation.

Several authors agree on the fact that the facilitator needs to be excellent to be able to use this technique. The facilitator is responsible for impartially driving the session towards the objectives, assuring the use of the available time and getting informants to participate to the maximum. Substantial moderator elicitation experience can assure these skills [Duggan and Thachenkary 2003][Leffingwell and Widrig 2006].

For this reason, the technique is **recommended** for use by elicitors with **High** elicitation experience. For cases with **Medium** experience, use is **indifferent**, but in **no** case is it **recommended** for use by elicitors with **Low** experience.

### 5.3.16 Scenarios/Use Cases

This is a technique that requires the elicitor to be clear about the purpose of the elicitation process to be able to get relevant information on requirements. In his or her interaction with the informant, the elicitor must focus on the functional aspects of the project and not let the informant get side-tracked by opinions on design issues. This way, sufficient experience in elicitation would enable the elicitor to recognize relevant functional aspects and determine when they have been fully determined.

Although this technique is easy to understand and apply, if elicitor experience is low, the results of the session may be incomplete or fuzzy.
In their Respect review of project techniques [Respect 1997], the academics stated that this technique requires an experienced elicitor to lead the session and explore scenarios.

On this ground, the technique is recommended for use with High and Medium elicitor experience, and its application is indifferent where the elicitor has Low experience in previous elicitation activities.

5.4 Experience with Elicitation Techniques

This attribute is described by the number of previous elicitation activities in which the elicitor has applied the technique. The defined values are: High, over 5 applications of the technique; Low, from 1 to 5 applications of the technique; and Zero, no technique applications.

5.4.1 Open-Ended Interview

This technique is relatively easy to apply. The elicitor interacts verbally with the informant, asking him or her about problem issues in some depth and breadth. The elicitor must manage and try to gauge these problem issues properly. In other words, he or she should not go into too much detail on each topic and try to cover as many topics as are set for the session.

The fine-honed skill required to successfully lead the session is gained with some previous practice in the application of the technique to real projects. To do this, at least some experience in the technique may help the elicitor to lead the session and find necessary and sufficient information.

On the other hand, a lack of real experience in the technique can complicate session management by the elicitor, making him or her unsure when to continue inquiring about a question or when to move onto another topic. In this case, the results are likely to be questionable and depend on other circumstances.

According to some authors, this technique requires some skill, acquired through practice, to improve conversation and lead a successful session [Cooke 1994][Scott et al. 1991].

For this reason, the technique is recommended for use when the elicitor has High or Low experience with the technique. If the elicitor has Zero experience, its use is indifferent.

5.4.2 Structured Interview

Being structured, this technique limits the participation and leadership of the session by the elicitor. However, he or she must make the most of the time and stop the informant from over-enlarging upon things or going into too much unnecessary detail. Additionally, he or she must prepare the interview by putting together a consistent, duly complete and thorough script of questions. An elicitor that has applied the technique before to other real projects will have the expertise to prepare and lead the session, and, this way, get better results and apply the technique effectively.

On the other hand, an elicitor that does not have any experience with the technique may make mistakes in putting together the script or leading the informant and fail to stop him or her enlarging too much on a particular question. Although the
technique is easy to understand, inexperience can bias the results, and compromise success in these cases.

For this reason, it is recommended for use in cases where the elicitor has had some previous experience working with the technique on previous projects, that is, for **High** and **Low** experience. If the elicitor has **Zero** experience with the technique, its use is **indifferent**.

### 5.4.3 Task Observation

In essence, this technique is quite straightforward. The elicitor observes the problem domain processes and participation is minimum. As it does not depend on particular elicitor skills, the technique can be applied by both experienced and novice elicitors.

When the elicitor is experienced with the technique, he or she put it to better use, distinguishing correct from superfluous information and deciding what to focus on and what to ask.

On the other hand, this is a very good technique for an elicitor that has no previous experience with the technique, as it will help him or her to get to know the problem environment without much effort or risk. Despite inexperience, then, the technique appears to be suitable for use by novice elicitors to get acquainted with the domain.

For this reason, the technique is recommended for use in all cases of elicitor experience, that is, **High**, **Low** and **Zero** experience values.

### 5.4.4 Critical Incident Technique

Elicitor participation is important in this technique, as he or she has to call upon the informant to react to the constraints or changes that he or she proposes. To do this, the elicitor must be confident about controlling the emerging critical cases and mastering informant behaviour. This way, an elicitor with minimum experience using the technique in earlier projects will have gained the expertise to retrieve from the informant requirements information that other interview types tend to miss.

On the other hand, an elicitor without any previous experience whatsoever with the technique in real cases may fail to find which data or concepts for the most part influence the uncommon cases. Although technique simplicity encourages its use, inexperience calls results into question.

This way, its use is **indifferent** for **Zero** elicitor experience, and it is **recommended** for use in cases where the elicitor experience in the technique is **High** or **Low**.

### 5.4.5 Concept Ranking/Laddering

These techniques involve a sizeable participation on the part of the elicitor, who has to encourage and motivate the informant to set up relations between the listed elements. In other words, the sessions place some demands on the elicitor in terms of skill and self-assurance, but, mainly, require the expertise to help out the informant with the *game of cards* and when he or she does not know what to do next. This special skill is provided by some previous experience in the use of the techniques. Therefore, if the elicitor has applied the techniques in real cases before, then he or she is likely use them more effectively.
An elicitor that has no experience with the techniques could apply them anyway because they are easy to understand and prepare. In these cases, however, the elicitor will pass on to the informant most of the responsibility for putting the target knowledge together. As the elicitor has no groundwork, the informant may deliver incomplete or insufficiently reasoned information. Accordingly, when the elicitor has never used the techniques before, the result of their use may depend on other circumstances.

Along these lines, Easterby-Smith states that whoever lead the session need to feel that they are in control of the process, and the use of an unfamiliar technique may detract from this control [Easterby-Smith 1981].

Therefore, the technique is **recommended** for use in cases where elicitor experience is **High** or **Low**. If the elicitor has **Zero** experience, its use is **indifferent**.

### 5.4.6 Questionnaires

This technique consists of administering a questionnaire that aims to retrieve information on or related to requirements. Generally, it is not especially hard to apply, although some traits are required to draft a questionnaire with any guarantee of it being effective. In any case, the elicitor does not need to have applied the technique before in real cases to be able to prepare a satisfactory questionnaire, that is, previous experience with the technique is desirable but not necessary.

An inexperienced elicitor could use the technique successfully, as, if he or she has other strengths (is experienced in elicitation or familiar with the domain), he or she can prepare an acceptable questionnaire. Moreover, the technique is adequate for use when the elicitor cannot use other techniques for which he or she does not have the required experience, as it is simple and requires no face-to-face or verbal interaction.

From the above, this technique is **recommendable** for use by elicitors that have **High**, **Low** or **Zero** experience.

### 5.4.7 Protocol Analysis

This technique, and primarily the analysis of the transcription taken down, is more complex. The elicitor leads the informant as he or she solves a case or situation aloud. From time to time, he or she must intervene to keep up the flow of the explanation, but the informant plays the leading role. The elicitor plays a bigger role in the analysis of the session transcription, encoding and outputting the procedural rules. This way, the technique appears to depend more on other attributes, like technique training, than on elicitor experience in the technique. For this reason, if the elicitor is experienced in the technique, he or she will be able to get more effective results, but experience is not absolutely necessary.

On the other hand, provided the other attributes are favourable, an inexperienced elicitor could apply the technique, although the results would be somewhat questionable.

Accordingly, the technique is **recommended** for use in cases where the elicitor has **High** or **Low** experience with the technique. For cases where experience is **Zero**, its use will be **indifferent**.
5.4.8 Repertory Grid

In this technique the elicitor elicits a rating of a grid of concepts from the informant. To get the concepts, he or she must interact with the informant, but the elicitor’s main role is to conduct a decisive analysis and interpretation of the data. Previous real practice with the technique is likely to be helpful for building and analysing the grid. This way, previous elicitor experience in the application of the technique can be important for the success of the session.

An elicitor with no previous experience with the technique could use the technique anyway, as the session is rather well structured and analysis is rather technical. In this case, though, there would be no guarantee of the results being sound.

Pursuant to this, we recommend the technique for cases of High or Low elicitor experience with the technique. When the elicitor has Zero experience, its use will be indifferent.

5.4.9 Brainstorming

Elicitor participation in this technique is less influential than in other techniques, as the elicitor will only lead the session when necessary. The elicitor must encourage ideas without questioning their quality. However, experience can be quite helpful when the session runs off track or is distorted. Particularly, having applied the technique on previous occasions will give elicitors a feeling when to curb any monopolization of the session or side-tracking on to topics that are not of interest at any particular time. This way, previous elicitor experience in the technique may lead to greater technique effectiveness.

On the other hand, an elicitor inexperienced in brainstorming could apply the technique, because it is simple in theory, although success will depend on other factors.

This way, this technique is recommended for use for cases of High or Low elicitor experience. If the elicitor has Zero experience, its use is considered indifferent.

5.4.10 Nominal Group Technique

In this technique the elicitor gathers, categorizes and prioritizes the ideas or opinions of a group of project stakeholders. Interaction and voting are fairly well structured, meaning that elicitor participation is not relevant to the actual discussion, as its procedure avoids conflicts. For this reason, previous experience in the technique does not appear to be a compulsory requirement for an effective session.

An inexperienced elicitor could apply the technique with an equal likelihood of success, provided the other attributes are favourable.

Considering the above, the technique is considered recommendable for use with any case of elicitor experience with the technique: High, Low or Zero.

5.4.11 Delphi Method

Delphi is a fairly well-structured method. The elicitor has put some effort into the preparation of the instrument to be used, then he or she has to process the response data, but this will be a rather technical task. However, the elicitor must have the expertise to put together an adequate questionnaire and especially must
prepare the feedback of the results to the informants. The success of the technique largely depends on how he or she prepares the following rounds. This way, an elicitor that has applied the Delphi method previously in real projects, he or she will be able to get more effective results.

An inexperienced elicitor could apply the technique because it is clearly defined and structured. However, he or she could make mistakes preparing the questionnaire and presenting the feedback information. In this case, the effectiveness of the method would be questionable.

For this reason, we decided to recommend the technique for use when experience is High or Low. It will be indifferent when the elicitor experience in the technique is Zero.

5.4.12 Participant Observation

In this case, elicitor participation is important for the success of the session. The elicitor not only observes the actions but has to actively perform some functions in the environment. He or she should be cautious about interacting with any “workmates” and have the expertise to explore the functions of the organization. If the elicitor has performed elicitation activities using this technique in earlier projects, he or she will have acquired the expertise for distinguishing which details to focus on, how to investigate a function without putting out the people in the environment, and where the boundaries of interaction lie. Therefore, this expertise can be gathered from past experience with the technique, meaning that an elicitor with these qualifications can achieve good results.

On the other hand, an elicitor that has no previous experience with the technique could use it because it is not very complicated in theory. However, performance will depend on other conditions. An inexperienced elicitor could put out the people in the environment by getting too involved or sticking his or her nose into other affairs. It could cause a revolt, which would be an obstacle to elicitation.

This way, the technique is recommended for use with elicitors that have High or Low experience. If the elicitor experience is Zero, its use is indifferent.

5.4.13 Prototyping

The leadership of prototyping sessions requires some skill on the part of the elicitor. The elicitor should get the informant to stick to the goals of the session and stop him or her from getting tired and confused. To do this, he or she should have some skill or expertise at successful session leadership. If the elicitor has already applied the technique before, he or she will be acquainted with the sort of situations that may arise and the traps into which the informant may fall, and will have explored remedies for such circumstances. For this reason, if the elicitor has previous experience of applying this technique, he or she will be guaranteed to achieve better results.

Elicitors without previous experience would be able to apply the technique, as it is related to their training but there is no guarantee of the results being reliable.

In his empirical study [Lloyd 2002], Lloyd established a positive correlation between previous elicitor experience in the technique and technique effectiveness.

For this reason, the technique is recommended for use with elicitors having High or Low previous experience with the technique. If experience is Zero, its use is indifferent.
5.4.14 Focus Group

Elicitor participation plays an important part in this technique, as the elicitor must choose the correct artefacts for the session, if applicable, which he or she must lead so as to satisfactorily facilitate the discussion. The elicitor must encourage all participants to state their opinion, pushing the shier ones and promoting agreement on the issues dealt with. As the effectiveness of this session is based on the actual discussion, the elicitor should have expertise in group management to get good results. This way, an elicitor experienced with the technique is more likely to run a successful session.

An elicitor's lack of real experience in the technique does not inhibit its use, as it is a well-defined and easy-to-understand technique. Inexperienced elicitors may come across difficulties that may call the any results into question.

On this ground, the technique is recommended for use in the case of High or Low previous elicitor experience. If elicitor experience is Zero, technique use is indifferent.

5.4.15 JAD

The workload and ability demanded by this technique of elicitors are massive. The elicitor is responsible for adequate logistic preparation, participant coordination, session management and interpreting results to state the findings. To do this, the elicitor must have expertise in managing group dynamics and the emerging circumstances of the technique. This skill can be acquired through previous practice on real projects. An elicitor that has sufficient previous experience with this technique will be able to get more effective results.

On the other hand, an elicitor that has no real experience with the technique runs a high risk, as weak leadership by the elicitor can confuse participants and compromise the session results, which may have serious consequences.

Several authors agree on the need for a facilitator skilled at applying the technique. The elicitor must demonstrate leadership, interaction management and ease of communication with the participants. Sufficient experience in the use of the technique would enable the elicitor to perform successfully [Duggan and Thachenkary 2003].

On the grounds of the above, the technique is recommended for use in cases where the previous elicitor experience with the technique is High or Low. If the elicitor has Zero experience, it is not recommended for use.

5.4.16 Scenarios/Use Cases

These techniques require continuous interaction and feedback between the elicitor and the informant, meaning that their success depends on how he or she leads the session. The elicitor must detect the functional information on requirements, and he or she needs expertise to do this. Sufficient experience with the technique would empower the elicitor to recognize correct information and prevent the informant from delivering unnecessary information. This way, previous experience can improve the effectiveness of the technique and its results.

An elicitor that has no experience with the technique will be able to use, as it has no hidden complexities. However, technique effectiveness is, in these cases, less certain and more dependent on other attributes.
Additionally, Ko presents a case study of a software project where several techniques were used [Dong Il Ko 1999]. Ko states that one of the reasons why the scenarios technique was chosen was the elicitor’s experience in the use of the technique.

In his empirical study [Lloyd 2002], Lloyd established a weak positive correlation between previous elicitor experience with the technique and technique effectiveness.

This way, the technique can be recommended when the elicitor experience with the technique is High or Low, and its use will be indifferent when experience is Zero.

5.5 Familiarity with the Domain

This refers to the number of previous projects or knowledge that the elicitor has acquired in the domain. Its values are: High, more than 2 projects or formal knowledge; Low, from 1 to 2 projects or informal knowledge, and Zero, no knowledge whatsoever.

5.5.1 Open-Ended Interview

The open-ended interview enables the elicitor to interact with the owners of the domain knowledge and gather basic and advanced information depending on the session goals. An elicitor that has previous knowledge of the problem domain will be able to clarify previous doubts or explore generalities in further depth to get clearer understanding of the needs behind development. The use of this technique with several stakeholders will enable the elicitor to form the body of knowledge necessary to determine requirements. The different informants may deliver information on different questions and at different detail levels.

On the other hand, if the elicitor is not familiar with the domain, the technique is equally adequate for gradually gaining knowledge, starting with general aspects that can shed light on the project goals. This way, the technique looks to be suitable for use by novice elicitors in the domain, as it would be a simple means of learning about unknown domains.

Therefore, the technique is recommended for use no matter how familiar the elicitor is with the domain, that is, for the High, Low, and Zero values.

5.5.2 Structured Interview

This technique is able to further explore questions about which information has already been acquired. It uses a set script of questions that the elicitor prepares for the session. To do this, the elicitor may have entered into contact with the domain in earlier projects or through some sort of training. In this case, he or she could apply the technique based on such previous knowledge. That is, an elicitor that has acquired information about the domain, either through training or because he or she has worked in similar domains, will be better able to prepare the questions and, therefore, get superior results.

On the other hand, an elicitor that has no knowledge of the domain can, depending on the information that he or she has acquired in earlier elicitation sessions, apply the technique. If he or she has already gathered information to
prepare the interview, he or she can get good results, that is, he or she is dependent on other factors and there is no guarantee of technique effectiveness.

Along these lines, Hoffman is of the opinion that the structured interview is applicable when basic information has already been acquired or if the elicitor is highly familiar with the problem domain [Hoffman 1987].

For this reason, the technique is recommended for use for High and Low elicitor familiarity with the domain. In the case of Zero familiarity with the domain, its use will be indifferent.

5.5.3 Task Observation

This technique is easy to apply and does not require the elicitor to have any special skills. For this reason, it looks to be suitable for making early exploratory contacts with the problem environments. This way, it can be used when the elicitor is not at all familiar with the problem domain. The elicitor could actually get to know the process participants and their respective active roles and dominant characteristics, the types of documents or materials involved, the task performance times, the action protocols and the communication mechanisms used.

If the elicitor is familiar with the domain, the technique can possibly be used for special purposes, but its results may be unreliable. If an elicitor is familiar with the domain, the use of this technique, in particular, may not turn up any more information than he or she already knows. In this case, it could turn out to be a waste of time and resources.

For this reason, the technique is recommended for use when the elicitor familiarity with the domain is Zero, and its use will be indifferent when familiarity with the domain is Low and High.

5.5.4 Critical Incident Technique

This technique focuses on complicated and critical domain cases. The session will not be successful unless the elicitor is especially familiar with the domain. This way, he or she will be able, once the case has been stated, to capture all its facets. An elicitor with significant domain knowledge would be able to juggle with the cases, by modifying variables and values and, generally, changing the conditions in order to capture useful information.

If the elicitor has elementary or zero domain knowledge, its application and possible results will depend on the knowledge acquired using other techniques, and there is no guarantee of it being satisfactory.

For this reason, this technique is recommended for use if elicitor familiarity with the domain is High. Its use will be indifferent if the elicitor familiarity with the domain is Low or Zero.

5.5.5 Concept Ranking/Laddering

Concept ranking and laddering require the elicitor to have basic information about the domain to prepare and lead the session. The elicitor must know and select the domain concepts that will be presented to the informant, who will be expected to relate them to each other. On the other hand, session leadership requires the elicitor to be somewhat consistent about the domain. On the above grounds, the technique may be more effective if the elicitor has some previous knowledge of the domain.
On the other hand, if the elicitor has no domain knowledge, the use and effectiveness of the technique will depend on the information available at the time.

McGeorge and Rugg state that laddering could help an elicitor get acquainted with a new domain with which he or she is not familiar, although he or she will have need of some basic notions [McGeorge and Rugg 1992].

From the above, this technique is recommended for use in cases where the elicitor familiarity with the domain is High and Low. When the elicitor has Zero knowledge of the domain, its use is indifferent.

5.5.6 Questionnaires

To use this technique it is essential to have previous information about the domain, as the questions that will be put to the informant have to be prepared beforehand. The questionnaire must have a clear goal. Strictly speaking, it may focus on a particular topic or clarify a number of different unrelated issues. In any case, a minimum level of domain knowledge is a guarantee for the proper preparation of the questionnaire. For this reason, an elicitor that is familiar with the domain will find this instrument easier to prepare and administer.

If the elicitor has no domain knowledge, the result of using this technique will depend on the previously captured information and on other conditions.

This way, questionnaires are recommended for use if the elicitor familiarity with the domain is High or Low. When the elicitor familiarity with the domain is Zero, the use of the technique can have unreliable results, making it indifferent.

5.5.7 Protocol Analysis

This technique outputs quite in-depth information about processes and information associated with the domain. This knowledge is generated from the analysis of what the informant has stated during the explanation of a particular case. Precisely for this reason, this technique can be ideal when the elicitor has little knowledge of or wants to gather more details about the domain.

On the other hand, if the elicitor has a fairly good understanding of the domain, the use of the technique may not provide new information, and call its application into question.

Holsapple and Raj state that, for protocol analysis to be effective, the elicitor must be well acquainted enough with the domain to understand the expert's job [Holsapple and Raj 1994].

Pursuant to the above, this technique is recommended for use where the elicitor familiarity with the domain is Zero or Low. When elicitor familiarity is High, the use of the technique is indifferent.

5.5.8 Repertory Grid

Repertory grid is a technique that presents a set of domain elements for an informant to rate according to certain parameters. This way, the elicitor requires previous knowledge of these domain concepts to prepare the session and correctly interpret the results of the analysis. Therefore, this technique can be very adequate and effective when the elicitor is somewhat familiar with the domain.
When the elicitor has no knowledge of the domain, the use of the technique is subject to what information is already available, meaning that its use is questionable. Therefore, it is recommended for use if the elicitor familiarity with the domain is \textit{High} or \textit{Low}. Where the elicitor familiarity is \textit{Zero}, its use is likely to be \textit{indifferent}.

\section*{5.5.9 Brainstorming}

The brainstorming technique is useful for capturing basic information about the domain and also for being able to generate more complex information on the basis of this knowledge. In the sessions, the informants deliver general-purpose information on the problem domain. For this reason, this technique can be used by elicitors that have no previous knowledge of the domain, as this will enable them to get acquainted with some domain issues.

On the other hand, it also looks to be applicable if the elicitor already has some knowledge of the domain, as it will enable him or her to understand any more complex questions that crop up during elicitation.

For this reason, this technique is \textit{recommendable} for use irrespective of whether or not the elicitor has any knowledge of the domain, that is, for the case of \textit{High}, \textit{Low}, and \textit{Zero} elicitor familiarity with the domain.

\section*{5.5.10 Nominal Group Technique}

This technique targets a wide range of information for different purposes. The informants state their opinions about topics that the elicitor proposes in an ordered framework. Being a multi-purpose technique, elicitor domain knowledge is not necessarily an advantage in terms of effectiveness.

Similarly, unfamiliarity with the domain is not a precondition for the use of the technique either, as at least some information is necessary for preparing the topics for discussion.

For this reason, the use of the Nominal Group Technique will be \textit{indifferent} for any elicitor familiarity with the domain value, that is, \textit{High}, \textit{Low}, or \textit{Zero}.

\section*{5.5.11 Delphi Method}

This technique implies the generation of a questionnaire that will be administered and later processed. On this ground, an elicitor applying this technique that has some knowledge of the domain can achieve better results than an elicitor that has none. Using this information the elicitor will be able to prepare the questions of the questionnaire that will be sent out to informants.

On the other hand, the technique appears to be less suitable for an elicitor that has no previous knowledge of the domain, although the information required to prepare the session can be gathered by other means, for example, an earlier session using another technique.

For this reason, this technique is \textit{recommended} when elicitor familiarity with the domain is \textit{High} and \textit{Low}. When elicitor familiarity with the domain is \textit{Zero}, the use of the technique is \textit{indifferent}. 

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5.5.12 Participant Observation

The participant observation technique enables the elicitor to get acquainted with the domain processes and physical interrelationships between process participants in situ. For this reason, it is very well suited when the elicitor is not familiar with and wants to gain knowledge about the domain. Also it is applicable when the elicitor is somewhat familiar with the domain, but wants to learn more details about some domain aspects in particular.

When the elicitor is quite well-acquainted with the domain, the use of the technique is likely to turn up information that he or she already knows. In this case, the technique is not one hundred percent effective.

In their Respect review of project techniques [Respect 1997], the academics state that, in their experience, this technique is useful as at an early stage for identifying issues related to a domain with which the elicitor is unfamiliar. Also Zowghi and Coulin [2005] prescribe the technique for use when the analyst is inexperienced in the domain.

Considering this, the technique is recommended for use for elicitors with Zero or Low familiarity with the domain. If elicitor familiarity with the domain is High, the use of the technique is indifferent.

5.5.13 Prototyping

This technique involves preparing support material before the session. This calls for previous knowledge of the problem. This way, its use is confined to situations where the elicitor is well acquainted with the domain, if the activity is to have a positive cost/benefit ratio.

If the elicitor is not very familiar with the domain, the results of applying the technique can be irregular. In any case, it may be wrong to use the technique if the elicitor has no knowledge whatsoever of the domain, as it would be very risky to build an artefact without sufficient information.

From the above, the technique is recommended for cases where elicitor familiarity with the domain is High. In cases where elicitor familiarity is Low, its use is indifferent. Finally, it is not recommended for use when elicitor familiarity with the domain is Zero.

5.5.14 Focus Group

This technique can be used to present mock-ups or artefacts that help to define some aspects of the product under development. Additionally, it can be used to present similar market products and, this way, get a better understanding of the goals of the target product. For this reason, preparation may require some previous knowledge of the domain. An elicitor that is familiar with the domain will probably get better results using the technique.

On the other hand, the application of the technique by an elicitor that is not familiar with the domain can be limited, and even futile. The elicitor prompts the informants to interact with each other by presenting elements that drive the discussion. This way, ignorance of the domain significantly reduces the chances of producing an effective discussion.
This way, this technique is **recommended** for cases where elicitor familiarity with the domain is **High** or **Low**. In the case of **Zero** knowledge, its use is **not recommended**.

### 5.5.15 JAD

This technique calls for a conscientious preparation for the elicitor to be able to correctly lead a session catering for many different opinions. The elicitor must prepare guidance documents to correctly inform participants and lead the debate towards its conclusion. Thus, an elicitor that knows something about the domain will find it easier to choose which information and topics to discuss.

On the other hand, if the elicitor does not have any knowledge of the domain, there is a high risk of the session failing and compromising the participation of all the stakeholder types in future activities.

Therefore, JAD is **recommended** for use when elicitor familiarity with the domain is **High** or **Low**. Its use is **not recommended** if the elicitor has **Zero** domain knowledge.

### 5.5.16 Scenarios/Use Cases

This technique is able to define the processes or functions that the product will support, primarily the boundaries of the software system. It can be used irrespective of whether or not the elicitor has previous knowledge of the domain, as it focuses on definite aspects of the product under construction. An elicitor that is unfamiliar with the domain will be able to use this technique to find out precisely which functions to develop. An elicitor that is familiar with the domain will be able to use the technique to further explore certain aspects of system functionality and determine which aspects of the domain to consider.

For this reason, technique use can be **indifferent** for any value of elicitor familiarity with the domain, that is, **High**, **Low**, or **Zero**.

### 5.6 People per Session

This attribute considers the **number of people** that can participate in the elicitation session. The values are: **Individual**, one person; **Small Group**, from 2 to 5 people; and **Large Group**, over five people.

#### 5.6.1 Open-Ended Interview

The open-ended interview is commonly used to gather information through the interaction of an interviewer and a respondent. In requirements elicitation, the elicitor is able to ask the informant any question about different, rather general topics related to the problem to be tackled. The purpose is to gain one individual's view about the question. That is, the technique is prescribed mainly for individual use.

If we want to capture the personal opinion of more than one person, it is possible to use the technique separately with each one. In some cases, however, the cost of separately interviewing each individual is unlikely to justify use. In these cases it would be better to consider using a group technique. Therefore, its suitability for groups of people is unclear, and the success of its use will depend on other conditions (what type of knowledge people have, information needs, etc.).
When there is a massive group of people, potential informants, the technique does not appear to be applicable, and the increased elicitation cost and time of use could even involve a high risk. In many cases, information could be the same or repetitive or, worse still, contradictory. In these cases, it would be better to use a group technique.

In their technique selection proposal, Davis and Hickey set the number of stakeholders attribute of this technique's vector of characterization to the value "one" [Davis and Hickey 2002c]. Also in another review of elicitation techniques [Christel and Kang 1992], Christel and Kang present a comparison between some techniques and tools and some process aspects. In particular, they state that unstructured interviews are less suitable for groups of stakeholders.

Therefore, the technique is recommended for individual use. Its use is indifferent if there is a small group of informants, and it is not recommended for use for large groups of informants.

5.6.2 Structured Interview

A similar thing applies as to the open-ended interview. The structured technique aims to go into further detail about some previously selected topics. Generally, the possible source of this information is identified by previous elicitation cases. Being a focused technique, its use is adequate for individual informants.

This technique is equally usable for more than one person, albeit separately, but its success will depend on other factors. A group technique is a potential substitute for offsetting the possible costs of unnecessary uses of the technique. In these cases, its use is unreliable.

If there are a lot of informants, the technique does not appear to be suitable for use because of its high cost. In other words, the use of a group technique would appear to be a better option than separately applying a structured interview.

In another review of the elicitation techniques [Christel and Kang 1992], Christel and Kang present a comparison between some techniques and tools and some aspects of the process. In particular, they state that the structured interviews are moderately applicable to groups of stakeholders.

On the above grounds, the technique is recommended for individual use. If there is a small group of potential informants, its use is indifferent. In any case, it is not recommended for use to capture information from a large group of informants.

5.6.3 Task Observation

Observation is a passive technique enabling the elicitor to get involved in the domain environment to learn what happens in situ. Being a technique that focuses on observable phenomena, it is indifferent to the number of people participating in the domain actions, that is, the operations of interest can be undertaken by a single individual or a group of participants. This way, the technique appears to be suitable for a moderate number of informants.

It does not appear to be very adequate when there are many users, as attention would not be able to focus on them all, and if they are divided into smaller groups, the technique appears to be costly.
In their technique selection proposal, Davis and Hickey set the number of stakeholders attribute of the vector of characterization for this technique to the “few” value [Davis and Hickey 2002c].

Therefore, it is recommended for use for individual or small group sessions. For large group sessions, its use is indifferent.

5.6.4 Critical Incident Technique

The critical incident technique aims to further investigate system exceptions. Generally, these cases are the concern of a manager of the environment where they occur. The elicitor leads the session using a pattern of constraints, but these constraints are presented to informant depending on what he or she says. This way, the technique appears to be very dependent on the information given by the informant, of which there should be one. For this reason, the technique appears to be prescribed preferentially for individual informants.

The technique could be applied if there is a group of informants, but not to all at once. It can be used separately, but this would imply a cost that would only be justified if the informants master different cases. In any case, an alternative group technique is likely to improve the results. This way, the use of this technique for groups of informants appears to be questionable in terms of effectiveness.

On the other hand, if there are a huge number of potential informants, the technique appears not to be suitable, as the cost/benefit risk is high. In these cases, the possibility of using another type of technique should be looked at.

For this reason, the technique is recommended for individual informants. It is indifferent if there is a small group of potential informants and is not at all recommended for a large group of informants.

5.6.5 Concept Ranking/Laddering

This technique aims to capture relations between domain concepts from an informant. Relations are captured by means of a systematic game with a set of cards that represent concepts. The session is led by the elicitor asking the informants to take actions with the cards depending on how the rankings evolve. This way, the technique is suitable for sessions with individual informants.

The technique cannot be applied to a group of informants altogether, although it could be used with each informant separately. However, this is likely to output repeated information, which tips the balance towards inefficiency.

When there are a great many potential informants, the technique is high risk and does not appear to be recommendable. Using the technique with each user individually is not practicable because of the associated cost.

Cooke states that this technique can be applied not only with a single individual, but can be replicated across several informants [Cooke 1994].

This way, the technique is recommended for individual informants. It will be indifferent if there is a small group of users and will not be recommendable when there are a large group of informants.
5.6.6 Questionnaires

Questionnaires are a set of questions that the elicitor prepares to capture information from informants through several means. One characteristic of the questionnaire is that the informant can answer it when and where he or she likes.

The goal of the questionnaire is to gather information of different types to clarify doubts about concepts, gather focused information, collect opinions about some aspects of the project, etc. In any case, the questionnaire can be administered to an individual or to a sizeable group of potential informants. For this reason, this is a general-purpose technique that can be sent to any number of people.

If there is a group of informants, the technique can be distributed as a survey to detect agreement and disagreement among several project stakeholders.

On these grounds, the technique is recommended for any number of people: individual, small group or large group.

5.6.7 Protocol Analysis

Protocol analysis is a technique that captures the problem-solving explanation from an informant. The analysis of the respondent’s explanation gives particular information about that informant’s view. This then is an intrinsically individual technique, that is, useful for application to only one individual at a time.

If there is a group of experts in an area to be interviewed using this technique, it can only be applied separately. In this case, efficiency will depend on how complementary the cases presented to the different informants are. In many cases, it may be costly, and another technique may be better.

The technique cannot be applied to a large group of potential informants at the same time. Separate use is unlikely to be adequate due to the high associated cost and risk. In this case, another technique would be better.

On these grounds, the technique appears to be recommendable when there is an individual informant. If there is a small group of potential informants, the technique is indifferent. If there is a large group of informants, the technique is not recommendable.

5.6.8 Repertory Grid

This technique aims to capture the particular view of an informant about a set of domain elements and constructs. Basically, it can be considered useful individually, but it can be applied separately to a group of informants.

If there is a group of informants, the elicitor may want to capture the opinion of the group with respect to one set of elements or, due to the distribution of knowledge across informants, capture the view of each informant with respect to different sets of elements. The cost of analysing these results does not appear to be high thanks to computer-assisted data processing, meaning that it looks to be equally suitable in these cases.

Similarly, Liou [Liou 1992] deals with a variant of the technique for group informants.

For this reason, the technique is recommendable for any number of informants: individual, small group or large group.
5.6.9 Brainstorming

Brainstorming is a free interaction of a group of people concerning different project aspects. Essentially, it is a group technique whose success is based on the number of opinions presented rather than their quality. Therefore, the more informants that participate, the more effective it will be. This way, it is impracticable for use individually.

The technique is applicable to a moderate-sized group of informants, but motivation is unlikely to be enough to generate good results. In a session with few interacting people, ideas inspiring the other participants might not surface or some participants may monopolize the session and intimidate the others. For this reason, although applicable, the technique is not guaranteed to be successful, as this will depend on other factors.

If there is a bigger group of informants, the technique is more likely to generate ideas and motivate all informants to participate. This technique appears then to be suitable for large groups of participants.

In their characterization of techniques, Maiden and Rugg state that the technique is applicable to a large enough group of stakeholders [Maiden and Rugg 1994]. Also in an academic review of elicitation techniques [Respect 1997], it is stated that from 5 to 12 people should participate in this technique. Osborne states that the best number of participants is 12 [Osborne 1953].

Numerous researchers have studied group size in terms of the number of generated ideas, difficulty in achieving consensus and interaction patterns. They found that around seven participants is the number that optimizes the session results [Delbecq et al. 1975].

On the above grounds, individual use is not recommended. Its use will be indifferent if there is a small group of informants and it is recommended for use for large groups.

5.6.10 Nominal Group Technique

As its name suggests, this is a technique focused primarily on groups of people. It provides for an ordered interaction of a group of people. In the session, the motions presented are prioritized, meaning that the technique focuses on the quality of the selected ideas.

On the above ground, the technique is not applicable to a single informant. On the contrary, it appears to be very adequate for groups of people; the more numerous the session is the better.

Some authors agree that this technique can accommodate a lot of participants without the dysfunctions of discussions among several participants. The generation of ideas is greater than other group techniques where there are more participants [Delbecq and Van de Ven 1970].

On this ground, it is not at all recommended for use for individual informants. When there are small or large groups of informants, the technique is recommended for use.

5.6.11 Delphi Method

This is a technique that focuses on promoting the convergence of opinions among a set of people. A questionnaire is drafted that is recurrently sent to this group
of informants. In each round, the statistical analysis of the previous responses is attached so that each individual can correct their earlier response, if they so wish.

Thus, the technique is not applicable to a single individual because it would not be reasonable to get them to reflect on their responses. In this case, some of the individual techniques would be more adequate.

When there is a group of informants, the discordant responses of a minority can be corrected by the pressure of the others. This way, a consensus is reached on key system aspects. The more people are questioned, the more valid the statistical data are and the more effective the technique is.

Several authors ratify the group use of this technique [Boose 1986]. An experiment in [Roth and Wood 1993] demonstrated that the information gathered from a group of experts was greater than the knowledge acquired individually.

On this ground, the technique is not recommended for individual use. It is recommended for use with small and large groups of informants.

### 5.6.12 Participant Observation

This technique involves the elicitor in the environment of the problem domain participating actively in the jobs performed by users. These activities can be carried out by a single individual who teaches the elicitor how to perform their functions or by a group of people that interact in the domain.

The technique is, therefore, adequate for any number of domain users.

For this reason, the technique is recommended for any number of individuals: individual, small or large groups.

### 5.6.13 Prototyping

This technique brings an informant face to face with a system prototype to be developed to determine requirements. During the session the user is questioned to find out what that person would like. Therefore, the technique appears to be more adequate for application to a single informant. This way, the information gathered is certainly representative of a user and not the, possibly biased, view of a group of people.

Applied to a group of people, the technique could produce an ambiguous and unclear view of the requirements due to divisions within the group or problem undefinedness. For this reason, the technique does not look to be suitable for use with a group of informants. The result of its use would be untrustworthy.

Therefore, the technique is recommended for individual use. In those cases where there are small or large groups of informants, the technique is indifferent.

### 6.5.14 Focus Group

This technique covers the interaction of a group of people in a session facilitated by the elicitor. In the session, the participants discuss subjects proposed by the elicitor possibly accompanied by a relevant artefact. The purpose is to produce in-depth opinions on the group about the artefact by means of intense discussions. On this ground, the technique does not make sense for a single informant. The technique then performs well with a well-selected group of people.
According to Nielsen, the technique gathers from six to nine users to discuss related topics [Nielsen 1993]. In their Respect project techniques review [Respect 1997], the academics state that this technique can be applied to a group of from six to eight representative users. Engelbrektsson speaks of this technique as an interaction between eight to ten people [Engelbrektsson 2002].

On this ground, the technique is not recommended for individual informants. The technique is recommended for small and large groups of informants.

5.6.15 JAD

The JAD technique involves a miscellaneous group of system stakeholders. The session has a broad focus and tackles diverse topics by subgroups, which are then discussed. The technique then is not applicable for a single informant.

When there is a smaller group of informants, the technique is applicable. However, its focus has to be delimited, which can reduce its effectiveness. In these cases, the suitability of the technique is questionable. If the number of stakeholders is high, the technique can be applied adequately, and there are better prospects of getting good results.

In a review of elicitation techniques [Christel and Kang 1992], Christel and Kang compare some techniques and tools with some process aspects. In particular, they state that approaches like JAD are very applicable to stakeholder groups. According to Wood, a session can have from 18 to 25 people [Wood and Silver 1989].

For this reason, the technique is not recommended with individual informants. For a small group of informants, the technique is indifferent, whereas it will be recommendable for large groups of informants.

5.6.16 Scenarios/Use Cases

This technique is an interaction of the elicitor with some informant to capture system functionality. Strictly speaking, it is a technique for a one-to-one session, because, under these circumstances, we gain a particular and separate view.

If there is a group of potential informants, the technique can be used separately or jointly, but the variability of viewpoints is likely to confuse the elicitor and be an obstacle to elicitation. In these cases, the results are likely to be uncertain.

For this reason, the technique is recommended for use for individual informants. On the other hand, the technique is indifferent for small or large groups of informants.

5.7 Consensus among Informants

This attribute defines how much agreement there is among informants at the outset. It covers two values: High, total agreement; and Low, no agreement.

5.7.1 Open-Ended Interview

This technique aims to capture general product information and other project features. It is primarily an individual technique, although it can be used separately to interview a group of people. The technique can be adequate when there is consensus among different informants, and it is, therefore, possible to interview a single individual owning representative information about the organization or partial knowledge about the domain.
On the other hand, if the potential informants do not agree, it is not enough to interview a single individual, as it would output a biased, and probably incorrect, view. In this case, one possibility is to interview all the stakeholders, but this will only gather diverse and confused information. The technique detects but does not solve the problem of consensus. On top of this, the cost of interviewing might not be worth the results it yields. This way, technique use is risky when there is no consensus and, therefore, it is worthwhile considering another more adequate technique to continue with the elicitation.

Consequently, we recommend using the technique when the consensus among informants about the information they supply is High. If consensus is Low, the technique is not recommended for use.

5.7.2 Structured Interview

This technique can explore specific topics in more depth with individual informants. Like the unstructured interview, then, it is suitable for informants supplying domain information about which they agree. A session with such an individual retrieves detailed information that is totally effective for preparing requirements.

If there is no agreement on the information, i.e. if there is more than one potential informant holding different views on the problem or on the details of part of the problem, the use of the technique with each one may capture different and not absolutely reliable information. In these cases, then, it does not appear to be adequate to use the technique, and the elicitor should sound out another strategy.

Therefore, the technique is recommended for use for informants among which there is a High level of consensus. When consensus is Low, its use can not be considered to be recommendable.

5.7.3 Task Observation

The aim of this technique is for the elicitor to come into contact with the domain functions, meaning that consensus may be a superfluous or as yet unobvious condition for the objectives of the session. Whereas it is applicable in any case, the technique is no good for use to reach consensus, that is, the effectiveness of the technique does not depend on there being a consensus.

For this reason, both for a situation of High and Low consensus among informants, the use of the technique is likely to be indifferent, depending on other conditions.

5.7.4 Critical Incident Technique

This technique aims to find out specific and detailed information about how a case or function is performed. Generally, there will very few people in possession of such specific knowledge about anomalous and sporadic cases. If there is only one informant, the technique will be applicable and output correct information. If there is more than one potential informant for the same topic –wherever possible not many-, they will possibly agree on such situations, and the technique can be applied to each one satisfactorily, that is, the technique is adequate when there is consensus among the potential informants.

On the other hand, if there is more than one potential informant and they are found not to agree, the technique could be applied one by one –as there are probably
not many- and then the differences could be worked out. In these cases, the technique can be unreliable to use in terms of the effectiveness of its results.

On these grounds, the technique is recommended for application where consensus among informants is High. If consensus is Low, the use of the technique is indifferent.

5.7.5 Concept Ranking/Laddering

In this technique the aim is to gather information about the relationships between concepts or entities in the problem domain. This information should preferably be stable and representative knowledge of the group of stakeholders. If there is consensus among the potential informants, the technique can be applied to a standard user and capture reliable information.

On the other hand, if the potential informants do not agree, the technique could be applied repeatedly across several individuals, but this alone would not settle the differences in the captured information. That is, although the technique is applicable, the quality of the results will be questionable. In these cases it might be worthwhile using another technique, as this one would not solve the problem of heterogeneity and disagreement about the elicited information.

For this reason, the technique can be recommended for informants where consensus is High, and is not recommended in the case of Low consensus.

5.7.6 Questionnaires

This technique can be applied to an informant or even a group of informants to gather information of the same type. If there are signs of uniformity and consensus within the group, the results of the questionnaire will be able to reliably confirm and validate the information. As the cost is marginal, it is probably better to administer questionnaires to more than one individual rather than to a single representative informant. This way, this technique appears to be suitable when there is agreement among the potential informants.

If there are signs of differences among informants, the technique can be applied, although it will not solve the problem in itself. As, unlike the interviews, the administration of the questionnaire or replication to a group of people does not have a sizeable associated cost, the technique can gather information that shows on what and how much the subjects differ. This way, the technique looks to be equally usable and adequate for situations where there is perceived to be disagreement on the substance of informant knowledge.

For this reason, the technique is recommended where informant consensus is High or Low.

5.7.7 Protocol Analysis

This technique aims to capture information on expert reasoning, representing his or her personal view of a situation. This is a costly technique that can be adequate when there is a single informant that represents the knowledge agreed upon by a group. In this case, the information captured is correct and can be considered as part of the requirements for a software system.

On the other hand, if the informants own the same knowledge and disagree, it is risky to put effort into questioning them one by one. The technique can confirm
conflicts but cannot settle the differences among the informants. This, on top of the associated cost, appears to be a contraindication for the use of the technique in these cases.

This way, the use of the technique is **recommended** for **High** consensus and **not recommended** for **Low** consensus among informants.

### 5.7.8 Repertory Grid

This technique outputs an informant’s personal view of about the set of domain elements. Also it is possible to apply it to a group of project stakeholders. If they patently agree, the technique is equally applicable to a representative informant, although, in exchange for a marginal cost, it could also be applied to each member, thereby giving a statistically more valid representative view of the whole.

If there is no perceived consensus among informants, a possible application of the technique is to retrieve different partial views and also form a representative view of the group. Although possibly not very reliable with a view to establishing the requirements, this representative view may be useful for gaining an overview of the domain.

Therefore, the technique is **recommended** for **High** or **Low** consensus among informants.

### 5.7.9 Brainstorming

In this technique informants can interact without restraint to generate ideas and opinions on which they may or may not agree. Also, it is likely to detect how much agreement there is among participants on some problem aspects. However, the technique does not aim to help reach an agreement or settle differences. Consensus does not appear to be a factor conditioning the use of the technique, but it is unclear whether or not it is adequate for these cases. If there is consensus among participants, the technique is able to generate diverse but not discordant ideas.

If there is no agreement among informants, the technique will be able to elicit probably disparate opinions and will show up the problem and existing differences. The technique can help to detect but will not necessarily solve disagreements.

On the other hand, Liou’s review of techniques states that brainstorming helps to prevent confrontation, reduces inhibition and detects conflicting views among informants [Liou 1992]. She does not, however, guarantee that these conflicts can be resolved, but merely admits the possibility.

For this reason, technique use is **indifferent** for **High** or **Low** consensus among informants.

### 5.7.10 Nominal Group Technique

This technique aims to generate a set of ideas or opinions in an orderly fashion and then introduces a discussion and final vote to settle any disagreements. For this reason, it is used not only to detect but also to somehow deal with differences of opinions among informants. In these cases, informants will state and get the chance to defend their discordant views before they are finally validated by the group. This way, the technique appears to be suitable for situations where project stakeholders do not agree.
On the other hand, if there is definite consensus among the informants, the technique can be applied as a technique for generating and prioritizing ideas. In other words, it is equally adequate for these cases.

Additionally, Liou defines the technique as effective in situations where there is uncertainty or discrepancies about the nature of a problem and the possible solutions [Liou 1992].

For this reason, this technique is recommended for use where consensus among informants is both Low and High.

### 5.7.11 Delphi Method

This technique is especially designed to deal with disagreements among informants with a similar level and type of knowledge. In a recurrent process, the opinions are refined until there is sufficient agreement on a set of questions. This agreement is achieved on the strength of the statistical groundwork. In each round the informants receive a report on the analysis of the responses as a whole. This way, informants that do not hold with the majority way of thinking can reconsider their responses in the following round. Thus, the technique is intrinsically suitable for a group of discrepant informants.

The technique is applicable even if there are clear signs of agreement among informants. In this case, however, it can turn out to be an unnecessary waste of resources, and it might be worthwhile weighing up a different choice of technique.

Several experts state that this technique is considered as an effective method for capturing information that represents the opinion on which a group of software project stakeholders agree [Chen 1989] [Liou 1992].

For this reason, the technique is recommended for use where there is a Low consensus among informants. Its application will be indifferent if consensus is High.

### 5.7.12 Participant Observation

This technique aims to find out details of what actions informants take in their work environment and can perhaps help to detect disagreements. However, the technique does not primarily aim to help to deal with them. Its aim is to simply learn domain functionality by participating actively in the domain.

This way, technique use is not subject to the precondition of there being agreement among informants.

To do this, its use is indifferent for High or Low consensus among informants.

### 5.7.13 Prototyping

This technique aims to gather functional and product design information. If there are signs of differences of opinion among informants, or, particularly, the aims are unclear, the technique can be used to help clarify needs or bring divergent standpoints closer. Therefore, the technique appears to be suitable when there are differences of view among informants.

If there is agreement among potential informants, the technique can be equally adequate and effective.

Thus, the technique is recommended for cases where consensus among informants is both High or Low.
5.7.14 Focus Group

This technique is able to gather opinions about some presented products and then prompt a discussion until some agreement is reached. The technique was developed to move a debate possibly ending in a definite view of diverse subjects. For this reason, it is suitable for cases where the informants disagree about some development aspects. During the sessions, participants are allowed to state such differences and given the chance to defend their positions. Sometimes, participants use a product or artefact to help to argue their standpoints.

If there is perceived to be agreement among informants, the technique can be applied to explore less explicit aspects of the project in more detail. This way, it is equally adequate, irrespective of how much agreement there is perceived to be.

On this ground, the technique is recommended for High or Low values of consensus among informants.

5.7.15 JAD

This technique elicits the view of each type of organizational stakeholder. Even if opinions differ, they will be reflected just so in the findings of the activity. The technique enables the organization to determine the size, scope and definition of the problem to be solved. This way, it is useful for detecting but not for dealing with disagreements. That is, the use of the technique is independent of how much agreement there possibly is among participants.

For this reason, technique use is indifferent for High or Low values of consensus among informants.

5.7.16 Scenarios/Use Cases

This technique aims to capture information on the different situations that the software system tackles. If the informant is representative of the group of informants, then the results of session use will be good. The technique appears to be suitable if there is clear agreement among the informants about the functionality of the system under development.

If there is perceived to be some disagreement among informants, the information that is captured from one informant may not be reliable. If there are few informants, the technique can be applied to each one separately to form an idea of the situation and later use some other technique to achieve homogeneity. If there are many informants, the use of the technique can be costly, meaning that there is no guarantee of it being adequate.

For this reason, the technique is recommended where consensus among informants is High. If consensus is perceived to be Low, its use is indifferent.

5.8 Informant Interest

This attribute refers to how motivated the informant is about participating in the elicitation sessions: High, very interested; Low, not very interested; and Zero, not at all interested.

5.8.1 Open-Ended Interview
This technique intrinsically implies an intense interaction among elicitor and informant. Active and motivated informant participation is essential to be able to achieve the planned objectives for the session. This is because the elicitor will let the informant expand on general subjects, with a little control on his or her part.

An informant with manifest interest in system development will be predisposed to actively participate in the session, delivering necessary and sufficient information for the elicitor. This way, if the informant presented a patent motivation prior to the session, this can be a guarantee of the session being beneficial and effective.

If the informant shows little interest or motivation, his or her participation in and the possible results of the session are likely to be unreliable and will depend on other influential factors.

When the informant has no interest whatsoever in the project and is not motivated to participate in the subsequent session either, the results can be very negative. An unmotivated informant will be averse to giving a lengthy explanation, will bias reliable information and even intentionally distort and perhaps even alter and sabotage the course of the session.

In their elicitation technique characterization [Batista and Carvalho 2003], Batista and Carvalho propose an intermediate value for the required user participation facet for his technique.

In his empirical study, Lloyd [Lloyd 2002] established a positive correlation between informant participation and the interview technique.

Therefore, if informant interest is High, the technique is recommended for use. If his or her interest is Low, technique use will be indifferent. Finally, if the informant has Zero interest, its application is not recommended.

5.8.2 Structured Interview

This type of interview is similar, from the informant viewpoint, to the open-ended interview, and motivation is generally equally influential. An obvious interest on the part of the informant is a guarantee for the subsequent session, as he or she will make an effort to deliver the information required and accept the instructions given by the elicitor on whether not to pursue particular aspects.

If the informant does not have much interest, it is not absolutely clear whether the technique will be adequate. It can have disparate results depending on other factors.

Unlike other interviews, when the informant is not inclined to participate, the technique could be applied any way, although there is no guarantee that the results will be reliable. That is, if the informant is not motivated, the basic and set organization of the interview can any way prompt brief, but sufficiently specific responses.

In their elicitation techniques characterization [Batista and Carvalho 2003], Batista and Carvalho propose an intermediate value for the required user participation facet for this technique.

For this reason, the technique is recommended for use when informant interest in participating in the session is High. When informant interest is Low or Zero, technique use is indifferent.
5.8.3 Task Observation

This task does not involve any special participation by informants. They will perform their normal functions in their work environment while the elicitor observes their performance and interacts very little. For this reason, this technique looks to be very suitable when informants are not very motivated about participating in the elicitation process, as they do not have to get involved in the sessions.

If the informants are interested in the project, the technique can lead to even better results, as they will help the elicitor to do his or her job.

In their review of elicitation techniques [Jitnah et al. 1995], Jitnah et al. state that the success of this approach for acquiring requirements depends on how inclined the users of the organization are to cooperate with the analyst at their workplace. In their review of the Respect project technique [Respect 1997], the academics state that user cooperation is vital for the use of this technique. The experts Sommerville and Sawyer characterize this technique as risky on the grounds of the likely resistance of users [Sommerville and Sawyer 2004].

For the above reasons, the technique is recommended for use for any degree of informant motivation: High, Low, and Zero interest.

5.8.4 Critical Incident Technique

This technique calls for sizeable participation on the part of the informant, as he or she has to respond to continual and increasingly more complicated questions and situations proposed by the elicitor. For this reason, if the informant is very motivated, he or she will make an effort to consider the preconditions and respond adequately. In this case, the technique appears to be suitable for running a constructive session.

If the informant is not very motivated and interested in the project, his or her responses to the elicitor inquiries can be light-hearted or not very well thought out, making the results unreliable.

When the informant shows no interest, he or she will evade determining critical situations and delivering reasoned information. The technique can capture biased information, entering wrong system requirements and putting the project at serious risk.

This way, the technique is recommended for use when informant interest in participation is High. If informant interest is Low, the use of the technique is indifferent. Finally, the technique is not recommended for use if the informant shows Zero interest in participating.

5.8.5 Concept Ranking/Laddering

In concept ranking, the informant must make the effort to relate concepts, meaning that he or she must be somewhat motivated. Fortunately, the technique procedure does not require informants to be extremely well disposed and may even help to motivate uninterested informants to participate. This way, if the informant shows some degree of interest in the project, the technique can be applied with greater possibilities of achieving more effectiveness.

On the above grounds, the technique could be applied in the hope of motivating the informant in the course of the session for the case of informants unmotivated or openly uninterested in participating in the project. The technique's
...fun factor that could actually encourage an averse informant. However, the results will depend on other related factors.

On this ground, the technique is **recommended** for cases where informant interest is **High** or **Low**. If the informant has **Zero** interest, its use will be **indifferent**.

### 5.8.6 Questionnaires

The questionnaire is a very comfortable technique for the informant, because he or she can respond to it anytime and anywhere. For this reason, it appears to be very suitable for application to informants that have no interest whatsoever in participating. The fact that informants can respond whenever and wherever they like can relieve the pressure on the informant. Additionally, the organization of the questionnaire questions, limiting the possible responses or asking for full details, for example, can make it easier for the informant to give accurate responses. This way, the technique appears to be adequate for informants not at all well disposed toward participation in the elicitation process, especially in face-to-face interactions.

If the informant is well disposed towards the project, the questions presented by the elicitor will be able to gather reliable information, that is, the technique can be more effective still, if the informant is motivated about the project.

In their elicitation technique characterization proposal, Batista and Carvalho [Batista and Carvalho 2003] propose a low value for the required user participation facet for this technique.

This way, the technique is recommended for use for any level of interest: **High**, **Low**, and **Zero**.

### 5.8.7 Protocol Analysis

Informants have to be one hundred percent involved in this the session to apply this technique. The informant must put his or her thinking into words. The informant needs to be especially motivated to do this, as he or she has to concentrate and reason about what action to take and how to resolve situations. This way, the more interested the informant is in the project the better able he or she will be to deliver reliable clues about how to proceed in his or her domain. The technique appears to be adequate, in these cases, to achieve quality information for analysis.

If the informant is not very motivated, the results will be unreliable and depend on how well the elicitor can motivate him or her or on other influential factors. Technique effectiveness is by no means assured.

On the other hand, if the informant has no interest in participating, the session runs a high risk of failing. An unmotivated informant is a serious obstacle for this type of techniques, where the active responsibility falls precisely on communication with the respondent. The interaction can often get bogged down, and the informant may even deliver incorrect information about his or her procedure. This way, the technique does not appear to be at all suitable, when the aim is for it to be applied to informants that show no interest in the project.

Therefore, the technique is **recommended** for use when the informant interest is **High**. If interest is **Low**, the use is **indifferent**. If informant interest is **Zero**, it is **not recommended** for use.
5.8.8 Repertory Grid

This technique aims to retrieve information derived from the informant without him or her having to interact too much with the elicitor. To do this, the informant has only to rate some concepts. This calls for very little participation. The elicitor asks questions the informant specific questions to which the informant must respond briefly. For an informant that is uninterested in the project, a session of this type can ease the elicitation of information about the problem domain. The informant is not required to expand on information, which could be discouraging. Thus, the technique appears to be very adequate when the informant is uninterested in participating because he or she will be set a simple and appealing task.

If the informant is in any way motivated, the technique is likely to be more effective. The informant will be inclined to answer the questions correctly and will deliver a better thought-out rating of the elements and constructs.

On this ground, use is recommended when informant interest in participating in the process is High, Low, or Zero.

5.8.9 Brainstorming

This technique produces results that depend on the effective participation of informants. Participants generate opinions unreservedly without the pressure of having to speak in order. This format calls for informants to be motivated about the project and interested in stating their opinions during the session. For this reason, the technique appears to be suitable when the informants are keen to participate in the elicitation process.

The technique could be applied if the informants are not very interested, but session success will depend on the elicitor’s leadership and other factors. The elicitor could manage to motivate the informant in the course of the session or the informant could take an interest in the generated ideas.

Informants that are clearly uninterested in participating put the effectiveness of applying the technique at risk. An unmotivated informant may simply refuse to participate and will be a negative factor in session dynamics. He or she may even try to sabotage the ideas of other participants or make impertinent remarks.

In their elicitation technique characterization proposal [Batista and Carvalho 2003], Batista and Carvalho propose a low value for the required user participation factor for this technique.

For the above reasons, the technique is recommended for use if informant interest is High. If interest is Low, its use is indifferent. If informants have Zero interest, the technique is not recommended for use.

5.8.10 Nominal Group Technique

A session of this technique involves several people, but the interaction is well structured, as the ideas are generated in writing and there is a final vote. Because of this format, informant participation is better planned and does not depend so much on how well disposed they are towards the project. On this ground, the technique appears to be suitable when there are informants that do not want to interact openly or show no interest in participating.

If the informants are to any extent motivated, the technique can be used and achieve even better results. The interested informants make a bigger effort at generating reasoned opinions and conscientiously assessing the proposed ideas.
For this reason, if informant interest is **High**, **Low**, or **Zero**, the technique is **recommended**.

### 5.8.11 Delphi Method

Applied to a group of informants, this technique gathers information that is successively refined to achieve convergence. The format of the questionnaire gives informants the freedom to respond and, in many cases, will not call for much effort. Thanks to this procedure, the technique appears to be adequate when the informants are uninterested in participating in the elicitation process or an interactive session.

If the potential informants are motivated and interested in the project, they will surely have better chances of getting positive results. The informants will thoroughly rethink their responses between each feedback and round. This way, the technique appears to be equally suited for informants that are interested in the project.

On this ground, the technique is **recommended** for cases where informant interest is **High**, **Low**, or **Zero**.

### 5.8.12 Participant Observation

This technique involves active elicitor participation in the informants’ sphere, learning functions and intervening in their development. For the elicitor to be able to take his or her actions, he or she must receive generous ad hoc help from his or her colleagues. Thus, the eagerness of the environment informants is essential for the technique to be effective.

If the informants are unmotivated, they will not receive their new *colleague* well, and may even refuse to collaborate. They may consider the elicitor’s intromission as an aggression and sabotage his or her learning and make his or her stay in the domain uncomfortable. In this case, the results will not be worth the cost, placing the project at risk. For this reason, it does not appear to be a good idea to apply this technique when the informants of the environment where the elicitor is to work show no interest in and no motivation whatsoever for the project.

If there is little interest on the part of the environment informants, the technique could be used, although the results may be questionable and will depend on other characteristics or elicitor skills.

On the other hand, a good work climate where informants are motivated about participating in the project will make the elicitor’s job easier, and he or she will be able to gather valuable and reliable information. This way, the technique will be even more effective when applied with informants interested in collaborating on the project.

In their review of elicitation techniques [Jitnah et al. 1995], Jitnah and colleagues state that the success of this approach for acquiring requirements depends on how well disposed users are towards the organization and cooperating with the analyst at the workplace. Likewise, Saiedian and Dale state that these interactive techniques require mature and motivated participation by clients [Saiedian and Dale 2000].

Therefore, this technique is **recommended** for use where informant interest is **High**, whereas its use will be **indifferent** if interest is **Low**. For informants with **Zero** interest, the technique is **not recommended**.
5.8.13 Prototyping

Prototyping is a good option when there are problems of interaction with the informant. A prototyping session is more entertaining and motivating. The elicitor can encourage the informant to show his or her preferences based on an artefact that captures his or her attention. This way, the prototype is useful for getting an informant uninterested in participating in the project to interact and encourage him or her to collaborate. The technique looks to be adequate for this type of informants with no apparent interest.

If the informant is in any way motivated, the session is more likely to be very effective, as he or she will be more inclined to use the prototype to its full potential and state alternative target requirements. That is, the technique appears to be equally appropriate for informants with interest in the project.

Teng and Sethi highlight the need for the user to participate and provide a lot of input for prototyping to be effective [Teng and Sethi 1990]. Zowghi and Coulin also underline that prototypes are beneficial for encouraging stakeholders to play an active role in development [Zowghi and Coulin 2005]. In their elicitation technique characterization proposal, Batista and Carvalho [Batista and Carvalho 2003] propose a high value for the required user participation facet for this technique.

In his empirical study, Lloyd [Lloyd 2002] established a positive correlation between informant participation and the prototyping and storyboarding techniques. In an empirical review of projects using this technique, it was found to help to cultivate and achieve user commitment and participation [Alavi 1984].

For this reason, the technique is recommended for use for High, Low, or Zero informant interest.

5.8.14 Focus Group

This technique is very interactive and involves a group of informants in an intense exchange of opinions. Participants must propose and defend their position with respect to key project aspects. This way, potential participants would appear to have to be interested in actively collaborating in the session. If the informants show any interest, then the technique appears to be suitable for getting good results.

If the informants are uninterested, their participation is unlikely to be very beneficial, and the results may even be adverse. However, the presentation of an auxiliary artefact (another market product, prototype, etc.) on which to focus the discussion may be enough to motivate them. This way, the technique can be applied, but it is uncertain how effective it will be.

On this ground, the technique is recommended for use for informants with High, or Low interest. If the informants have Zero interest, its use is indifferent.

5.8.15 JAD

The success of this technique is linked to the informants’ participativeness. Informants must meet in small groups to tackle a set subject and present it to the others. For the quality of the information to be presented to be good enough, each informant must contribute his or her knowledge and view of the set topic. For this reason, the activity can be highly beneficial provided the informants are very motivated. The technique looks to be effective when the potential informants have a manifest interest in the project.
If average informant interest is foreseen to be less clear, the results of applying the technique are likely to be less certain. Some interested informants may motivate others on the grounds of professional or occupational proficiency or through the pressure of subordination.

If there are unmotivated informants, the session can be very negative. If they have a higher organizational status, these participants may repress the others or act coercively on their ideas. This way, it is not a very good idea to apply the technique if there is no interest among participants, as it puts the project at serious risk.

In their elicitation technique characterization proposal, Batista and Carvalho [Batista and Carvalho 2003] propose a high value for the required user participation facet for this technique. Therefore, the technique is recommended for use where informant interest is High. If interest is Low, use will be indifferent. On the other hand, the technique is not recommended for use if there is Zero interest.

5.8.16 Scenarios/Use Cases

This technique actively involves the informant in the session. The informant must make an effort to focus his or her attention on the target system functionality and provide the required information to the elicitor. For this reason, the technique appears to be adequate when the potential informant is at all motivated.

If the informant is not clearly motivated, the technique can be applied but the result will depend on other influential factors, such as elicitor skills.

In their elicitation technique characterization proposal, Batista and Carvalho [Batista and Carvalho 2003] propose a high value for the required user participation facet of this technique.

In his empirical study, Lloyd [Lloyd 2002] established a positive correlation between the participation of the informants and use cases.

For this reason, this technique is recommended for use when informant interest is High or Low. Its use will be indifferent, if there is Zero interest.

5.9 Expertise

This attribute considers informant experience in the problem domain or function. The stipulated values are: Expert, over five years in the domain or job; Knowledgeable, from two to five years in the domain or job; and Novice, less than two years in the domain or job.

5.9.1 Open-Ended Interview

This is a multi-purpose technique, although it is generally used to get a general definition and rough idea of the scope of the product under development. This type of information will normally be owned by people with more experience within the organization or in the domain. These people will be clearer about defining the problem and the domain of the product under construction. Respondent experience will make the captured information more reliable. For this reason, we will always try to conduct these sessions with this type of people. When there is a group of users, potential respondents about a topic, preference will be given to the ones that are more experienced.
This way, an experienced enough potential informant could deliver higher quality and more reliable information and probably high-level information, which is the view generally sought by this technique. Therefore, the technique is likely to be suitable when the informant is experienced in the organization or domain, owing not necessarily the thoroughness of his or her knowledge but thanks to the sound vision that he or she will have of the product.

If the informant is not experienced enough, the quality of the information delivered may be questionable. In some cases, it may be ambiguous, biasing the organizational view of the product to be developed. In these cases, the technique would be equally applicable, but the quality of the results is less certain.

For this reason, we recommend the technique for informants with an expertise level of Expert or Knowledgeable. If they are Novices, use is indifferent.

5.9.2 Structured Interview

This technique aims to examine particular requirements issues in further detail. Generally, this knowledge is sounder and more reliable when it is owned by experienced users. As the purpose is to gather further details about some specific domains, it is more reliable to interview those informants that have been in their jobs longer who will be clearer about the required details. For this reason, the technique appears to be suitable for questioning informants that have enough experience to give details about previously defined actions or processes.

A not very experienced informant could apply the technique, but the reliability of the captured information is likely to vary, and the effectiveness of the technique is unreliable.

For this reason, the technique is recommended for use for informants with an expertise level of Expert or Knowledgeable. When informants are Novices, the use of the technique is indifferent.

5.9.3 Task Observation

Elicitors play a passive role in the observation technique. Users perform their jobs meticulously and procedurally when they are new or inexperienced. On the other hand, more experienced operators will have introduced shortcuts, observable or otherwise, into the procedure over time. This is an obstacle to the use of the technique. This way, when an informant is not very experienced, his or her actions will be more distinguishable, and the use of this technique appears to be more adequate.

If the informant or informants have years of experience in their job, their performance will be more opaque to the elicitor, making it more difficult to gather accurate information. Although the technique is equally applicable in this case, its effectiveness is uncertain.

For this reason, the technique is recommended for use with informants that have Novice or Knowledgeable expertise levels. If the informant is Expert, the technique is likely to be indifferent.

5.9.4 Critical Incident Technique

A precondition of this technique is for the informant to be expert enough to exteriorize reliable information about such anomalous situations. That is, critical
situations are generally sporadic and it takes people a long time in the job to gather sound knowledge about when and why they occur and how to deal with them. This way, the technique is likely to have better results if the potential informant is quite experienced at his or her job.

If the informant is new to his or her job, he or she is unlikely to be knowledgeable enough about the existence of critical situations or to have dealt with them correctly. Because of such uncertainty, although the technique could be applied to these people, results could be questionable, as it could capture mistaken information about situations in which the informant is not experienced.

For this reason, the technique is recommended for informants with an expertise level of Expert or Knowledgeable. If the informant is Novice, technique use is indifferent.

5.9.5 Concept Ranking/Laddering

This technique captures relations between concepts known to the informant. This interaction is aided by the procedure, which prevents problems of communication or alike that pose a threat to the activity. If the potential informant is experienced, the captured information will be more reliable. However, a novice informant can be knowledgeable enough to establish the relations about entities that he or she has mastered. That is, as the required knowledge is available, informant experience does not appear to be a necessary precondition for applying the technique. For this reason, the technique appears to be suitable irrespective of the level of informant expertise.

For this reason, the technique is recommended for use with informants of any level of expertise: Expert, Knowledgeable or Novice.

5.9.6 Questionnaires

This technique can be used to capture diverse types of information from an individual or group of potential informants. It is an instrument whose preparation depends on the target population, that is, the elicitor will prepare the questions depending to whom it is to be administered. The questionnaire is prepared for the level of knowledge of the informant or informants.

For this reason, its use appears to be independent of informant expertise, as it will be drafted ad hoc for the potential informant population.

On this ground, this technique is recommended for cases where the informant has any level of expertise: Expert, Knowledgeable or Novice.

5.9.7 Protocol Analysis

This technique is aimed at retrieving details about the reasoning of the informants, meaning that they should have some tacit knowledge acquired by experience in the job or domain. A very experienced informant will be able to deliver heuristic knowledge that would be difficult to capture using another technique. This way, the technique appears to be suitable for use with informants that are very experienced at doing their job.

Although the technique is powerful for capturing implicit knowledge, it can also be used to gather general information about processes and functions. The technique
is equally applicable for inexperienced informants, but its effectiveness will be questionable and the results less certain.

On this ground, the technique is recommended for use by Expert informants, and is indifferent if used for sessions with Knowledgeable or Novice informants.

**5.9.8 Repertory Grid**

This technique involves the informant rating a set of elements from his or her job or knowledge domain. The potential informant must have some knowledge at least, although experience is not a precondition for technique success, as the session will be aimed at gathering an individual informant’s personal view of his or her knowledge.

The technique can be used with inexpert informants to ascertain their view of their domain knowledge. For this reason, the technique appears to be equally suitable for application with expert or novice informants.

This way, this technique can be recommended for informants with some level of expertise: Expert, Knowledgeable, or Novice.

**5.9.9 Brainstorming**

This technique gathers opinions from several informants that can provide input about a number of topics. Generally, it can be applied to gain an overview of the problem at all organizational levels. For this reason, a diverse sample of project stakeholders can participate in the session. That is, there will be experienced and novice users in the domain. This means that the technique is very open with respect to the participants, and their expertise does not appear to be key condition.

For this reason, it is recommended for Expert, Knowledgeable or Novice informants.

**5.9.10 Nominal Group Technique**

Like brainstorming, although more structured, this technique retrieves different opinions from different types of informants. Also, participants may include diverse stakeholders from the different organizational levels. Therefore, it is not a technique that preconditions the participants on the grounds of domain experience.

The technique then is suitable for application to stakeholders of any experience level, that is, irrespective of their level of expertise.

For this reason, it is recommended for any level of informant expertise: Expert, Knowledgeable or Novice.

**5.9.11 Delphi Method**

The method involves informants answering a questionnaire. The aim is to get a opinion that is representative of the group. The technique emerged as a tool for use with experts. This way, it appears to be adequate for participants with lengthy domain experience.

However, the technique does not intrinsically condition participation by expertise level, that is, depending on the objective of the elicitation session, informants with different experiences will be able to participate grouped by areas or
expertise levels. However, it appears to be less reliable when the participants are novices, as the statistical trend will possibly be measured and weaker.

For this reason, the technique is recommended for use for informants with Expert and Knowledgeable levels of expertise. When the participants are Novices, the technique is indifferent.

### 5.9.12 Participant Observation

This technique gets the elicitor involved in the informants’ function. The aim is to get an idea of their work or to capture details of how they do things, which may be less straightforward with another choice of technique. The informants will be able to carry out activities of different types and complexity, and the technique can, in any case, capture effective information.

When informants are experienced, the elicitor may not understand all the actions that they take, but, unlike simple observation, he or she can, in this case, ask or study until he or she learns the procedure. This means that the technique can be applied with informants of any level of expertise in the problem domain or the organization where they perform their tasks.

The experts Beyer and Holtzblatt state that this technique enables the elicitor to learn from the informant’s (master) experience. This experience will give clues about special events that have taken place before and are likely to be of consequence [Beyer and Holtzblatt 1995].

For this reason, the technique is recommended for any level of expertise of informants: Expert, Knowledgeable or Novice.

### 5.9.13 Prototyping

Prototype use retrieves information on requirements and preferences for the design of a range of product functions. These functions can be executed by or be the responsibility of any informant in the organization. This way, the technique is independent of the level of expertise of possible informants.

Christel and Kang state that this technique is recommended for users with low experience [Christel & Kang 1992].

On this ground, the technique can be used for any level of informant expertise: Expert, Knowledgeable or Novice.

### 5.9.14 Focus Group

This technique enables the interaction between a group of informants about some defined element or product. The participants are diverse depending on the session objectives. No set level of informant expertise is necessarily required to get effective results. This way, the technique appears to be equally applicable and effective with experienced and inexperienced informants.

In an experiment with this technique, the technique was found to be more effective with experienced participants than with others that were less experienced [Engelbrektsson 2002]. However, the session with artefacts that represented the product encouraged more participation by less experienced users.

For this reason, it is recommended for any level of informant expertise: Expert, Knowledgeable, or Novice.
5.9.15 JAD

This technique enables the interaction of informants of different levels of the organization, as it aims to achieve an overview of all the aspects involved in the project. Additionally, success may depend precisely on the participation of informants of different experience, that is, the technique is adequate for informants with any experience.

This way, it is recommended for informants of any level of expertise: Expert, Knowledgeable, or Novice.

5.9.16 Scenarios/Use Cases

This technique captures information, owned by organization managers from different levels with varying experience, about different final product functions. The technique, then, does not condition participants by their job experience. That is, they do not need a level of expertise for the technique to be applied effectively.

For this reason, the technique is recommended for any level of informant expertise: Expert, Knowledgeable or Novice.

5.10 Articulability

This attribute refers to how easy the informant finds it to explain his knowledge. Its values are: High, gives an excellent explanation of his/her knowledge; Medium, gives a moderately good explanation of his/her knowledge; and Low, does not give a clear explanation of his/her knowledge.

5.10.1 Open-Ended Interview

This technique involves an open interaction between the elicitor and the informant. The elicitor proposes a general script that may vary in the course of the session depending on the information that the interviewee supplies. The informant should try to explain anything and everything about the stated questions. Being a technique whose effectiveness is based on oral communication, the interviewee’s skill at explaining his or her knowledge has a bearing on the results.

If the informant has an excellent capability for explaining what he/she knows or he/she at least knows how to give a satisfactory explanation, the elicitor will be able to understand and continue the session correctly, extending the breadth of the topic or going into more depth as required. In this case, the technique appears to be better for achieving a successful session in terms of results.

If the informant is not skilful at explaining his or her knowledge clearly enough, the interview may become tiresome and waste a lot of time. The elicitor may misunderstand what the informant explained, and such ambiguity can lead the session along unnecessary paths. This way, the technique can be used but the results will be unreliable.

In their review of elicitation techniques [Jitnah et al. 1995], Jitnah and colleagues state that the interviews depend on how skilful the interviewees are at properly expressing information.
In an experiment on elicitation techniques [Chao & Salvendy 1995], Chao and Salvendy concluded that significant cognitive skills are associated with the interview technique including ease of expression.

For this reason, this technique is recommended for informants with High and Medium articulability. If informants have a Low articulability, its use is indifferent.

5.10.2 Structured Interview

This technique employs set questions that target definite information. Although the informant has to keep to the elicitor's script throughout the session, he or she always has to expand on set topics. As for the open-ended interview, an informant that is manifestly skilful at explaining his or her opinions or know how can help the elicitor to gain a good understanding of the issue. This way, if the informant expresses his or her knowledge moderately or extremely well, the technique appears to be suitable for producing better and more complete results.

If the potential interviewee finds it difficult to clearly explain what he or she knows, the session could gather ambiguous or erroneous information, making its effectiveness uncertain. In these cases, the technique is applicable, but its effectiveness is questionable.

For this reasons, the technique is recommended for informants with High or Medium articulability. If the informant has Low articulability, its use will be indifferent.

5.10.3 Task Observation

This technique places few demands on the informant. Precisely for this reason, its use is suitable for situations where there is no interaction with the informant, that is, where it is possible to gather information about observable phenomena. Therefore, the potential informants' ability to express what they know is a characteristic that does not have a major influence on session effectiveness.

This way, the technique appears to be adequate precisely when informants have difficulty expressing their reasoning or explaining what they do. In these cases, it is appropriate to observe initially how they perform their jobs. On the other hand, if informant articulability is moderately good or excellent, the technique is equally applicable, in this case to gather other views of the organizational context, that is, its results will potentially be even better.

Therefore, it is recommended for use for informants with any articulability: High, Medium or Low.

5.10.4 Critical Incident Technique

This technique involves in-depth reasoning about situations that are complicated by altering their conditions. The informant has to exteriorize this reasoning, and therefore his or her skill at explaining his or her thinking is crucial for achieving effective results. On this ground, the informant will have to have at least a normal articulability for the technique to be applied.

If the informant is not good at articulating his or her reasoning, he or she will not clearly specify the special situations, and much less establish the problem-solving conditions and requirements. In these cases of informants, it is preferable for another more structured technique to be used.
Elicitation Technique Adequacy

This way, the technique is recommended for use for informants that have **High** or **Medium** articulability. It is **not recommended** for use with informants that have **Low** articulability.

### 5.10.5 Concept Ranking/Laddering

This technique captures information by having informants associate elements using cards, meaning that it minimizes the verbal interaction with the elicitor. Due to this game-like and psychomotor strategy, communicative capabilities are not as influential in the session. This way, the technique appears to be suitable when the informants are not good at expressing what they know.

If the informant has average or good linguistic skills, he or she will be able to justify the relations between the concepts. This way, the technique can be equally effective and produce even better results.

Byrd and colleagues define this technique as adequate for tackling problems of informant communication and interaction with the elicitor [Byrd et al. 1992].

For this reason, the technique is recommended for use for informants that have **High**, **Medium**, or **Low** articulability.

### 5.10.6 Questionnaires

This technique avoids a face-to-face interaction among informants and the elicitor by sending out a set of prepared questions. The technique minimizes verbal interaction, meaning session effectiveness does not depend on the informant’s articulability. For this reason, the technique is very well suited for situations where the informant finds it hard or difficult to put his or her thoughts into words.

The results of administering the questionnaire will not benefit from an informant that has ease of expression, and the technique is equally applicable.

Therefore, the technique is **recommended** for use for informants with any articulability level: **High**, **Medium**, or **Low**.

### 5.10.7 Protocol Analysis

This technique involves the informant explaining his or her reasoning about a set case aloud. For this reason, session success depends on the informant’s ability to express his or her reasoning. An informant that is especially good at explaining his or her procedures in certain situations will be able to unambiguously expound the actions and heuristics that he or she applies.

If the informant has average communication skills, the results are equally likely to be good, although some key information could be missing. In this case, the technique is less reliable.

An informant that finds it hard to express what he or she knows poses a threat to the effectiveness of the session. Wrong or shallow information could be captured that would not justify the high cost of the session. In this case, the technique does not appear to be adequate.

Some authors have related technique adequacy to the expert’s personality and skill at introspection and correctly verbalizing processes [Wagner et al. 2003]. In their review of elicitation techniques [Jitnah et al. 1995], Jitnah and colleagues likewise...
state that users that cannot describe what they do satisfactorily may pose a threat to the success of technique use.

In an experiment on a number of elicitation techniques [Chao & Salvendy 1995], Chao and Salvendy concluded that significant cognitive skills, including ease of expression, are associated with the protocol analysis technique.

For this reason, the technique is recommended for use with informants that have High articulability. If the informant has Medium articulability, technique use is indifferent. The technique is not recommended for use with informants with Low articulability.

5.10.8 Repertory Grid

The repertory grid involves the informant establishing a set of domain concepts and characteristics and completing a grid of ratings. Interaction is minimal, as the elicitor asks very brief and concrete questions, which merit equally brief responses. For this reason, the potential informant’s communication skills do not have a major influence on session success. This way, the technique appears to be adequate when the informant is not proficient at expressing his or her ideas because he or she does not have to interact too much with the elicitor.

If the informant is good at articulating his or her knowledge, the technique can likewise be applied with similar or better results.

Byrd and colleagues define this technique as adequate for overcoming problems of communication with informants and their interaction with the elicitor [Byrd et al 1992].

In an experiment on selected elicitation techniques [Chao & Salvendy 1995], Chao and Salvendy found that the repertory grid technique is associated with significant cognitive skills, including ease of expression.

For this reason, the technique is recommended for use with informants with High, Medium, or Low articulability.

5.10.9 Brainstorming

This technique involves an intense interaction among informants, meaning that participants have to have satisfactory communication skills. In these cases, participants will be able to put forward clear and motivating ideas that encourage the others to give their opinion, increasingly improving the quality of the results. This way, the technique appears to be adequate when the potential participants are able to explain what they know.

Informants that are not very good at expressing their ideas may hold up the session or offer biased information. Ambiguous ideas can confuse the other participants distorting the focus of the session. In these cases, the technique does not appear to be very adequate.

Byrd and colleagues define this technique as adequate for tackling problems of informant communication and their interaction with the elicitor [Byrd et al 1992].

On this ground, the technique is recommended for use with informants with High articulability. If articulability is Medium, use is indifferent. If the informants’ articulability is Low, the technique is not recommended.
5.10.10 Nominal Group Technique

This technique involves a reasoned interaction among the informants to define and justify their opinions. They take turns to explain their ideas, which are then voted on. This way, if the informants are good at expressing their ideas, the session can be very effective. In this case, the technique appears to be adequate for achieving good results.

On the other hand, if the informants have limited articulability, the ideas can be fuzzy and misinterpreted, meaning that they can confuse the other participants. The technique can have adverse results in this case, making its use very risky.

For this reason, the technique is recommended for use with High or Medium articulability. If informants’ articulability is Low, the technique is not recommended.

5.10.11 Delphi Method

This method is based on the administration of a questionnaire to the informants to gather a representative opinion. This foregoes the need for verbal interaction. This way, linguistic capabilities are irrelevant to the effectiveness of the session. Therefore, the technique is likely to be adequate precisely when the informants are not capable of clearly putting their thoughts into words.

If informant articulability is average or excellent, the technique is equally applicable with effective results.

In a review of techniques, Liou [Liou 1992] states that this technique reduces the influence of potentially dominant participants, prevents some individuals with overbearing personalities from holding too much sway, and enables strangers to communicate with each other effectively. This eases the effective participation of people that find it difficult to articulate their reasoning and may otherwise be intimidated.

For this reason, the technique is recommended for use with informants with High, Medium, or Low articulability.

5.10.12 Participant Observation

The technique aims for the elicitor to get involved in the functions of the organization and gain a detailed understanding of how the informants proceed. The elicitor will have to recurrently question the informant about the issues with which he or she is concerned and the details of his or her function. The informant must have the skill to clearly explain what is required and thus clarify the emerging doubts. For this reason, the technique appears to be suitable for situations in which the informants are skilled at expressing their knowledge or functions.

If the informant or informants are not good at stating their ideas, they could supply biased information. However, the fact that the session is in situ and the elicitor performs the tasks in the real environment or infrastructure appears to help overcome this weakness.

Therefore, the technique can be recommended for High or Medium articulabilities. If articulability is Low, the use of the technique is indifferent.
5.10.13 Prototyping

This technique aims to improve the capture of requirements with the help of a simplified artefact of the software under construction. In the session, the elicitor relies on the artefact to gather requirements information from the informant. The use of this medium helps the informant to express his or her ideas on the final product. That is, the prototype can help informants that find it hard to express their requirements using another purely verbal interaction technique. This way, the technique appears to be suitable when the potential informant generally finds it hard to express his or her ideas.

If the informant is articulate enough to explain his or her reasoning, the technique is equally applicable.

Byrd and colleagues define this technique as adequate for tackling informants’ communication problems and their interaction with the elicitor [Byrd et al 1992]. On this ground, the technique is recommended for use for informants with High, Medium or Low articulability.

5.10.14 Focus Group

The technique is rooted in the interactive discussion by informants about a subject or object that is presented to improve requirements capture. Ideas must be clearly expounded and argued, meaning that participation in the session requires participants to be skilful at expressing their ideas. For this reason, the effectiveness of this technique appears to depend on potential participants having this skill. If they have an average or above average ability for explaining their reasoning, the technique will be effective.

If informants present linguistic deficiencies, the session can turn out to be difficult and fruitless. Ambiguous ideas would not be helpful for the discussion and could destabilize interaction, distracting it from its ends. In these cases, the technique does not appear to be adequate, and another strategy should be tried.

For this reason, the technique is recommended for use with High or Medium articulability. If informant articulability is Low, it is not recommended for use.

5.10.15 JAD

This technique mainly rooted in an intense interaction and exchange of opinions among informants. The participants are of diverse organizational status, meaning that the topics and the later discussion must be very clearly expounded. For this reason, if the participants are able to correctly articulate their knowledge, the use of the technique can be very beneficial.

If the informants are not very good at expressing their thoughts, they could put forward confusing ideas that are difficult for the other participants to understand, wasting time and discouraging the audience.

Several authors agree that the technique is adequate for enabling introverted users with communicational difficulties [Duggan and Thachenkary 2003].

This way, the technique is recommended for informants with High or Medium articulability. If informants have Low articulability, it is not recommended for use.
5.10.16 Scenarios/Use Cases

This technique requires the elicitor and the informant to interact. When the informant is skilled at expressing his or her thoughts, the elicitor can question him or her efficiently, receiving correct and complete information. This way, the technique appears to be pertinent when the informants are well able to put their thoughts into words.

If informants have limited articulability, the session is likely to be unreliable, as inaccurate functional information can be gained. This can turn out to be costly as questions have to be repeated. The possibility of relying on the diagrams to check the captured information offsets this disadvantage.

According to Jones and Britton, this technique appears to be a promising solution to communication problems between the elicitor and the user [Jones & Britton 1996]. Byrd and colleagues define this technique as adequate for tackling informants’ problems of communication and their interaction with the elicitor [Byrd et al 1992].

For this reason, the technique is recommended for informants with High or Medium articulability. If articulability is Low, the use of the technique is indifferent.

5.11 Availability of Time

This attribute refers to how much time is available to the informant to be spent on elicitation sessions. The values are High, has enough time; and Low, has less than enough time.

5.11.1 Open-Ended Interview

This technique takes quite a long time to complete, and therefore is time consuming for the informant. Additionally, it is a face-to-face session, meaning that it requires the elicitor to make a mutually convenient appointment. This way, if the potential informant has plenty of time for the project, he or she will be able to agree on and attend an interview session. The technique appears to be adequate for use in this case.

If informant availability is viewed as complicated, either because he or she does not have much time to participate or finds it difficult to schedule a meeting with the elicitor as he or she is not close at hand, the technique is worth considering but will take more effort to manage.

Therefore, the technique is recommended for use if the time available to the informant for the activity is High. If informant availability is Low, technique use will be indifferent.

5.11.2 Structured Interview

Although more structured, this technique requires the presence of the informant. As with other interviews, an appointment has to be made to meet and run the session. For this reason, if the informant has plenty of time, the session could be carried out and applied successfully.

If the potential informant has little time for the activity, it is conceivable to apply the technique but it will take an extra effort and actions to manage session execution.
This way, the technique is recommended for use in cases where the time available to the informant is **High**, and **indifferent** when his or her availability is **Low**.

### 5.11.3 Task Observation

This activity basically relies on the observation of the informant or informants in their work environment. That is, it does not significantly distract the informant from his or her routine functions, which means that it can be used independently of the time that is available to him or her. Therefore, the technique appears to be suitable precisely when informants have little time to spend on the elicitation process.

If the informants have plenty of time, requirements information can be expected to be captured even more successfully, as they could answer any questions that crop up.

On this ground, if the time available to informants is **High** or **Low**, the technique is recommended.

### 5.11.4 Critical Incident Technique

The technique requires the presence of the informant, meaning that it is vital to be able to agree on a meeting with the elicitor. In the session, the informant may have to enlarge for quite some time on the presented case and the possibilities of changing constraints. If the informant has enough time for the project, there would be no obstacle to preparing and running the session.

If the informant does not have much time to spend on the process, the elicitor should try to arrange an appointment at a convenient time or place or could prepare a short session and leave some factors for another session. In any case, it is worth considering applying a more open technique.

Therefore, the technique is recommended when the time available to informants is **High**, and its use is defined as **indifferent** in the case of **Low** availability.

### 5.11.5 Concept Ranking/Laddering

Concept classification is a technique aiming to retrieve information by means of a **playful** interaction between the elicitor and the informant. The session must be face to face, and the elicitor has to find a way to schedule the meeting to get informant attendance and commitment. If the informant has enough time for the elicitation process, a session using the technique will be able to be arranged at any time.

If the informant is not freely available, the elicitor may try to squeeze a session into a gap in his or her agenda, as the technique does not take up too much time.

For this reason, the technique is recommended for use if the time available to the informant is **High**. It will be **indifferent** if the time available to the informant is **Low**.

### 5.11.6 Questionnaires

This technique covers the response of the informant to a questionnaire. This activity has the advantage of the informant being able to respond at his or her leisure,
whenever most convenient and wherever he or she pleases. For this reason, the technique appears to be suitable for cases where the informant does not have time to travel to and participate in meetings or has a very tight agenda.

If time is available to the informant, there is a possibility of guaranteeing better results, as the informant will be able to respond conscientiously.

Liou [1992] reviews several techniques. Liou’s opinion of the questionnaire technique is that is has the advantage of being easy to use for informants that do not have much time, as they can to respond at any time, when they are not busy.

On this ground, the technique is recommended for High or Low informant time availabilities.

5.11.7 Protocol Analysis

This technique involves the verbal statement of the informant’s reasoning and can be a lengthy and complicated activity. For this reason, the informant may have to have plenty for time to attend and expound his ideas at length. If the informant is available, then the technique can be applied.

If the informant does not have much time for the project or has a very tight schedule, the session can be hard to run or subject to time pressure, and the results may be unreliable. When the informant does not to have time for the activity, its application may be unsuccessful.

For this reason, the technique is recommended for informants that have High availability of time. When the informant has Low availability, the technique is not recommended for use.

5.11.8 Repertory Grid

This technique involves the informant briefly interacting and rating a grid that can be completed in situ or as considered convenient. It does not take up a lot of the informant’s time, meaning that it appears to be adequate for application when the informant is short of time for working on the project.

If the informant has plenty of time to schedule and participate in the session, the results will be more likely to be more effective, as he or she will able to argue his or her responses.

For this reason, the technique is recommended for use when the time available to informants is High or Low.

5.11.9 Brainstorming

This technique involves participants in an intense and lengthy exchange of opinions, meaning that informants need quite a lot of time to attend. This way, if the informants have plenty of time, the session can be scheduled easily for all participants. The technique, then, appears to be suitable when participants have enough time for the session.

If the informants’ time is tight, the session can be hard to arrange. The technique can be rejected, as it will be hard to tie in the agendas of the potential participants.
Therefore, the technique is **recommended** for use for **High** informant availability. The technique is **not recommended** for use when the time available to informants is **Low**.

### 5.11.10 Nominal Group Technique

The technique involves group interaction that mainly aims to prompt a discussion of ideas. On this ground, the informants are required to tie in their agendas and arrange a time to all attend the session. If they have plenty of time, the technique is a possibility.

On the other hand, if the potential participants do not have enough time to spend on elicitation, the technique should be changed as it would be hard work trying to arrange a meeting for the session.

For this reason, this technique is recommended for use in cases where the time available to informants is **High**. If the time available to informants is **Low**, the technique is **not recommended** for use.

### 5.11.11 Delphi Method

The method involves the informants recurrently answering a questionnaire. The ease of response makes it suitable for cases where the informants have little time for coordinating other session types.

If the informants do have time, they will be able to answer the questionnaires thoughtfully, and the technique requires the respondents to reconsider their responses.

For this reason, it is **recommended** for use for all the values of time availability, that is, **High** or **Low**.

### 5.11.12 Participant Observation

Unlike task observation, this technique requires more of the informants’ time, as they have to help the elicitor to satisfactorily learn the set functions. This activity calls for the informant to treat the elicitor as an apprentice to the job. For this reason, the environment informants will need to have plenty of time to spend on performing the activity for the technique to be applied.

If the informants have little time or a tight schedule, the elicitor will waste a lot of time waiting to get their attention. In many cases, the activity risks missing its objective and turning out to be a waste of time. For this reason, it does not appear to be adequate to apply this technique when the informants are short of time.

Therefore, the technique is **recommended** for use when the time available to informants is **High**. If time availability is **Low**, its use is **not recommended**.

### 5.11.13 Prototyping

Prototyping is a technique that requires the presence of the informant. Session duration varies depending on the effectiveness of the interaction. If the informant has plenty of time to participate in the session, the elicitor will be able to gather full information on the product requirements. In this case, the technique appears to be adequate for the elicitation of the product characteristics.
If the informant finds it hard to make time for the project, the session will not be able to be scheduled, and, if time is limited, the target information might not be gathered.

For this reason, the technique is **recommended** for use if the time available to informants is **High**. It is considered **indifferent** when the time available to informants is **Low**.

### 5.11.14 Focus Group

This technique calls for an interactive group session that can take time to achieve good results. The potential participants should have plenty of time to spend on the project so that they can fit in sessions and participate throughout the entire process. For this reason, the use of the technique is adequate when participants have more than enough time for the activity.

If the participants are generally short of time or have a tight schedule, the technique may not be applicable due to the difficulty of arranging meetings that they can all attend.

This way, this technique is **recommended** when the time available to informants is **High**. Finally, if the available time is **Low**, it is **not recommended** for use.

### 5.11.15 JAD

This activity entails participant involvement in long sessions that they all have to attend at the same time. Participants usually come from all levels of the organization, and this activity calls for sessions possibly lasting more than one day. In many cases, they have to try to reduce or interrupt their working day to attend the session. The session may be held at a venue outside the organization. For this reason, the use of the technique is subject to potential participants having plenty of time.

If the potential participants do not have time or the management does not promote the activity performance, the technique will not be able to be used, as a smaller session may not achieve the goals and may not be warranted from the cost/benefit viewpoint.

This way, the technique is **recommended** when the time available to informants is **High**. It is **not recommended for use** if the time available to participants is **Low**.

### 5.11.16 Scenarios/Use Cases

This technique calls for informant participation, meaning that he or she must have enough time to attend the session. The technique appears to be adequate in such cases, as this way the informant will be able to participate for the scheduled duration of the session.

If the informant does not have much time, the cases may not cover all the possibilities or variations, leading to incomplete results. For this reason, the technique could be applied but with limitations or uncertainty.

For this reason, the technique is **recommended** when the time available to informants is **High**. It will be **indifferent** if the time available to informants is **Low**.
5.12 Location/Accessibility

The attribute refers to the physical location of the informant with respect to the elicitor. The values are: Far, in a different town to the elicitor; and Near, in the same town as the elicitor.

5.12.1 Open-Ended Interview

The technique is intrinsically interactive and face to face. The distance separating the elicitor from the informant is, therefore, a factor for effective session performance. If the informant is in the same town as the elicitor, an appointment can be made to hold the interview.

If the informant is based outside the elicitor’s town, in another town or a hard-to-access environment, the session will be hard to run. There are alternatives for performing this activity, like taking advantage of a scheduled trip by either the informant or the elicitor or using telematic resources to stage the interview. However, they imply other problems and costs. For this reason, the technique is not one hundred per cent applicable in this case, and it is worthwhile weighing up another possibility for eliciting information from far-off informants.

In their technique selection proposal, Davis and Hickey set the physical location attribute of the vector of characterization of this technique to the “same place” value [Davis & Hickey 2002c].

For this reason, the technique is recommended for near informants. If informants are far from the elicitor, the technique is indifferent.

5.12.2 Structured Interview

Like the open-ended interview, the elicitor and the informant also have to meet in this case. Therefore, the distance between participants is a factor that is beneficial for the session. If they are near, the technique will be straightforward to apply.

If the informant is quite a long way from the elicitor, he or she could follow other strategies such as mentioned above, but it would mean more effort and resources, which would make the technique a worse option.

On these grounds, the technique is recommended for informants that are near. If they are far from the elicitor, the technique is indifferent.

5.12.3 Task Observation

This technique involves the elicitor in the domain environment. This means that he or she will have to travel to the place where the target functions are developed in the organization. This way, if the elicitor is in the same town as the informant or informants to be observed, the technique can be applied as a matter of course.

On the other hand, if the elicitor is not in the same town as the organization or target unit, the technique could be applied using telematic resources, but it would not be as effective and comprehensive, and does not appear to be one hundred per cent adequate.

For this reason, the technique is recommended for use for near informants. If informants are far from the elicitor, the technique is indifferent.
5.12.4 Critical Incident Technique

This technique involves face-to-face interaction between the elicitor and the informants. The elicitor then has to be able to arrange a meeting with the informant. If they are in the same town, this technique is easier to use.

If the informant and the elicitor are at a considerable distance, this is an obstacle to running the session. Also, the technique is likely to be more effective if it is run in the organizational environment because the informant can give examples or demonstrate in situ the critical situations and how to solve them. For this reason, the technique does not appear to be adequate if the stakeholders are far apart.

For this reason, the technique is recommended for near informants. If informants are far from the elicitor, the technique is not recommended.

5.12.5 Concept Ranking/Laddering

The technique involves the elicitor and the informant in a face-to-face interaction. For this very reason they have to be at a convenient distance to run the session. If an appointment can be arranged, then the use of the technique is adequate for achieving the elicitation goals.

If the elicitor and the potential informant are separated by a large distance, this will be an obstacle to the face-to-face session. A long-distance session could be attempted using some telematic software tool or resources, but the effectiveness of the technique is less reliable in this case.

For this reason, the technique is recommended for near informants. If informants are far from the elicitor, the technique is indifferent.

5.12.6 Questionnaires

A questionnaire can be easily administered at a distance. This is precisely its advantage, as it does not require the informant to appear before the elicitor, and the informant can respond wherever he or she pleases. For this reason, it appears to be a suitable technique for application when the elicitor and the potential informant or informants are at an unbreachable distance.

If the elicitor and the stakeholders are in the same town, they can administer the questionnaire equally well, without the need to meet in person.

On this ground, the technique is recommended irrespective of whether the informants are near or far.

5.12.7 Protocol Analysis

The technique requires the informant to appear before the elicitor and interact and record the session. The feedback and motivation of the elicitor, and the interviewee’s body language are important in the analysis of the technique, meaning that it could not be applied effectively at a distance. This way, the technique appears to be adequate when the elicitor can easily arrange a meeting with the informant.

If the elicitor and the informant are at a considerable distance from each other, the technique does not appear to be adequate, as it would involve additional costs. In these cases, the other technique is likely to be more appropriate.

Therefore, the technique is recommended for use for near informants. If informants are far from the elicitor, the technique is not recommended.
5.12.8 Repertory Grid

This technique includes two activities in which the informant has to participate. In the first place, the elicitor interacts with the informant to establish and has the informant rate some key domain elements. In this case, although the first part works better face to face, other telematic resources can be used to run the session. The informant can do the second part in private wherever convenient.

This way, the technique appears to be beneficial for both situations where the elicitor and the informant can arrange an appointment to meet and when there are unbreachable distances.

On this ground, the technique is recommended for use if the elicitor is either near to or far from the informants.

5.12.9 Brainstorming

This technique places session participants under the obligation to attend. Its success depends on the generation of multiple ideas encouraging the other informants to participate. This way, it is essential for them to be able to meet at the same place. If this is the case, that is, the elicitor and the informants find it easy to meet, either because they are in the same town or the elicitor can get to the stakeholders’ place of work, then the use of the technique is adequate.

If the elicitor cannot manage to arrange a meeting at the same place, because some are at a considerable distance, then the technique does not appear to be adequate. Another technique is likely to work better.

Therefore, the technique is recommended for informants that are near to the elicitor. If they are far from the elicitor, the technique is not recommended.

5.12.10 Nominal Group Technique

The technique requires the presence of the stakeholders for the session to be held. Like brainstorming, the potential informants and the elicitor have to be near enough to being able to easily schedule a meeting. This way, the technique appears to be best suited when all the selected stakeholders and the elicitor are able to arrange a meeting.

If it is not possible to arrange a meeting of all the stakeholders because some are too far away, then the technique cannot be applied. The use of telematic resources does not appear to be an efficient substitute.

For this reason, the technique is recommended for use for informants that are near the elicitor. If they are far, the technique is not recommended.

5.12.11 Delphi Method

This technique relies mainly on the participation of informants by answering questionnaires. For this reason, it is not necessary for the required informants to meet with the elicitor in person. The elicitor can use other convenient means for administering the questionnaires.

This way, the distance between the informants and the elicitors is not relevant for carrying out the method activities. Therefore, the technique is ideal for use in any case, whether informants are near or far from the elicitor.
Additionally, several experts are of the opinion that this technique is useful if a group of geographically disperse informants are to give an appraisal [Liou 1992][Roth & Wood 1993].

On this ground, the technique is recommended irrespective of whether the informants are near or far.

5.12.12 Participant Observation

The technique involves the elicitor in the work environment or domain. He or she therefore has to be able to visit, perhaps for several days, the place where the informants perform their activities. If the organizational unit is in the same town as the elicitor, then the technique appears to be adequate for application.

If there is a considerable distance between the elicitor and the target site where the informants work, the technique cannot be applied, even using telematic resources, as it requires intense interaction among participants for the elicitor to be able to understand and learn the details of the functions.

For this reason, the technique is recommended for use for informants near the elicitor. If they are far, the technique is not recommended.

5.12.13 Prototyping

The prototyping session requires the presence of the informants to interact with the elicitor about the features of the target product. If the elicitor and the potential informants are at an accessible distance, they will be easily able to arrange a meeting. This way, the technique is adequate when the participants are close by.

If there is a sizeable distance between the informant and the elicitor, the technique cannot be applied as it is necessary for both to handle the prototype to generate the ideas on the target product requirements.

Therefore, the technique is recommended for use with informants that are near to the elicitor. If the elicitor is far from the informant, the technique is not recommended.

5.12.14 Focus Group

This technique requires all the stakeholders to meet at the same place where the session is held. The participants speak on topics referred to the requirements and, in some cases, supported by related artefacts. For this reason, they have to be near enough to visit the place at which the elicitor schedules the activity. This way, the technique appears to be adequate when all the participants, elicitor included, are based in the same town.

If there are informants that are not in the same town or are a considerable distance away from the specified site, the technique does not appear to be adequate, as its management and logistics would not be at all straightforward.

For this reason, the technique is recommended for use for informants that are near to the elicitor. The technique is not recommended if the elicitors are far from the elicitor.
5.12.15 JAD

Like the other group techniques, this activity requires a sizeable number of stakeholders from the organization to be able to meet with the elicitor. Being in the same town or near to the elicitor will make it easier for them all to attend the session or group of sessions. Then, the technique appears to be adequate when all the participants are relatively near.

If there are key participants that are at a distance from the others or the elicitor, efforts should be made to get them to attend. As this is a technique involving sizeable resources and can, in many cases, be conducted at a venue other than the place of work—even outside the town-, arrangements can be made for all the required participants to attend.

For this reason, the technique is recommended for informants that are near. If informants are far from the elicitor, the technique is indifferent.

5.12.16 Scenarios/Use Cases

In this case, the technique requires the informant and the elicitor to meet to interact and gather the information referring to the product functionality. This way, the technique is adequate if both participants are based in the same town, because it will be easier to schedule a session.

If the informant and the elicitor are at a sizeable distance, it will not be easy to arrange a session. Such cases may not warrant the heavier workload and resources, meaning that another technique is likely to be better suited.

On this ground, the technique is recommended for use for informants that are near to the elicitor. If they are far, the technique is not recommended.

5.13 Type of Information to be Elicited

The attribute describes the categorized type of information that the technique can elicit. The defined values are: Strategic, elicits strategies/control; Tactical, elicits procedures/heuristics; and Basic, elicits concepts/attributes.

5.13.1 Open-Ended Interview

This technique is used with diverse project stakeholders with equally miscellaneous purposes. In most cases, it will be used to tackle different development topics, especially to ascertain the purposes and scope of the project. But it can also be used to capture the general functions and non-functional features that the product should support. That is, the technique is adequate for capturing information about higher level problems, that is, procedures, and control or general strategy covered by the solution.

Interviews are able to capture fine-grained information at the level of domain concepts or attributes. However, this is a by-product of the regular interaction with the informant, as these domain concepts tend to surface when discussing diverse subjects. An interview should not be scheduled exclusively for the purpose of gathering this type of information.

In their review of elicitation techniques [Christel & Kang 1992], Christel and Kang compare certain techniques and tools with some process aspects. They state particularly that open-ended interviews are adequate for capturing organizational and
contextual factors, including the identification of software system objectives, problem context, and boundaries and interfaces. In another comparison of techniques, Maiden and Rugg explain that the technique is adequate for capturing problem domain behaviour and processes [Maiden & Rugg 1994]. Pan and colleagues state that interviews can provide requirements engineers with an understanding of the users’ work. They can identify the tasks and constraints underlying the requirements [Pan et al. 1997]. Kotonya and Sommerville explain that the open-ended interview is adequate for understanding the problem and capturing the general system requirements [Kotonya & Sommerville 1998].

On this ground, the technique can be recommended for capturing Tactical and Strategic information types. The technique can be used to capture Basic information, like domain concepts or attributes, although the cost/benefit ratio is unclear, that is, its use is indifferent.

5.13.2 Structured Interview

This technique is useful for gathering details about matters that have been dealt with but not explored to the full or issues selected in earlier sessions. Some of the questions will possibly aim at clarifying the definition of domain concepts or attributes. This way, the technique appears to be effective for capturing in-depth information about domain functions or procedures, as well as the details of concepts or attributes used in their enactment.

The technique could capture strategic information, but conceivably only to confirm ambiguous ideas that turned up earlier.

In their review of elicitation techniques [Christel and Kang 1992], Christel and Kang compare certain techniques and tools with some process aspects. They particularly state that structured interviews are moderately good for capturing organizational and contextual factors, like the identification of software system goals, the problem context and boundaries and interfaces. Also in their comparison, Maiden and Rugg state that this technique is adequate for capturing problem domain behaviour and processes [Maiden & Rugg 1994].

For this reason, the technique is recommended for use for capturing Basic and Tactical information. If the information to be captured is Strategic, the use of the technique is indifferent.

5.13.3 Task Observation

Elicitors use this technique mainly to find out which observable processes or functions are carried out in the domain. Being a rather passive activity, it is not possible to learn details about the domain concepts. Neither is it one hundred per cent adequate for capturing high-level or strategic information, as this knowledge is less observable. Thus, although it is suitable for eliciting information of this type and can even capture information on domain elements and concepts and strategic information, it is not especially effective.

Cooke states that the observation technique is useful for identifying the tasks carried out in a domain and their boundaries and constraints, identifying the information required for a task, and verifying the description of what the users do [Cooke 1994]. Also in their techniques comparison, Maiden and Rugg explain that the technique is adequate for capturing behaviour and problem domain processes [Maiden & Rugg 1994].
For this reason, it is recommended for use for capturing Tactical information, and is considered indifferent for gathering Strategic or Basic information.

### 5.13.4 Critical Incident Technique

This technique focuses on knowledge of how to process complex cases that are likely to change depending on the conditions. That is, it can be used to gather information on functional levels or their processes. Critical cases can possibly tie in with system exceptions that define the system options.

It does not appear to be as adequate for capturing elementary information, although it may throw up some information in this respect. Neither is it a technique that can capture higher level information, like strategies or control, as it focuses on particular cases.

For this reason, the technique is recommended for gathering Tactical information. If the aim is to capture Basic information, its use is indifferent. The technique is not recommended for capturing Strategic information.

### 5.13.5 Concept Ranking/Laddering

This technique is useful for capturing relations between domain concepts that are presented to the informant as cards. The informant must try to form groups to classify or rank these attributes or concepts.

By nature, it is not adequate for gathering information on procedures or processes, and much less so for higher level information, like product control or strategy.

Boose claims that this technique is designed to elicit declarative knowledge and is not adequate for capturing procedural information [Boose 1985]. Also in their comparison of techniques, Maiden and Rugg state that the technique is adequate for capturing problem domain data and not very well suited for processes and behaviour [Maiden & Rugg 1994].

Some experts found evidence that this technique works fairly well in declarative domains [Burton et al. 1988b].

On these grounds, the technique is recommended for capturing Basic information. The use of the technique is not recommended for capturing Strategic and Tactical information.

### 5.13.6 Questionnaires

The ease of preparation and response means that this technique is multi-purpose, that is, can target different types of informants to capture a range of information. It may be adequate for both clarifying and extending higher level system information, like goals, scope or global constraints. Also it can be used to find out details of the functions or processes involved. It can even gather information about domain concepts, elements and attributes that may have emerged earlier but whose meaning in the system is unclear.

Liou characterizes several elicitation techniques. She states that questionnaires are particularly useful for discovering specific objects, relations, attributes and uncertain factors in a domain [Liou 1992].
Therefore, the technique is recommended for use to gather any type of information: Basic, Tactical or Strategic.

5.13.7 Protocol Analysis

This technique focuses on capturing information about the informant’s reasoned knowledge. The technique is useful for finding out how the informant tackles domain cases or situations or his or her tacit knowledge. That is, the informant is a stakeholder that has knowledge of the system functions or processes and knows how to execute or solve emerging problems.

The technique is not designed to capture strategic information or elementary information, like problem domain attributes, although knowledge of this type may be reported in its results.

Holsapple and Raj review some studies on this technique [Holsapple & Raj 1994]. They particularly state that its purpose is to identify concepts visualized by an expert, identify the relationships between these concepts and outline inferences based on these relationships. Other researchers [Kim & Courtney 1988] equate the technique with the capture of heuristic knowledge and domain concepts. Also in their comparison of techniques, Maiden and Rugg state that the technique is adequate for capturing problem domain behaviour and processes and is not very suitable for capturing data [Maiden & Rugg 1994].

Some experts found evidence that the technique works fairly well in procedural domains [Burton et al. 1988b].

This way, the technique is recommended for use for capturing information at the Tactical level. Its use for capturing Strategic or Basic information is indifferent.

5.13.8 Repertory Grid

The repertory grid is useful for ascertaining the relationship that there is between a set of domain elements. The elicitor interacts with the informant to get to know the domain elements or proposes some that he or she has discovered through other means. He or she questions the informant to compare the elements with each other and define their distinctive features or constructs. Later, the informant rates the elements and, through a statistical analysis, forms an idea of how they are related. This way, the use of the technique appears to be adequate to find out elementary information or basic information about the problem domain.

Because of its procedure and the type of results analysis, the technique could not be used to gather information about processes or control.

In this respect, Boose states that this technique focuses mainly on eliciting declarative knowledge. It is no good for capturing sequential and procedural information [Boose 1985]. Other researchers [Kim & Courtney 1988] equate the technique with the capture of heuristic knowledge and domain concepts. Pan and colleagues state that this technique can easily elicit concepts and terminology, apart from the conceptual structure of the domain [Pan et al. 1997].

On this ground, it is recommended for use for capturing Basic information, but it is not recommendable for capturing Strategic or Tactical information.
5.13.9 Brainstorming

This technique is able to generate information of different kinds through the uncontrolled interaction of a group of informants. It gathers more general and high-level product development information. For example, it can capture the problem scope that the product should satisfy, the functional characteristics that should be supported, some non-functional aspects, alternative problem-solving technologies, etc. For this reason, the technique appears to be better suited for finding out general-purpose information about the project and the processes or functions to be considered.

The technique is not suitable for capturing information on domain concepts or elements and their relationships.

In her review of elicitation techniques claims that the brainstorming technique was used to define the scope of the problem and identify possible solutions [Liou 1992]. Also in their characterization of techniques, Maiden and Rugg state that the technique is good for eliciting high-level domain entities and topics [Maiden & Rugg 1994].

For this reason, the technique is **recommended** for capturing **Strategic** or **Tactical** information. The technique is **not recommended** for use for gathering **Basic** information.

5.13.10 Nominal Group Technique

This technique is able to prioritize the needs of the project stakeholders. To do this, the elicitor gathers opinions from participants in an orderly manner, and then there is a vote on the importance of the stated ideas. The session is useful for finding out the opinion of the informants on diverse, mainly of medium-high level aspects, that is, on the processes or functions or on the pursued strategies.

The technique is not adequate for capturing elementary information on the domain and other techniques are preferable for this purpose.

Liou states that this technique is useful for identifying problems, exploring solutions and establishing priorities [Liou 1992].

This way, the technique is **recommended** for use to gather **Strategic** or **Tactical** information. Its use is **not recommended** for capturing **Basic** information.

5.13.11 Delphi Method

This technique is useful for finding out the opinion of several informants about diverse product features. Stakeholders are usually questioned about the project goals or scope, technological issues, automatable functions or processes, non-functional features of the target system, expert domain knowledge, etc. This way, the technique appears to be suitable for capturing all kinds of information, although its focus is on more significant information, like strategies or processes.

This technique should not be used for capturing information on domain concepts, although this information could be gathered as a by-product.

Liou claims that this technique is useful for identifying goals and objectives, generating possible alternatives, establishing priorities, revealing group ratings and capturing miscellaneous information [Liou 1992].
For this reason, the technique is **recommended** for use for capturing **Strategic** or **Tactical** information. For capturing **Basic** information, the use of this technique is **indifferent**.

### 5.13.12 Participant Observation

This technique is useful for the elicitor to find out detailed information about the different domain processes. The elicitor observes the dynamics of the environment and learns to execute functions. Thanks to his or her participativeness, the elicitor can interiorize information mainly about the different functions performed by the informant or informants possibly from different organizational levels. For this reason, the technique appears to be suitable for gathering high- and medium-level information about the domain, that is, about strategies, objectives and processes.

The technique does not appear to be suitable for capturing basic information, on cost/benefit grounds, although it may be gathered as a by-product.

In their comparison of techniques, Maiden and Rugg state that the technique is suitable for capturing problem domain behaviour and processes and, to a lesser extent, for gathering data [Maiden & Rugg 1994]. Also the experts Beyer and Holtzblatt state that this technique helps the elicitor to learn work strategies and techniques by observing multiple instances of a task and his or her own understanding of how to do the task [Beyer & Holtzblatt 1995]. Kotonya and Sommerville state that this technique is suitable for gaining an initial understanding of the system and the application domain. Later, it can be focused on some particular environment processes [Kotonya & Sommerville 1998].

For this reason, it is recommended for use for capturing **Strategic** or **Tactical** information. Its use is **indifferent** for capturing **Basic** information.

### 5.13.13 Prototyping

In this technique the elicitor gives the informant a simplification of the target system for him or her to validate, propose and correct visible product information. The prototype sets out to gather information on the product design, but also on the functions and elementary data that it will process. For this reason, it can be used to capture the conceptual domain information and processes. It does not appear to be appropriate for gathering strategic information.

In their technique comparison [Maiden & Rugg 1994], Maiden and Rugg state that the technique is suitable for capturing problem domain behaviour, processes and data. In another elicitation technique review [Jitnah et al. 1995], Jitnah and colleagues state that the prototypes can be used to establish software system interfaces and functionalities. Other authors claim that this technique provides groundwork for developing and refining the initial definitions of the target system requirements [Jones & Britton 1996][Sutcliffe 1996]. Wiegers states that these techniques are able to clarify and refine functional requirements [Wiegers 1999].

This way, it is recommended for use for gathering **Tactical** or **Basic** information. Its use is **indifferent** if it targets **Strategic** information.

### 5.13.14 Focus Group

This technique is useful for ascertaining the participants’ opinion about a range of system aspects. Usually some artefact like a mock-up, a document or even
another market product is used to incentivize the participants. The elicitor prompts a heated debate to be able to gather information about the strategic and/or operational processes. The technique is then suitable to gather medium and high levels of information.

The technique does not appear to be adequate for gathering basic domain information, although this may crop up in the discussion.

This way, the technique is recommended for capturing Strategic or Tactical knowledge. If the aim is to capture Basic information, technique use is indifferent.

5.13.15 JAD

The aim of this technique is to discover high-level information about the product and its relationship to the organization. To do this, the elicitor assembles a sizeable number of project stakeholders. These stakeholders prepare, in groups, different subjects that they present and discuss openly. Its purpose is to define strategic aspects of the organization from the information technology viewpoint. That is, its use targets the capture of strategic and functional information.

In their review of elicitation techniques [Christel & Kang 1992], Christel and Kang compare certain techniques and tools with some process aspects. They particularly state that group approaches like JAD are very adequate for capturing organizational and contextual factors, including the identification of software system goals, problem context and boundaries and interfaces.

It should not be used to gather elementary information, because of its huge cost, and an alternative type of techniques should be preferred.

On this ground, this technique is recommended for capturing Strategic or Tactical information. Its use for capturing Basic information is not recommended.

5.13.16 Scenarios/Use Cases

This technique is useful for questioning the informant to find out information mainly about different product processes or functions. It is not effective for capturing strategies or elementary information, although this may possibly turn up in the sessions.

Burton and Shadbolt also suggest that scenarios is a technique that works fairly well in procedural domains [Burton and Shadbolt 1987]. Also in their comparison of techniques, Maiden and Rugg state that the technique is adequate for capturing behaviour and processes and, to a lesser extent, problem domain data [Maiden & Rugg 1994]. In the elicitation techniques review [Jitnah et al. 1995], Jitnah and colleagues state that scenarios can help to identify the functional features of the system. Pan and colleagues state that use cases can describe a job from start to finish [Pan et al. 1997]. Wiegers states that these techniques are useful for finding out user goals and tasks [Wiegers 1999].

On these grounds, this technique is recommended for use for capturing Tactical information. Its use for capturing Strategic or Basic information is indifferent.
5.14 Level of Available Information

This attribute describes the categorized type of information that is available prior to the session, before applying any technique. It represents the information that is required for each technique to be used. The values are: **High** level, there are strategies, directives, procedures, processes, functions, heuristics; **Low** level, there are concepts, attributes, basic domain elements; and **Zero**, there is no information.

5.14.1 Open-Ended Interview

This technique is used to capture diverse information. Although its use is more common for gathering general information, it is also used with informants that have basic information. It can be used when there is no information about the project or when the process has already advanced, and we have to interview informants with different information levels.

If strategic and/or tactical information is available, it can be used to extend, detail or further examine this information and get basic information. If basic information is available, interviews can be held to extend or clarify concepts or to relate basic to tactical information.

On this ground, the technique is **recommended** for use when there is **Zero**, **Low** or **High** level information.

5.14.2 Structured Interview

This technique captures well-defined information that aims to more thoroughly examine certain already defined topics. Therefore, it cannot be applied when there is no information whatsoever, as some background is required to prepare the questions.

If there is basic information, the technique can be used to clarify questions, establish definitions or relationships between domain elements. If tactical information is available, it can be used to gain a better understanding of tactics or variants or to examine them in more detail right down to the basic elements. If strategic information is available, the technique can be useful for mapping strategies or directives to functions or system processes.

In this respect, Cooke states that some previous knowledge of the domain on the part of the elicitor is necessary to apply this technique [Cooke 1994]. Hart also agrees that this interview can be applied once the basic knowledge has been acquired [Hart 1986]. In the Respect review of project techniques [Respect 1997], the academics state that the interviewer may need to gather knowledge of the domain to find out what to ask.

This way, the technique is **recommended** for use when there is **Low** or **High** level information. It is **not recommended for use** when there is **Zero** available information.

5.14.3 Task Observation

This technique retrieves information about the domain through the *in situ* observation of actions. Being a passive activity, it does not require previous information for use; on the contrary, it is adequate for first making contact with and retrieving the preliminary information about the domain.
If there is more general information about the project, the technique may be useful for finding out the functions or processes covered or for retrieving visible information that may have been overlooked in an interview. If there is elementary information about the problem domain, the technique may be useful for putting abstract knowledge into context.

For this reason, the technique is **recommended** for use when information of any level - **Zero**, **Low** or **High** - is available.

### 5.14.4 Critical Incident Technique

This technique aims to further knowledge of the domain processes, varying the conditions for the informant to be able to restate how they should be dealt with. If high-level information is available, i.e. the elicitor has some idea of the functions and processes involved, the technique can be applied for the informant to instantiate particular cases of those procedures.

When there is elementary information about the domain, the technique could be used to derive functions and their critical situations related to the domain elements for the first time. However, this is not an ideal condition for the technique to be effective. If there is no information whatsoever, the technique cannot be applied, because of the associated cost/benefit ratio. Another technique should be given preference over this one in this case.

On this ground, the technique is **recommended** for use when there is **High** level information. When there is **Low** level information, the use of the technique is indifferent. If the available information is **Zero**, it is **not recommended** for use.

### 5.14.5 Concept Ranking/Laddering

This technique is useful for finding out the relations between domain concepts. It is logical, then, that information should be available about the domain before the session is held. To prepare the activity, the elicitor must write out cards containing problem domain elements or concepts. This information may have been acquired through training or in an earlier elicitation session. The technique appears to be applicable only if there is information about the domain concepts/attributes.

When there is no previous information, the technique simply cannot be applied because the elicitor would not be able to prepare the cards. If there is high-level domain information, like general directives or processes, the technique cannot be applied because it requires fine-grained information.

Some authors state that this type of techniques require the elicitor to have some basic knowledge of the domain before its use [McGeorge & Rugg 1992][Zowghi & Coulin 2005]. Also in their technique characterization, Maiden and Rugg state that the technique requires key domain entities to have been identified [Maiden & Rugg 1994].

For this reason, the technique is **recommended** for use when there is **Low** level information. It is **not recommended** for use when **High** level or **Zero** information is available.

### 5.14.6 Questionnaires

This technique is useful for gathering varied information about the problem domain. Its aim is to extend, clarify and build on already acquired general knowledge.
That is, it is usually applied once there is some information about the problem. It targets information of any level, meaning that the technique looks to be adequate when there is already some sort of information.

If there is no information whatsoever about the problem, the technique should be applied only if there is no alternative. In other words, a questionnaire could be applied in the first place only if the conditions prevent the use of another technique. However, the activity is not guaranteed to be effective.

For this reason, the technique is recommended for use if the level of information is Low or High. If there is Zero information, the technique is not recommended for use.

5.14.7 Protocol Analysis

This technique is useful for ascertaining how an informant reasons out how he would solve or tackle a case. To do this, some information is required, that is, information, even if it is coarse-grained about the domain processes or functions is necessary. If information is available, the technique appears to be adequate, is useful for focusing the session and selecting the right informant.

If there is no information whatsoever, or there is only basic information about the domain concepts, the use of the technique does not appear to be effective.

In their characterization of techniques, Maiden and Rugg state that the technique requires adequate domain tasks have to be identified [Maiden & Rugg 1994].

This way, the technique is recommended for application when there is High level information. If the levels of available information are Zero or Low, the technique is not recommended.

5.14.8 Repertory Grid

Repertory grid is helpful for getting more thorough knowledge of the domain elements by establishing relationships and comparisons. To run the session, it is preferable for elementary information to be available for the purposes of preparation. This information may have been acquired through training or in earlier sessions. This way, the technique appears to be adequate if there is basic information about the domain elements.

If there is no information whatsoever, or whatever information there is is high level, such as strategies or processes, the technique cannot be applied because quite a lot of session time would be wasted determining which of these elements are necessary for rating the grid.

McGeorge and Rugg state that this technique requires some knowledge of the domain structure to select a set of useful elements [McGeorge & Rugg 1992]. Also in their techniques characterization, Maiden and Rugg state that the technique requires key domain entities to have been identified for use [Maiden & Rugg 1994].

For this reason, the technique is recommended for situations where there is already Low level information. If there is Zero or High level information, the technique is not recommended for use.
5.14.9 Brainstorming

This technique aims to gather varied information, mainly to form a general idea of the problem. This way, if there is no information, or whatever information there is is elementary, the technique can be applied to acquire high-level information and fill in gaps in problem knowledge.

If there is high-level information, the technique could be used to extend or detail such knowledge. However, another more easily coordinated technique could be more effective.

On this ground, the technique is applied for when there is Zero or Low level information. Its use is indifferent when there is High level information.

5.14.10 Nominal Group Technique

Like brainstorming, this technique can be used to capture a variety of information, but it is more effective at capturing high-level information. Its use does not depend on there being previous information. If there is no information whatsoever, the technique is useful for the elicitor to get in touch with the domain. Likewise, if there is only basic information, the technique is useful for extending the knowledge of the domain to form a more general idea.

If high-level information is already available, the technique could be applied to extend this information, although, depending on the quality of information available, other techniques may be better.

This way, the technique is recommended when there is Zero or Low level information. If there is High level information, the use of the technique is indifferent.

5.14.11 Delphi Method

This method is based on administering a questionnaire to a group of informants. To prepare this instrument, the elicitor should have some information about the problem. In actual fact, the information about the problem and the differences of opinion among the informants is what prescribes the use of this technique. Consequently, the technique is adequate when the elicitor has some knowledge of the problem domain.

When there is no information whatsoever, it is impossible to prepare a preliminary questionnaire. This way, the technique cannot be applied in these cases.

For this reason, the technique is recommended where there is Low and High level information. The technique is not recommended for use when Zero information is available.

5.14.12 Participant Observation

The aim of this technique is to acquire knowledge of the domain, mainly when the elicitor does not have much of a clue about the domain or when there are obstacles to using another technique to learn about it. When there is no information whatsoever, the technique can be applied as a means of making contact with the domain processes.

If there is some level of information, the technique might be worth considering if the informants’ heuristics are unclear and the environment domains are complex or unknown.
In the Respect review of project techniques [Respect 1997], the academics state that the elicitor does not require any previous knowledge of the domain to use this technique.

This way, the technique can be recommended when there is Zero, Low or High level information.

5.14.13 Prototyping

This technique is useful for capturing requirements information through the use of a software artefact. To design the prototype, there must be some level of information. A throw-away prototype can be prepared if there is information about strategies and functions. If there is elementary information, a screen mock-up can be built.

If there is no information whatsoever about the problem, the technique cannot be used, as no prototype will be able to be designed.

Therefore, it is recommended for use when there is Zero, Low, or High level information.

5.14.14 Focus Group

This technique is useful for capturing diverse information depending on the session goals. For its preparation, information is needed about the problem to focus the activity and look for possible artefacts to support the discussion. That is, the technique is applicable when there is general information about the problem and the processes it involves.

If there is only elementary information, the technique cannot be used. Likewise, it cannot be used when there is no previous knowledge about the problem.

Therefore, the technique is recommended when there is High level information. If there is only Zero or Low level information, the technique is not recommended for use.

5.14.15 JAD

This technique requires complex preparations as the participants come from different strata of the organization. However, it is very effective for defining the organization’s software strategies and establishing the project boundaries. It is adequate when there is no information about the problem and the aim is to form a global view elicited from all the stakeholders.

When the elicitor has information about the problem, the technique can also be applied to gather more complete and negotiated information.

On this ground, this technique is recommended for use when there is Zero, Low or High level information.

5.14.16 Scenarios/Use Cases

This technique has the aim of determining the functional features of the product. To do this, it does not require any previous information in particular. If there is high-level information, the technique is useful for detailing the processes involved.
If there is no information whatsoever or whatever domain information there is is elementary, the technique is effective and adequate.

This way, it is recommended for use when there is **Zero**, **Low** or **High** level information.

### 5.15 Problem Definedness

This attribute defines the **clarity** of the **goals and scope** of the project. The values defined for this are: **High**, well-defined; and **Low**, poorly defined.

#### 5.15.1 Open-Ended Interview

The primary aim of this technique is to define goals and other global project aspects. Generally, the project managers and leaders are interviewed to capture their ideas about and the personal features required to solve the problem. Therefore, the technique will be more suitable when these aspects are unclear, and they need to be fixed.

When the goals have been set, that is, the elicitor already knows the general directives about the target product, the technique can be used, albeit for other purposes, like interviewing the managers or owners of the knowledge about the functions.

On this ground, the technique is **recommended** for use when project definedness is **Low**. If the definedness is **High**, technique use is **indifferent**.

#### 5.15.2 Structured Interview

This technique is used to further research specific product aspects. The elicitor selects aspects or part of the problem and prepares the questions that the informant is to enlarge upon. That is, the technique appears to be more adequate when the overall project aspects are clearer.

If the scope is still unclear, the technique could be used but must be carefully prepared. If a script has to be prepared on the basis of ambiguous information, inconvenient questions are likely to crop up and waste time. Therefore, there is no guarantee of it being effective.

This way, the technique is **recommended** when there is a **High** project definedness. Its use is **indifferent** if definedness is **Low**.

#### 5.15.3 Task Observation

The observation activity aims to gain, first-hand, a functional and dynamic view of the domain. The idea is to make contact with the problem domain environment. If the project goals are unclear, the technique can be used to recognize on the ground which actions it covers. Its use can ease the understanding of the problem and its scope.

If the scope of the project is well defined, the technique will be able to be used to focus on actions that are within the project objectives. In an unfamiliar environment, some functions are likely not to be absolutely clear, for example, and observation can help to gain an understanding of these.
For this reason, the technique is recommended for use when there is a **High** project definedness. Its use is **indifferent** if definedness is **Low**.

### 5.15.4 Critical Incident Technique

This technique is useful for going further into tougher cases. Normally, the functions under consideration will have been clearly established, meaning that this technique is useful for focusing on such functions or processes to gain information on special cases. This way, the project must be quite clearly defined for it to be applied with any guarantee of effectiveness.

If the problem is not clear enough, the application of the technique may be useless, and its results ineffective. Some of these processes may not end up being part of the end product.

For this reason, technique use is **recommended** when the definedness is **High**. Its use is not **recommended** when project definedness is **Low**.

### 5.15.5 Concept Ranking/Laddering

This technique is useful for dealing with domain concepts. This low-level information is useful for understanding the relationships with each other. Generally, a fine-grained analysis is achieved when the project goals are clear. Using this technique for - or before- establishing the expectations and scope of the project does not appear to be adequate. It may end up being a wasted effort, as there is no guarantee that warrants its preparation and validates its results.

If the elicitor has already delimited and specified the scope of the target product, the technique can be applied at any time according to the information requirements determined by the elicitor.

On this ground, the technique is **recommended** if the project definedness is **High**. Its use is not **recommended** if project definedness is **Low**.

### 5.15.6 Questionnaires

This technique must be prepared conscientiously to retrieve correct information. Its aim is to extend and/or confirm captured information or gather new information for different purposes. In this case, the most relevant general information about the project has already been gathered. It is under these circumstances that the technique appears to be more effective.

If the project scope and the objectives are not clear, the technique can be used to provide some insight for this purpose or to retrieve information that is helpful for setting goals.

On this ground, the technique is **recommended** for use when project definedness is **High** or **Low**.

### 5.15.7 Protocol Analysis

This technique further examines the reasoning of informants that are more experienced in particular fields of the problem domain or the organization. To do this, it is necessary to determine the session goal and the informant in question. The scope of the project should be clear in order to select the cases that will be dealt with in the
session. This way, the technique appears to be adequate when there is already a clear
definition of the problem and target product.

If the project is unclear, it is not worth moving on to deal with the domain
cases or processes, as it could be a waste of time. The results output may be
unusable, meaning that the technique is not adequate in these cases.

This way, the technique is recommended for use for projects that have a High
definedness. The technique is not recommended for use if the definedness is Low.

5.15.8 Repertory Grid

This technique uses the domain concepts to find out how they relate to each
other. To process this low-level information, the scope and objectives of the project
have to have been established. If they have been, fine-grained information can be
specified. That is, the technique will be able to be used effectively only if the scope of
the domain covering the problem is clear.

If there is no clear project definition, the technique should not be applied
because it would involve determining the domain elements that are supposedly within
the scope of the problem.

On this ground, the technique is recommended for use when definedness is
High, and its application is not recommended when it is Low.

5.15.9 Brainstorming

This technique is useful for gathering information from many informants and
on a range of project aspects. If no ideas about the problem are forthcoming, a session
with the key stakeholders will be able to provide an understanding of what they
expect as a solution to their needs. If there are ideas about the project, but they are
still fuzzy, then the technique can help to clarify the vague aspects. This way, the
technique appears to be very adequate for situations where there is no clear definition
of the project objectives.

When the objectives have been clearly defined, the technique is equally
applicable, albeit for other more specific purposes. A session focused on particular
project aspects where informants are selected according to the topic to be dealt with
can be carried out at any time after the project goals have been set.

This way, the technique is recommended for use when there is a Low or High
project definedness.

5.15.10 Nominal Group Technique

This technique is able to generate ideas about the project in a more structured
manner. Like the brainstorming technique, it is suitable for use for defining the
project objectives and scopes, if they have not yet been gathered or they are not
completely established.

If the project scope has already been clearly defined, the technique can be used
for other purposes, as specified in brainstorming.

On this ground, the technique is recommended for cases where project
definedness is Low or High.
5.15.11 Delphi Method

The technique is helpful for aligning the standpoints of the stakeholders on general project issues. If these overall requirements have not been established or they are considered ambiguous, the use of the technique can be very good for reaching agreement on the goals and scope of the project.

If these aspects have already been defined, the technique is equally applicable, albeit for other more specific purposes, confined to part of the problem and a particular group of informants.

This way, the technique can be recommended when project definedness is Low or High.

5.15.12 Participant Observation

This technique brings the elicitor into contact with the domain functions. Although observation provides an understanding of the domain, active elicitor participation involves a bigger workload, and, therefore, a decision must have been taken on the importance of the functions in question. That is, the goals and functions covered by the project must have been clearly established to apply the technique. Only then can a session be scheduled to learn the details of how to perform the selected functions or processes. This way, the technique is adequate when the general project aspects have already been established.

If they are not very clear, the technique could be used, but the cost of learning about the problem is quite high. In these cases, it is better to use another technique like simple observation.

From the above, the technique is recommended when project definedness is High. If its level is Low, use is indifferent.

5.15.13 Prototyping

Prototyping confronts stakeholders with an artefact that can help to set the overall project aspects. When the project aspects are not at all clear, that is, when there is confusion about what the target product should or should not do, a prototype helps the informant to establish goals through interaction with the elicitor.

If these aspects are already well established, the technique can be applied likewise to deal with other more particular aspects of the design or data to be processed.

In their review of some requirements techniques [Teng & Sethi 1990], Teng and Sethi argue that prototypes are a good technique where there is a lot of uncertainty. On the other hand, Jones and Britton state that prototypes very often had to be used when it was hard to visualize how the proposed system was to be used [Jones and Britton 1996]. Wiegers states that these techniques are appropriate when requirements are uncertain, ambiguous, incomplete or vague [Wiegers 1999].

The technique is recommended for use when definedness is Low. Its use is indifferent if definedness is High.

5.15.14 Focus Group

This technique is useful for bringing opinions on diverse aspects of the project into line. The presentation of similar or market products can help to clarify the target
product requirements. The discussion among informants helps to determine the key project goals. This way, the technique is adequate when the essential characteristics of the product under development are unclear.

If the project scope or goals are not yet clear, the technique could be used for any other purpose at any other time.

On this ground, it is recommended for use if definedness is **Low** or **High**.

### 5.15.15 JAD

The main utility of this technique is to help to define objectives, scope and other project aspects. The session participants are representative of all the types of informants that hold an opinion on these aspects. Generally, it takes several sessions to agree on the project goals and scope. Consequently, the technique is adequate when there is no clear definition of what the final product should be.

If the project is well defined, the technique is not adequate, as it is expensive and there is probably a more suitable technique.

This way, the technique is **recommended** for use when project definedness is **Low**. On the other hand, it is **not recommended** for use if project definedness is **High**.

### 5.15.16 Scenarios/Use Cases

This technique can be used when the project objectives and scope are defined. This is because it focuses on determining the particular functionality of the project in question. That is, there first has to be a clear definition of the project to then use the technique to capture the details of the processes involved.

Its use can be unreliable when these aspects are still unclear. It may perhaps be helpful to clarify the product definition for small projects, but it is not very good for large projects.

The technique is, then, **recommended** for use when project definedness is **High**. Its use is considered **indifferent** if problem definedness is **Low**.

### 5.16 Project Time Constraint

This attribute considers the relative availability of time to apply the technique in the project. The values are: **High**, little time; **Medium**, sufficient time; and **Low**, plenty of time.

#### 5.16.1 Open-Ended Interview

This technique takes time to execute, and it is not clear whether the time spent will generate effective results. That is, productivity is uncertain. If there is enough time to interact with the informant, there are more chances of it being effective. This way, if there is enough project time, the technique appears to be more adequate.

If the project time is tight, that is, it is hard to meet the schedule and, therefore, elicitation time has to be optimized, the technique can be applied with constraints, but the results will be less certain.
In their elicitation techniques characterization proposal [Batista & Carvalho 2003], Bautista and Carvalho propose a medium value for the cost (time and workload) facet of this technique.

On this ground, the technique is recommended for use when the time constraint is a Low or Medium. If there is a High project time constraint, the technique is indifferent.

5.16.2 Structured Interview

This technique focuses on set questions that require preparation. However, the technique can be accommodated to the available time. In other words, the length of the script written beforehand can target a set time. Therefore it is possible to use it when there is a time constraint, but there is no guarantee of its effectiveness. When time is tight, its use appears to be totally justified. If there is plenty of time, the technique is equally applicable

Some experts agree on the fact that this technique is time consuming [Cooke 1994], but the elicitor can acquire knowledge as the session advances, which reduces the need for preparation [Geiwitz et al. 1988].

This way, we recommend the use of the technique when the project time constraint is High, Medium and Low.

5.16.3 Task Observation

This technique takes time to execute. Depending on the type of organization or context and the goals set for the session, the elicitor may take more or less time to apply the technique effectively. This way, the technique appears to be more suitable for projects that have plenty of time.

If time is tight, its use will depend on other circumstances and its results are less foreseeable. On the other hand, if there are time constraints for undertaking requirements elicitation, another more effective technique should be explored.

On the other hand, some authors are of the opinion that the use of direct observation is subject to the available time, and, although an option, video recording will still require the elicitor's attention [Liou 1992][Preece et al. 1994][Maiden & Rugg 1994][Alexander & Stevens 2002]. The experts Sommerville and Sawyer state that the developer costs of this technique are significant [Sommerville & Sawyer 2004].

On this ground, it is recommended for use when there is a Low time constraint. If the constraint is Medium, the use is indifferent. If there is a High time constraint, it is not recommended for use.

5.16.4 Critical Incident Technique

This technique focuses on a special case within the domain and aims to find out alternative solutions from the informant. It is a technique whose depth can be controlled, that is, the conditions can be varied as required and time permitting. Therefore, it appears to be adequate when there are project time constraints.

If there are no time constraints and there is plenty of time for running the session, the results of its use are likely to be even better.

This way, it is recommended for use for any constraint case: High, Medium or Low.
5.16.5 Concept Ranking/Laddering

This technique is useful for capturing the relations between the domain elements by ordering a set of cards. It does not take very long to prepare and execute [Cooke 1994]. Thus, it appears to be a technique that is adequate for use when the project is short of time.

If there is enough or plenty of time for elicitation, it can be used to even greater effect.

Thus, the technique is recommended for any constraint case: High, Medium or Low.

5.16.6 Questionnaires

A questionnaire is useful for gathering information quite quickly and without having to coordinate a face-to-face session. Its length depends more on how much time the informant has than on project time.

This way, the technique appears to be suitable for when there is not much time or there is a project time constraint. When there is plenty of time for the project, the technique is equally applicable.

In their elicitation technique characterization proposal [Batista & Carvalho 2003], Bautista and Carvalho propose a medium value for the technique cost facet (time and workload).

For this reason, it is recommended for use for projects with Low, Medium or High project constraints.

5.16.7 Protocol Analysis

This technique takes time to run and then analyse. It is a very time-consuming technique as elicitors have to transcribe and take to pieces what the informant says. This way, this technique appears to be adequate only when there is plenty of project time.

If the available time is tight, its use is unlikely to be successful. In any case, it does not appear to be applicable if there are project time constraints. In this case, it is worth considering the use of a more immediate technique.

This reasoning is supported by several authors that qualify this technique - including protocol recording, transcription and interpretation- as very time consuming [Liou 1992][Cooke 1994][Wagner et al. 2003][Maiden & Rugg 1994].

Some experts demonstrated empirically that this technique takes longer than other techniques [Burton et al. 1988a].

For this reason, the technique is recommended for use when there is a Low time constraint. Its use is indifferent if there is a Medium constraint. It is not recommended if there is a High project time constraint.

5.16.8 Repertory Grid

This technique outputs the view taken by an informant or group of informants on a set of domain elements. It is a structured technique that takes up little of the
informant’s time and not long to analyse, especially if there is a support tool. Therefore, it appears to be very adequate when there are project time constraints.

If there is enough time available, technique application will be even more warranted.

Therefore, the technique is recommended when there is a High, Medium or Low project time constraint.

### 5.16.9 Brainstorming

This technique takes time to develop. Mainly, it takes time to coordinate and run. It is a slow technique, but can be very effective. For this reason, it is proposed for use in cases where there is plenty of time. If time is tight, its use will be subject to other factors.

If the project is short of time, the technique is not adequate, as it can take up all of what little time there is and not achieve the expected results.

In their elicitation technique characterization proposal [Batista & Carvalho 2003], Bautista and Carvahlo propose a mean value for the technique cost (time and workload). However, it depends on the creativity of the participants.

This way, the technique is recommended for a Low time constraint. The use is indifferent when the time constraint is Medium. If there is a High time constraint, the technique is not recommended for use.

### 5.16.10 Nominal Group Technique

Like brainstorming, this takes time to coordinate and run the session using this technique. Therefore, it appears to be adequate when there is plenty of time available for the project.

When time is tight, the technique can be used, albeit without any guarantee of success. If there are time constraints, the technique should be shunned in preference for another more suitable technique.

On this ground, the technique is recommended for use there is a Low time constraint. If the project time constraint is Medium, its use is indifferent. If there is a High project constraint, the technique is not recommended.

### 5.16.11 Delphi Method

This technique involves repeatedly sending out questionnaires and statistical analyses to a group of informants. There can be up to four rounds, which, although able to guarantee the results, are time consuming. This way, it is an adequate technique when there is plenty of time for the project.

If time is tight, there is no guarantee of its results. If time is short, the technique should not be applied, and another faster technique should be considered.

This reasoning is shared by some experts that point out as a technique weakness the time it takes between successive questionnaire rounds [Roth & Wood 1993]. Also Delbecq and colleagues state that this technique is more time consuming than other techniques like nominal group or brainstorming [Delbecq et al. 1975].
For this reason, it is recommended for use when there is a Low time constraint. If the time constraint is Medium, its use is indifferent. If there is a High project constraint, the technique is not recommended.

5.16.12 Participant Observation

This technique is very time consuming. The elicitor stays long enough to thoroughly learn the functions or processes that are enacted in the organizational setting. For this reason, the technique is adequate when there is plenty of time.

If the project has time constraints, the technique should not be used, and another more productive technique should take priority. If time is tight, it can be used to a limited extent, albeit with no guarantee of success.

In their Respect project review [Respect 1997], the academics state that this technique requires a considerable investment of time and effort to integrate the elicitor in the environment under study. Other experts [Alexander & Stevens 2002] state that this technique requires a heavy workload, although some projects may warrant this.

This way, the use of the technique is recommended when there is a Low time constraint. If the project time constraint is Medium, its use is indifferent. If there is a High project constraint, the technique is not recommended.

5.16.13 Prototyping

Prototype preparation can be time consuming. Mainly, it takes time to prepare the prototype, meaning that its use is only recommended when there is plenty of project time.

If there are time constraints, the use of the technique can degrade the path. If time is tight, the technique can be used albeit without any guarantee of success.

In their technique characterization, Maiden and Rugg state that it takes time and effort to build the artefact to be used [Maiden & Rugg 1994]. In their Respect review of project techniques [Respect 1997], the academics state that this technique is more time consuming than other approaches. The experts Sommerville and Sawyer characterize this technique as having high developer costs. Developer experience can, however, offset this weakness. Also they suggest technique alternatives, like paper prototypes or wizard of oz, as less costly possible options [Sommerville & Sawyer 2004].

On this ground, the technique is recommended for use when there is a Low time constraint. If the project time constraint is Medium, its use is indifferent. If there is a High project constraint, the technique is not recommended.

5.16.14 Focus Group

The technique takes time to prepare and run. Arrangements have to be made for all participants to attend, and choose the ad hoc artefact to support the discussion. This way, this technique appears to be adequate when there is plenty of time available for the project. If there is not much time, the technique will not be totally effective.

This way, it is recommended for use when there is a Low time constraint. If the project has a Medium time constraint, its use is indifferent. Its use will not be recommended if there is a High time constraint.
5.16.15 JAD

This activity takes a lot of preparation and running. The attendance and the logistics required to run the technique take a long time to arrange. The activity itself may call for meetings over several days. This way, its use appears to be adequate when there is plenty of time for application.

If there is not enough time, the technique should not be used. If time is tight, it can be applied with some boundaries and conditions.

In their Respect project technique review [Respect 1997], the academics state that workshops often keep stakeholders occupied for several days at a time. Other experts [Alexander & Stevens 2002] agree that this type of techniques keep participants busy for several days (from 2 to 5) at a time, as well as requiring quite a lot of preparation. In their elicitation technique characterization proposal [Batista & Carvalho 2003], Batista and Carvalho propose a high value for technique cost (time and workload).

For this reason, the technique is recommended for use when there is a Low time constraint. If the project time constraint is Medium, its use is indifferent. If there is a High project constraint, the technique is not recommended.

5.16.16 Scenarios/Use Cases

This technique does not take long to run. It is a focused interview technique. Its use can be adequate irrespective of project time.

In their elicitation technique proposal [Batista & Carvalho 2003], Batista and Carvalho propose a medium value for the technique cost facet (time and workload).

Thus, it is recommended for High, Medium or Low project time constraint.

5.17 Process Time

This attribute refers to the stage at which the project elicitation process is prior to the session. The values are: Start, elicitation of general definitions; Middle, elicitation of key requirements; and End, elicitation of final information.

5.17.1 Open-Ended Interview

This technique is commonly used at the start of the project when its purpose is still unknown, and general objectives are to be set. It is useful for capturing general information about the product requirements, particularly the project boundaries and general functions. This way, the technique appears to be well suited for use at the early stages of elicitation.

In view of its nature and simplicity, the technique can be used at later stages of the elicitation process. Informants can be interviewed about more specific product aspects, even to confirm the last doubts about requirements information.

In keeping with this opinion, Cooke states that because this technique does not require or assume any domain knowledge on the part of the elicitor, it appears to be suitable for the early elicitation sessions designed to gain a broad-based view of the domain or establish a relationship with informants [Cooke 1994]. Other authors also
claim that the technique is effective at the start of the development process [Pan et al. 1997][Hart 1986].

For this reason, the technique is **recommended** for use at any stage of the elicitation process: **Start**, **Middle** and **End**.

### 5.17.2 Structured Interview

This technique aims to further explore already defined project aspects. It is useful for capturing focused information that is, generally, about specific product aspects. For this reason, it is suitable when the global aspects have already been determined, and we want to find out their details, that is, at later elicitation times.

There is no guarantee of the results if it is used at the start as the global aspects of the project will not yet be clear. Its use may be warranted at this stage if the project is very large or its domain is complex, and a structured interview concerning general aspects needs to be prepared due to the ambiguous results of earlier sessions.

For this reason, it is **recommended** for use for the **Middle** and **End** stages. Its use in the **Start** stage is **indifferent**.

### 5.17.3 Task Observation

This technique is adequate for making a first contact with the domain, mainly when it is hard to capture information by other means. An interview or another technique may not give a clear idea of how the processes operate in practice in a confusing or unknown domain. In these cases, it is preferable to enter into contact with the real environment and observe what goes on in situ. On this ground, the technique appears to be suitable for use in the early stages of the process.

Its use in later stages can be unnecessary and costly. It can be used to examine the odd function, but it is not very adequate. Its application in the final stages of the process is not at all justified, as the formal aspects of the processes should have already been fixed by that time.

This way, its use is **recommended** for the **Start** stage of the process. Its use in the **Middle** stage is **indifferent**, but its use at the **End** stage is **not recommended**.

### 5.17.4 Critical Incident Technique

This technique focuses on abnormal situations of the domain functions. Having established the domain processes, it must focus on anomalous situations that occur sporadically. This way, it will be used after the initial definitions, that is, when the aim is to get further details about the requirements on already established functions. This way, the technique appears to be adequate in the later stages of requirements elicitation.

The technique does not appear to be adequate in the early process stages, as the functions or domain processes of interest to the project would still not have been fixed.

For this reason, it is recommended for use in the **Middle** and **End** stages of the process. Its use at the **Start** stage is **impracticable**.
5.17.5 Concept Ranking/Laddering

This technique is useful for finding out relations between elements in the problem domain. It can be used at the early stages to gather knowledge about the domain with which the elicitor will not be familiar. The elicitor may possibly be acquainted with domain elements and want to use the technique to confirm and extend his or her knowledge. Also it is plausible to use it in the middle of the process to clarify any relationships of domain concepts that are unclear. This way, the use of this technique appears to be adequate at the early and middle stages of the elicitation.

It does not make much sense to use this technique at the final stages, as these basic aspects should have already been clarified by that time.

This way, the technique is recommended for the Start or Middle stages of the process. When the process is at the End stage, it is not recommended for use.

5.17.6 Questionnaires

The key use of this technique is for capturing the huge amount of information related to different aspects of product requirements. It is suited for application when project boundaries have already been defined, and the aim is to further explore or clarify certain topics. It is also applicable at the end of the process when we have to confirm information or establish minor or last-minute project requirements. This way, the technique appears to be adequate in the later stages of the elicitation process.

At the early stages of the process it could be used to find out the global project aspects, when there is no other applicable technique, due to the unbreachable distance to the target environment, for example. However, this is not the best option, and there is no guarantee that the technique will be effective.

On this ground, the technique is recommended for use in the Middle or End stages of the process. At the Start stage, its use is indifferent.

5.17.7 Protocol Analysis

This technique focuses on monolithic cases or situations that involve one particular informant that owns knowledge. This means that the global aspects and the general functions of the project should have been established before it is used. This way, the technique appears to be suitable and effective at intermediate elicitation process times when the functions have already been stated.

The technique is not applicable at early process times, as, because of its high cost, its use is only warranted if the risk is guaranteed to be low, that is, it is not useful unless the general aspects of the problem are clear. It can possibly be used in the later stages depending on the circumstances at the time.

For this reason, the technique is recommended for the Middle stage of the process. It is not recommended for use at the Start. At the End stage, its application is indifferent.

5.17.8 Repertory Grid

This technique requires the domain elements to have been previously identified, meaning that it could not be applied at the start of the process. Only if the elicitor has previous and basic knowledge of the domain and wants to establish relations could it be used. Even in these cases, it is not guaranteed to work. Likewise, it does not appear very adequate for use at the end of the process, as these basic relations should already have been settled by that time.
The technique appears to be more suitable in the middle stages of the process to further explore domain aspects and extend their understanding.

Pan and colleagues state that this technique can be used after the early requirements have been captured [Pan et al. 1997].

Thus, this technique is **recommended** for use in the **Middle** stage of the process. It is **not recommended** for use at the **Start**. At the **End** stage, its application is **indifferent**.

### 5.17.9 Brainstorming

This unscripted technique is useful for capturing ideas about the project, mainly at the start when little is known about the project. Its use is then adequate at the start of the elicitation process to gather the overall impressions from the project stakeholders.

At later stages, it can possibly be used circumstantially to clarify emerging aspects of design requirements or new needs added to the product. At the end of the elicitation process, its use does not make sense, because of its cost and as it is general-purpose technique.

A review of elicitation techniques [Respect 1997] claims that this technique is used mainly in the early development stages when there is a need for new ideas for the product.

On this ground, this technique is **recommended** at the **Start** stage of the process. When it is at the **Middle** stage, its use is **indifferent**. Its use is **not recommended** at the **End** of the process.

### 5.17.10 Nominal Group Technique

Likewise, this technique is useful for defining global project aspects, that is, at the start of the development process. However, it is also useable in the requirements specification stages, as it can be used in sessions with informants that give their opinion on design aspects or functionalities. This way, the technique appears to be adequate both at the start and during requirements retrieval.

At the end of the elicitation process, the use of this technique is less adequate on the grounds of the complexities of its logistics and arrangements.

Therefore, this technique is **recommended** for use at the **Start** or **Middle** stages. Its use at the **End** stage is **not recommended**.

### 5.17.11 Delphi Method

This technique is useful for agreeing on key requirements information. It is run using a questionnaire, and because of its associated cost, it should include substantial domain content. These questions administered to a group of informants focus on the core knowledge of the problem domain. After the objectives have been defined, the technique is capable of digging deeper into the functional requirements and related information. This information must be unique and stable in order to specify the final product requirements. This way, the technique appears to be adequate for gathering most of the requirements, that is, in the central stages of the elicitation process.
The technique can be used at the start of the process for the purposes of definition, but it is less adequate. If the main stakeholders are distant from each other, it could perhaps be used to unify criteria on the target product.

Similarly, at the final stages, these aspects should already be clear, making it less useful.

On this ground, the technique is recommended for use in the Middle stages. Its use will be indifferent for the Start and End stages.

5.17.12 Participant Observation

This technique is suitable for learning about an unknown or complex domain. The elicitor can use this technique to get to know the internal workings of the processes or functions in detail. It is useful, through a sort of learning, for discovering the procedures and data involved in the actions taken in the environment. This way, the technique appears to be adequate at the start and midway through the elicitation process.

At the later stages of the process, its use is less adequate because of its cost/benefit ratio. It could capture marginal information or new last-minute requirements, but a lot of replicated information would also be gathered.

Thus, the technique is recommended for use in the Start and Middle stages. It is not recommended for use at the End stage of the process.

5.17.13 Prototyping

This technique is useful for capturing information on visible requirements, mainly when it is difficult to capture through other means. Its use is adequate when the boundaries and other general aspects of the project have already been defined, although it can also be helpful for clarifying them. That is, it is suitable in the central stages of the requirements process, when the key information for requirements specification has already been captured.

It can be useful at the start if the complete functionality of the product is unclear and an exploratory artefact is desired. It is less useful at the end of the process, although it can be helpful for bringing out the least obvious details of the target product. In these cases, it is worthwhile exploring another technique due to the associated cost and the amount of information gathered.

Jones and Britton state that this technique appears to be adequate for the early stages of requirements elicitation, although some preliminary definitions are required beforehand [Jones & Britton 1996].

This way, it is recommended in the Middle stage of the process. Its use at the Start and End stages is indifferent.

5.17.14 Focus Group

This technique is useful for defining general project aspects based on a review of other similar products. In the middle of the process, it can help to define more complex or less sure characteristics. Sometimes, a prototype or another product can help to generate and discuss ideas related to the target product. This way, the technique is adequate in the initial and central stages of the elicitation process.
It is less often used at the end stage, as coordination and logistics are harder to arrange. It may not be cost effective for merely corroborating already determined information or capturing information on marginal requirements.

In their Respect review of project technique [Respect 1997], the academics state that this technique is useful in the early stages of the requirements process. Likewise, Kuhn is of the opinion that the use of this technique in the early stages is adequate for finding out participant opinions on and needs for the product or system to be built [Kuhn 2000].

On this ground, the technique is **recommended** for use in the **Start** and **Middle** stages of the process. Its use at the **End** stage is **indifferent**.

### 5.17.15 JAD

This technique is used mainly at the start of the project to establish its general aspects. It involves representatives of the entire organization and stakeholders. As a whole, they define the directives and general scope of the project. This way, its use is adequate at the early stages of the elicitation process.

This technique does not appear to be adequate in the later stages of the elicitation process because of its high cost. To carry on using all the participants and have them give their opinion on aspects with which they are unfamiliar or are not in their domain is not efficient. In these cases, it is better to focus information capture according to information needs.

Its use is **recommended** for the **Start** stage of the process. In the **Middle** or **End** stages, its use is **not recommended**.

### 5.17.16 Scenarios/Use Cases

This technique captures key information on the problem functions. After the general aspects have been established and the boundaries defined, the technique is used to find out the functional system requirements. That is, the technique appears to be adequate for going into detail about the product requirements. At the early or final stages, its use is less common and not as effective.

Pan and colleagues state that this technique can be used in many process phases [Pan et al. 1997].

On this ground, the technique is **recommended** for use in the **Middle** stage of the process. Its use in the **Start** or **End** stages is **indifferent**.