A Nominal Group Interview Technique to Support Lightweight Process Assessments: Description and Experience Report

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Abstract. This paper describes a group interview technique designed to support lightweight process assessments while promoting at the same time collaboration among assessment participants. The method was successfully used in one consulting assignment were it got previously discording participants, talking to each other and agreeing on the issues. The technique borrows from agile software development the concept of user stories to cast CMMI's specific practices in concrete terms and the Planning Poker technique, instead of document reviews and audit like interviews, for fact finding and corroboration.

Keywords. Process assessment, planning poker, lightweight assessment, CMMI, SCAMPI

1   Introduction

The group interview technique presented in this paper was developed by the author to support the assessment portion of a process improvement initiative launched by the management of a research agency which, as part of its mandate, develops and maintains a very sophisticated application used by more than 2,000 scientists all over the world. The organization was aware of its two main problems concerning this application: the accumulation of technical debt resulting from the development of features over a period of ten years without much architectural oversight and little refactoring, and the lack of a common development process fueled by the internal dissent of highly specialized and almost irreplaceable specialists. A previous attempt to address these problems had backfire due to the heavy handed approach followed by the person responsible for the improvement initiative. In requesting an assessment of their current ways of working, management had two objectives in mind: pinpointing specific problems by means of a recognized best practices framework and getting the development group to buy-in into the initiative. The development group for its part, was skeptical of what was perceived as a bureaucratic exercise getting in the way of doing the work.

Fig. 1. Group interview process
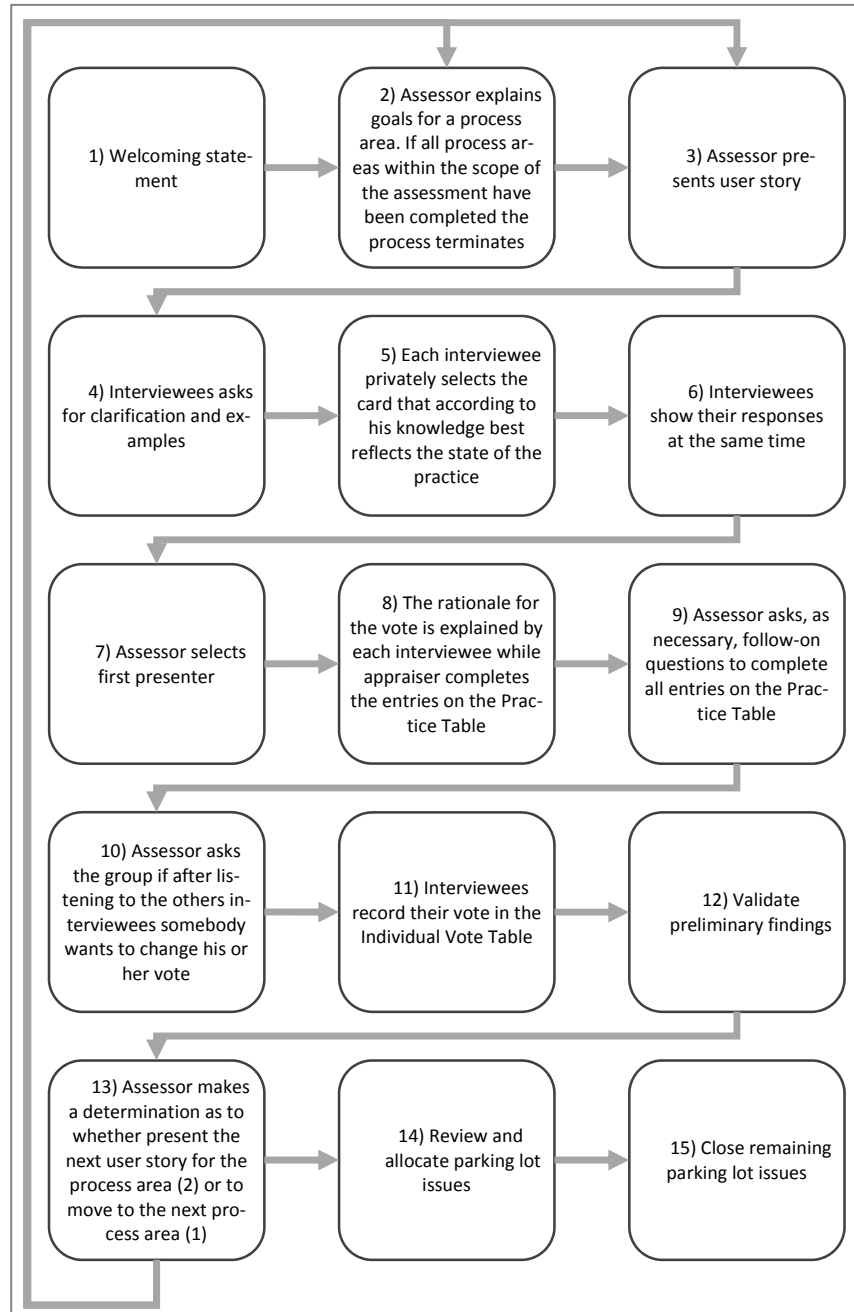
In this context, a SCAMPI[1] like assessment based on document reviews and audit-like interviews was out of the question. In the opinion of the author, this approach would not only had met with the passive resistance of those involved but would have further convinced them, that they were right in their rejection of the whole process.

Through his teaching activities in the Master of Software Engineering at Carnegie Mellon University, the author had learned first-hand about the power of user stories to synthetize a lot of information in a concise format and that of the Planning Poker to get people talking and helping them to arrive to a consensus. So he thought to himself: why not use them for fact finding and corroboration? Both techniques looked apt for the job and would give the assessment a much needed fresh look in the eyes of the developers.

The assessment comprised individual interviews with managers and a group interview with practitioners. Figure 1 depicts the group interview process, the focus of this experience report. The interviews with managers had for purpose finding out what were the pain points, the improvement goals, the degree of support for the initiative and the impediments they saw moving forward. The group interview with practitioners focused on the state of the practice within the group vis-à-vis all level 2 and some level 3 process areas of the CMMI, the issues from the practitioners' point of view and whether the group had a congruent view of the problem and its possible solution.

The rest of the paper is organized as follows: Section 2 explains why and how to express specific practices as user stories. Section 3 discusses the modified Planning Poker technique used in the assessment of the current practice. Section 4, describe the preparation of the final findings documents, Section 5 briefly describes management interviews and Section 6 the experience applying the method.

2   Expressing specific practices as user stories.

Assessing the group's way of working against the process areas of the CMMI requires verifying whether the practices defined by it are performed or not and in the affirmative they do so in an effective and efficient manner. To do this, the group interview process presented in the next section walks assessment participants through all the practices in scope, asking them whether the practice is implemented or not, and whether they find it valuable. The participants' answers and more importantly, their buy-in into the process depends a lot on how the question is formulated [1]. For example, while few people will argue that connecting test cases to the functionality they verify is an important quality of a software development process, asking them if they *"maintain bidirectional traceability among requirements and work products"* would rise quite a number of eyebrows.

Of course the two phrases are not equivalent, the first is an instance of the second and is limited to a single work product. The point here is that while the CMMI rightly aims for generality, response accuracy, buy-in and the development of a shared understanding about the problems is built around specific and not abstract constructs. The situation has been cleared described by Arent et al [2] in the recount of their experience

at Ericsson: *"The problem was that the project managers didn't understand the reasons for using CMM until they had actually tried to use it, and they didn't use it because they didn't understand the reasons for it. It was a vicious circle, making it difficult to succeed"*.

To make CMMI specific practices concrete, we use a slightly modified user story format: "As a <role> <personal pronoun> <practice instance> so <benefit>". This is a good vehicle for moving from the abstract to the concrete not only because most developers are already familiar and well predisposed to them but because they include who does it or who benefits from the practice: the <role>, what is done: the <practice instance> and the reason for doing it: the <benefit>. The <personal pronoun> is just that, its function is to make the user story grammatically correct.

The user stories are crafted by the assessor using his or her knowledge of the CMMI, some knowledge about how the organization works and their vocabulary. Table 1 below provides some examples as to how this is done.

Notice that there could be more than one <role> or <benefit> associated with a single <practice instance>, for example a <practice instance> could benefit or be performed by developers and testers and/or there could be multiple <benefit>s accruing from it, but in order to keep things simple we circumscribe the user story to direct performers and beneficiaries or, if already in use by the organization, a more encompassing category such as "team member", but we do not create artificial roles for the sake of economy of expression. Similarly we limit the description of the user story to one or two direct benefits since these are all it is needed to justify a practice. Conversely, if we could not find any beneficiary for doing something, we should consider dropping the practice from the assessment, otherwise seems like the organization has to do things for the sake of the model and not for the quality of the product or to better their way of working.

The more abstract a concept is, the higher the level of interpretation required and in consequence the higher the variability in the understanding of the same [3]. This makes the choice of <practice instance> to be used in lieu of the corresponding CMMI abstract practice, a critical issue in eliciting definite answers from the assessment participants. Continuing with the idea of making things obvious, a simpler practice is preferred to a more complex one. In general, if the organization is not doing those things that give more bang for the buck it is unlikely they will do those that are at the fringes. Including a simpler practice in the user story when the organization is doing something more elaborate, is not a problem because one or more participants in the interview are likely to recognize the intent of the practice and answer correctly while at the same time volunteering good information.

The previous discussion deals with specific practices, but what about, CMMI's generic goals and practices? A CMMI generic goal is one that applies to multiple process areas in the model. These goals and their associated practices deal with the institutionalization of the specific processes that is whether the organization follows them routinely as part of doing business or not.

In the proposed method, the institutionalization of the process is assessed via the consistency of the interview responses and by the comments made by the interviewees. This will be explained in detail in the next section.

Table 1. Recasting CMMI's specific practices as user stories. Selected examples.

Reference	CMMI Practice	User story
REQM 1.3 L2	Manage changes to requirements as they evolve during the project	As a team member I can find how user stories have evolved over time as well as their current status so I can better understand stakeholders' needs and avert "he said, she said" situations
PP 1.2 L2	Establish estimates of work product and task attributes	As a team we establish estimates for user stories and tasks so that we can make commitments to our stakeholders and plan our work
RSKM 1.1 L3	Determine risk sources and categories	As a team we have at our disposal a list of risks sources that can help us identify what might go wrong in a project and decide what to do about it
RSKM 2.1 L3	Identify and document risks	As a team we make a conscious effort to identify and document potential problems so we don't overlook them
TS 1.1 L3	Develop alternative solutions and selection criteria	As a team we discuss the characteristics a good software solution should possess and evaluate different solutions against them to avoid following a dead end path
VER 2.2 L3	Conduct peer reviews	As developers we review each other code with the purpose of identifying bugs and non-compliances with our coding guidelines

3 The group interview technique

Figure 1 above, describes the workflow used in the practitioners interview. The process is based on the nominal group technique proposed by Delbeq et al [4] and on the Planning Poker [5, 6], from which we borrow the idea of using cards to answer the interview questions, see Figure 2.

The two key activities in the nominal group technique are the private voting and the round-robin explanation mechanism. Both activities synergistically promote frankness, participation and engagement. Because private voting precludes people from knowing how the others will vote, people cannot piggyback on somebody else's explanations forever while maintaining some kind of intellectual consistency over the course of the assessment, so most participants would choose to be candid in their votes and explanations. The stipulation that all voting cards must be turned at the same time reduces conformity effects. The round robin mechanism promotes engagement by either giving the opportunity or by forcing everybody to speak about their vote and in turn, listen to the explanations provided by others. In the words of Delbecq et al [4], the inventors of the method, *"The rather mechanical format of going to each member in turn to elicit ideas establishes an important behavior pattern. By the second or third round of idea giving, each member is an achieved participant in the group"*. We observed a similar pattern that is discussed in Section 5.

The selection of participants for the assessment is key to the credibility of findings and recommendations. The selection must ensure discipline coverage; balancing experienced personnel, who understand the organization well, with new comers, who face the challenge of getting on board. Having a wide spectrum of participants also ensures domain coverage. To promote openness management shall be excluded from participation in these interviews. Since the method relies on the agreement or disagreement of the interviewees it is very important to have at least two representatives from the main development areas. The number of participants should be kept under ten in the interest of time. The following paragraphs detail each of the workflow steps.

1. Welcoming statement

The assessor welcomes the participants, explain the process, its purpose, and objectives. Participants are also informed about the reason for their selection, highlighting the need for everybody's contribution despite differences in roles and seniority. During the welcoming statement participants are provided with the deck of cards, see Figure 2, they will use to take votes and made aware of the basic appraisal rules: no attribution of votes and comments, no right or wrong answers, that interviewees should answer to the best of their knowledge, and that questions might be skipped if it becomes obvious from previous responses that no new insights will be gained by asking them. On a more mundane note, the assessor will inform participants about breaks and other logistics. The author has also found that cookies, coffee and a brief words by a senior manager concerning the importance of the initiative, will go a long way towards a successful meeting.

2. Assessor explains the goals of the process area

The assessor explains the intent of the process area the group is about to aboard. During this activity the assessor will explain the overall intent of the process area and that he will be using scenarios, in the form of user stories, to exemplify specific practices but that the organization might be achieving the same through some other mechanism and for that reason is very important to keep an open mind.

3. Assessor presents a user story

The assessor presents a user story to the group and after explaining it asks if clarification is required. User stories for each process area are presented one at a time. The assessor will first put a slide with the user story text that will remain up until the next one is presented and read it aloud. During the presentation the assessor might remind the group that the <practice instance>, as well as the <role> and the <benefit>s presented are just an exemplar and that there might exist other <role>s performing it or other <benefit>s derived from it. The assessor ends the presentation by asking if the user story is understood or if further clarification is required.

4. Interviewees ask for clarification

During this step the assessment participants ask questions with regards to the practice. Typical questions include the practice implementation, its goals and the protagonists. In responding, the assessor might resort to the original text of the specific CMMI practice to widen the perspective of the group in considering it. Time-boxing this period helps keep the conversation on point and minimizes wasted time. A good technique to prevent the conversation from drifting while remaining respectful of the speaking participant, is to acknowledge the argument and explain the point will be addressed on a

coming process area or ask the group if the issue can be put in a parking lot to deal with it later.

5 & 6. Interviewees vote

Interviewees privately select the card that according to their knowledge best reflects the state of the practice. Once everybody has selected his or her answer, they all show them up at the same time. After answering the interviewee's questions, the assessor will direct the assessment participants to take a preliminary vote on whether the practice is always followed, often followed, seldom followed, never followed or to indicate they don't know using cards like the ones show in Figure 2. During this activity each assessment participant privately selects from the deck of cards the one that, to the knowledge of the interviewee, best reflects the state of the practice.
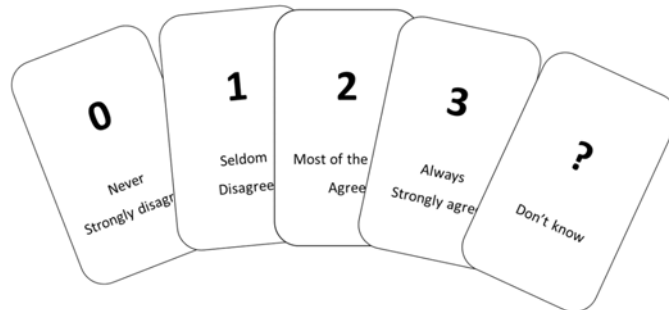

Fig. 2. Voting cards. Notice the cards do not include a neutral option. This was purposefully designed to force participants to take a stand on one side or other of the scale

When the assessor notices that everybody has selected his or her card, he will ask the interviewees to show their votes at the same time. The assessor shall allow an adequate time for thinking and reflection before the vote.

7. Starter selection

The assessor select the first participant to start the explanation round. This might seem as a trivial step, but in order to avoid primacy and recency effects and for preventing a more extrovert personality to unduly dominate the meeting with his or her explanations or to liberate shy individuals from the stress of always being the first, it is important to choose a different starting participant for each round of explanations. Sometimes it might be the person that was second to the first in the previous round some other times it could be somebody with a dissenting or extreme vote, because as much as the private vote mitigates conformity effects, hearing a couple of their colleagues say the opposite, might weaken the sound of a lonely voice. To avoid having participants misinterpreting this move as an affront or disrespect for their opinions it is very important to explain this during the welcoming statement.

8. Explanations

Each interviewee explain his vote. No interruptions are allowed during the exposition. During this step the interviewees take turn to explain the rationale for their vote. It is key that participants feel free to express varying points of view or to disagree. At this time the assessor has three responsibilities: pace the group in order to give time to everybody to talk, avert side conversations and excessive argumentation among participants and take notes. Notice that during this step the assessor does not attempt to clarify

or seek additional information. Doing so might bias the explanations in a certain direction, when the goal is to cast a wide net. If at some point the explanations start to repeat and the remaining votes coincide, the assessor might ask the participants if somebody has anything new to add and otherwise go to the next step in order to save time.

For capturing the information in a structured manner and ensure completeness the author has used the list shown in Figure 3 and referred to as "Practice Table" in the workflow.

- Is the practice being performed? Requires majority of respondents to agree or strongly agree
- Brief description if alternative practice
- Is it relevant? Adds value? If it were not executed something would not be accomplished, would cost more, etc.
- Efficient? The achievement of the goal requires an effort commensurate with the value of the outcome. The practice does not overlap or interfere with other practices
- Institutionalized? Does the staff receive training to perform it? Are adequate resources provided for performing it? Whenever a project is late, does the organization shortcut the practice with the excuse of saving time?
- Documented? Is there a document that mandates or describes the practice?
- Are there any noticeable strengths or weaknesses?
- Assuming that it makes sense, what prevents the practice from being implemented?
- Can anybody remember a problem in a project that can be traced back to deficiencies/lack of practice being performed?
- Additional comments

Fig. 3. Practice Table

9. Follow-on questions

If necessary the assessor asks follow-on questions. After all participants have provided their votes' explanation the assessor might ask follow on questions or seek clarification to some answers. In interest of time, the assessor should keep this short. The completion of all entries in the Process Table serves as exit criteria for the task. If there are items in which the assessor wants to go deeper, the assessor should make a note to retake the conversation at a later time and move on.

10. Definitive vote

At this point the assessor will ask participants if after listening to their colleagues they would like to change their vote.

11. Vote recording

Participants record their vote in the Vote Table, see Figure 4. Each participant has its own form to vote and, of course, the forms are not attributable to a particular participant. The purpose of recording the votes is twofold: 1) to have a backup if any of the findings is challenged and 2) to provide an indication of the validity and strength of the findings to those that did not take part in the interview. For example, a finding where 90% of the interviewees voted "seldom done" or "never" it is easier to accept and would

trigger different improvements actions, than one where 80% of the participants say it is practiced "most of the time" and the other 20% say they "don't know".

12. Validate preliminary findings

The assessor communicates to the group his understanding of the state of the practice. If something had been misinterpreted the assessor corrects or clarifies the mistake. In case of disagreement the item is sent to a parking lot and the group moves forward. Instead of waiting until the end of the interview or later, to confirm a batch of preliminary findings like prescribed in the SCAMPI approach, the proposed interview process includes a quick validation step at the end of each iteration to validate the assessor understanding of the state of the practice. Because this takes place in the context of what is being discussed and what was said still vivid in the minds of the interviewees the possibility of misreading the situation with the consequent frustration and rework is avoided.

First the assessor will make a quick judgment of whether the practice is Fully Implemented (FI), Largely Implemented (LI), Partially Implemented (PI), or Not Implemented (NI), with the help of the rules in Table 2 and the information collected in the form. The assessor then his judgment using the reasoning behind the voting rules and paraphrasing the information gathered through explanations and follow-on questions. Factual misunderstandings are corrected in the spot and matters of interpretation are put on a parking lot for further discussion at a later time. The group then moves to the next step.

Fig. 4. Vote Table. Each row corresponds to a user story/specific practice in the respective process area

<div align="center">**Table 2.** Vote interpretation rules</div>

Scenario	Rating	Reasoning
All the participants vote "Always" or "Most of the time" ("Strongly Agree" or "Agree")	Fully Implemented (FI)	All the participants know about the practice and they all perform it to some extent under most circumstances
All participants vote "Never" or "Seldom" ("Strongly Disagree" or "Disagree")	Not Implemented (NI)	One or more participants could have tried the practice, the "seldom" votes, in the past or through individual efforts but the practice is not being performed
A majority of the participants vote "Always" or "Most of the time" ("Strongly Agree" or "Agree"). The dissenting votes are "Don't know"	Largely Implemented (LI)	Most of the participants are performing the practice and those that don't is because they didn't seem to be aware of them. This could be due to lack of training, weaknesses in the onboarding process or lack of an organizational level policy
A majority of the votes fell in the "Seldom", "Most of the time" and "Don't know" categories	Partially Implemented (PI)	This clearly points to a practice that is carried out through individual efforts with some success, the "most of the time" votes, but is not institutionalized as indicated by the "seldom" and "Don't know" votes
Other	Assessor judgment	

13. Assessor makes a determination about what to do next

The assessor decides if it is worth continue exploring the same process area or move to the next. Normally the assessment will move from one user story to the next within the same process area and once all user stories have been assessed, to the next process area. Sometimes however, after the exploration of a few user stories, it might become obvious the assessed organization does not meet the intent of the process area, and is of no use and almost demeaning to continue asking questions to which we already know the answer. At this point, the assessor should ask the group whether it is worth continuing with the current process area or move to the next.

14. Review and allocate parking lot issues

To conclude the group interview, participants review items put in the parking lot. Some of those would have probably resolved themselves through explanations following the decision that put them there in the first place. Unresolved issues, are assigned to specific participants to gather additional evidence, most likely in the form of work products or descriptions of alternate practices. A meeting with the group is scheduled for the next day.

15. Close remaining parking lot issues

All outstanding parking lot issues are closed. Some items might not have a single best answer and in this case to avoid damaging the relation between the assessor and the interviewees the second best alternative is to agree to disagree. If consensus cannot be reached, the assessor in his character of expert has the last word on the disposition of the item but has to leave established that consensus was not reached.

4   Final findings

The assessor rates the specific goals, determines whether each process area is satisfied or not and derives strengths and weaknesses from the practitioners and management affirmations and his own observations[2]. Optionally an unofficial maturity level might be reported.

Final findings are goal-level statements that summarize the gaps in process area implementation [7]. Strengths are enablers of organizational development. Implementations worth highlighting might be included in the final findings as long as they don't seem to be there just to have something to say on the "bright side". Weaknesses are inefficient implementations of a key practice or hurdles to be overcome to make the improvement initiative successful.

The judgments made about goal satisfaction are driven by the validated preliminary findings and the observations of the assessor. When a goal is not satisfied, it is important to be able to describe how the set of documented weaknesses or the extent of implementation of the associated practices led to this rating. It is also important to link this rating to one or more problems experienced by the organization to make, a compelling case for improvement.

5   Management Interview

Management interviews encompass senior and middle level managers. The focus of these interviews is not on the ways of working but rather the improvement goals from a managerial perspective, the organization culture, the political situation and the consensus about the improvement initiative. The questionnaire shown in Figure 5 was used during the interviews.

6   Experience

The group interview technique described here was employed twice in the course of assessing the organization which has development sites at two different locations. In both cases the reaction to it was much the same which gives the technique some extra credibility over the single data point case.

Each assessment was conducted on two sessions of three and a half hours each. In one case the sessions were scheduled in two different days, in the other we had a morning and afternoon session. During the sessions there were little or no signs of fatigue. The use of the cards created a lively environment which was marked by the anticipation of knowing how the others would vote after each user story was presented.

Everybody present at the interview participated, even those that because of personality or opinion, were reluctant in the beginning. In this regard, I just can speculate as to the why. For those normally withdrawn, the engagement was perhaps the result of

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[2] In this we differ from SCAMPI which tries to be totally data driven. We believe the experience of the assessor is relevant especially in a process improvement setting.

having the opportunity to talk and be listened to. For others the possibility of change that the assessment opened up. Those that thought the assessment was a bad idea, were put in an uncomfortable position by the round-robin mechanism which left them with no choice but to decline to talk and be perceived as negative and childish or participate. Participating when you did not believe in it though, would trigger a feeling of dissonance which could, unconsciously, be resolved by saying to oneself that this type of assessment was not so bad, and fostering engagement.

Whatever the reason, engagement was achieved within a couple of voting rounds and maintained through the assessment. These observations are not only consistent with those already mentioned of Delbecq et al [4] but also with those reported by Gresham [8] in his dissertation "Expressed Satisfaction with the Nominal Group Technique Among Change Agents" and Haugen [9] in his study of the Planning Poker.

Current situation
- What is your organization responsibility with regards to software development?
- The 2013 User Committee Report identified a number of problems: communications with user, prioritization, performance and usability, lack of predictability, third party participation. Some of the same problems repeat in the 2014 Report. Do you agree with these problems?
- Do these problems affect your funding, the survival of the organization, why is important to solve them?
- Are there other pain points not mentioned in the reports?
- What do you think is the root cause of these problems?
- What do you see as impediments to solve this problems?
- Do other members of the management team share your assessments?

Environment
- What are your improvement goals? How would you know you have reached them?
- If you were to establish development processes or ask team members to report time or status, how do you think they would react to that?
- Is there any organizational policy mandating software development, project management, quality assurance? Why not?
- Does management provide adequate funding, physical facilities, skilled people, training and appropriate tools to perform the processes?
- Do you assign responsibility and authority for performing the process, for example through job descriptions?

Closing
- Before we close the interview, is there anything you would like to add, any points we missed and you would like to comment on?

Fig. 5. Management interview questionnaire

7 Conclusion

Many process improvement methods resort to assessments for the purpose of determining the gap between a "best practices" framework, such as the Capability Maturity Model Integrated (CMMI) [10], the Information Technology Infrastructure Library (ITIL) [11] or the new ISO/IEC 33000[3] and the way the assessed organization works to decide what needs to be improved and, depending on the type of assessment, how.

During the assessment, the assessors examine project and organizational practices to see whether they support the best practices included in the framework or not. The determination is done by reviewing work products and interviewing personnel and comparing the findings to the prescriptions of the framework. One of the problems with this audit like type of assessment, is that it automatically sends interviewees into a defensive mood and that it reinforces the perception of the process approach as an attempt to curtail creativity and collaboration by part of the management establishment. This is just the opposite of what is needed when you are about to embark in an organizational process improvement initiative.

The assessment method presented here takes a totally different approach. It is based on the Planning Poker, a well-known nominal group technique used for estimation purposes, which favors consensus building while mitigating common phenomenon like conformity effects and groupthink. The technique was successfully put into practice in two group interviews of the same organization. The method application was successful in the sense that not only correctly identified the organizational problems it was supposed to identify but also played a reconciliation role among groups with different views and people that was against the initiative ended up being very supportive.

Compared to a conventional SCAMPI-B or C [12], the proposed method is economical and its light ceremony makes it palatable to the agile practitioners.

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