author

**Requirements Definition**

**Detailed Assessment**

VERSION 1.0

This template was created to enable departments to more easily develop their project plans. The Department of Technology, Consulting and Planning Division, created this template based on its experiences. The template relies on industry best practices combined with decades of experience on California state information technology projects. The way it was structured is to enable a department to complete the information related to its project without having to write background information related to the discipline. A department may use as much or as little of the template as it wishes.

**Template Instructions:**

* ***Instructions for completing*** this template – written for the author of the project plan - are encased in **[ ]** and the text is ***italicized*** *and* ***bolded.***
* *Examples* are provided as a guideline to the type of sample information presented in each section and the text is *italicized*.
* Boilerplatestandard language for each section is written in the document font and may be used or modified, as necessary.
* A department’s project specific information goes within the brackets ***<< >>***.
* *Informational text is italicized* within square brackets [ ] for informational purposes to the person who has to create the plan and includes background information, explanation, rationale, etc.

**DOCUMENT HISTORY**

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# INTRODUCTION

This document identifies the questions and necessary inputs required for the Department of Technology IT Advisor to perform a detailed assessment of a projects’ Requirements Definition effort. These questions are focused on collecting the data necessary to compare how well the project planned and executed the Requirements Definition process, how well the project documented the requirements as they were evolving, from requirements elicitation to their final approval, and if the project followed any generally accepted industry standard recommendations for the Requirements Definition effort. While the questions were developed based on ISO/IEC/IEEE Standards 29148, 12207, and 15288[[1]](#footnote-1), it is assumed that a project may have not followed these standards. Therefore, each of the Standard based questions generally have a follow-up question to capture how the project performed the related activity/task, with data collection needs to support further analysis, to determine if the intent of the Standard was met or achieved by the projects’ approach.

The determination of strict adherence to the ISO/IEC/IEEE Standards is not the intent of this assessment. However, the intent is to assess if the project performed or is performing the necessary activities and tasks, with the necessary documentation and outcomes, in order to accomplish the Standards’ stated goals, objectives, outcomes, and addresses the Standards’ identified gaps that often occur in Requirements Definition.

Since Requirements Definition establishes the requirements foundation for a project, and any errors created at this phase of the project will simply propagate through the project with ever increasing impacts over time until they are discovered, it is vital that this work be done right. Therefore, this Requirements Definition Detailed Assessment, coupled with later analysis, will help the IT Advisor to assess how well Requirements Definition was performed for a specific project. Again, this document only supports the data collection aspect of performing this assessment; the analysis and impact aspects are performed later by the IT Advisor.

While this document was developed for the IT Advisor to support data collection for a Requirements Definition Detailed Assessment, the document can be given to a project to support a detailed self-assessment. However, it must be re-stated that this document only guides the data collection aspect and not the analysis and impact assessment. The Department of Technology Consulting and Planning Division has also created a Requirements Definition Self-Assessment tool/guide to assist the project and organizational Senior Managers in performing their own assessment of the Requirements Definition effort and the products produced.

# Instructions

The following Assessment Questions are broken out into three (3) areas: Project Level, Functional/Business Level, and Non-Functional Level. Each of these question levels has a series of questions that identify the question, why the question is important and being asked, and an explanation of the potential impact. In addition, there is a Response column and a Notes column. While the Response column can be simply marked Yes or No, it is important to document within the Notes column what the project is actually doing to address the questions and more specifically the concern expressed in the Why section following the actual question. Notes support the later analysis of the entire Requirements Definition effort; success and/or compliance to Standards based Requirements Definition process cannot be determined by the response of a single question. Also, if this assessment is used by a project, then the Department of Technology Consulting and Planning Division IT Advisor can only assist in evaluating the results if the Notes are captured and are complete.

To complete this assessment, answer all of the questions in each of the three sections. If there is any question that is deemed as not applicable, note that in the Notes column as well as the Response column.

# REFERENCED DOCUMENTS

The following documents are referenced in this deliverable:

* ISO/IEC/IEEE 29148-2011, Systems and software engineering - Life cycle processes – Requirements engineering
* ISO/IEC/IEEE 12207 and 15288

# Assessment Questions

The following is a detailed assessment that was created for the Department of Technology Consulting and Planning Division IT Advisor, primarily. This assessment document can be given to a project but the assessment questions are not in general terms but in terms of a Requirements Engineer. Besides being just a Yes/No questionnaire, there may be follow-up questions that will help capture what the project actually did for Requirements Definition.

The assessment questions are grouped as follows:

* Project Level
* Functional/Business Level
* Non-Functional Level

## Project Level Questions

| # | Question | Response | Notes |
| --- | --- | --- | --- |
| 1. | Was the project scope clearly defined with enough detail documented to be able to assess if a requirement was in scope or not?  *Why? This is necessary in order to determine if a requirement is part of the project scope or not. As the requirements are/were being collected, there is typically a lot of input from users, business and technical, that had to be reviewed and screened to determine which ones will be considered as part of the project and which ones were not. The “filter” that is normally used is the definition of the Project scope.*  If the project scope was not clearly defined and used as the filter to determine what elicited requirements were in scope and which ones were not, how was this determination consistently made? | Yes/No |  |
| 2. | Was the project scope agreed to by all participants/stakeholders in the project and there are no open items or points of contention?  *Why? This is important because, as the requirements are being collected, the requirements team needs to know that everyone understood and agreed to the scope. (Understandably, the worker level staff may not have been part of the agreed scope but their management has set the direction and the project must proceed in that direction.)*  If the project scope was not agreed to by all participants/stakeholders, then what was the process used to resolve conflicts regarding in scope vs out of scope of the project between participants, stakeholders, and the project during the requirements definition effort? | Yes/No |  |
| 3. | Was a concept of operations or similar approach used to develop a greater understanding of the user’s intentions, needs, and expectations of the new system, at an organizational level?  *Why? Before progressing too far down the path of specifying the requirements for a new system, the requirements team must have a strong and consistent understanding of what the users want, which is often accomplished with a concept of operations or similar type of document.*  If not, how did the project develop a strong and consistent understanding of the stakeholders’ intentions, needs, and expectations for the new system? | Yes/No |  |
| 4. | Was a Work Breakdown Structure (WBS), or other requirements model, created that identifies all of the products that need to be created for the project identified to include items such as training material, maintenance and operations (M&O) documentation, PM documentation, etc.?  *Why? A WBS is, by far, one of the best methods (due to its simplicity and ease of understanding) for identifying all of the requirements that need to be created for a project; it helps to avoid the unintentional omission of requirements as you create them for an RFP/contract.*  If a WBS or other requirements model was not used, what did the project use to ensure all of the requirements necessary for the project were identified and documented? | Yes/No |  |
| 5. | Were all stakeholders (business, management, IT, the project, etc.) involved in the development of the WBS, or requirements model, and did they agree that the WBS was complete?  *Why? The WBS describes what will be delivered by the project to the organization; it identifies everything that will be delivered. If anything is not on the WBS list, it will not be delivered. (The term “delivered” extends beyond products such as a Maintenance Manual; it also includes system characteristics such as performance and availability, as well as training, organizational planning, and other services that need to be provided.) Therefore, to make the best attempt at obtaining a complete WBS, the stakeholders must be involved in reviewing and eventually agreeing on the WBS.*  If the stakeholders were not involved in creating the WBS or requirements model, what method did the project use to ensure all of the deliverables were identified for all stakeholders? | Yes/No |  |
| 6. | Was a structured plan created to define on how each item within the WBS would be further elaborated?  *Why? Before eliciting requirements, there should be a structured approach on how this will be done in order to ensure that the requirements collected are at or close to the same level of detail.*  If a structured plan was not created, what approach did the project use to further elicit and elaborate on the requirements and how was the level of detail for each balanced to ensure consistency? | Yes/No |  |
| 7. | For each individual deliverable item (product) in the WBS, was the purpose, characteristics, and constraints for each item defined and were the requirements for each item elaborated, to include such requirements as format, content, media, readability, etc. as required by the stakeholders?  *Why? Like all requirements, it is important to identify the business reason or need for any requirement and deliverable. By doing so, it helps to further define the requirements, put them in context, as well as help to identify missing requirements. However, caution must be used here to focus on “what” is required and not “how”. Also, only specify lower level requirements that are actually required, not desired; for example, if a user specifies that a System Administration Manual requires Arial 12pt font, the question should be asked as to “what is the need that requires Arial 12pt font?” Maybe it is a higher level requirement such as “All M&O documentation shall use the same font”, but again the question should be “Is there a valid business need?”. If so, then it is a valid requirement.*  If the individual deliverables were not clearly specified with regards to business need/purpose, characteristics and constraints, what approach did the project use to ensure this information was communicated to the potential bidders to ensure they knew what the project/stakeholders required? | Yes/No |  |
| 8. | When elaborating the requirements for each deliverable (product and service), were the purpose, characteristics and constraints articulated and were brainstorming, structure decomposition, and/or other techniques used to identify the lower level requirements?  *Why? During the elicitation process, users of the deliverable must keep in mind the objective/purpose of the deliverable, any defined characteristics and constraints that will be imposed upon the deliverable. Also, often the users simply do not know what they should require of the deliverable. Therefore, a combination of a structured/guided requirements definition approach as well as brainstorming approach will often help identify additional requirements. However, what also tends to be identified are those that are ‘wants’ and not necessarily business based requirements. Regardless, the requirements team needs to capture all of these items and document them for later analysis.*  If not, then what approach did the project use to aid in defining and elaborating on the requirements for each deliverable? |  |  |
| 9. | After the requirements were collected and clearly documented, were they reviewed to verify that each requirement was within scope of the project, supported the business need, were justifiable (from the standpoint that it is not just a ‘want’), and that all of the requirements collectively met the business need for the deliverable, (i.e. nothing is missing)?  *Why? During the requirements elicitation process, there tends to be a lot of brainstorming activity, which is good. However, the results from brainstorming efforts tend to be fragmented or disjointed and need to be ordered to make them more cohesive. Only then can they be reviewed to determine if the requirements, or even an individual requirement within a collection of requirements, are in scope of the project. Also, at this point, the completeness of a requirement set can be assessed with respect to meeting the defined purpose, characteristics and constraints of the deliverable (product and service). This is the time to find gaps.*  If not, how were the collected requirements reviewed to ensure they were all within the scope of the project? How were they assessed to ensure the collected set of requirements would meet the needs of the stakeholders (i.e. nothing was missing)? | Yes/No |  |
| 10. | For all requirements, were they taken back to the group from which they were elicited and were the dispositions of each one collected identified, discussed, and agreed to?  *Why? It is important to get back to the users that participated in the requirements elicitation sessions with the results of the session and the requirements analysis/clean-up activities. This not only provides the necessary feedback to keep the users involved but also provides additional clarification. The requirements team may not have fully understood the implications of an identified need and may have inadvertently identified it as a want when it was really a firm must-have requirement. This step provides the forum for both the feedback and the clarification.*  If the stakeholders were not “debriefed” with respect to the requirements that they identified, what approach or method did the project use to ensure that the results of the requirements analysis work did not inadvertently delete or modify the intent of a stakeholder provided requirement? | Yes/No |  |
| 11. | If any holes/gaps were identified during the requirements analysis effort, did the requirements team discuss with the user group the holes/gaps? Were these discussions in the context of all of the requirements set associated with a specific need? Were additional requirements elicited to close those holes/gaps for the specific need?  *Why? It is very common that holes will be identified because users and requirements team members tend to lose focus on the purpose, characteristics and constraints for a deliverable (product or service) due to the brainstorming approach often used. Only after analysis are the holes made apparent. This step performs the iterative step of going back to the users to close the holes/gaps within the requirements.*  If not, how were the holes/gaps closed and were they closed within the context of a specific stakeholder need? | Yes/No |  |
| 12. | Did the stakeholders verify/validate that the final content of the deliverable (product and service) were correct and that a deliverable that met all of the identified requirements would satisfy the stakeholders’ needs?  *Why? A project needs the users’ buy-in on the products that will be delivered. This step, which may be formalized, helps to ensure that if the project delivers what is specified in the requirements it will be accepted and usable by the end users.*  If not, how will the project address the potential problems associated with the stakeholders changing, adding or deleting requirements, which will likely be higher if there is no initial stakeholder buy-in? | Yes/No |  |
| 13. | Did the Project perform the initial traceability between the project scope description (typically in a State Project Approval Document and/or Project Charter) to the requirements in the procurement document (typically in a Request for Proposals – RFP) and perform the analysis to verify that the defined requirements were complete, correct, consistent, and traceable?  *Why? This initial traceability is important in order to ensure that the procurement document contains all of the requirements necessary to ensure the project delivers a solution that addresses the full content of the scope/approved project; this will also help to clearly identify the scope/project approval items that are not being included into the contract but that the State will be doing.*  If not done, what method did the project use to ensure that the entire span of the project scope is being addressed by the requirements in the procurement document and the requirements that the State has decided to deliver? | Yes/No |  |

## Functional/Business Level

| # | Question | Response | Notes |
| --- | --- | --- | --- |
| 1. | If there are different user groups that interact through the legacy system data, was any business process re-engineering and standardization done prior to defining the business requirements?  *Why? Many legacy systems evolved over many years and the business processes between separate groups may not have been consistent. This leads to things such as different processes being used to perform essentially the same function by different groups. Business process re-engineering and standardization will re-set these processes to be consistent which will require less clean up later. This work should be done prior to defining the requirements for a new system.*  If not, did the project define any standardization work and/or re-engineering work required in the procurement document that must be done prior to the requirements analysis phase or deliverable? | Yes/No |  |
| 2. | Were a representative set of activity sequences, such as business process flow diagrams, developed prior to defining the detailed business functional requirements?  *Why? To start defining business requirements, it is always beneficial to begin with what the users already know. Though less emphasis should be placed on “how” the work is done, you must capture “what” is done by identifying activities that are done from a business perspective. This should model what is done in the legacy system as well as what is performed outside of the legacy system, to include manual activities/steps as well as in other systems, e.g. a standalone MS Access database, an Excel spreadsheet, etc. This step is essential if the solution may be a COTS product but also necessary for full custom development efforts to ensure no gaps are left when modeling the new application requirements.*  If not, what approach was used to aid in defining the business requirements to ensure that the requirements team successfully drilled down into all of the business process steps to capture and document all of the business requirements? | Yes/No |  |
| 3. | Were the business requirements developed using an iterative and/or recursive approach in order to ensure the requirements were fully elicited?  *Why? Different user groups will view the system differently and during the requirements elicitation process conflicts, inconsistencies, and gaps commonly arise. Only through an iterative and/or recursive approach can these problems be reconciled and a complete and consistent set of requirements be obtained.*  If the business requirements were not developed using an iterative and/or recursive approach, describe the approach used. | Yes/No |  |
| 4. | Were those stakeholders who have a legitimate interest in the system and/or any specific points in the development of the system clearly identified?  *Why? All stakeholders who have a real or legitimate interest in the system or in the development of the system must be identified for requirements elicitation purposes. Besides end users who will use the system after it is developed, some stakeholders may have an intense interest in specific points during the development life cycle; for example, maintenance staff may have a specific interest during the design of a custom application to ensure it will be maintainable by the support staff, which may drive the need for specific design requirements, reviews, etc.*  To verify that all of the stakeholders were clearly identified, describe the approach the project used to identify the legitimate project stakeholders that had an interest in the system and its development. | Yes/No |  |
| 5. | Were individual requirements evaluated to verify that each requirement was necessary, implementation independent, unambiguous, consistent, complete, singular, feasible, traceable, and verifiable?  *Why? A group or set of requirements is only as strong as the individual requirements. In order to develop a large set of requirements or many sets of smaller subsets of requirements, individual requirements must be reviewed to ensure that they are each written as well as they can be.*  To better validate that the individual requirements were properly evaluated, describe the approach used to evaluate the requirements once they were elicited from the stakeholders, to include any tools or checklists used. (Note, it is insufficient just to state that they were reviewed by IV&V, the approach, tools, checklists, etc. must still be identified.) | Yes/No |  |
| 6. | Were requirements in a set, or related subset, evaluated to verify that the requirements were complete, consistent, affordable (not just cost but schedule, technically, legally, etc.), bounded, and as a collection will satisfy one or more user’s business needs or functions?  *Why? This is needed to ensure that the set of requirements will collectively satisfy the user’s needs and constraints. While individual requirements can be written well, when a collection of requirements is put together to form a subset, this subset must be complete, consistent, affordable, and bounded from the perspective that it clearly and completely satisfies one or more business needs.*  To validate how the sets and subsets were evaluated, identify how the requirements, collections and/or subset, were evaluated to ensure that the requirements were complete and would satisfy the user’s business need. | Yes/No |  |
| 7. | Were the resulting business functional requirements evaluated and modified to achieve requirements that were “well-formed” (i.e., they can be verified, necessary, measurable, bounded, etc.).  *Why? Upon the completion of the requirement elicitation and analysis effort but before verification, the requirements must be “cleaned up” to ensure they meet the conditions of being “well-formed” objective requirements. While some of the work for “well-formed” is discussed above (e.g., bounded) a final objective assessment needs to be made to verify that the requirements obtained are necessary and verifiable and measurable.*  To assess how the elicited requirements were evaluated from the perspective of ensuring each requirement was necessary, verifiable/measurable, and generally “well-formed”, describe the approach used and provide any checklists, guides, tools, etc. used to support this effort. | Yes/No |  |
| 8. | Were the requirements written using defined and consistent syntax, such as all mandatory requirements use “shall”, declarative requirements use “will”, preference requirements use “should”, etc.?  *Why? During requirements analysis, a clear and consistent use of these key words makes the analysis and the understanding of the larger set of requirements easier to evaluate and comprehend. While the exact words chosen between projects may differ, for a specific project there must be a clear definition of what each key word means with respect to if the requirement is mandatory, informative, preference, optional, desirable, etc.*  To validate that a consistent syntax was used, provide the glossary that was created that defines the key words for the requirements team to use (to indicate mandatory, informative, preferential, optional, desirable, etc.) and identify any tool or other means used to verify compliance with this glossary. | Yes/No |  |
| 9. | Were the “final” set of requirements provided back to the stakeholders, the disposition of requirements that they provided that were deleted/rejected explained, their feedback obtained, clarifications/corrections made as necessary, and did the stakeholders sign-off or formally agree on the resulting requirements?  *Why? Stakeholder buy in, commitment, and the communications between the project and the stakeholders are essential to ensure stakeholders support the system when deployed to meet their needs. This does not mean that the requirements will not change later; change is inevitable. However, at the time the requirements are defined and agreed to, they represent the stakeholders’ needs at that specific time based on the best information available.*  If the requirements were not provided back to the stakeholders and their feedback obtained, describe the approach the project used to obtain stakeholder feedback and obtain the stakeholders’ agreement to the defined requirements. | Yes/No |  |
| 10. | Was the “final” set of requirements captured in a formal requirements repository and managed in accordance with a Requirements Management Plan?  *Why? Upon agreement with the stakeholders, all requirements must be controlled to avoid issues such as scope creep, missing/dropped requirements, etc. without a formal agreement (e.g., a change request).*  Describe how were the requirements were controlled and managed after the stakeholders agreed to the requirements and, if changes were made to the requirements after the agreement, how changes were recorded, managed, tracked, and controlled. | Yes/No |  |

## Non-Functional Level

| # | Question | Response | Notes |
| --- | --- | --- | --- |
| 1. | Were non-functional requirements (performance, security, availability, reliability, supportability, maintainability, etc.) defined within the procurement document?  *Why? Non-functional requirements are the primary requirements that define and drive system architectures. By clearly and completely defining these requirements, a system architecture can be developed to address these requirements. However, it must be identified that many of these requirements are conflicting requirements (e.g. performance and security) and so they must be carefully and clearly articulated with respect to the needs and when the identified needs apply; conflicting requirements must be resolved either by modifying the requirements or by placing the requirements in a context or in scenarios that avoid conflicts. (The following question assesses how these requirements were defined.)*  If non-functional requirements were not identified in the procurement document, describe how the system architecture will be defined and evaluated. | Yes/No |  |
| 2. | Were the non-functional requirements clearly defined and specified in scenario/model terms and verifiable?  *Why? A non-functional requirement, like all requirements, must be measurable and verifiable. This can only be achieved by documenting these requirements by using scenarios or other similar models that better describe the state of the system, environment, inputs, internal processing occurring, and expected response. Thus, the system could be deployed with these conditions and the response evaluated/measurable in order to verify the requirement.*  Describe how the non-functional requirements were defined and how they were assessed to ensure that they are measurable and verifiable. | Yes/No |  |
| 3. | Were the non-functional requirements reviewed by the stakeholders and agreed to?  *Why? Beside just the technology stakeholders, business stakeholders have a vested interest in the non-functional requirements of the system. The non-functional requirements must be reviewed with all of the stakeholders to ensure they understand the non-functional requirements and the impacts or effects of the defined requirements on the system.*  Describe how the non-functional requirements were validated with the stakeholders. | Yes/No |  |
| 4. | Was the non-functional requirements captured in a formal requirements repository and managed in accordance with a Requirements Management Plan?  *Why? Non-functional requirements are critical for defining the system architecture and must be tightly controlled and managed. Further, since non-functional requirements are commonly conflicting requirements, they are also highly likely to change as the design progresses during development. Therefore, they must be captured, managed and tracked from the beginning.*  Describe how the non-functional requirements were controlled and managed. | Yes/No |  |

1. All three of these Standards are consistent with respect to the Requirements Definition process. [↑](#footnote-ref-1)