

Requirements definition

self-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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TABLE OF CONTENTS

1. Introduction 1

2. GOALs, Questions, and Rationale 3

APPENDIX A. COTS, MOTS, CUSTOM CONSIDERATIONs A-1

# Introduction

The following is a self-assessment guide or tool that can be used to help Project Executives determine if the requirements that have been documented for inclusion into the Projects’ solicitation document (e.g., a Request for Proposals [RFP]), are of sufficient “quality” to begin the solicitation[[1]](#footnote-1). This assessment was developed to be used by the Project Director-level and above to aid them in assessing the “quality” of the requirements document(s). However, sharing this assessment document with the Project team that will be defining the Project requirements prior to them beginning their work would be advisable and the first significant step towards improving the requirements document; the Project team can then plan their activities, tasks, and documents to better respond to the questions that will be asked within this assessment. *[The Department of Technology Consulting and Planning Division also has a template for a Requirements Development Plan that guides the Project team in planning and preparing for the necessary activities, tasks, and documentation consistent with this assessment].*

Within this document, the use of the term “requirements” is meant to imply all products and services and their characteristics and/or behavior that must be delivered or provided to the stakeholders. Therefore, requirements include items such as the business requirements (functionality), technical/management/support requirements, constraints, deliverables, meeting support services, integration services, etc. The only requirements area of an RFP that is not directly covered by the term “requirements” within the context of this document are the Administrative Requirements, all others are within the scope of the “requirements” term of this document.

For the purposes of this assessment, “quality” is determined by verifying that the following goals have been achieved:

1. A sound approach was used to develop the requirements.
2. All stakeholders who have an interest in the management, execution, and/or the outcome/products of the Project have been consulted and their requirements documented.
3. The requirements document clearly and accurately communicates the needs of the Project stakeholders.
4. All stakeholders agree with the final set of requirements and there are no outstanding issues or conflicts between stakeholder groups or stakeholder requirements.
5. The documented requirements are complete, correct, consistent, readable, and measureable/verifiable.
6. The final set of requirements is under version/configuration control and the requirements will not be changed without formal Project approval methods.

Since this assessment was developed for Project Director-level and above executives who will review and eventually approve the requirements, it is not assumed that these managers will have sufficient time or the expertise to perform a detailed review of the requirements document(s). Therefore, this assessment is comprised of a mixture of questions that should be asked of the Project by the executives as well as suggested items that should be sampled. The questions and sampling of items are grouped appropriately in order to assess if the overall identified goal was achieved.

The questions for the Project are focused on determining and verifying that the Project used a sound approach (e.g., a generally accepted industry standard approach) in eliciting, analyzing, and controlling the requirements. Therefore, these questions primarily focus on the overall planning and communications aspects, the interviewing approaches and documentation aspects of requirements elicitation, the analysis, problems/issue resolution, and review aspects of requirements analysis, and the controlled state of the requirements at the present time, which is when the executives are reviewing and/or approving the requirements document.

The sampling of the requirements document(s) is meant to be brief and limited and does not assume that the manager has in-depth domain knowledge in any of the business, technical, management, or support areas[[2]](#footnote-2). The main focus of this sampling effort is not to verify the correctness or completeness of the requirements; the main focus is to verify that the requirements document(s), as a whole, clearly and effectively communicates the stakeholders’ needs to a potential vendor (i.e., the readability and understandability of the requirements document(s) for a vendor community that may have little to no knowledge of the States’ actual business, technical, management, or support needs).

Note that this self-assessment is by no means complete and it relies on an unbiased perspective of how the requirements were elicited, documented, analyzed, reviewed, and controlled. The approach used to develop the questions and sampling tasks below was patterned after the “Goal, Question, Metric” approach originally developed by IBM and adopted by numerous quality organizations worldwide, including national and international Quality Standards organizations (i.e., International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), Institute of Electrical and Electronic Engineers (IEEE)). However, instead of developing hard (numeric) metrics, the results are less quantifiable and focused on giving the executives a level-of-comfort or confidence with respect to the “quality” of the requirements prior to publication in a solicitation document.

# GOALs, Questions, and Rationale

Included within this section is a re-statement of the six goals identified in Section 1, a list of questions to ask the Project and/or sampling points to look for within the requirements document(s) and the rationale on why the question or sample is being asked so that the executive will know what answer they should expect from the project. This rationale is provided to better assist the executive in understanding the implications when requirements activities are not performed appropriately and what likely consequences may occur.

**Goal 1: A sound approach was used to develop the requirements.**

**Question 1: Did the Project follow a generally accepted industry standard approach for developing the requirements for the Project?**

Rationale: Industry Standards, such as ISO/IEC/IEEE[[3]](#footnote-3), define approaches for developing stakeholder and high-level system requirements, which are the level of requirements that are included within an RFP or other solicitation document. It is important to understand that these standards were developed by organizations, public and private, worldwide who share their knowledge and experience in performing tasks, such as requirements definition, and they participate in writing, drafting, and voting for the approval of the standards; standards are not written by a standards organization (ISO/IEC/IEEE) based on theory or science but are written by practitioners with real world experience in the area addressed by the standard. Therefore, by adhering to a generally accepted approach to developing requirements, such as the approach defined in ISO/IEC/IEEE 29148, the Project will have incorporated years’ worth of lessons learned from practitioners doing the same type of effort, requirements definition/development. If the Project did not adhere to generally accepted industry standards, then it is likely that the lessons learned represented in the standards will need to be re-learned by the Project that will result in lower quality requirements being incorporated into the contract.

**Goal 2: All stakeholders who have an interest in the execution and/or the outcome of the Project have been consulted and their requirements elicited.**

**Question 2.1: Does the Project have a list of the stakeholders that were identified as having an interest in the Project and the rationale on how this list was created?**

**Rationale:** One of the most common problems with requirements development is not eliciting requirements from all the major stakeholders that have a legitimate interest in the execution of the Project or will be impacted by the products produced by the Project. If the Project has a rationale on how the stakeholders were identified that appears structured and sound (e.g., top-down approach structured around business, technical, management, and support-type stakeholders) and the list of stakeholders seems complete, then it may be assumed that all of the stakeholders have been identified for the elicitation effort. The list should have included the executives reading this document as you are clearly a management-type stakeholder and likely require specific status reports or have other requirements that may need input from the vendor and therefore may need to be included within the contract requirements. This question, and its response, can only help assess if the approach used to identify stakeholders appears sufficient for the specific Project; it cannot determine if all of the impacted stakeholders have been identified.

**Question 2.2: Does the Project have a list of each stakeholder and the approach that was used to elicit requirements from each?**

**Rationale:** An approach is analogous to a technique that would be used to perform interviews, information fact-finding, or other information gathering efforts, such as top-down business process analysis for business stakeholders or activity-based analysis for support stakeholders. Different stakeholders and different stakeholder groups typically require a different approach to elicit their requirements in order to make the elicitation effort as complete as possible; the Project team needs to speak in the stakeholders’ terms and within their framework of knowledge. Therefore, the Project should have performed stakeholder analysis and have identified an approach, or sequence of approaches, that were used to elicit requirements from each stakeholder and stakeholder group. The same approach to elicit requirements from all stakeholder groups will not work (e.g., a business process model top-down approach works well for business stakeholders but does not work well for technical, management, of support stakeholders). If the Project did not develop an approach for individual stakeholder groups, it is likely that additional[[4]](#footnote-4) requirements will have been missed.

**Goal 3: The requirements document clearly and accurately communicates the needs of these stakeholders.**

**Question 3.1: How did the Project document the stakeholder requirements and requirement context during the elicitation sessions?**

**Rationale:** During the elicitation sessions, the focus should not be on formalizing the requirements and requirements context. Instead, the focus should be on documenting the context of the discussions, the specific requirements, the completeness of the discussion and recorded documentation, and any issues or action items identified during the sessions. Analysis of the requirements and the formatting of the documentation will occur later in the requirements analysis stage. If a significant effort was placed on developing “final” requirements sets during the elicitation session and not on the context of those requirement sets and identifying the requirements themselves then the requirements analysis effort will likely be incomplete due to missing requirements, resulting in lower quality requirements. Further, during elicitation, the stakeholders should never be asked if they agree with the requirements as documented during the sessions as this skips the requirements analysis stage, which is where additional quality checks are made to the requirements and their context. They may be asked if the items documented is consistent with what they had stated during the session. It must be recognized by the Project that these requirements elicitation sessions are meetings where participants are required to focus on a detailed topic for an extended period of time. The human factors aspect of this type of work requires that the train of thought and the momentum must be maintained in order to complete the task and identify as many of the requirements as possible. Distractions that break the train of thought, such as reviewing and confirming the requirements mid-way through a session or branching off into another topic without completely addressing the one being elicited, will likely result in an incomplete requirements set.

**Question 3.2: Did the Project document and package/group the context of the stakeholders’ needs with the associated requirements?**

**Rationale:** During requirements development, it is extremely important that requirements be kept with the context in which the requirements occur. For example, a requirement context may be a description of the business process of approving a Medi-Cal application and a set of requirements may be documented for this context, such as income verification, State residence, etc. The requirements context must be maintained and kept (packaged) with the set of requirements for which the requirements apply. Requirements must be communicated to potential vendors who likely do not know or understand the States’ processes or needs and by keeping the requirements context with the requirements set, the communication of the needs significantly improves. If the Project did not document, maintain, and keep the requirements context with the associated requirements sets then the ability to properly communicate the true needs of the stakeholders will have degraded significantly.

**Sampling 3.3: Review the requirements document and assess if the requirement sets and their context communicates the stakeholders needs to you.**

**Rationale:** The requirements should be grouped into sets of related requirements where the relationship is the defined context for the requirements set, such as the Medi-Cal example used in Question 3.2. The requirement sets and their context should not require extensive domain knowledge, with the possible exception of limited areas related to the citing of specific statutes (e.g., HIPAA security compliance). Regardless, an executive with limited domain knowledge should be able to assess the adequacy of the requirements related to their ability to communicate the stakeholders’ needs to a potential vendor community. Again, this review is not focused on the correctness or completeness of the requirements as that type of review would require extensive domain knowledge as well as time; it is focused on communication, readability, and understandability of the requirement sets and their context.

**Goal 4: The documented requirements are complete, correct, consistent, readable, and are measureable/verifiable.**

**Question 4.1: What method did the Project use to verify the correctness, completeness, consistency, readability, and testability of individual requirements and requirement sets?**

**Rationale:** The verification of these quality aspects of requirements occurs during the analysis stage of the requirements development effort and is a commonly missed area that contributes to the poor quality requirements. Projects should have used a method that performs analysis on requirement sets, which are groups of requirements partitioned around individual business processes, technical areas, and management and support activities. This approach not only allows for increased communications but also allows for the manageable analysis of requirements, requirements sets, and their context for correctness, completeness, and consistency. For readability, an approach that uses tools, such as those available for MS Word, and/or quality checklists that provide guidance on specific words and phrases to look for are commonly used. For testability, many Projects will leverage the expertise of a test manager to review the requirements, requirement sets, and their context to verify that a test case/script can be developed to verify the individual requirements as well as the overall stakeholder needs, which is also why it is important to keep the requirement context with the requirement sets. If the Project does not have a hands-on sound method for how these aspects of requirements quality were reviewed, then it is likely that the quality of the requirements is lower than they should be[[5]](#footnote-5).

**Question 4.2: How did the Project characterize the state of the system when defining technical and support requirements, specifically the non-functional requirements such as performance, security, availability, maintainability, etc.?**

**Rationale:** Non-functional type requirements are typically written in incomplete and/or non-verifiable terms, such as a “The system shall have a 1-second response time”. These types of requirements require the use of scenarios, which is a form of context that defines the state of the system when the non-functional requirement applies. A 1-second response time will be assumed to be measured from the time between the input to the system under the vendor’s control to the corresponding output from the system and only when the system is in its normal operating mode; this mode is significantly different than if the system it is executing batch updates, batch mode, or patches are being installed, maintenance mode, which may have undefined performance requirements. The Project should be able to explain that scenarios, or context, were created for each non-functional requirement and how they verified that these types of requirements could be tested and validated during the testing phase of the Project; a “requirement” that cannot be verified and validated is not a requirement because there is no way to confirm that it was delivered.

**Goal 5: All stakeholders agree with the final set of requirements and there are no outstanding issues or conflicts between stakeholders and stakeholder requirements.**

**Question 5.1: How did the Project identify, track, resolve, and close all issues, action items, and stakeholder conflicts during the requirements development effort?**

**Rationale:** Issues, action items, and conflicts between stakeholders and stakeholder requirements will occur throughout the requirements development effort. These items must be recorded, tracked, resolved, and closed prior to the completion of the analysis stage and then again prior to receiving stakeholder agreement. The Project should have a log or other recorded means of performing this effort that should be reviewed to assess if the number of entries appears consistent with the size of the Project, the number of stakeholders, homogeneity of the stakeholder groups, and the maturity of the organization with respect to existing documented processes. While there are a lot of factors that would determine how many entries should be expected, the executive should be looking for outliers, which are 1) a relatively small number that would indicate that the log was likely not used appropriately and many issues, action items, and conflicts were not recorded and could re-emerge later in the Project, or 2) a very large number of entries that would warrant a review/sampling of the closure resolution process to verify that these items were sufficiently closed and will not re-emerge later in the Project.

**Question 5.2: How did the Project validate with the stakeholders that the documented requirements and requirement context is correct and record their agreement?**

**Rationale:** The final critical step prior to the requirements document being submitted to the executives for approval is to obtain agreement with the stakeholders that the requirements and requirement context accurately and completely identifies their needs. The Project should describe an approach where they provided the requirement sets and requirement context to the appropriate stakeholders for their review and then met with the stakeholders to review their requirement sets and context. It is typical that additional issues or action items will be identified during these reviews, which also must be recorded, tracked, resolved, and closed. The Project should describe how, once these changes were made and a final review completed, each stakeholder’s agreement to the documented requirements was recorded. Often on State Projects, obtaining agreement from stakeholder groups cannot be achieved, due to various reasons. If that has occurred, the Project needs to explain how this lack of agreement was escalated and how the Project team believes the requirements and requirement context is correct despite the stakeholders agreement. The failure to obtain agreements on the correctness and completeness of the requirements should be documented as a Project Risk that must be managed throughout the Project life cycle and may be a significant problem during user acceptance testing and the stakeholders’ eventual acceptance of the system in production.

**Goal 6: The final set of requirements is under version/configuration control and the requirements will not be changed without formal Project approval methods.**

**Question 6.1: How is the Project performing version/configuration control for the requirements document(s)?**

**Rationale:** As the requirements and requirements context are reviewed and accepted by the stakeholders, they must be immediately placed under version/configuration control. This control must prevent any unauthorized changes to the document(s) and all authorized changes must be traceable to the authorization that approved the change and the individual who made the change. The control mechanism or tool must also ensure that the previous versions of the requirements are recorded and maintained. The Project should identify an approach to accomplish this version/configuration control by identifying how they established a ridge/formal process for capturing the requirements in a controlled repository and for making necessary changes to the requirements as they are being analyzed, reviewed, and approved. While password protecting the document(s) provides some of the needed capabilities, there is always issues as to how many people know the password; also, password protection does not provide version/configuration control in that the history data is not retained and a record of the person who made the change is not recorded. Without a proper version/configuration controls and a strict approval process on how changes can be made, the requirements can easily be modified prior to being incorporated into an RFP or contract, potentially degrading all of the work that has been done to create quality requirements up to this point.

1. COTS, MOTS, CUSTOM CONSIDERATIONs

| **CONSIDERATIONS FOR COTS, MOTS, and CUSTOM IMPLEMENTATION** |
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| **COTS** | * The main consideration for COTS is that during requirements elicitation, the requirements are based on the as-is processes, such as the current business processes, which is the only process that the stakeholders know. Care must be used to ensure the requirements are documented such that they are system independent, meaning the requirements cannot have any references to the legacy application or system; the requirements must clearly address what is done and needed and not how a task is done.
* Another key point is that a COTS Project requires a unique deliverable early in the developed that translates the legacy requirements built around the legacy processes into the processes that are implemented by the COTS application. Since not all COTS applications implement the same processes in the same way, before a Project gets significantly into the development effort, a mapping or translation of how the legacy processes will be transformed to work with the COTS implemented process. This is really a critical step that is most often forgotten until too late into the development. This sets the foundation for the detailed development of the system with the stakeholders so they understand the new process as their detailed needs are being defined. It also, lays the foundation early for organizational changes that need to occur as well as help define the magnitude of the training that will be necessary.
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| **MOTS** | * In general, MOTS has the same considerations as COTS as long as the magnitude of the modifications is limited, for example less than 10% of the functionality will require modification of the COTS application. However, if the extents of the modifications are significant, say 50% or more, then the Custom approach should be used.
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| **CUSTOM** | * From a requirements development perspective, developing requirements for a Custom application/system compared to COTS/MOTS is the most difficult unless done correctly, which requires experience. The reason for this is that the users have nothing to base their to-be needs upon other than the legacy system; unless the Project is developing an identical replacement for the legacy system, the stakeholders have to “imagine” what they want for the to-be application/system.
* When developing requirements for a Custom application/system, the requirements elicitation approach must consider using a large number of models to identify and communicate the to-be application/system, such as to-be business process flow models, architectural models, integration models, organizational models, maintenance models, management models, etc. The need for the extensive use of documented to-be models is to create a shared vision of the system that can be communicated to all stakeholders, which addresses the to-be functionality of the system, how it will fit within the organization administratively, organizationally, managerially, etc. The only way to create this shared vision is through documented models, which requires additional work but it is essential for requirements elicitation and analysis and to communicate this shared vision and need to potential vendors. These models must be included within the requirements document(s) along with the requirements context documentation. Again, requirements are about communicating the needs.
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1. It is acknowledged that the Project requirements are only one part of a solicitation document and there may be other parts that must be prepared to publish the solicitation. [↑](#footnote-ref-1)
2. In actuality, the converse is better, the lack of knowledge in the business, technical, project management, and support areas is better as it will allow the executives to review the requirements document from a vendor’s perspective. This will allow the review to focus on the communications aspect of the stakeholders needs instead of the correctness of the requirements. [↑](#footnote-ref-2)
3. It is important to note that the correct standard must be selected. Standards such as ISO/IEC/IEEE 12207, 15288, and 29148 all have essentially the same content with respect to the requirements definition effort but differ in other areas. Care must be used in selecting the correct standard to follow and any individual company’s standard is not considered an Industry Standard. [↑](#footnote-ref-3)
4. Some requirements will always be missed but the objective is to minimize the number of missed requirements by using an approach that will maximize the opportunity to identify all of the requirements. [↑](#footnote-ref-4)
5. Simply stating that the requirements were reviewed by an IV&V resource is insufficient unless the Project knows how the IV&V verified each of these aspects. [↑](#footnote-ref-5)