

# Requirements Analysis

## Purpose

The purpose of Requirements Analysis is to obtain a thorough and detailed understanding of the business need and to break it down into discrete requirements, which are then clearly defined, reviewed and agreed upon with the Customer Decision-Makers. Requirements Analysis provides the foundation for the desired product or services. These requirements will become the specifications if the procurement process is invoked.

Requirements Analysis can be challenging because all of the major Customers and their interests are brought into the process of determining requirements. The quality of the final product is highly dependent on the effectiveness of the requirements analysis. Since the requirements form the basis for all future work on the project, it is of the utmost importance that the Project Team creates a complete and accurate representation of all requirements that the product must accommodate or services that must be performed. Accurately identified requirements result from effective communication and collaboration among all members of the Project Team, and provide the best chance of a product that fully satisfies the needs of the Customers.

## Description

It is important for the Project Team to tightly manage the documentation so that requirements are not lost, misunderstood or overlooked. The Project Manager may need to utilize techniques and/or tools to help document requirements and ensure that they are not missed. The Glossary contains a brief description of some of the techniques available to the Project Manager; examples include storyboarding, interviews, joint application design sessions (JAD), Unified Modeling Language (UML), prototyping, data flow diagramming, process modeling, and entity-relationship diagramming.

Determining Business Requirements requires eliciting, analyzing, specifying, prioritizing, verifying and negotiating business functions that the product must deliver and support. The results are captured in a Requirements Analysis deliverable; a Requirements Analysis template is available on the EPM website. During this process it is important to have all of the Stakeholders involved. Since this is the process in which all business and processing requirements are determined and agreed to, it is critical that all parties understand the ramifications of including or excluding requirements from scope. This is an opportunity to work out business process issues as a group, in order to reach optimal performance and efficiency within an organization or even across organizations or functional areas. Decisions made will impact the project and/or its product, so all parties involved should be heard, and all areas of concern or question should be

### **Roles for this Step**

Project Manager  
Project Sponsor  
Business Analyst  
Facilitator  
Subject Matter Experts  
Data/Process Modeler  
Technical Lead/Architect  
Technical Services  
Information Security Officer  
Technical Support  
Customer Decision-Maker  
Customer Representative  
Stakeholders

thoroughly addressed. Reaching consensus and agreement on the final requirements will help to ensure that everyone gets the product to which they agreed.

**TIP:** Don't hesitate to use one of the commercially available tools to assist the Project Team in their documentation efforts. Through use of these tools, changes made to a process are automatically carried through to all other associated processes or business rules.

Requirements fall into multiple categories that, while related, are themselves separate and distinct. These categories are:

**Figure 1**

Category	Description
Functional Requirements	Requirements that define those features of the product that will specifically satisfy a Consumer need, or with which the Consumer will directly interact.
Technical Requirements	Requirements that identify the technical constraints or define conditions under which the product must perform.
Operational Requirements	Requirements that define those “behind the scenes” functions that are needed to keep the product operational over time.
Transitional Requirements	Requirements that define those aspects of the product that must be addressed in order for the product to be successfully implemented and to relegate support responsibilities to the Performing Organization.

When capturing Business Requirements, the Project Manager must ensure that the Project Team addresses all of the categories above. Figure 2 illustrates the types of considerations and requirements that the Project Team must capture specific to Requirements Analysis. The considerations listed are generally intended for software development projects.

**Figure 2**

Category	Example Considerations	Representative Requirements To Be Captured
<b>Functional Requirements</b> Impacts the Business Process	<ul style="list-style-type: none"><li>-Common Functions</li><li>-GUI Functions</li><li>-Reporting Functions</li><li>-Interface Functions</li><li>-Batch Functions</li><li>-Security Functions</li></ul>	<ul style="list-style-type: none"><li>-Common features and functions</li><li>-Screen layout, report characteristics, and navigational requirements.</li><li>-Data exchange between this system and others</li><li>-Off-hours processing requirements</li><li>-Authorizations, roles, and access privileges</li><li>-Business Processes</li></ul>
<b>Technical Requirements</b> Impacts the Product Infrastructure	<ul style="list-style-type: none"><li>-Accessibility</li><li>-Encryption</li><li>-Hosting</li><li>-Environment</li><li>-Disaster Recovery</li></ul>	<ul style="list-style-type: none"><li>-Technology guidelines, regulations, and constraints (e.g. EA Standards)</li><li>-Fit with existing infrastructure</li><li>-Environment for system operation and maintenance (geography, internal/external hosting)</li><li>-Strategies for long-term protection and operation of the system/data</li></ul>
<b>Operational Requirements</b> Impacts Operations and Support	<ul style="list-style-type: none"><li>-System Performance</li><li>-Data Archival</li><li>-Audit and Controls</li><li>-System Administration</li><li>-SQA</li><li>-Business Continuity</li></ul>	<ul style="list-style-type: none"><li>-System performance and responsiveness expectations</li><li>-Activities related to administration and maintenance of system/data</li><li>-Organizational procedures involving audits, data archival/retrieval, and quality assurance</li></ul>
<b>Transitional Requirements</b> Impacts Implementation	<ul style="list-style-type: none"><li>-Data Conversion</li><li>-Release Validation</li><li>-Documentation</li><li>-Training</li><li>-Deployment</li></ul>	<ul style="list-style-type: none"><li>-Historical data cleansing, conversion, and import into the new system</li><li>-Requirements associated with validation of the system prior to release</li><li>-Expectations for user/technical documentation, and supporting training materials</li><li>-Mechanics of physically deploying/transitioning the application</li></ul>

One approach to eliciting requirements from the Customer is to hold one or more requirements gathering sessions. For these sessions, assembling individuals from both the program areas and IT into cross-functional groups can help clarify how proposed changes to a business process may impact operations. The benefit of having a session with multiple representatives from the program areas is that the pros and cons of business process changes are heard and discussed by all involved.

Requirement gathering, when properly facilitated, establishes a forum for everyone to be heard, for issues to be worked through, and for resolutions to be defined that meet the needs of all parties. Through this forum, multiple opinions may enhance the team's understanding of how certain processes are currently being performed, better defining how they should be structured within the context of the new product. This approach may also result in negotiations of functionality. There may need to be some trade-offs, and as

a result processes may be reexamined and redefined. As the sessions progress, the Project Team must constantly assess and analyze the requirements.

**TIP:** A common mistake when coordinating the logistics of interviews or group requirements definition sessions is to hold these meetings where the majority of the participants represent only the Customer and Consumer populations. Doing so may set the stage for the Project Team to form a type of tunnel vision in which business requirements that focus primarily, or even exclusively, on the functional aspects of the system are captured. Just by the nature of their day-to-day responsibilities, Customers will often approach these requirements definition sessions from the perspective of, “What do I need this system to do in order for me to perform my duties?” Many operational, technical, and transitional requirements do not fall within the answers to that question. It is up to the Project Team member running these sessions (typically a Business Analyst or Facilitator) to make certain that these aspects of the system are also discussed, and that the individuals best positioned to provide this information are represented at the requirements definition meetings.

It is not unrealistic to assume that there may come a point at which negotiation or consensus building activities will break down, and that resolution of an issue may require insight or information not available to the Project Team. Ultimately, there must be a single decision-making body responsible for resolving such issues. A key role of the Project Sponsor or Customer Decision-Maker is to make the final determination regarding these issues, and to communicate the decision to the Project Team. The Project Sponsor may or may not choose to share the rationale for such decisions with the entire team, nor is it guaranteed that the team will agree with determinations that are made. The Project Manager should encourage the team to support the decisions and move forward.

The following steps should assist the team in building a useful and comprehensive Business Requirements document:

- **Capture all requirements.** Before the requirements can be analyzed, they must first be collected. Team members need to take everything in, no matter how unimportant or inconsequential it may seem. There are many approaches to gathering these requirements, but all start with effective listening. Regardless of the technique used, the Project Team must remember that the goal of this process is to understand what the Customers need – not what the team members think they need.

**TIP:** While it may be okay to start with a blank slate with customers to produce the requirements analysis, in most cases it is worthwhile to do an environmental scan to see if anyone else has done this before and borrow from them. For example, if someone else has built or written an RFP for a State's Attorney system, it would make sense to either start with their requirements or validate your requirements against it. The scan could also include a review of research or technical journals on the topic. Coming into the requirements analysis with some up-to-date knowledge rather than "this is the way we have always done it" can go along way to selecting the right solution.

**Interpret the requirements.** Now that the requirements have been captured, the Project Team must think about them. What have they heard? What was missed? Look for unanswered questions or contradictions. The requirements must be stated as clearly and concisely as possible, avoiding combining requirements and eliminating subjective wording. If the system must do A and B and C and D, there should be four distinct and verifiable requirements that can each be approved or rejected on its own merits. Avoid ambiguities and opinions. If the requirement is that some process should be "easy", the team should go back and find out exactly what that means. What would make something about that process difficult or more complex than it should be?

**TIP:** Avoid using overly restrictive requirements that may limit competition or drive up the project's final cost. A requirement is considered overly restrictive when it has the effect of limiting responses to only one brand, make, source of supply, or service provider and has no reasonable relation to the actual needs of the purchasing agency.

[Administrative Rules Chapter 4-12-06](#), Specifications for Commodities and Services, contains valuable information for the analysis of products or services that will advance to the procurement process.

ND University Systems institutions are to follow the NDUS procurement policies and procedures.

- **Bind the requirements.** While defining what the requirements are, it is also necessary to determine what they are not! This is done to establish consensus on the scope and to clarify any scope issues. At least some requirements that were captured will be labeled “out of scope.”
- **Categorize the requirements.** Even for a relatively small project, you are likely to end up with scores of requirements. To understand how they relate to each other, and to effectively deal with them later on in the process, it is necessary to separate them into categories, logically grouping the requirements according to related business functions or organizational boundaries.
- **Prioritize the requirements.** Regardless of how accurately the requirements reflect the business need, it may not be feasible to implement them all at once (or even at all). In finalizing the requirements to be implemented, it will be necessary to prioritize them according to their criticality to the business. This classification into core, essential, and desirable will very likely involve both the Project Sponsor and Customer Decision-Makers.

The following guidelines may be used: “Core” requirements are the ones without which the product may as well not be developed at all; it will be of no use to most Customers without these. “Essential” requirements are those for which a short-term work-around could be developed (or for which an old process can hobble along for a little while longer) but over the long run, they have to be there. “Desirable” requirements are the “bells and whistles” that may be precious to certain constituencies, but without which the product will function just fine.

To put it another way, the product must be delivered with all Core and a good portion of Essential requirements represented, and with a plan to implement the remaining Essential requirements.

### **Deliverable**

Requirements Analysis – A document containing detailed requirements for the product. These requirements define the functional, technical, operational, and transitional capabilities, restrictions, and features that must be provided.

## **Frequently Asked Questions**

### **Do different types of projects require analysis beyond defining the requirements?**

Yes. For some projects, such as one resulting in a software purchase that will simply be installed and placed into production, holding a JAD session to define requirements may suffice. However, for complex projects, such as a system re-write, further analysis may be necessary and beneficial. For these types of projects, the Project Team should consider determining the requirements while simultaneously defining the supporting process and data models. By conducting these three processes (Determine Business Requirements, Define Process Model, and Define Logical Data Model) concurrently, as opposed to sequentially, the team can develop the process and data models as information and requirements are defined, and can update these models as a result of gathering new or changed information.

### **I've hired a vendor to assist with requirements analysis process. Will they be restricted from submitting bids or proposals?**

Yes. When a purchasing agency has specifications prepared by someone other than a state employee or official on behalf of the state, that person or business entity must be excluded from submitting bids or proposals.

## **Glossary of Terms**

**Brainstorming** – A technique used to stimulate creative thinking and overcome impasses to problems. Team members gather in a room and offer ideas for solutions to a problem(s). No idea is rejected no matter how absurd or impractical. Often a practical solution surfaces and a decision is reached by group consensus.

**Consumer** – People that will use the product or service that the project is developing. Consumers internal to the Performing Organization may also be Customers.

**Customer** – Business Units that identified the need for the product or service the project will develop.

**Customer Decision Makers** – Those members of the Customer community who have been designated to make project decisions on behalf of major business units that will use, or will be affected by, the product or service the project will deliver.

**Data Flow Diagram** – A picture diagramming how data flows through a system. It depicts the external entities (which are sources or destinations of data), the processes, which transform that data, and the places where the data is then stored.

**Entity Relationship Diagram (ERD)** – A pictorial representation of the relationships between entities. This diagram can be helpful in communication information needs with business users and can also provide information to technical specialists for design of physical databases, foreign keys, business views, and so forth.

**Joint Application Design (JAD)** – A process that brings the Project Team, Customers, and Stakeholders together to clarify, define, and gain consensus on business requirements. JAD sessions are formal meetings involving a detailed agenda, visual aids, and a facilitator who moderates the session and an analyst who records the specifications. By utilizing JAD, Customers become directly involved in the application design.

**Logical Data Model** – Data that supports the processes and business rules is logically modeled, identifying entities and their relationships to other entities and defining attributes with their business definitions.

**Performing Organization** – The entity that is most directly involved in completing the work of the project.

**Process Model** – Pictorial top-down representation of the major business processes that interact with the system is diagrammed and decomposed into manageable functions and sub-functions until no further breakdown is feasible.

**Product** – Outcome of the project.

**Project** – A temporary endeavor undertaken to create a unique product or service.



**Project Manager** – Person who is responsible for ensuring that the Project Team completes the project. The Project Manager develops the Project Plan with the team and manages the team's performance on project tasks. It is also the responsibility of the Project Manager to secure acceptance and approval of deliverables from the Project Sponsor and Stakeholders.

**Project Sponsor** – Entity responsible for securing spending authority and resources for the project. The Project Sponsor has a demonstrable interest in the outcome of the project. The Project Sponsor holds decision-making authority.

**Project Team** – Group that is responsible for planning and executing the project. It consists of a Project Manager and a variable number of Project Team members, who are brought in to deliver their tasks according to the Project Schedule.

**Prototyping** – The process of building a small working version of a system design as a means of hedging risk, and attaining Customer buy-in. Prototyping can provide a better understanding of Customer requirements, validate those requirements, and sometimes perform as a proof-of-concept tool.

**Scope** – The products and services in total to be provided by the project.

**Stakeholders** – People that are in any way affected by the new product or service.

**Storyboarding** – A technique to use during a JAD session to aide in the brainstorming process. Ideas are written down on cards and posted immediately on a wall by the participants. Once all the ideas are posted, several passes of categorization take place. Some ideas may be dropped via group consensus; other may be enlarged or improved.

**Unified Modeling Language (UML)** – UML is a modeling language used to define a system prior to construction, much like a blueprint is used prior to building a house. It allows the Project Team to specify, visualize, and document an application, including its structure and design, in a way that meets all of the user business requirements.