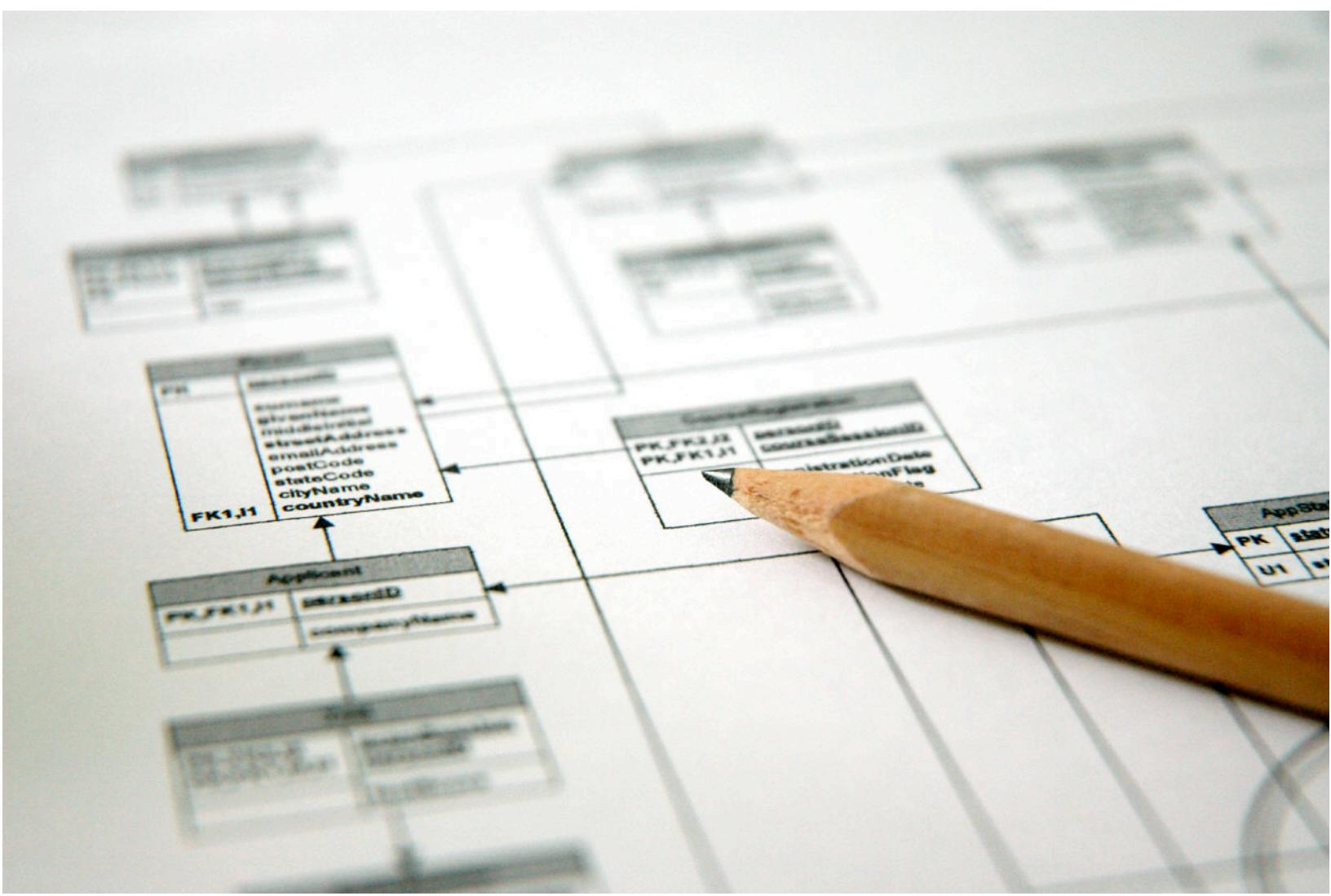


A Guide to the

Business Analysis Body of Knowledge





International Institute of Business Analysis

Guide to the Business Analysis Body of Knowledge
Draft Material for Review and Feedback

Release 1.6 Draft

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Preface to Release 1.6

P.1 Purpose of this release

The purpose of this release is to add refined detailed content to the material that was published in BOK 1.4, as well as add content in most of the areas not addressed in 1.4. This release moves us significantly closer to a complete guide to the Business Analysis Body of Knowledge. As such, this release is being made available to IIBA members only. We will continue to provide the table of contents and pieces of content to the general public to help potential members understand what is covered in the BOK.

This document represents a snapshot of the Knowledge Area documentation as of June 2006. Over the past months since the October 2005 previous release we have gathered feedback and input from many business analysis practitioners through a structured feedback process. Each reviewer in that process was pre-screened to ensure they represented practitioners with at least 3-5 years experience. Their feedback was used by the Knowledge Area sub-committees to refine our content. We extend a huge thank-you to each reviewer for taking the time to help in the ongoing creation of the Business Analysis Body of Knowledge.

We also heard from many IIBA members and potential members who informally reviewed the previous version. Rest assured your comments and ideas sparked many discussions among the core team or sub-committees. Your support and enthusiasm have been critical in helping us maintain focus and momentum. Thank you!

P.2 What is and is not in this release

This release includes:

- An updated introductory chapter including an updated definition of the business analyst role, and a definition of requirements types. The introduction chapter will continue to be revised as the BOK is further refined.
- Both refined and added content for:
 - Enterprise Analysis
 - Requirements Planning and Management
 - Requirements Elicitation
 - Requirements Analysis and Documentation
 - Solution Assessments and Validation
 - Requirements Communication
- An updated structure for the Underlying Fundamentals area.

This release does not include:

- The detailed content describing the Underlying Fundamentals area
- An updated Glossary

P.3

Continuing the review and refinement process

To address missing content a new sub-committee for Underlying Fundamentals has been created and is already hard at work on content. We will also have someone focus on the Glossary to ensure all key terms are added.

So, while there is still some content to be added for the next release, the primary focus will be on refinement of the existing material.

The ongoing review and refinement process has a number of components:

BOK Core Team Review for consistency and coherence across the Body of Knowledge

The BOK core team is currently reviewing the inputs and outputs of each knowledge area in order to:

- fix inconsistencies between chapters
- fix any redundancy between chapters

Many members of the core team have been heavily involved in writing detailed content for specific knowledge areas. We now have the opportunity to also participate in a detailed review of the material we did not write. This will further enable us to find and fix inconsistencies. Our detailed review will focus on:

- keeping the BOK as a descriptor of the knowledge needed by a business analyst vs. an analysis process or analysis methodology, or a how-to guide
- verifying that the BOK remains methodology-neutral and broadly applicable
- detailed integration between the Knowledge Areas
- ensuring a consistent level of detail across the Knowledge Areas

Industry Expert Advisory Group for industry validation

We have created a panel of industry experts who can provide feedback and input based on their specialty and experience. This group will be assisting us through the end of 2006 by reviewing the overall scope of the BOK in preparation of the rollout of the certification program at the end of this year.

In 2007, the group will assist us with a detailed review of the content.

We are still building this group. As of the date of writing this panel includes:

- Scott Ambler, Owner and Founder of Ambyssoft Inc. and Practice Leader Agile Development, IBM Rational. <http://www.ambyssoft.com/>
- James Baird, Professor at Humber College and Owner of BPM3 Inc., www.bpm3inc.com
- Rafael Dorantes, Senior Project Manager, Rational Centre of Competency, IBM Canada Inc.
- Ellen Gottesdiener, Principal Consultant and founder of EBG Consulting, Inc., <http://www.ebgconsulting.com/about.asp>
- Paul Harmon, Executive Editor, Business Process Trends, <http://www.bptrends.com>
- Ann M. Hickey, Ph.D., Assistant Professor of Information Systems, University of Colorado, <http://web.uccs.edu/ahickey/>
- Dean Leffingwell, entrepreneur, software industry executive, and technical author, <http://www.leffingwell.org/bio.html>
- Mark McGregor, Principal, BPMG.org (<http://www.markmcgregor.com>)
- Meilir Page-Jones, President and Senior Consulting Methodologist, <http://www.waysys.com/>
- Richard Payne, Consulting Partner, Bauhaus Consulting Group, <http://www.bcgrp.com/>
- Karen Tate, Member of the PMI Board of Directors and President of the Griffin Tate Group, <http://www.griffintate.com/>
- Steve Tockey, Principal Consultant, Construx Software, <http://www.construx.com/training/instructors/BioSteveTockey.php>
- Dr. Ralph R. Young, Director of Process Improvement, Systems and Process Engineering, Defense Group, Northrop Grumman Information Technology, <http://www.ralphyoung.net>

General membership review and input on specific topics

As the review and refinement continues, there will be specific topics or questions we need to put to the IIBA membership. At various times, specific topics or small surveys will be posted on the IIBA forum in the BOK area. Please check there often for topics of interest to you.

Professional editing for adherence to the style guide, overall flow and readability

Finally, we recognize that most of the BOK Core team are not professional writers or editors. As we head into the 2007 release(s) we will be obtaining the professional editing services required to move us to a professional BOK publication.

P.4

Thinking ahead to the next release

As this release is published, work has already begun on the next release planned for the end of 2006. The next release will include:

- Content for all sections of each knowledge area and an updated Glossary.
- Refinements based on the Body of Knowledge core team review to ensure all the connections between the knowledge areas are rationalized.
- Refinements based on the review feedback from our Industry Expert Group.

P.5

Contributors to this Release

The following volunteers have contributed to this release.

Name	Role
Kathleen Barret	Member, Body of Knowledge Committee and President, IIBA
Kevin Brennan	Co-chair, Body of Knowledge Committee and Leader, Requirements Analysis & Documentation Sub-committee
Barbara Carkenord	Member, Body of Knowledge Committee and Leader, Requirements Communication Sub-committee and Solution Assessment and Validation Sub-committee
Mary Gorman	Member, Body of Knowledge Committee and Leader, Requirements Elicitation Sub-committee
Kathleen (Kitty) Hass	Member, Body of Knowledge Committee and Leader, Enterprise Analysis Sub-committee
Brenda Kerton	Chairperson, Body of Knowledge Committee
Elizabeth Larson	Member, Body of Knowledge Committee and Co-leader, BOK Review Sub-committee
Richard Larson	Member, Body of Knowledge Committee and Co-leader, BOK Review Sub-committee
Dulce Oliveira	Member, Body of Knowledge Committee and Leader, Requirements Planning & Management Sub-committee
Cleve Pillifant	Member, Accreditation – liaison to Body of Knowledge Committee
Tony Alderson	Member, Requirements Analysis & Documentation Sub-committee
Neil Burton	Member, Enterprise Analysis Sub-committee
Karen Chandler	Member, Requirements Communication Sub-committee
Richard Fox	Member, Requirements Planning & Management Sub-committee
Rosemary Hossenlopp	Member, Requirements Analysis & Documentation Sub-committee
Peter Gordon	Member, Fundamentals Subcommittee
Monica Jain	Member, Requirements Planning & Management Sub-committee
Peter Kovaks	Member, Requirements Communication Sub-committee
Finny Lee	Member, Requirement Elicitation Sub-committee

Chris Matts	Member, Fundamentals Subcommittee
Laura Markey	Member, Requirements Communication Sub-committee
Patricia Martin	Member, Requirements Planning & Management Sub-committee
Richard Martin	Member, Requirements Communication Sub-committee
Rosina Mete	Member, Requirements Planning & Management Sub-committee
William Murray	Member, Fundamentals Subcommittee
Harrish Pathria	Member, Requirement Elicitation Sub-committee and Requirements Analysis & Documentation Sub-committee
Kathleen Person	Member, Requirements Communication Sub-committee
Tony Rice	Member, Requirements Analysis & Documentation Sub-committee
John Slater	Member, Requirements Analysis & Documentation Sub-committee
Mark Tracy	Member, Requirements Planning & Management Sub-committee
Jacqueline Young	Member, Enterprise Analysis Sub-committee

P.6**Body of Knowledge Reviewers**

The following volunteers were part of the virtual review team.

Name	Name
Sharon Aker	Betty H Baker
Cathy Brunsting	Carrollynn Chang
Pauline Chung	Joseph R Czarnecki
Stephanie Garwood	May Jim
Day Knez	Barb Koenig
Robert Lam	Cherifa Mansoura Liamani
Gillian McCleary	Kelly Piechota
Howard Podeswa	Leslie Ponder
Cecilia Rathwell	Jennifer Rojek
Keith Sarre	Jessica Gonzalez Solis
Jim Subach	Diane Talbot
Krishna Vishwanath	Marilyn Vogt
Scott Witt	

Chapter 1: Introduction

1.1 What is the IIBA BOK?

The Business Analysis Body of Knowledge is the sum of knowledge within the profession of Business Analysis and reflects what is considered currently accepted practice. As with other professions, the body of knowledge is defined and enhanced by the business analysis professionals who apply it. The BOK describes Business Analysis areas of knowledge, their associated activities and tasks and the skills necessary to be effective in their execution.

Since the Business Analysis Body of Knowledge is growing and evolving constantly, this release must be considered an evolving guide to the complete body of knowledge. Additions will be made at least bi-annually for the next few years until the complete foundation has been established. While specific techniques may be referenced, the criteria for including information in the guide are that it is proven, generally accepted and widely applied.

1.2 Purpose of the Guide to the IIBA BOK

The primary purpose of this guide is to identify the Business Analysis Knowledge Areas that are generally recognized and accepted as good practice. The Guide provides a general overview of each Knowledge Area and the list of activities and tasks associated with each.

As this is the first time a formal document focused on the practice of Business Analysis has been collected and collated into a structured document, the Guide is also intended as a spring board for discussions amongst its professionals using a common, agreed to vocabulary. Going forward the Guide will provide the basic reference document for all practitioners.

In addition, as the Guide reflects the fundamental knowledge required of an effective Business Analysis professional, any assessment or certification would require a demonstration of ability to perform the activities and tasks identified within it. The Guide to the Body of Knowledge is the basis for developing examination questions for the exam that individuals must pass to become certified by IIBA. Applicants for IIBA Certification will be tested on their knowledge in each area in a rigorous and psychometrically sound examination. This examination is being developed as the IIBA BOK is constructed and with the aid of a professional certification and licensure testing company. IIBA is following the International Standard ISO/IEC 17024, General Requirements for Bodies Operating Certification of Persons, in the creation of the certification and examination processes.

This guide provides a basic reference for anyone interested in the profession of Business Analysis. This includes, but is not limited to:

- Senior Executives
-

- Managers of Business Analysis Professionals
- Business Analysis Professionals
- Project managers
- Educators and Trainers teaching Business Analysis and related topics
- Consultants and other specialists in Business Analysis

This document is neither comprehensive nor all-inclusive. It lays the groundwork for ongoing development of the Body of Knowledge and will expand as information is added.

1.3

Defining the Business Analysis Profession

The IIBA is an organization that is dedicated to advancing the professionalism of its members as well as the business analysis profession itself. IIBA recognizes the important contributions business analysts make to organizations every day. As the governing body, IIBA is seeking to establish common standards of knowledge within the BA profession and is committed to work with practitioners around the globe to continually add to those standards through education, research, and the sharing of effective tools and techniques. A universally recognized certification is the first step towards creating a profession unique to the functions of business analysis. Establishing a certification for the profession will create a common expectation by organizations of the skills and knowledge they will receive from certified business analysts.

Business Analysis is the set of tasks, knowledge, and techniques required to identify business needs and determine solutions to business problems. Solutions often include a systems development component, but may also consist of process improvement or organizational change.

Those performing business analysis are today known by a number of titles such as business analyst, business systems analyst, systems analyst and others. For simplicity in this guide we refer to those performing business analysis as business analysts.

Business analysis is distinct from financial analysis, project management, quality assurance, organizational development, testing, training and documentation development. However, depending on an organization, an individual Business Analyst may perform some or all of these related functions.

1.4

Core Concepts of Business Analysis

This section covers the knowledge needed to make effective use of the material in the Knowledge Areas. Typically this knowledge is required across all the knowledge areas. Much basic terminology is covered in the Glossary (Chapter 9), but the most key concepts and knowledge are also discussed here with more detail than a glossary entry can allow.

This section will grow as the detailed material for each knowledge area is developed.

1.4.1

Definition of the Business Analyst Role

A business analyst works as a liaison among stakeholders in order to elicit, analyze, communicate and validate requirements for changes to business processes, policies and information systems. The business analyst understands business problems and opportunities in the context of the requirements and recommends solutions that enable the organization to achieve its goals.

1.4.2

Definition of a requirement

A requirement is¹:

- (1) A condition or capability needed by a stakeholder² to solve a problem or achieve an objective.
- (2) A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed documents.
- (3) A documented representation of a condition or capability as in (1) or (2).

Requirements serve as the foundation of systems or system components. A requirement can be thought of as something that is demanded or obligatory; a property that is essential for the system to perform its functions. Requirements vary in intent and in kinds of properties. They can be functions, constraints, or other elements that must be present to meet the needs of the intended stakeholders. Requirements can be described as a condition or capability a customer needs to solve a problem or achieve an objective. For clarification purposes, a descriptor should always precede requirements; for example, *business requirements*, *user requirements*, *functional requirements*.

1.4.3

Definition of requirements types

The types of requirements that exist vary based on the problem domain and methodology that the Business Analyst works with. For the purposes of the *Business Analysis Body of Knowledge*, the following types of standard requirements types have been defined:

- **Business Requirements** are higher-level statements of the goals, objectives, or needs of the enterprise. They describe such things the reasons why a project is initiated, the things that the project will achieve, and the metrics which will be used to measure its success. They are detailed further in the *Enterprise Analysis* KA.
- **User Requirements** are statements of the needs of a particular stakeholder or class of stakeholders. They describe the needs that a given stakeholder has and how that stakeholder will interact with a solution. User Requirements serve as a bridge between Business Requirements and the various classes of solution requirements.

¹ This definition is based on IEEE Std 610.12-1990.

² The word “user” in IEEE Std. 610.12-1990 has been changed to “stakeholder”. Requirements may emerge from persons or organizations that do not directly interact with the system under development.

They are gathered from stakeholders as described in the *Requirements Elicitation KA* and documented using the techniques described in the *Requirements Analysis and Documentation KA*.

- **Functional Requirements** describe the behavior and information that the solution will manage. They describe capabilities the system will be able to perform in terms of behaviors or operations – a specific system action or response. They are further described in the *Requirements Analysis and Documentation KA*.
- **Quality of Service Requirements** capture conditions that do not directly relate to the behavior or functionality of the solution, but rather describe environmental conditions under which the solution must remain effective or qualities that the systems must have. They are also known as non-functional or supplementary requirements. They are further described in the *Requirements Analysis and Documentation KA*.
- **Assumptions and constraints** identify aspects of the problem domain that are not functional requirements of a solution, and will limit or impact the design of the solution. They are further described in the *Requirements Analysis and Documentation KA*.
- **Implementation requirements** describe capabilities that the solution must have in order to facilitate transition from the current state of the enterprise to the desired future state, but that will not be needed once that transition is complete. They are further described in the *Solution Assessment and Validation KA*.

1.4.4

Effective requirements practices

Through practical experience and study of system and software engineering practices, it is clear that the use of effective requirements definition and management practices leads to successful projects, satisfied customers and increased professionalism in the industry. Benefits include:

- A clear understanding of the needs of users, customers and stakeholders
- A collaborative relationship between the users, customers and stakeholders and the technical team
- A strong commitment of the requirements development team members to project objectives
- Use of a repeatable requirements process that is continuously improved
- A system architecture that supports the users, customers and stakeholders current and planned needs

- The ability to accommodate changes in requirements as they are progressively elaborated
- High quality systems and products
- System development cost savings, accurate schedules, customer satisfaction

1.5

The Body of Knowledge in summary

There are six knowledge areas defined, that combined, cover the core areas where the IIBA will set professional standards for those performing business analysis:

- Enterprise Analysis
- Requirements Planning and Management
- Requirements Elicitation
- Requirements Communication
- Requirements Analysis and Documentation
- Solution Assessment and Validation

Two other topics round out the knowledge requirements for business analysts:

- BA Fundamentals
- Glossary

1.5.1

Enterprise Analysis

This knowledge area is the collection of pre-project or early project activities and approaches for capturing the necessary view of the business to provide context to requirements and functional design work for a given initiative and/or for long term planning. In some organizations this work is treated as an investigative, feasibility or business architecture initiative and treated as a project in itself.

It is important for those in the Business Analysis profession to understand the organizational environment in which they are working. They should understand how the project, and their work in it, supports the entire enterprise.

Typical Enterprise Analysis activities leading up to project selection guided by the Business Analyst include those listed below. While these activities appear to be sequential, they are often conducted concurrently and iteratively.

- Creating and maintaining the Business Architecture
- Conducting feasibility studies to determine the optimum business solution

- Identifying new business opportunities
- Scoping and defining the new business opportunity
- Preparing the Business Case
- Conducting the initial Risk Assessment
- Preparing the Decision Package.

Enterprise Analysis is covered in Chapter 2.

1.5.2

Requirements Planning and Management

The *Requirements Planning and Management* Knowledge Area defines the resources and tasks associated with the planning and management of requirements gathering activities throughout the requirements process. The Business Analyst must define the requirements activities that will be performed and how those activities will be performed on a project, in accordance with any existing standards in the organization. It includes identifying key roles, selecting requirements activities, managing the requirements scope and ongoing communication of the requirements gathering status. Proper planning and management of requirements gathering activities ensures the success of the requirements process and requirements deliverables.

Before initiating requirements activities and during the requirements process it is important to consider how the Business Analysis team is going about the requirements activities on a project. This is necessary to ensure:

- the set of requirements activities undertaken are the most appropriate, given the unique circumstances of the project,
- the requirements work effort is coordinated with the other work being done for the project,
- the whole requirements team on a project has a common understanding of what activities they are undertaking,
- business analysts are able to monitor and react to requirements challenges and slippage,
- the tools, resources and requirements contributors are available as needed for the requirements activities,
- and, changes are captured correctly and consistently.

Requirements Planning and Management is covered in Chapter 3.

1.5.3***Requirements Elicitation***

Eliciting requirements is a key task in business analysis. Because the requirements serve as the foundation for the solution to the business needs it is essential that the requirements be complete, clear, correct, and consistent. Leveraging proven means to elicit requirements will help meet these quality goals.

The Requirements Elicitation knowledge area defines standard techniques used to collect the requirements of the system. This activity is also known in the industry as “eliciting” requirements. The system in question may be a business system, and automated system or both. The scope of the Elicitation work may be a new system or an enhancement to an existing system. The business analysis professional selects the appropriate mean(s) to gather the needed requirements based on the applicability of a technique’s process, key features and strengths and weakness.

Requirements Elicitation is covered in Chapter 4.

1.5.4***Requirements Analysis and Documentation***

This knowledge area describes how stakeholder needs are analyzed, structured and specified for use in the design and implementation of a solution. The objective is to define and describe the characteristics of an acceptable solution to a business problem, so that the project team has a clear understanding of how to design and implement it.

Requirements analysis defines the methods, tools and techniques used to structure the raw data collected during Requirements Elicitation, identify gaps in the information and define the capabilities of the solution, which must be documented.

Deliverables from this process will be used by the project team to develop estimates for the time, resources, and budget required to implement a solution or solutions that will fulfill the requirements. The documentation itself is only one of several techniques the Business Analyst will use to ensure that a consensus between all the stakeholders exists as to the behavior of the solution. The primary focus of documentation activity is to refine the models based upon stakeholder feedback and iteratively ensure feasibility of the proposed requirements to support the business and user needs, goals and objectives.

Requirements Analysis and Documentation is covered in Chapter 5.

1.5.5***Requirements Communication***

The Requirements Communication Knowledge Area is the collection of activities and considerations for expressing the output of the requirements analysis and documentation to a broad and diverse audience. Requirements communication is an ongoing, iterative activity that is done in parallel with Requirements Gathering and Requirements Analysis and Documentation. It includes presenting, communicating, verifying, and gaining approval of the requirements from the stakeholders and implementers of the project.

An effective business analyst must be able to clearly present the requirements in a format and structure that is appropriate for its intended audience. Business Analysts must understand the options and select the appropriate communication formats for their project. BAs must consider when and where communications need to take place, what communication approach is appropriate for each situation, and how each communication should be presented. Requirements must be “packaged,” reviewed, and approved before the solution is implemented.

Requirements Communication is covered in Chapter 6.

1.5.6

Solution Assessment and Validation

This knowledge area covers the business analysis tasks necessary to ensure that the solution meets the stakeholder objectives, is thoroughly tested, and is implemented smoothly.

Once a solution design has been agreed upon, the Business Analyst assists the technology team with detailed design work including splitting a large project into phases, reviewing technical design deliverables, and helping to build usability into the application software. In the case of a purchased solution, they will assist with any package customization decisions that need to be made and with interface requirements. As the solution is built and available for testing, the Business Analyst role involves supporting the Quality Assurance activities. They may help business stakeholders with user acceptance testing, defect reporting and resolution.

The Business Analyst is accountable for ensuring that the solution developed meets the defined needs and should assess project success after implementation.

Solution Assessment and Validation is covered in Chapter 7.

1.5.7

Complementary Chapters

Chapter 8 in this Guide is titled BA Fundamentals and it defines the collection of general competencies, skills, techniques and knowledge needed to effectively perform business analysis. The defined knowledge is not unique to those performing business analysis and the IIBA will not set the professional standards for this knowledge, but it is nevertheless required in a business analysis role.

Chapter 9 of the Guide is the Business Analysis Body of Knowledge Glossary. The Glossary will continue to grow and evolve as more detail is added to each knowledge area.

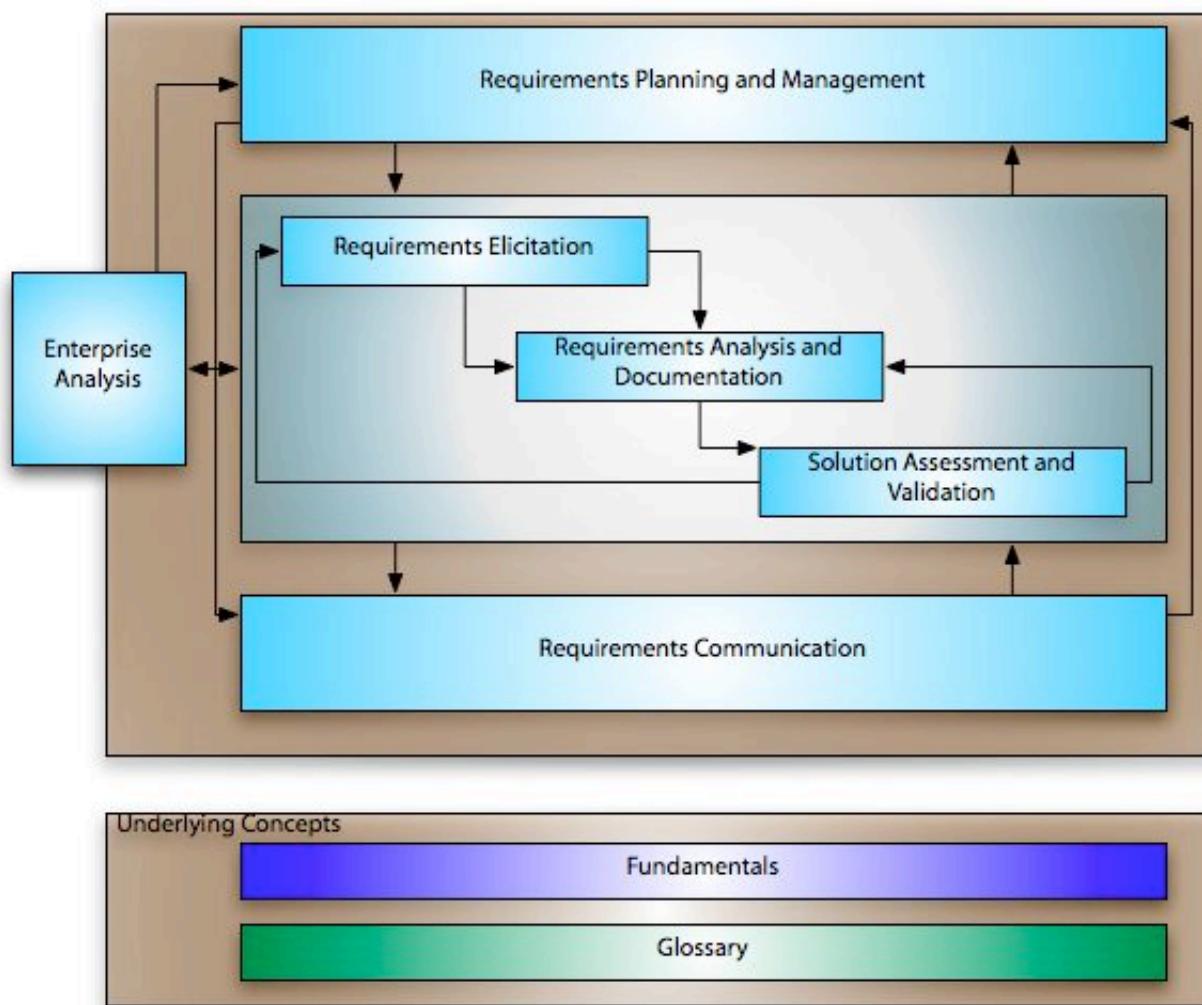
1.6 The Body of Knowledge in context

1.6.1 Body of Knowledge relationships

The Body of Knowledge is not a methodology. While it defines the activities, tasks and knowledge that a business analysis professional needs to know, it does not do so from the perspective of prescribing an order or sequence.

Specifically, the knowledge areas do not define a business analysis methodology. They do define what the BA needs to know to work within any analysis process or overall solutions development methodology.

By looking at the following picture, however, we understand the relationships between the areas of the Body of Knowledge and the broader world that business analysis fits into.



This picture highlights a number of important points:

1. The Fundamentals and Glossary sections of the Body of Knowledge are not activity or task driven. As described in the previous section, they outline the base knowledge needed for a business analysis professional to be successful.
2. Not all work that a business analysis professional does is for a defined project. It is not unusual for Enterprise Analysis activities to be considered either pre-project work or an early feasibility phase of a project, with the outputs of that analysis becoming input into the requirements planning for a project as well as the high-level requirements goals for further requirements Elicitation.
3. Requirements Planning and Management activities tend to span the duration of a project with planning input provided to each of the other areas and output provided back that allows for the requirements management activities and re-planning work to be done.
4. Communicating about requirements also tends to span the duration of a project with output from each other knowledge being those things that need to be communicated and results of the communication feeding back into the necessary knowledge area.
5. Theoretically, one gathers requirements then analyzes and documents them, then uses them as input into the designs that lead to the final implementation of the gathered and documented requirements and the testing that validates the solution against the requirements. In most situations a business analysis professional will face however, there is significant concurrence and overlapping of these activities. It is normal to have requirements elicitation and requirements analysis and documentation work going on concurrently. In fact many of the analysis techniques outlined later in this Guide are used (often in an informal form) during Elicitation to understand and confirm the information being gathered. It is also not unusual to have work being done on alternative solutions and technology options concurrently with elicitation and analysis work. It is not advisable to start Solution Assessment and Validation too early though, in order to avoid too early a focus on the solution without a solid understanding of the need.
6. Information gathered during requirements elicitation or requirements analysis may lead to further work or refinement of the project feasibility. Also true, though not desirable is that work done during the implementation of the requirements also causes review and revision of project feasibility. A full discussion of project methodologies is outside the scope of this Guide, however, many common methodologies are designed to reduce the risk of feasibility or requirements discovery during implementation work.

1.6.2

Relationship to the solutions lifecycle

An individual Business Analyst must work with the project team and other stakeholders to determine which tasks and techniques defined in the Business Analysis Body of Knowledge are appropriate for their organization and for a given project. Different

projects and methodologies may demand that requirements be produced in specific formats and in varying levels of detail.

The final version of the Business Analysis Body of Knowledge will be compatible with small to large, simple to complex projects and all types of methodologies (e.g. iterative, agile, waterfall). This section will show how the BOK knowledge areas relate to typical solutions and systems development lifecycles and the project lifecycle.

As this section is further developed it will help the Business Analyst determine which material in the BOK is most appropriate for their needs.

Chapter 2: Enterprise Analysis

2.1 Introduction

2.1.1 Definition

Enterprise Analysis is the Knowledge Area of the *Business Analysis Body of Knowledge* (BA BoK) that describes the Business Analysis activities that take place for organizations to (1) identify business opportunities, (2) build their Business Architecture framework, and (3) determine the optimum project investment path for the enterprise, including implementation of new business and technical system solutions.

The *Enterprise Analysis* Knowledge Area consists of the collection of pre-project activities for capturing the future view of the business to provide context to project requirements elicitation and solution design for a given initiative and/or for long-term planning. In some large complex organizations this work is treated as an investigative, feasibility or Business Architecture endeavor and is managed as a stand-alone project. During Enterprise Analysis activities, the Business Requirements for future project investments are identified and documented. Business requirements are defined as higher-level statements of the goals, objectives, or needs of the enterprise. They describe such things as the reasons why a project is initiated, the things that the project will achieve, and the metrics which will be used to measure its success. They are detailed further in this chapter of the BA BoK.

As project management matures into a critical management discipline, organizations tend to realize that managing projects has two dimensions: (1) investing in the most valuable projects, and (2) planning, executing and controlling project activities to attain the business value as early as possible. In order to ensure they are investing in the most valuable projects, management needs accurate, consistent and useful information about initiatives that are currently funded as well as proposed new ventures. It is through Business Analysis practices that this decision-support information is gathered, analyzed and prepared in the form of a decision package for proposed new projects.

Enterprise Analysis activities (1) begin after the executive team of the organization develops strategic plans and goals, (2) continue until information is gathered to propose new programs and supporting projects to management for a go/no go decision whether to select, prioritize and fund a new project, and (3) end after the benefits of project outcomes are measured and analyzed. Refer to Table 1.0 for a summary of Enterprise Analysis activities and their link to business planning events.

2.1.2 Overview

Projects play an essential role in the growth and survival of organizations today. With the rapidly changing competitive business environment, projects are viewed as a means to manage change and achieve the strategies of the enterprise. Competitive advantage is now linked to an organization's ability to rapidly deploy business solutions, to efficiently use

technology to support business processes, and to adapt these solutions as the business need evolves. Projects must not only deliver high quality products faster, better, and cheaper (traditionally the responsibility of the project manager), they are also under intense scrutiny to positively impact the bottom line (increasingly, the joint responsibility of the project manager, project sponsor, and the Business Analyst).

Activity	Owner	Deliverables	Role of the BA
<i>Strategic Plan Development</i>	Executive Team	Strategic Plan Document	Sr. BAs may be asked to: Conduct competitive analysis and benchmark studies that serve as input to the strategic planning process Help plan and facilitate strategic planning sessions.
<i>Strategic Goal Development</i>	Executive Team	Strategic Goals, Themes & Measures	Sr. BAs may be asked to facilitate strategic goal setting sessions.
<i>Business Architecture Development</i>	Business Analyst	Business Architecture	Using information from the strategic plan and goals, the BA leads the development and maintenance of the current and future state Business Architecture.
<i>Feasibility Studies</i>	Business Analyst	Feasibility Study Report	The BA collaborates with subject matter experts and facilitates the team to: Identify solution options Examine the feasibility of each option Determine the most viable option
<i>Business Case Development</i>	Business Analyst	Business Case Document	The BA collaborates with subject matter experts (the business sponsor, business representative(s) and IT management) to scope the proposed project, make time and cost estimates, quantify business benefits and prepare the business case.
<i>New Project Proposal</i>	Business Sponsor	Executive Presentation Decision Package	The BA collects the relevant information about the proposed new project and provides the executive presentation and decision package to the business sponsor to propose a new project to the organizational project investment governance body.
<i>Selecting and Prioritizing New Business Opportunities</i>	Enterprise Governance Group	Project Selection Project Priority Project Charter	Sr. BAs may be asked to help plan and facilitate portfolio management meetings, and present the proposal for new projects.
<i>Launching New Projects</i>	Project Manager	Project Plans	The BA supports the project manager in initiating and planning the new project. During the project initiation and planning processes, the BA is eliciting, analyzing, documenting and validating business requirements and collaborating with the system architect during initial design of the business solution to be delivered.
<i>Managing Projects for Value</i>	Business Analyst	Updated Business Case at key control gates	The BA works in partnership with the PM to update the Business Case at key checkpoint control gate reviews to provide management with information to help determine whether to continue to invest in the project.
<i>Tracking Project Benefits</i>	Business Sponsor	Balanced Scorecard Reports	The BA ensures metrics and measurements are in place, analyzed and reported to the business sponsor to track actual vs. expected benefits as documented in the business case.

Table 1.0 Enterprise Analysis Activities Linked To Business Planning Events

Since there appears to be a never-ending demand for efficient business solutions and new products and services, organizations are adopting the practice of professional Business Analysis to increase the value projects bring to the organization. For business requirements and goals to be converted into innovative solutions that truly reflect the needs of the business, the Business Analyst role is emerging as the individual who collaborates with business stakeholders to build a strong relationship between the business and the technical communities when implementing a new IT-enabled business solution.

2.1.3

Strategic Planning

The Business Analyst needs to fully understand the strategic planning process and the current enterprise strategies. In their strategic planning role, the executive management team defines the organization's future in terms of vision, mission and strategic goals.

Strategic planning focuses the executive team on the organization's reason for being and provides the foundation to select and prioritize programs and projects. The strategic planning process provides the *context in which Enterprise Analysis is conducted*. The information compiled as a result of Enterprise Analysis facilitates investment decisions that manifest themselves in programs and supporting projects.

Strategic planning serves to establish the future course of an enterprise. Various business circumstances and needs are considered during the strategic planning process including:

- Investigating current strategy as related to environmental and market trends
- Assessing the current technology structure and strategies to ensure a fit with the business vision
- Identifying ongoing business issues
- Remaining competitive, profitable and efficient.

In today's fast-paced environment, the strategic plan is considered a living, breathing document that changes as business needs evolve. As the strategies change, the portfolio of programs and projects is also likely to change.

2.1.4

Strategic Goal Setting

The Business Analyst must also understand the strategic goals and priorities of the enterprise. Scores of important strategic goals and objectives are likely to be developed during the strategic planning cycle. Strategic goals are then converted into an organized, actionable, measurable framework to attain the results that are intended.

An effective approach to execute strategy is to convert strategic goals and objectives into strategic themes as the building blocks of the strategy. Strategic themes not only reflect financial performance goals, but also include goals relating to customer value, business operations that drive value to the customer and ultimately to the shareholders, and the capabilities of human resources and other corporate assets. Strategic themes begin to define new business opportunities. Examples of strategic themes include ideas such as: (1) reduce costs through on-line customer ordering, (2) increase the number of high-value customers through acquisitions, and (3) increase revenue per customer by increasing the services provided per customer. For each strategic theme, context, objectives and measures of success are developed.

To monitor the journey, executive teams are often building corporate scorecards as an outgrowth of the strategic plan. Increasing the wealth of stakeholders is the ultimate goal

of for-profit organizations; as a result, financial goals often rank highest. However, non-financial decision criteria are also needed to invest in the future success of the enterprise. The balanced scorecard (Robert Kaplan and David Norton 1996) provides an effective technique to frame strategic goals. In this model, goals are partitioned into four dimensions: financial, customer, internal operations, and learning and innovation, as described below.

Financial goals are the dollar-denominated goals that address finance and accounting outcomes of the business. Example: "Earn 6% on sales, 18% on investments, and 12% on assets this year."

Customer goals address how the customer views the business. The primary measure is customer satisfaction. An example: "Earn a customer satisfaction rating at 95% or better this year."

Internal Operations goals relate to process and functional performance and effectiveness of core competence. Measures are typically internal, comparing performance with industry benchmarks. Example: "Achieve inventory turns of 8.0 or better this year."

Learning and Innovation goals address new product development, organizational learning and skill development, and application of technology and productivity tools. Example: "Earn 6% on new product sales."

In the public sector where mission results drive government agency strategies, the dimensions take on a slightly different slant (*Global Balanced Scorecard for US Government, PEA, 1999*). Measures are established to answer the following questions.

- Customer: "How do our customers see us?"
- Financial: "How do we get the best results for the funds?"
- Internal processes: "What must we excel at?"
- Innovation and Improvement: "How do we continue to improve and create value?"

Just as the strategic plan is a living document, strategic goals are dynamic as well. So the process now includes tighter planning cycles to monitor progress and make course corrections along the way. The bar for adding business value is likely to be raised for every planning cycle.

2.1.5

The Business Analyst Strategic Role

In small organizations Business Analysts do not typically participate directly in strategic planning. In large, complex organizations, senior Business Analysts often conduct competitive analysis and benchmark studies to provide information to the strategic planning team. As management teams realize they need a framework for strategy

execution, they are calling on senior Business Analysts to not only provide information to management, but also to help plan and conduct strategic planning and goal setting sessions.

Whether involved or not, it is imperative that Business Analysts have a full understanding of the strategic goals of the enterprise to ensure new initiatives fit in the long term strategy and/or mission of the organization, to build and manage the Business Case and other relevant information regarding new project opportunities. Therefore, it is through Enterprise Analysis activities that the Business Analyst plays a role in translating business strategies and themes into proposed new business solutions and ongoing operational activities. Minor enhancements to a business solution or change initiatives that do not represent a significant investment often do not require a rigorous enterprise analysis. However, all change initiatives should be reviewed for alignment with organizational strategies. The Business Analyst often performs this analysis.

2.1.6 *The Business Analyst Enterprise Analysis Role*

The Business Analyst plays a critical role working with key stakeholders and subject matter experts to provide management with the information they need to select and prioritize projects to optimize the return on project investments. As the name implies, when conducting Enterprise Analysis, the focus is at the enterprise level where considerations about a proposed initiative are made across the organization. This is necessary to be able to understand the business implications, inter-project dependencies and system interfaces; to determine the risks and exposures to the business; and to relate these considerations in a consistent manner to enable effective decision making from a project portfolio perspective.

Every business change initiative needs clear articulation of what the business motivation is for change. To accomplish this, the Business Analyst collaborates with project managers, business unit managers and lead information technology (IT) architects and developers to prepare decision-support information needed by management. In doing so, the Business Analyst may need to seek advice from other industry experts, either through the use of internal organizational resources or through the acquisition of these experts, if not available internally.

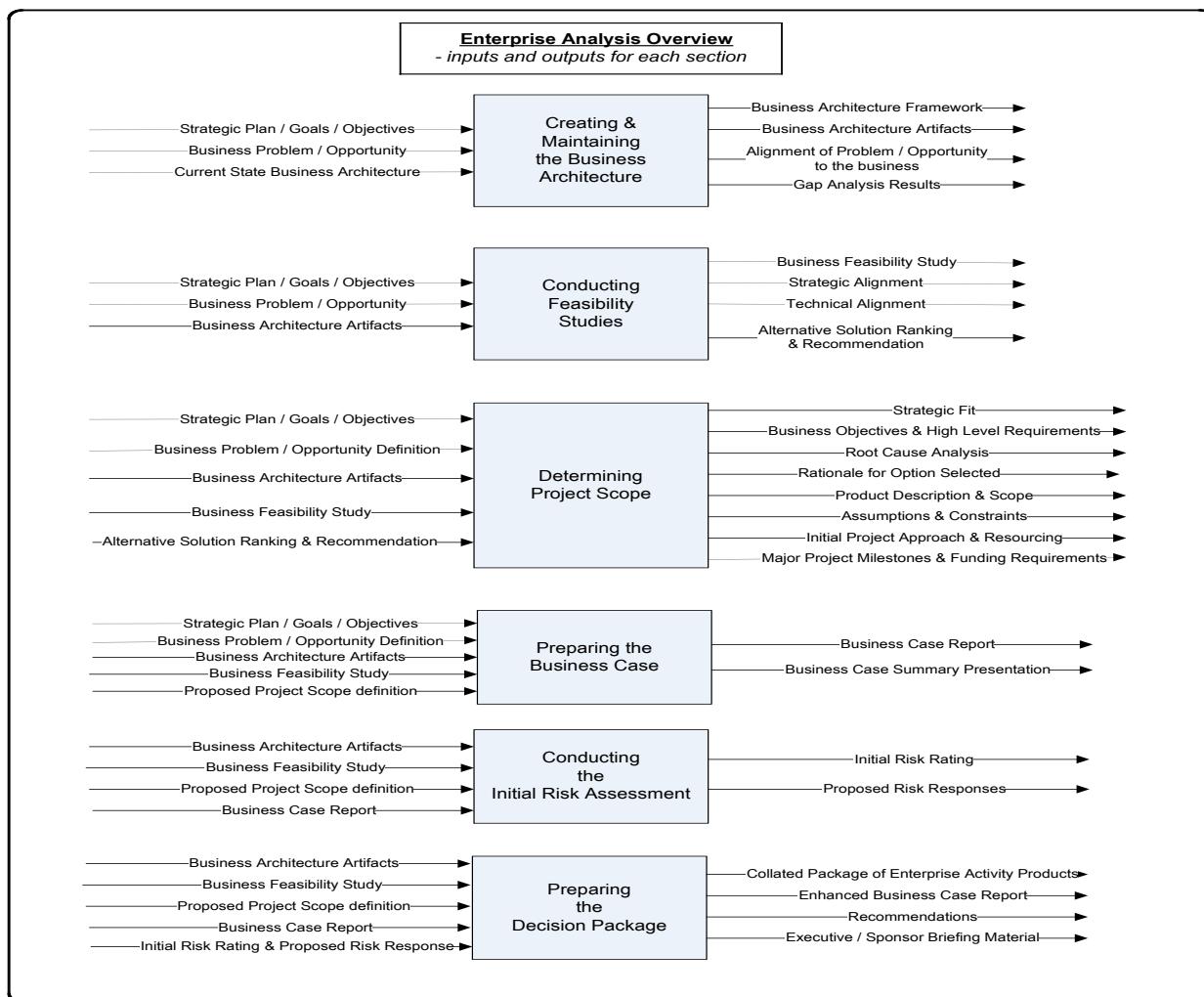
2.1.7 *Enterprise Analysis Activities*

Typical Enterprise Analysis activities leading up to project selection include those listed below. While these activities appear to be sequential, they are undoubtedly conducted *concurrently and iteratively*. These activities are described in detail in the following sections of this chapter. See Table 2.0 for a depiction of Enterprise Analysis activities, with a view of the inputs and the outputs produced. Enterprise Analysis activities include:

- Creating and maintaining the Business Architecture
- Conducting Feasibility Studies to determine the optimum business solution

- Scoping and defining the new business opportunity
- Preparing the Business Case
- Conducting the initial Risk Assessment
- Preparing the Decision Package.

Table 2.0 Enterprise Analysis Processes



.1 Scaling Enterprise Analysis Activities

To produce information for project investment decisions, the Business Analyst directs the array of activities designed to produce *just the right amount* of information to determine whether or not to invest in an opportunity. Obviously, significant, high-risk investments often require more rigor and study than efforts to comply with a legal requirement or to enhance an existing business system.

One of the tasks of the Business Analyst is to determine how much rigor is needed in conducting the Enterprise Analysis activities. See Table 3.0, Project Sizing Grid to help determine the project size, which in turn will help determine the level of analysis recommended prior to proposing a new project for funding. Also see Table 4.0 for guidelines for scaling Enterprise Analysis activities to conduct the appropriate amount of analysis, and the commensurate Business Analyst experience level required.

Project Type Project Attribute	Small, Low Risk (SMALL)	Low-to-Moderate Risk (MEDIUM)	Significant, High Risk (LARGE)
Estimated Elapsed Time	< 6 Months	6 – 12 Months	12 - 24 Months
Timeframe	Schedule is Flexible	Schedule can undergo minor variations, but deadlines are firm	Deadline is fixed and cannot be changed. Schedule has no room for flexibility
Complexity	Easily understood problem and solution. The solution is readily achievable	Either difficult to understand the problem, the solution is unclear or the solution is difficult to achieve	Both problem and solution are difficult to define or understand and the solution is difficult to achieve
Strategic Importance	Internal interest only	Some direct business impact and/or relates to a low priority	Affects core service delivery and/or directly relates to key initiatives
Level of Change	Impacts a single business unit	Impacts a number of business units	Enterprise impacts
Dependencies	No major dependencies or inter-related projects	Some major dependencies or inter-related projects, but considered low risk	Major high-risk dependencies or inter-related projects

Table 3.0 Project Sizing Grid

1. Significant, high-risk projects are likely to need robust Enterprise Analysis performed by a core team of subject matter experts and facilitated by the Business Analyst.

Referencing the Project Sizing Grid, significant high-risk projects are characterized by:

- Level of Change = enterprise impacts; or
- Two or more categories in Large column

2. Low-to-moderate risk projects are likely to need a more moderate amount of enterprise analysis performed by the Business Analyst prior to investment. Referencing the Project Sizing Grid, low-to-moderate risk projects are characterized by:

- Four or more categories in the Medium column; or
- One category in Large column and three or more in Medium column

3. Small, low risk projects are likely to need little or no enterprise analysis performed by the Business Analyst prior to investment. However, decisions to invest in even small projects should be made based on a cost vs. benefit analysis to ensure the project will add value to the organization. Referencing the Project Sizing Grid, low-to-moderate risk projects are characterized by the remaining combinations.

PROJECT SIZE	LEVEL OF ENTERPRISE ANALYSIS
Significant, High-Risk Projects	Full set of Enterprise Analysis deliverables: Business Architecture Feasibility Study Business Case Risk Rating Decision Package
Low-to-Moderate Risk Projects	Modified set of Enterprise Analysis deliverables; minimally a full Business Case and some Business Architecture activities
Small, Low-Risk Projects	Simplified Business Case and some Business Architecture to provide a context

Guidelines for Scaling Enterprise Analysis Activities

2.1.8

Relationship to Other Knowledge Areas

The outputs from the Enterprise Analysis Knowledge Area become the basis for decision making during project planning and requirements gathering. As projects progress through the life cycle, a well-constructed set of pre-project Enterprise Analysis documentation provides the foundation for project team members to frame the project so that it will add the value expected to the organization from the project outcomes. Outputs from Enterprise Analysis will become inputs to:

- Requirements Planning and Management Knowledge Area
- Requirements Gathering Knowledge Area
- Requirements Communication Knowledge Area

It is expected that in the later phases of business analysis, the level of detail developed in the documentation produced during Enterprise Analysis will be progressively elaborated.

2.2

Creating and Maintaining the Business Architecture

2.2.1

Purpose

In complex organizations, it is becoming a widespread practice for senior Business Analysts to focus on the development and maintenance of the Business Architecture. The purpose of the Business Architecture is to provide a unified structure and context that guides selection and management of programs and projects.

The Business Architecture is a set of documentation that defines an organization's current and future capabilities. The Business Architecture describes the business strategy, its

long term goals and objectives, the high level business environment through a process or functional view, the technological environment, and the external environment. It also defines the relevant stakeholders, such as the government, regulatory agencies, customers, employees, etc. The Business Architecture is considered a strategic asset used to understand the current state and plans for the future state of the enterprise.

The Business Architecture consists of an interrelated set of documents, models and diagrams, organized to present information about the business in terms of business vision, mission, strategy, functions, rules, policies, procedures, processes, organizations, competencies and locations, that together comprise the business as a system for delivery of value. The collective set of documents, models and diagrams provide a context from which change impacts can be assessed.

Through the creation of the current and future state Business Architecture, a common understanding of changes that the business must make to achieve its goals comes into view. As we change the business, we ensure that business operations and their supporting IT systems are aligned. Through architectural work, we capture and portray business and technical information in a way that makes the two sets of information easy to interrelate to drive consistency between business operations and IT systems. Therefore, the Business Architecture becomes one element within the larger view, the Enterprise Architecture. The Enterprise Architecture consists of five architectures which in total comprise Enterprise Architecture:

- Business Architecture
- Information Architecture
- Application Architecture
- Technology Architecture
- Security Architecture

2.2.2

Description

The Business Architecture provides a common planning framework that fosters strategic and operational alignment. The current and future state views of the business provide both strategic and operational perspectives that then forms the basis for designing and managing ongoing change initiatives.

As new business opportunities turn into proposed projects, the Business Architecture views are used to determine the impact of change both on the business and on the IT systems supporting the business. As new initiatives are planned, the architectural views help to ensure integration of policies, processes and IT systems by:

- Documenting the current Business Architecture in terms of the business structure and components describing the product and/or service strategy, and the

organizational, functional, process, information, and geographic aspects of the business environment.

- Developing the future Business Architecture to depict the strategic vision in practice.
- Analyzing the gaps between the current and future state Business Architectures to determine the extent of change required to realize the future state objectives.
- Providing a context in which change initiatives (projects) can be assessed and helping identify new business opportunities that need to be pursued.

While emerging as a key practice to help manage the complex business environment, the nature of the Business Architecture implementation depends on the needs and maturity of the business entity. In small or less mature organizations, the Business Architecture consists of organizational structure charts, business plans and a simple set of business rules. In more mature, large organizations, the Business Architecture consists of the traditional business planning documents accompanied by powerful models, graphs and matrices to depict the current and future states of the enterprise. Whatever format the end product takes, most Business Architecture efforts have a common goal: to bring order to the massive amounts of change businesses are struggling to manage. Achieving this goal is difficult, since the Business Architecture must not only provide structure and efficiency, but also remain flexible enough to accommodate different changing business strategies, functions, rules, and components.

2.2.3

Knowledge

Business architects have knowledge of:

- General business practices
- Industry domains
- IT-enabled business solutions
- Current and emerging business concepts, strategies and practices
- How various lines of business within the organization interact
- Business concepts for organizing enterprise knowledge
- Standard architectural principles and semantics, including an understanding of how business issues drive information systems requirements
- Standard business concepts and guidance as to how to use them to create organized information about specific enterprises.

2.2.4 Skills

Business architects have a balanced and applied skill set in the following areas:

- Business strategy
- Business process engineering
- Business analysis
- Business modeling, as well as various generic industry reference models
- Business concepts, rules, policies and terminology.

2.2.5 Predecessors

Business strategy and planning documents that provide direction when creating and maintaining the current state Business Architecture include current business plans, goals, measures and existing business documentation.

Predecessor activities also include strategic plans and goals, feasibility studies, approved projects to seize new business opportunities and future state business and IT system documentation.

2.2.6 Process and Elements

Since there can be different drivers for developing a Business Architecture, the sequence of activities may vary. Some enterprises begin by developing descriptions of the current state of the business, while others develop the description of the desired future state.

Typical process steps include:

- Determine the scope of the effort
- Plan the activities
- Create or update the documents and drawings
- Conduct a quality review of the Business Architecture components.

.1 Determine the Scope of the Business Architecture Effort

Not every business requires a full blown Business Architecture, and those that do, do not require all possible views. Therefore, it is important to determine the specific requirements that are driving the Business Architecture effort, how the resulting architecture is intended to be used, and by whom. Expectations must be understood from both the business and the IT groups.

Plan the Business Architecture Effort

Building Business Architecture components is a significant endeavor that should be initiated and planned like a project. Steps include:

- Determine appropriate framework and approach (see techniques section for representative frameworks).
- Determine the architectural documents and drawings to be created or updated.
- Select appropriate resources on the basis of the business drivers for building the architecture and the business entities under review.
- Select relevant business architectural viewpoints, e.g., lines of business, or business units (operations, management, financial, engineering, etc.), those that will enable the architect to document the key capabilities of the organization under review.
- Identify appropriate tools and techniques to be used for capture, modeling and analysis. Depending on the degree of sophistication warranted, these may comprise simple documents and spreadsheets, or more sophisticated modeling tools and techniques.
- Determine how the architectural components will be stored. This may involve creation of a repository to serve as the archiving mechanism.

Additionally, as plans are developed to create the business architecture, there are a number of considerations that must be taken into account, including but not limited to the following:

- Once again, revisit how the architecture will be used. Will it support business planning activities, or help determine the scope of a change initiative? This decision will help determine the level of detail that is needed when building the architecture. (Note: building only the components that are necessary to document the scope of the business to be impacted by the project would limit the size and complexity of the architecture effort.)
- The decision to build the architecture using a top-down approach vs. a change-initiative driven approach.
- The decision to build only the future state (to-be) model, or the current state (as-is) model, or both. (Note: this may be determined by how much documentation already exists on the current state.)

.2 Create or Update the Architectural Drawings and Documents

For each business entity, create the documents and models to describe the essential organizational components. As noted above, only those that are required to meet the

specific business need should be created, so as not to invest too heavily in building the Business Architecture. Activities involved in completing the architecture include the following:

- Build the requirements traceability matrix to ensure specific architectural components exist that meet the business need, thus ensuring all requirements for the scope of the initiative have been addressed.
- Prepare the Business Architecture Report. Document the rationale for structure and composition, and other decisions made, e.g., whether to build or not to build certain elements of the architecture in the final architecture report.

Recognize that there are always different perspectives held and that multiple versions of a base model may be required to represent information and communicate to these different audiences; the most obvious is the different perspectives of business versus IT.

.3 Conduct a Quality Review and Baseline the Business Architecture

Conduct both an internal and external review with key stakeholders. Review all architecture components and check against the requirements for this iteration of the Business Architecture to ensure the Business Architecture is complete enough to be used for its intended purpose (e.g., by a new project). In addition:

- Validate not only the original motivation for the architecture project to determine if it is fit for use for the immediate need, but also that it is fit to support subsequent work in the other architecture domains.
- Ensure standards compliance for each of the architecture components.
- Review to ensure each architecture component is fully documented.
- Refine the Business Architecture if necessary to close any gaps uncovered during the quality reviews.
- Review and refine business performance measures, checking to ensure performance measures and metrics are defined and relate to the strategic goals and themes.

2.2.7

Stakeholders

The Business Architecture focuses on the process and functional aspects of the enterprise or a portion of the enterprise. It addresses the concerns of all stakeholders of the business, including:

- Executive and middle management
- Individual contributors

- Project and operational teams
- Shareholders
- Customers and end users
- Government and regulatory bodies.

2.2.8 ***Deliverables***

The deliverables are the documents, graphs, models and any other descriptive representations of the enterprise that are developed, refined or referenced as part of the Business Architecture initiative, and may include:

- *Strategic* plans, goals and strategic themes
- Organization structures, identifying business locations and organizational units
- Business unit goals and objectives for each organizational unit
- Business functions, a detailed decomposition of major functional areas
- Business product lines, and customer-facing activities for each business unit
- Business services provided to customers, both internally and externally, for each business unit
- Business processes, including performance measures
- Business roles, including knowledge and skill requirements
- Gap analysis results.

2.2.9 ***Techniques***

A variety of frameworks, tools and techniques are employed to create and maintain the Business Architecture.

.1 Business Architecture Frameworks

The value of a framework is that it provides compartments in which to place predefined architectural products or outputs, thus providing order and structure to the components. Examples of architectural frameworks include the following.

The Zachman Framework

It is helpful to use a defined framework that provides a common structure and classification scheme for descriptive representations of an enterprise. One such framework that has been widely adopted by organizations both public and private is the Zachman Framework for Enterprise Architecture developed by John Zachman two

decades ago. The framework has evolved to become a universal schematic for describing complex enterprise systems.

The framework provides common language and common structure for describing an enterprise. Without a unifying framework, the fundamental design of an organization may not result in an integrated, well functioning enterprise, which leads to redundancies, inefficiencies and integration issues. The Zachman Framework is both complex and comprehensive, and is presented in a matrix format, where:

The columns represent the questions that must be answered to design a business entity:

- What (data and entities)
- How (process or function)
- Where (location and network)
- Who (people)
- When (time)
- Why (motivation).

Whereas, the rows of the framework describe the different perspectives of the enterprise:

- Scope
- Business Model
- System Model
- Technology Model
- Detailed Representations.

The POLDAT Framework

Another, simpler structure that is often used in business process re-engineering projects is the POLDAT framework. This model develops documents, tables, matrices, graphs, models and organizes them in the following categories:

- **Process** – the business processes that flow value from the organization to the customer.
- **Organization** – the organizational entities that operate the business processes, including the management teams, staff positions, roles, competencies, knowledge and skills.

- **Location** – the location of the business units and other organizational entities, e.g., call centers, distribution centers, etc.
- **Data** – the data and information that is the “currency” of the organization, flowing through the processes to accomplish the business functions.
- **Applications** – the information technology (IT) applications that enable the business processes to operate efficiently and provide decision-support information to the management team.
- **Technology** – the enabling technology that supports the operation of the processes and applications.

In this framework, the Process, Organization and Location components comprise elements of the Business Architecture. When they are accompanied by the Data, Applications and Technology views, the entire Enterprise Architecture is complete.

.2 Techniques for Business Architecture Modeling

There are a variety of models and graphical representations of business entities that may be used to create the Business Architecture. Refer to Chapter 5 of the BAbOK for a more detailed description of the most-used business analysis models.

Component Business Models

IBM's Component Business Model is a simplified way of looking at an enterprise. The Component Business Model has evolved from traditional views of a business, such as business units, functions, locations or processes. Each model identifies a basic building block of the business, and includes the people, processes and technology needed by the component to deliver value to the customer.

Business Process Models

Process Models are often referred to as *Activity Models*. They describe the process associated with business activities and the information exchanged between activities. Process models are typically hierarchical in nature. They capture the activities performed in a business process, and the inputs, outputs, and resources used of those activities. Process models often reflect an enterprise wide horizontal perspective, not constrained by functional areas or business units.

Class Models

A *Class Model* describes static information and relationships between information. Like many of the other modeling techniques, it also can be used to model various levels of granularity.

Use Case Models

Use Case Models describe business processes or systems functions. A Use Case model describes the business processes of an enterprise in terms of actors involved in business

processes and organizational participants, (i.e., people, organizations, etc.). The early stages of Business Architecture it may be sufficient to develop a high level list of Use Cases providing a platform from which further levels of detail can be developed.

Business Scenarios

Business scenarios are a valuable technique that may be used as an input to the development of the Business Architecture to help identify and understand the workings of the business, and thereby to derive the business requirements and constraints that the architecture must address. Business scenarios are used to depict what should happen when planned and unplanned events occur.

Knowledge Management

While *Knowledge Management* is not typically thought of as a business analysis activity, it is fast becoming a critical competency in organizations. Knowledge Management is defined as the process of systematically managing, storing and using the vast array of knowledge that has emerged within an organization. It is the process of transforming intellectual property into a permanent asset.

.3 Business Architecture Tools

As the business and enterprise architecture activities become more comprehensive, it is helpful to use sophisticated modeling tools. In addition, archiving data management tools are used to consolidate the drawings and documents into a single repository to provide the foundation for further business analysis activities.

There is an array of tools that exist to help architects model, store, manage and share information about the enterprise. The tools are typically classified in two main categories, repositories and modeling tools. As with architecture techniques and frameworks, enterprise architecture tools are still emerging. However, the focus of business architecture is about understanding the business, and the business architecture work should not be overshadowed by the pursuit and use of technology tools.

2.3 Conducting Feasibility Studies

2.3.1 Purpose

Organizations are continually improving their strategic planning and goal setting process, accompanied by a deliberate approach to strategy execution. Building the current and future state Business Architecture provides a firm foundational understanding for where the organization is today, and where it wants to be in the future. The next logical step is to launch programs and supporting projects to manage the change and reach future goals as quickly as possible. Determining the optimal project investment path involves identifying alternative solutions and performing the analysis to select the best option.

A feasibility study may address either a business problem to be resolved, or a business opportunity to be seized. The main purpose of the study is to ascertain the likelihood of each potential solution alternative's probability of satisfying the business need in terms of

economic, operational and technical feasibility. The outcome of the feasibility study is a *recommended solution option* to be further defined in a business case.

2.3.2

Description

Feasibility studies are research efforts designed to help organizations understand the competitive environment, enabling them to make informed decisions the future of their business. Formal feasibility studies use reliable data, and apply proven methods of statistics and market research to ensure complete and accurate information is produced.

Typically, a feasibility study is conducted to determine the viability of an idea for a new business opportunity. Depending on the size, complexity and criticality of the study, it may be consider its own stand-alone project. Feasibility studies provide information:

- When executives are developing strategic goals and themes to drive toward strategy execution;
- During Enterprise Analysis to help the portfolio management team determine the best investment path to solve business problems and seize new business opportunities; and,
- During the requirements and design to help conduct trade-off analysis among solution alternatives.

The feasibility study is typically an integral part of formulating a major business transformation project, e.g., establishing a new line of business, increasing market share through acquisition, or developing a new product or service. Abbreviated studies may also be conducted for lower risk change initiatives. Although feasibility studies may be conducted prior to, during or after the completion of a business case, it is usually undertaken as part of the *overall analysis process to create the business case*.

2.3.3

Knowledge

Ideally individual(s) will have broad experience in business and IT, understand the concept of project value and what it may mean to their organization. In addition, the Business Analyst needs to understand:

- Financial analysis to evaluate the viability of a potential solution
- The industry and the organizational vision, mission, and strategic goals, as well as organizational policies and procedures that may affect the study or be affected by the change initiative under study
- A broad, not deep, understanding of the IT infrastructure that supports the business

2.3.4 Skills

Due to the wide range of techniques that are used when conducting a major feasibility study, the Business Analyst may not possess all of the skills required to plan and execute the study. Therefore, the Business Analyst must enlist a team of experts to provide the skills required, including:

- Research and information analysis skills
- Ability to plan and conduct the study, and document the results
- Technical writing skills
- Leadership and organizational skills
- Change management skills
- Communication skills (oral and written) in order to better facilitate, interview and communicate in a collaborative manner
- Ability to work independently or in a team environment.

.1 Predecessors

Predecessor activities to conducting feasibility studies include:

- Strategic planning and goal setting
- High level business issues and problems descriptions
- Business architecture framework.

2.3.5 Process and Elements

Based on the size and/or complexity of the situation, the study effort may be broken down into smaller, more manageable pieces and prioritized accordingly. The typical process steps to conducting a feasibility study include those outlined below. It must be noted that these steps are often be conducted *concurrently, iteratively* and, in fact, some steps may be *omitted entirely*, depending on the complexity and criticality of the effort. Process steps include:

- Determine requirements for the study
- Determine objectives, scope and approach, and plan the effort
- Conduct a current state assessment
- Identify potential solutions

- Determine the feasibility of each option
- Document and communicate the results of the study, and obtain approval to develop the Business Case for the recommended solution.

.1 Determine Requirements for the Study: Business Problem or Opportunity

Since feasibility studies are used to determine the approach to solving a business problem or seize a new business opportunity, the approach is slightly different. In the case of a business problem, the Business Analyst first determines and documents the problems faced by the organization and the potential areas of study required to address the issues. The analyst then conducts root cause analysis to determine the full nature of the problem, the actual cause (or causes) of the problem, the adverse impact it is having on the business and the criticality and required timing of the resolution.

To take advantage of a new business opportunity, the analyst defines the opportunity in as much detail as possible to understand the scope and determine the nature of the study. This information is then used to determine the methodology or approach to be undertaken to complete the study. For each business problem and/or opportunity, the analyst drafts a requirements statement describing the business need for a solution. Examples include:

- Implement a new business process which will improve time to market for current products by 30%.
- Implement a payroll system that complies with new state regulations by the end of the year.
- Establish a new line of business to address an identified market demand.
- Establish a project management office to lead strategic projects
- Implement a new financial system that complies with new regulatory requirements.

.2 Determine the Objectives, Scope and Approach and Plan the Study Effort

To plan the feasibility study effort, the Business Analyst first assembles a team of skilled resources who collaboratively perform the following tasks:

Establish specific, measurable objectives that the recommended solution must meet. These objectives provide the basis for formulating options for consideration.

- Develop benefit criteria upon which alternative solutions will be evaluated in the form of quantitative measurement criteria by which to judge the success of the investment in the recommended solution.

- Define scope of activities to be performed during the study.
- Define deliverable(s) to be produced from the study; if it does not exist, develop a template for the final feasibility study report.
- Review all of the information developed in steps 1 and 2 with the sponsor to validate requirements and scope, and to ensure the study will be complete, and will satisfy the business drivers. Review and validate:
 - Requirements of the study
 - Plans for the study
 - Objectives benefit criteria and measures by which to evaluate alternative solutions.

.3 Conduct a Current State Assessment

The study team conducts a limited amount of internal analysis when initiating the feasibility study. These may include review of business objectives, strategy and vision; analysis of current business processes; and assessment of current (as-is) and future (to-be) documentation. If Business Architecture has been created, the descriptive graphs and documents would provide the source from which this assessment would be conducted. The current state assessment consists of a review of all or part of these elements, depending on the nature and scope of the study:

- Strategy – Review the business vision, strategy, goals and measures.
- Business Area – Describe the mission of each line of business or business unit that is a stakeholder for the area under study, and collect relevant organizational charts.
- Locations – Document the physical location of each impacted business unit.
- Data and Information – Identify the major types of business information required. It is also helpful to list the repositories which retain the information listed.
- Infrastructure – List each of the current business technologies impacted by the initiative.
- Processes – List and provide a description of each of the current business processes relevant to this project.
- Competitive Arena – Describe the current business environment within which the business operates, including:
 - Market analysis, competition, products and services available

- Emerging markets and technologies
- Regulatory or legislative changes.

.4 Identify Potential Solutions

At this point the study team conducts external research activities to uncover general information about the industry, the competitive environment, best practices, risks and results of the actual similar approaches that have been implemented by others to solve the business problem or seize the new opportunity under consideration. Then, the team identifies as many potential options as possible to meet the objectives identified in the planning process. It is important to note that the list of possible alternatives should include the option of doing nothing.

.5 Determine the Feasibility of each Option

For each potential solution, typical analysis steps include the following:

- Describe the solution option in as much detail as possible, perhaps building a high-level work breakdown structure (WBS), a hierarchical decomposition of the solution, to bring the full scope of the effort into view.
- Identify methods to assess the alternative, ensuring the analysis of the economic, operational and technical feasibility of the option. Examples of methods include: prototyping to prove the highest risk portions of the solution option are technically feasible, market surveys to ensure there is a demand for the solution and it will be economically feasible, technology capability assessment to ensure the solution does not require new, unproven technology, and business staff interviews and IT staff interviews to determine operational feasibility.
- Identify expected results of the assessment.
- Define assessment steps.
- Undertake feasibility analysis for each option.
- Review results to ensure completeness.

.6 Document and Communicate the Results of the Study

Describe the results of the feasibility study for each identified alternative solution. Share the results with the executive sponsor of the study, and secure approval to proceed with the analysis activities to build the Business Case for the recommended option.

2.3.6

Stakeholders

Stakeholders who are involved in or impacted by pre-project feasibility studies include the following:

- Executive management

- Business process owners
- Business unit managers
- Subject matter experts who are participating in Enterprise Analysis activities: Business Analysts, project managers, technology managers.

2.3.7 *Deliverables*

The deliverable is a *Feasibility Study Report* that includes environmental information, both internal and external to the organization that is relevant to the business problem or opportunity. Other elements that may be included in the report are listed below. It should be noted that the information in the feasibility report is preliminary and at a very high level. Further analysis is needed to fully define a proposed project, as described in other sections of this chapter.

The Feasibility Study Report identifies each of the solution options available and rates the likelihood of each option achieving the desired result. The Feasibility Study Report is typically comprised of the following information:

- Executive Summary
- Business problem and/or opportunity statement, including information uncovered during the current state assessment and the external research activities
- Feasibility study requirements, including the business drivers of the initiative
- For each option that was assessed, the results of the study including the following pieces of information:
 - A complete description of the solution option
 - A complete description of the assessment process and methods that were used
 - A complete description of the overall results; document expected vs. actual results, scoring, and other considerations
 - A list of identified risks associated with the alternative. A risk is an event that may adversely affect the ability of the solution to meet the business need, including bringing about the business benefits (in terms of profitability, reduced cost, increased market share, etc.). Risks can be strategic, environmental, financial, operational, technical, industrial, competitive, or customer related.
 - A list of identified issues which adversely impact the success of the solution.

- Assumptions made during the study process to close gaps in information. It is important to note that if the assumption does not prove to be true, it may pose a risk to the success of the option under consideration.
- Alternative Solution Ranking
 - Ranking criteria
 - Ranking scores
- Results – recommended solution, including any additional rationale for the decision
- Appendix containing all supporting information.

Additional information that may be included in the final report includes:

- Strategic alignment of the proposed change initiative to the organizational strategy, direction and mission extracted from the Business Architecture activity
- Technology alignment with the current Enterprise Architecture standards
- Availability of COTS (Commercial Off the Shelf) software packages
- Extent to which existing business solutions will be changed, managed and affected.

2.3.8

Techniques

There is an array of techniques that may be used to conduct the feasibility study, including techniques to:

- Conduct the current state assessment
- Plan the feasibility study effort
- Identify solution options
- Assess the feasibility of each solution option.

.1 Techniques to Conduct the Current State Assessment

There is an array of techniques the Business Analyst uses to capture the current state of the business. If the organization has an up-to-date Business Architecture, the task to document the current state will have been completed, and the Business Analyst needs only to review and glean as much understanding as possible about the business from the Business Architecture documentation. If this is not the case, documentation that is developed during the current state assessment by the feasibility study team will serve as a basis for the first iteration of the Business Architecture for the current state. Therefore,

most if not all of the techniques used to develop the Business Architecture are applicable when assessing the current state, including:

- **Organization Charts** to depict business entities impacted by the study.
- **Geographical Maps** to depict the physical locations of the business entities.
- **Data Flow Diagrams** to describe the major types of information required by the business processes that will be impacted.
- **Technology Architecture Diagrams** to show the interfaces between current business technologies.
- **Process Flow Diagrams** to depict the flow of process steps to complete a business function.
- **Domain Modeling** techniques are used to provide a simplistic visualization of the business area under consideration to understand the scope of the initiative.
- **Six Sigma** techniques to use data and statistical analysis to measure both current and future state process efficiency.
- **Root Cause Analysis** to identify the conditions that initiate the occurrence of the undesired activity or state.

.2 Techniques to Plan the Feasibility Study

During this step, the Business Analyst enlists the assistance of an experienced project manager. Techniques include:

- Standard **Project Management** techniques to plan and manage the feasibility study activities.
- **Brainstorming** techniques to identify as many potential solutions as possible that will meet the requirements.
- **Work Breakdown Structure** (WBS) to provide a decomposition of each proposed solution as part of the description of each option.

.3 Techniques to Identify Solution Options

During this step, the Business Analyst facilitates a creative session to identify as many potential options as possible. Techniques include:

- **Brainstorming** techniques to identify as many potential solutions as possible that will meet the requirements.

- **Six Sigma** techniques are also useful when the study is focusing on business process improvement because of its quality measurement and improvement capabilities.
- **Business Process Reengineering** techniques may be used by the study team to foster fundamental rethinking and radical redesign of business processes to achieve dramatic improvements.
- **Cause-and-Effect** diagramming techniques graphically summarize the results of a brainstorming session, identifying the causes of a specified undesirable outcome.

.4 Techniques to Conduct the Analysis of the Feasibility of each Option

During this step, the Business Analyst involves all members of the study team. Techniques that may be used include:

- **Market Surveys** to prove acceptance and to forecast demand in the marketplace.
- **Technology Feasibility Assessment** to ensure the option is not beyond the organization's current limits of technology.
- **Interviews**
 - Business staff interviews to determine operational feasibility in the workplace
 - IT staff interviews to determine operational feasibility in the technical operating environment
 - Finance staff and project manager interviews to estimate the cost of the alternative solution to ensure economic feasibility.
- **Prototyping** to build the highest risk component of a proposed solution to prove that solution is technically feasible.
- **Risk** identification, assessment, ranking and risk response planning.
- **Benchmarking Analysis** to determine best-in-class practices.
- **Competitive Analysis** to examine the viability of market success of the solution.
- **Environmental Impact Analysis** to determine the likely environmental impacts of the proposed solution.
- **Technology Advancement Analysis** to examine the latest technical approaches to solving the business problem.

- Early **Cost Vs. Benefit Analysis** to determine the economic viability of the each option (this will be covered in more detail under the task to develop the business case).
- **COTS Package** compare/contrast analysis to decide whether to select a commercial-off-the-shelf product for a part or all of the solution option.
- **Issue** identification, assessment, ranking and issue response planning.
- **Pareto Diagram** to be used as a presentation device to help assess the relative value and cost of potential solutions.
- The **Analytic Hierarchy Process** (AHP) to help study teams make the best decision, capturing both qualitative and quantitative aspects of the decision. The process is used to reduce these complex decisions to a series of simple comparisons. Its power is that it provides a clear rationale for the decision.
- **Decision Analysis** is also used to help study teams make the best decision by providing a statistical method to delineate the probabilities of various outcomes.
- **Decision Tables** are a matrix representation which can be used to communicate the logic of the decision for the recommended option.
- **Structured Problem Solving Techniques** to provide mechanisms to receive and retrieve new information in a systematic manner, e.g., the explicit method.
- **Data Gathering and Research Approaches** to conduct a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to the knowledge about each option.
- **Probability Analysis** is also used to help study teams make the best decision by providing a mathematical description of the likelihood of a specific event.

2.4 Determining Project Scope

2.4.1 Purpose

Once the business solution has been identified, it must be further defined. The purpose of this task is to define the project to conceptualize and design the recommended solution in enough detail to build a business case, conduct an initial analysis of the risks and propose a new project to the portfolio management governance group. The preliminary scope definition provides a documented basis for building the business case. The activities include:

- Describing the business environment in enough detail to provide context to the new project.

- Describing the business requirements in enough detail to understand the business needs.
- Defining the scope of the work that must be performed to deliver the product, service or results to meet the business objectives in enough detail to prepare time and cost estimates.

During Enterprise Analysis, it is likely that a project manager has not yet been assigned, since the project has not yet been approved. Since project scoping and defining is typically the role of the project manager, the Business Analyst enlists the assistance of an experienced project manager to establish the boundaries of the business problem and solution and define the scope of the proposed project. The Business Analyst, serving as the lead during Enterprise Analysis activities, facilitates the development of the high level scoping documentation that is needed to build a Business Case for the proposed initiative. It is likely that the Business Analyst will not only enlist the assistance of a senior project manager, but also a business and technical lead to serve as a *proposal team*, compiling the decision package for the executive sponsor of the proposed project. It is useful if the study team that conducted the feasibility study also serves as the proposal team to continue the effort quickly.

2.4.2 *Description*

Defining the proposed project scope includes:

- Describing business objectives
- Determining expected deliverables at a high level in terms of products, services or other outcomes
- Documenting business assumptions and constraints
- Building a statement of the anticipated work effort.

2.4.3 *Knowledge*

The knowledge requirements for the proposal team of subject matter experts include the following.

An understanding of external frameworks for business process improvement, including but not limited to:

- Business process re-engineering concepts and techniques
- Business architectural frameworks that provide industry context to Enterprise Analysis, e.g., The Zachman Framework.

- Capability Maturity frameworks that provide proven methods to advance organizational capabilities, e.g., the Carnegie Mellon University, Software Engineering Institute's Capability Maturity Model.
- International standards that are proven to enable business processes, e.g., ISO, the International Organization for Standardization.
- An understanding the business environment, including industry standards, organizational culture, politics, social networks, organizational structures and norms within the enterprise.
- Knowledge of general management disciplines, e.g., financial management, purchasing, sales and marketing, contracts, manufacturing and distribution, logistics, strategic planning, operation planning, health and safety practices.

A basic understanding of the Project Management Institute Project Management Body of Knowledge (PMBOK), including:

- Project life cycles
- Project management process groups
- Project management knowledge areas, especially project scope management
- Projects, subprojects, programs and portfolios.
- Knowledge of the impacted application area standards and regulations:
- Functional departments within the enterprise
- Supporting disciplines within the enterprise: legal, production, inventory management, marketing, logistics, human resources
- Knowledge about the technology elements supporting the enterprise, including engineering, research and development, information technology
- Familiarization with management specializations, including government contracting, new product development.

2.4.4 Skills

Skills required to scope and define the proposed project include:

- Planning, estimating and scheduling.
- Scope definition and decomposition.

- Interpersonal skills: influencing the organization, leadership, motivation, negotiation, conflict management.
- Documentation and diagramming approaches used to describe typical business components including entity relationship diagrams, process diagrams, and workflow diagrams. Note: these will be developed only at a very high level at this point, to ensure the scope of the proposed project is understood.

Communication skills:

- Written communication
- Presenting
- Interviewing
- Listening
- Teamwork/Collaboration.

2.4.5 Predecessors

Predecessor activities to scoping and defining the proposed new project include:

- Strategic planning and goal setting
- Business architecture development and documentation
- Business opportunity and/or problem definition
- Feasibility studies to conduct alternative solution analysis and determine the recommended solution.

2.4.6 Process and Elements

Scoping and defining the project proposal includes:

- Drafting the preliminary project scope statement
- Developing a high-level work breakdown structure
- Developing cost and time estimates
- Describing the project approach.

.1 Draft the preliminary project scope statement

Drafting the preliminary project scope statement involves developing a high level description of the work that must be performed to deliver the proposed new business

solution. Scope statements typically clearly state in-scope and out-of-scope elements of the solution.

In addition, develop a list of key stakeholders who will be involved in or impacted by the project. Describe the new solution in terms of the major features and functions that are to be included. Finally, depict project boundaries in terms of business units impacted, business processes improved or redesigned, process owners, IT systems and technology that will be impacted.

.2 Develop a high-level Work Breakdown Structure

Creating a high-level work breakdown structure (WBS) involves decomposing the work that must be performed into lower-level deliverables. The WBS is used to further define the project scope, and for cost and schedule estimating. In this early pre-project analysis, the WBS should be decomposed only to levels 2 or 3.

.3 Develop Cost and Time Estimates

Develop initial cost and resource requirement estimates, including costs to procure, develop, integrate, test, deploy and operate the new business solution. In addition, develop the initial milestone schedule.

.4 Describe the Project Approach

Describe the initial project approach and structure, e.g., partitioning the proposed project into releases that will deliver useful subsets of functionality to the business, outsourced development of the entire solution, purchase an existing system and integrate the solution into current business processes and technology, etc.

2.4.7 Stakeholders

Key stakeholders who are involved in or impacted by the proposed business solution scoping activities include:

- Business executive sponsor of the proposed project..
- Business process owner(s) and business process subject matter experts for the business area to be changed. The business process experts will assist in defining the project objectives, business area constraints and the process boundaries of the project.
- IT management who is supporting the business area. The IT manager will help scope the components of the business process that will be supported with technology.
- The portfolio management governance group.

2.4.8 ***Deliverables***

The deliverable from this effort is the scope statement and supporting information defining the following components by inclusion or reference. This documentation is input to the preparation of the *Business Case*, and includes the following elements.

- Summary of activities that led up to the recommended solution including the business environment analysis and competitive analysis.
- Strategic alignment describing how the initiative fits with organizational direction or mission.
- Business objective(s) and high-level business requirements.
- Product description and scope.
- Project boundaries including context diagrams to provide a visual model of the scope of the project.
- Assumptions and constraints.
- Major project milestones, funding requirements and limitations.
- Initial project approach including resource requirements, methodology, tools, and training requirements.
- Current and future standards, policies, regulations to be adhered to and impacts to the initiative.
- Commercial Off-the-Shelf (COTS) packages available vs. customized development of the solution.
- Dependencies, including downstream systems, interfaces, supporting data required.

2.4.9 ***Techniques***

.1 Techniques to Define the Scope of the Proposed Project

Scope Decomposition and Decomposition

Scope definition and decomposition involve the activities to size the proposed project so that estimates can be made of costs, resources requirements and project duration. Scope definition and decomposition are traditional project management practices designed to understand the full scope of a project. When used as a component of pre-project Enterprise Analysis activities, the Business Analyst typically enlists the help of a senior project manager who is skilled in early scope decomposition and cost and time estimation. This information is critical for the portfolio management governance group to

understand the magnitude of the proposed project, and for the proposal team to develop cost and schedule estimates. Techniques include:

- **Work Breakdown Structure** (WBS), a decomposition of work that is required to complete a project to accomplish the business objectives. It is typically deliverable-oriented and hierarchical in nature. The WBS describes the total scope of the project work to be performed.
- Initial product analysis represented in a **Product Breakdown Structure** (PBS) format, a decomposition of the components of the product. The PBS describes the total scope of the product or service to be delivered.
- **System Interface Analysis**, a depiction of the scope of work required to integrate the new solution into the business and technical environments.

.2 Context/Business Domain Models

The *Context Diagram* provides a visual model of the scope of the project. It serves as a high-level view of the business solution to be built, and identifies the entities that interface with the solution. Context diagrams are reviewed by all stakeholders and therefore are written in natural language so that business stakeholders can understand the items within the document. Context diagrams are used early in a project to get agreement on the scope under review. A *Use Case Diagram* also represents the scope of the project at a similar level of abstraction as the context diagram. See Chapter 5 for more detailed information on context diagrams.

2.5 Preparing the Business Case

2.5.1 Purpose

The Business Case will ultimately be submitted to management as a basis to determine whether further investment in the project is warranted, i.e., funding for project initiation, planning and requirements elicitation, analysis and documentation. It is common business practice to require the discipline of Business Case development for large-scale initiatives. The Enterprise Analysis activities culminate in development of the Business Case to ensure that adequate information is presented for the portfolio management governance group to make the best investment decisions.

2.5.2 Description

The Business Case describes the justification for the project in terms of the value to be added to the business as a result of the project outcomes vs. the cost to develop the new solution. It usually includes information about the opportunity in terms of the market trends, competitive environment and expected market penetration if a feasibility study is not available to provide this context information. The Business Case also includes qualitative and quantitative benefits, estimates of cost and time to breakeven, profit expectations, follow-on opportunities, etc. The Business Case may present expected cash

flow consequences of the action, over time, and the methods and rationale that were used for quantifying benefits and costs. This provides a framework to demonstrate how the initiative is expected to achieve business objectives.

The Business Case also discusses the impact of the proposed change initiative on the business operations, as well as on the technology infrastructure. In addition, the Business Case lists the constraints associated with the proposed project, along with the estimated budget, and alignment with priorities established by the business.

2.5.3 *Knowledge*

In addition to the knowledge required to define and scope the proposed initiative, Business Case authors need:

- An understanding of accounting practices in order to quantify costs and benefits that will result through the proposed project that is under consideration.
- Knowledge of how to translate the proposed change into financial terms and knowing when and how to use financial projection techniques described in this section is also needed.
- Knowledge of the organizational strategy and goals, the relevant business processes and the supporting technical infrastructure is required.
- Financial analysis to forecast the economic impacts of the proposed new project; it may be necessary to enlist the assistance of financial analysis experts to support this activity.

2.5.4 *Skills*

The Business Analyst typically leads the effort to construct the business case, in collaboration with other subject matter experts. In addition to the skills mentioned in the previous section to scope and defining the proposed initiative, the following skills are required:

- Financial analysis
- Financial profit projection models
- Use of technology tools to represent the benefits and costs.

2.5.5 *Predecessors*

Predecessor activities to preparing the Business Case for the new opportunity include:

- Strategic planning and goal setting
- Business architecture framework

- Business opportunity and/or problem definition
- Feasibility studies
- Proposed project scope definition.

2.5.6 *Process and Elements*

The information gleaned from the preceding Enterprise Analysis activities serve as critical input to Business Case development. To develop the business case, the following steps are involved:

- Identify and Quantify the Benefits
- Identify and Quantify the Costs
- Prepare the Business Case
- Determine the Measurement Process for the Costs and Benefits.

.1 *Identify and Quantify the Benefits*

Measure the benefits of the recommended solution in terms of both qualitative and quantitative gains to the enterprises. Where possible, benefits should be quantified, however, benefits of a non-financial nature are also identified. Ideally, benefit estimates should relate back to strategic goals and elements of the balanced scorecard.

.2 *Identify and Quantify the Costs*

Estimate the total net cost of the solution. This requires estimates to be made of capital expenditures for the new investment, costs of developing and implementing the change, opportunity costs of not investing in other options, costs related to changing the work and practices of the organization, total cost of ownership to support the new solution and consequential costs borne by others.

It is a difficult endeavor to prepare cost estimates for IT projects during pre-project Enterprise Analysis activities, when only very high level planning and requirements definition has occurred. Since the decision is made to invest in projects at this early point, there is a strong desire on the part of senior management to have cost estimates fixed at this point in time. The desire for fixed cost estimates, however, is not supported by the reality of most IT projects. By their nature, IT projects have a higher level of uncertainty, and require a greater investment in defining the solution before costs and benefits can be articulated with a high level of confidence. At this point, the accuracy of the cost estimates is used to help confirm the viability of the proposed new project.

.3 *Prepare the Business Case*

Develop the Business Case at the level of detail sufficient to demonstrate project viability and secure a go/no go decision for the initiative.

.4 Determine the Measurement Process for Costs and Benefits

Underlying many of the problems associated with both the development and the realization of Business Case projections is an immature measurement culture within the organizations today. The Business Case should articulate not just the benefits that will be realized, but how those benefits will be assessed and evaluated. The Business Case may also include a plan for benefit measurement and reporting, including where realignment of internal measures or systems is needed to ensure that the behaviors we are seeking can be seen, evaluated, and realized.

The business defines assumptions regarding how benefits will be apportioned; particularly in situations (increased revenue being the most common) where a change in what is being measured cannot always be fully attributed to one project alone. The resulting measurement approach is accepted as part of the Business Case approval along with the actual cost and benefit projections.

2.5.7 Stakeholders

Key stakeholders who are involved in or impacted by the Business Case include:

- Business executive sponsor of the proposed project. The executive sponsor will likely use the Business Case to present the new project proposal to the portfolio management team for a decision to further invest in the project.
- Business process owner(s) and business process subject matter experts for the business area to be changed. The business process experts likely assist in estimating business benefits expected from the new initiative.
- IT manager who is supporting the business area. The IT representative likely established cost projections for the technology needed to support the new solution.
- Senior project managers (PM). The PM assists the Business Analyst in establishing initial cost and time estimates.
- The portfolio management team, aka, project investment governance group. This committee comprised of senior executives reviews the Business Case information and determine whether to invest in the proposed new initiative.

2.5.8 Deliverables

The deliverable from this effort is the Business Case document. The Business Case will incorporate a summary of the findings from a number of the other documents and reference other documents, models and charts that have been produced to date relevant to the opportunity.

Organizational standards typically dictate the contents and format of the Business Case document. Ultimately, the final deliverable presents the information necessary to support

a go/no go decision to invest and move forward with a project. A sample Business Case table of contents would contain the following elements:

1. Executive Summary
2. Introduction And Summary
 - a. Project Rationale For Preferred Option
 - b. Current Business Process
 - c. Description Of The Problem
 - d. Opportunity
 - e. Project Objectives
 - f. Project Scope
 - g. Business Benefits
 - h. Project Costs
 - i. Assumptions
 - j. Potential Business And Staff Impact Analysis
 - k. Potential Technology Impact Analysis
 - l. Other Issues
 - m. Implementation Plan
3. Approach
 - a. Financial Metrics
 - b. Privacy Impact Assessment
 - c. Alternative Evaluation Criterion
4. Key Selection Criterion
 - a. Weighting
 - b. Constraints And Limitations
5. Preferred Alternative (Insert Title)

- a. Business Benefits
 - b. Alternative Costs
 - c. Assumptions
 - d. Potential Business And Staff Impact Analysis
 - e. Other Issues
6. Risk Management Plan
 - a. Risk Assessment
 - b. Risk Response
 - c. Benefit Realization
 7. Conclusion and Recommendations.

2.5.9

Techniques

Many techniques are used to develop a Business Case for proposed project, including both qualitative business benefit analysis and quantitative financial profit/profitability models. Several of these techniques are described below.

.1 Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis

The SWOT analysis demonstrates how the organization will maximize strengths and minimize weaknesses relevant to the proposed solution. It includes a discussion of the opportunities now possible because of the solution. It is also a means to identify, minimize and prevent threats to the organization that may be caused by the solution.

.2 Financial Valuation

Financial valuation techniques include

- Discounted Cash Flow
- Net Present value
- Internal Rate of Return
- Average Rate of Return
- Pay Back Period

.3 Cost-Benefit Analysis

Cost/Benefit Analysis seeks to compare the costs of implementing a solution against the benefits gained from it. This technique is effective when both the costs and the benefits can be quantified.

.4 Activity Based Costing

Activity Based Costing (ABC) is a technique that measures the development and performance cost of activities, resources, and items. **ABC** identifies opportunities to improve business process effectiveness and efficiency by determining the "true" cost of a product or service. ABC focuses attention on the total cost of ownership, including the cost to produce a product or service, operate it during its life, and the ability to recover the cost.

2.6 Conducting the Initial Risk Assessment

2.6.1 Purpose

The purpose of the initial risk assessment is to determine if the proposed project carries more risk than the organization is willing to bear.

2.6.2 Description

Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on at least one project objective, such as time, cost, scope, or quality (PMBOK Guide Third Edition). Project risk management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project. The initial risk assessment is performed as a component of Enterprise Analysis activities. Most of the risk management processes are updated throughout the project. Since this is a project management practice, the Business Analyst typically enlists the assistance of a senior project manager to perform the risk assessment.

2.6.3 Knowledge

To perform risk assessment, the Business Analyst enlists the assistance of an experienced project manager and other members of the study team who possess an understanding of:

- Risk management principles and concepts
- Financial analysis and profit projection models
- Business enterprise structure, operations, skill sets, etc.
- Organizational readiness for the change initiative
- Technical feasibility of the proposed solution, both to build and to operate and maintain the technology.

2.6.4 Skills

Skills required to conduct the initial risk assessment include:

- Facilitation
- Risk identification
- Risk probability and impact assessment
- Overall risk rating development.

2.6.5 Predecessors

Predecessor activities to conducting the initial risk assessment include all Enterprise Analysis activities performed to date.

2.6.6 Process and Elements

The process steps to conduct the initial risk assessment include:

- Identifying project risks
- Assessing risk probability and impact
- Planning risk responses
- Assessing organizational readiness and calculating an overall risk rating.

.1 Identify Risks

Identifying project risks involves the following activities:

- Identifying and analyzing business risks
- Identifying and analyzing financial risks
- Identifying and analyzing technical risks.

.2 Assess Risks

Assessing risks involves analyzing the probability of the risk occurring, and the impact if the risk does occur.

.3 Plan Risk Responses

For high probability/high impact risks, identifying risk mitigation strategy and contingency response plans. Assess the cost of each risk response plan and add these costs to the overall initiative cost estimates.

.4 Assess Organizational Readiness

Assess the overall organizational readiness for the magnitude of the change embodied in the proposed new project.

- Quantify change management risk, impacts and response plans
- Describe and quantify the risk to the organization of doing nothing
- Calculate an overall risk rating for the proposed initiative in terms of costs, time, and quality of the business operations.

2.6.7 Stakeholders

Key stakeholders who are involved in or impacted by the risk assessment include:

- Business executive sponsor of the proposed project. The executive sponsor will likely present the new project proposal with the Business Case and the risk rating to the portfolio management team for a decision to further invest in the project.
- Business process owner(s) and business process subject matter experts for the business area to be changed. The business process experts assist in analyzing risks to achieving the business benefits expected from the new initiative.
- IT manager who is supporting the business area. The IT representative assist in analyzing technology risks, and risks to cost projections for the technology needed to support the new solution.
- Senior project managers (PM). The PM assists the Business Analyst in establishing risk estimates.
- The portfolio management team, aka, project investment governance group. This committee comprised of senior executives will review the Business Case and initial risk assessment information and determine whether to invest in the proposed new initiative.

2.6.8 Deliverables

The deliverable from this effort is the initial Risk Rating for the proposed initiative and the nature and cost of the risk response plan. This information is typically added to the Business Case document.

2.6.9 Techniques

Techniques to determine the initial risk rating include standard project risk management methods, such as risk probability and impact assessment and overall risk rating analysis. In addition, techniques to help identify potential risks include information gathering techniques, such as:

- Brainstorming
- Interviewing
- Root cause identification
- SWOT analysis.

2.7 Preparing the Decision Package

2.7.1 Purpose

The purpose of this activity is to provide an actionable set of information regarding the proposed new project to the organizational decision makers. The business sponsor of the proposed initiative is typically the individual who proposes the proposed new project to the governance group for them to select and prioritize the portfolio of projects for the enterprise. The Business Analyst plays a major role in compiling all of the information gathered during the Enterprise Analysis activities.

The proposal documentation includes or references all information gathered about the proposed project to date. In addition, the proposal identifies and justifies the next steps in the overall process to continue with the proposed new project opportunity, including approval of funding for the next major phase of the project and appointing a project manager and core project team to proceed with project initiation, planning and requirements development.

2.7.2 Description

This activity compiles the documents and summarizes all relative information about the proposed project.

2.7.3 Knowledge

This activity requires knowledge in the following areas:

- Portfolio management
- Project selection and prioritization.

2.7.4 Skills

Skills required to prepare the project proposal documentation set include:

- Written communication skills
- Executive briefing preparation skills.

2.7.5 ***Predecessors***

Predecessor activities to conducting the initial risk assessment include all Enterprise Analysis activities performed to date.

2.7.6 ***Process and Elements***

The Business Analyst compiles all relevant information from the Enterprise Analysis activities. In addition, an executive presentation is prepared summarizing the proposed project and recommendations.

2.7.7 ***Stakeholders***

Key stakeholders who are involved in or impacted by the project proposal include:

- Business executive sponsor of the proposed project. The executive sponsor will likely present the new project proposal to the portfolio management team for a decision to further invest in the project.
- The portfolio management team, aka, project investment governance group. This committee comprises of senior executives will review the project proposal information and determine whether to invest in the proposed new initiative.

2.7.8 ***Deliverables***

Deliverables from this effort include:

- The Business Case and supporting Enterprise Analysis reports
- Executive Briefing.

2.7.9 ***Techniques***

Techniques used to prepare the decision package include:

- Executive-level communication techniques
- Data representation techniques.

2.8 **Selecting and Prioritizing Projects**

After the decision package is complete, it is used by the sponsor of the proposed project to present the proposal to the portfolio management governance group. As the individual who possesses the most knowledge about the opportunity, the Business Analyst often supports the sponsor when presenting the project proposal information.

The portfolio management process enables the organization to select the right investment path from the mix of potential opportunities including (1) research initiatives, (2) new product development activities, (3) information technology enhancements, (4) internal business improvement projects, and (5) new business endeavors. Through enterprise

portfolio management, the organization is positioned to allocate scarce corporate assets in priority order to ensure projects have the necessary resources to achieve their strategic goals.

Portfolio planning and management groups usually follow a structured decision-making methodology for selecting the portfolio of valuable projects. Since all project proposals cannot be funded, selecting projects requires a framework consisting of a predetermined, structured, defined decision-making process. The Business Analyst not only plays a vital role in preparing the project proposal information as input to the portfolio management process, but also is involved in continually improving the process for project selection and prioritization process. As we have seen, the Business Analyst uses sophisticated opportunity assessment and documentation techniques to prepare the information presented to management so that they can make informed project selection decisions.

To ensure they invest in the most valuable projects, executives and key stakeholders are required to evaluate potential change initiatives that will enable their organization to reach their strategic business objectives. To select and prioritize the best change initiatives, executives need information largely provided through the efforts of the Business Analyst. The critical information will allow them to:

- Clearly understand the business problem or opportunity and the impacts of the proposed project to the enterprise and to specific business units.
- Consider the options and the relevant costs and benefits of each alternative opportunity.
- Understand the organization's project resource capacity and expertise to deliver a quality business solution.
- Prioritize and establish a means to measure progress to ultimately deliver the expected business value.
- Provide guidance for formulation of the adopted course of action and project related direction in terms of goals and constraints.
- Participate in project reviews for ongoing management oversight.
- Ensure delivery of expected results and value added to the enterprise.

2.9

Launching New Projects

Once a project has been approved, a project charter is prepared and a project manager is assigned. The Business Analyst collaborates with the project manager throughout the project initiation and planning process. It is at this point that the Business Analyst will begin to plan the requirements elicitation, analysis and documentation activities.

2.10

Managing Projects for Value

Once projects are funded, they must be managed throughout the project life cycle to ensure that the Business Case remains valid and continued investment in the project is still warranted. The Business Analyst plays a critical role in the project control gate review process.

Typically, management reviews of ongoing projects are held at key project milestones to re-validate the business case, review current estimates of cost and time, validate or refine the project priority, and make a go/no go decision about funding the project for the next phase. At key milestones the Business Analyst partners with the project manager, business representative(s), and the lead architects and developers to update the project plans, current cost/schedule estimates, the risk assessment and the business case. Once these documents have been updated, the core team arrives at a consensus recommendation to management regarding continued investment in the project. The Business Analyst will often attend the management review meetings and help present the current status of the project and the recommendation for future funding.

2.11

Tracking Project Benefits

Once projects solutions are implemented, the project team is usually disbanded and reassigned to new projects. However, the process is incomplete unless the organization measures the return on project investments (ROI). The Business Analyst plays a vital role in ensuring the metrics and measurements are in place to track project ROI, often several months or years after project completion.

Ideally, the measures of success were identified during the pre-project business planning activities and documented in the business case. To track and analyze the ROI, the data collection process must be delivered as part of the business solution (if it does not already exist). The Business Analyst then reviews the data, tracks trends, and reports to the project sponsor and portfolio management team on actual project ROI. It is through this process that the portfolio management team can determine how valuable the project was to the enterprise. If the ROI is not realized, one or more strategic goals or objectives may not have been met, or may have been met only partially. In order to continuously improve the project selection and execution process, the organization should conduct a root-cause analysis to determine what circumstances prohibited the project outcomes from delivering the expected value to the organization.

2.12

References

Ambler, S. (n.d.). Agile analysis. Retrieved Apr. 08, 2005, from Ambyssoft Web site:
<http://www.agilemodeling.com/essays/agileAnalysis.htm>.

Ambler, S. (n.d.). When does(n't) agile modeling make sense? Retrieved Apr. 08, 2005, from Ambyssoft Web site:
<http://www.agilemodeling.com/essays/whenDoesAMWork.htm>.

- Bechtold, R. (1999). Essentials of software project management. Vienna, VA: Management Concepts.
- The Carnegie Mellon University, Software Engineering Institute, The Capability Maturity Model, (1994) Addison Wesley Longman, Inc.
- Dye, Lowell D. and Pennypacker, James S. (1999) Project Portfolio Management, Selecting and Prioritizing Projects for Competitive Advantage. Pennsylvania: Center for Business Practices.
- Dymond, K.M., A Guide to the CMM, (1995) Process, Inc., Annapolis, MD.
- Fowler, M. (2003). The new methodology. Retrieved Apr. 08, 2005, from martinfowler.com Web site:
<http://www.martinfowler.com/articles/newMethodology.html>.
- Hadden, R. (2003). Leading culture change in your software organization. Vienna, VA: Management Concepts.
- Hass, Kathleen B. (2006) Business Analyst as Strategest. Vienna, VA: Management Concepts
- Intervista Institute, Inc. (2003). Managing Integration in a Federated Architecture Environment, <http://www.intervista-institute.com/articles/zachman-by-kull.html>, <http://www.intervista-institute.com/articles/zachman-by-kull.htm>
- Jalote, Pankaj, CMM in Practice, (2000) Addison Wesley Longman, Inc., Reading, MA
- Goodpasture, John C. (2002) Managing Projects for Value. Vienna, VA: Management Concepts, Inc.
- Kaplan, R. and Norton, D. (1996) The Balanced Scorecard: Translating a Strategy into Action. Boston: Harvard Business School Press
- Mooz, H., Forsberg, K., & Cotterman, H. (2003). Communicating project management: the integrated vocabulary of project management and systems engineering. Hoboken, NJ: John Wiley and Sons.
- OSD Comptroller iCenter,**
<http://www.dod.mil/comptroller/icenter/learn/abcosting.htm>
- Project Management Institute, Inc. (2004) A Guide to the Project Management Body of Knowledge, Third Edition, Newtown Square, PA.
- Rad, Parviz F. and Levin, Ginger, Advanced Project Management Office, (2002) CRC Press LLC, Boca Raton, FL.

Sodhi, J., & Sodhi, P. (2003). Managing IT systems requirements. Vienna, VA: Management Concepts.

Sodhi, J., & Sodhi, P. (2001). IT project management handbook. Vienna, VA: Management Concepts.

The Standish Group, (1999). Unfinished voyages: a follow-up to the chaos report. Retrieved Apr. 08, 2005, from The Standish Group Web site:
http://www.standishgroup.com/sample_research/unfinished_voyages_1.php.

Scholtes, Peter R., The Team Handbook, How to Use Teams to Improve Quality, (1988) Joiner Associates, Inc., Madison, WI.

Stevens, R., Brook, P., Jackson, K., & Arnold, S. (1998). Systems engineering: coping with complexity. Indianapolis, IN: Pearson Education, Prentice Hall PTR.

Wiegers, K. (2003). Software requirements: practical techniques for gathering and managing requirements throughout the product development cycle. 2nd ed. Redmond, WA: Microsoft Press.

Young, R. (2001). Effective requirements practices. Addison-Wesley information technology series. Boston: Addison-Wesley.

<http://www.research.ibm.com/journal/sj/381/mcdavid.html>

Chapter 3: Requirements Planning and Management

3.1 Introduction

3.1.1 Knowledge Area Definition

The *Requirements Planning and Management* Knowledge Area defines the resources and tasks associated with the planning and management of requirements gathering activities throughout the requirements process. The Business Analyst must define the requirements activities that will be performed and how the requirements activities will be performed on a project, in accordance with any existing standards in the organization. It includes identifying key roles, selecting requirements activities, managing the requirements scope and ongoing communication of the requirements gathering status. Proper planning and management of requirements gathering activities ensures the success of the requirements process and requirements deliverables.

The Business Analyst must select which stakeholders, tasks, and communication tools will most effectively provide the Business Analyst with the needed requirements deliverables. For example, the Business Analyst must determine if the company CIO is a stakeholder and if so, decide how best to gather requirements information from this individual, merge this information with requirements gathered from other stakeholders, and communicate all stakeholders' requirements in an effective format.

3.1.2 Rationale for Inclusion

The rationale for including this knowledge area is that the project manager and the rest of the project team are relying on the Business Analyst to provide clearly defined requirements deliverables for the project. To provide this in a timely and efficient manner, the Business Analyst needs to develop, define, and manage the roles and tasks associated with requirements gathering, in coordination with the project manager.

- Proper planning and managing of requirements on a project ensures that;
- All necessary stakeholders are identified and properly represented during the requirements gathering process.
- The most appropriate activities related to the requirements process are performed, given the project circumstances.
- The requirements work effort is coordinated with other work done on the project.
- The requirements team has a common understanding of the activities they will perform.

- The BA or BA team can effectively monitor and react to requirements challenges and slippage.
- The tools, resources, and requirements contributors are available when requirements activities are scheduled.
- Changes are captured correctly and consistently.

3.1.3 *Knowledge Area Tasks*

This Knowledge Area includes ten tasks that the Business Analyst will define and manage through the requirements gathering process.

3.1.4 *Relationship to other Knowledge Areas*

.1 Inputs

- Business environment analysis from KA Enterprise Analysis
- Enterprise requirements scope from KA Enterprise Analysis
- Feasibility assessment from KA Enterprise Analysis

.2 Outputs

- List of project team members assigned to the project and team member roles
- List of stakeholders and their relationship to the project
- List of requirements gathering tasks and division of work
- Tool(s) used to gather and communicate requirements

3.2

Understand Team Roles for the Project

The Business Analyst should identify, understand and document all needed team roles in the entire spectrum of requirements related activities for each of their projects in order to insure that these activities are completed in the most effective and efficient manner possible. It is important to the success of the project that all people involved understand their role(s) and responsibilities. For example, it is likely that the Business Analyst may decide to communicate in different ways using different methods to the different roles. I.e. formal presentations to the Executive Sponsor and Project Manager while using emails and memos to the project team members.

During this activity, the Business Analyst must work closely with the Project Manager in identifying, understanding and documenting team roles and responsibilities for the entire spectrum of requirements life cycle activities. The Business Analyst will be involved in all requirements related activities and roles while the PM is naturally concerned with all project activities.

3.2.1 *TASK: Identify and Document Team Roles for the Project*

.1 Purpose

The purpose of this task is to identify and document all team roles relating to and involved with the requirements related project activities. It should also provide an understanding of certain team roles on a project and how each of these roles may contribute to the process of requirements definition and management. It is important for the Business Analyst to understand the difference between a role and a job title. Different organizations will certainly have varied job position titles involved in their projects. The roles that are discussed in this section may be titled very differently in different organizations, so the Business Analyst must take this into account when reading this section and especially when executing these tasks in their project.

Some of the roles shown below, as well as other roles that may be defined by an organization, may or may not exist in any particular project. Project requirement responsibilities may also be divided differently among different roles. Some of the roles may exist only as needed at specific points of the project, while others may be in existence throughout the entire project. Depending on the project and the organization, many of these roles may be filled by a single individual or perhaps by multiple individuals.

.2 Description

This task will enable the Business Analyst to identify and document the necessary team roles on their project. This will enable the Business Analyst to insure that all of these roles are filled and that their responsibilities are assigned to someone.

.3 Predecessors

Inputs to this task will include the current project plan and other initial project documents as may be available such as the project charter. Any available project standards documents may also prove useful in identifying required requirements planning and management roles. PLC and SDLC standards, if available, will also be used in this task.

.4 Process and Elements

Project team roles should be identified early in the project to help ensure timely delivery of project deliverables. Some individuals may be called on to play a variety of roles on different projects and occasionally even on the same project.

Many organizations may have standards applicable to defining team roles. For example, many PLC's will define roles and responsibilities of project roles.

Typical Team Roles may include, but not be limited to the following:

- **Executive Sponsor** – The executive sponsor has overall responsibility for the project at the management level including funding, go/no go decision making and providing resource support. Often the executive sponsor also will function as the project “champion” within the organisation. (also see Solution Owner)
- **Business Analyst** – The business analyst elicits, analyses, documents and reviews the requirements for accuracy and presents them to project stakeholders for review and approval.
- **Project Manager** - The project manager manages the day-to-day activities of the project ensuring that requirement related tasks are delivered on time, within budget, and within scope. The project manager must ensure that proper stakeholder approval of the requirements is obtained before progressing forward with project delivery.
- **Developer** – Developers are the technical resources assigned to a project, and may include many technical roles within a project team, e.g. The Technical Lead oversees the design, code, and test activities for the technical members of the project team. Developers also plan the application's transition to the user community, often working directly with the business analyst and trainers.
- **Quality Assurance Analyst** – The quality assurance analyst is responsible for ensuring that quality standards are adhered to by the project team.
- **Trainer** - The trainer is responsible for developing user training curriculum materials and delivering training to end-user personnel. These materials are based on the functional requirements.
- **Application Architect** - The application architect defines the architectural approach and high-level design for a project solution. The application architect is responsible for determining the technical direction of the project and the overall structure of the solution.
- **Data Modeler** – (See Information Architect)

- **Database Analyst (DBA)** - The database analyst is responsible for all technical aspects related to designing, creating and maintaining project databases.
- **Infrastructure Analyst** - The infrastructure analyst designs the overall hardware and software infrastructure and environment needed to meet the application development and operational requirements.
- **Information Architect** - The information architect is responsible for assessing the overall data requirements of an information system project. Information architects identify reusable data assets and resolve enterprise data modeling issues.
- **Solution Owner** - The solution owner is responsible for defining and approving the project scope and ensuring that it aligns with the business strategy. Approving project scope changes and defining the project success criteria and measurement are also part of the responsibility of the solution owner. (see also Executive Sponsor).
- **End User** – The end user represents the group of people in the organisation (and often external to it also) who will actually interact directly with the software application.
- **Subject Matter Expert (SME)** – The subject matter expert (SME) provides expertise in a particular business functional area. SME responsibilities are closely tied to defining, approving and using the functional requirements for the project. SMEs typically work very closely with business analysts in identifying and managing the requirements.
- **Stakeholders** - Stakeholders represent anyone materially affected by the outcome of the project. Stakeholders are often a prime source of information when planning and managing requirements.

.5 Stakeholders

Stakeholders who should play a part in this task include all project stakeholders since any of these may conceivably have a distinct team role to play in the project. A key input to the task for the Business Analyst will be the Stakeholder List created in Section X.X.

.6 Deliverables

The deliverables from this task will typically be a revised/updated business analysis requirements planning and management plan as well as a descriptive list of all of the currently identified team roles for this specific project.

3.2.2

TASK: Identify and Document Team Role Responsibilities

Each of the roles defined in the above task may share responsibility in the activities related to requirements. Some of these responsibilities may overlap and must be clearly defined and managed on each project.

.1 Purpose

The purpose of this task is to identify, document and achieve agreement on the specific project responsibilities for all requirements related tasks for those roles identified in the previous task.

.2 Description

This task will enable the Business Analyst to identify and document the responsibilities for each of the team roles identified in the previous task. This will enable the Business Analyst to insure that all of the responsibilities have been assigned to someone.

.3 Predecessors

The primary input to this task will be the list of roles identified in the previous task.

PLC and SDLC standards, if available, will also be used in this task.

.4 Process and Elements

Project team role responsibilities should be identified early in the project to help ensure timely delivery of project deliverables. The Business Analyst must identify and document his/her understanding of the specific responsibilities for each of the roles identified in the previous task. Much of these responsibilities will not vary from project to project and should prove to be relatively straightforward for the Business Analyst to document. Some projects may however require more effort to identify and achieve agreement on the responsibilities for each role because of the nature and objectives of the project itself. It must be recognised by the Business Analyst that this task is only concerned with the Requirements planning and Management activities in the project.

A list of typical responsibilities for the roles that were identified in the previous task are listed below. These would be expected to be modified by the Business Analyst to better suit their organization and project.

Some common responsibilities for these roles are shown below.

- **Executive Sponsor** – The ultimate “approver” of the requirements and their management process. (also see Solution Owner)

- **Business Analyst** – The business analyst identifies, documents and manages the requirements, manages the requirements modification process, and presents the requirements for review and approval.
- **Project Manager** - The project manager must deal with requirements through managing the project tasks that are involved in their creation, approval, management, and ultimately, their fulfilment.
- **Developer** – Developers are involved in the requirements review, sign-off and approval discussions with the Business Analyst and others on the project team. They must have a complete understanding of the requirements in order to insure that the application meets all of them.
- **Quality Assurance Analyst** – The quality assurance analyst should be involved in requirements review and approval. Their review of the requirements will often result in clearer, more testable and better defined requirements. Their major project task is to ensure that the final product meets all user requirements.
- **Trainer** - The trainer uses the functional requirements in developing training curriculum materials. They may also be involved with the review and approval of the requirements .
- **Application Architect** - The application architect uses the requirements to insure that the architectural approach and high-level design will allow the application to meet them. They should also review requirements to insure completeness and suitability to accomplish overall application product goals.
- **Data Modeler** – (See Information Architect)
- **Database Analyst (DBA)** - The database analyst is responsible for designing and creating databases that will meet the performance and data requirements of the project. They should also be involved in the review of this area of the requirements.
- **Infrastructure Analyst** - The infrastructure analyst uses the requirements in their design of the infrastructure needs and should be involved in the review and approval process.
- **Information Architect** - The information architecture is responsible for identifying data requirements and should be heavily involved in their review and approval. They should also be empowered to assist in the review of these requirements.
- **Solution Owner** – The solution owner provides information when gathering requirements and often is directly involved in the approval of the final functional requirements. (see Executive Sponsor also).

- **End User** – The end user is often a source of information used in creating the requirements and certainly is impacted by their quality and completeness.
- **Subject Matter Expert (SME)** – The SME will be a major source of requirements information and must also be heavily involved in their review and approval.
- **Stakeholders** – The responsibilities of stakeholders varies greatly depending on the type and level of stakeholder, but often involve providing information when gathering requirements as well as reviewing and approving final requirements.

Definition of a Stakeholder

A ‘Stakeholder’ is defined as person or group that has a stake or interest in the success of a project. Stakeholders are also important sources for project requirements and can be responsible for one or more project activities or deliverables. A stakeholder can impose constraints or boundaries on the project like time, money, and resources. These constraints are part of the ‘stake’ or investment that the stakeholder makes in the project. The stakeholder is may be a decision maker or influencer on the solutions and success of the project. Stakeholders can also be the primary benefactor of the project, because the completion of the project will affect the efficiency, quality, or financial success of their department or company. A stakeholder can be a person, group, organization, department, corporation or governmental entity. If the stakeholder is an organization or group, the Business Analyst should understand who (a specific individual or individuals) will communicate the group’s interests and needs.

It should also be noted that a stakeholder may not directly participate in the project, but a representative of the stakeholder’s interests may be included. If a stakeholder’s representative is included in the project, the Business Analyst should clearly understand the level of decision making authority and expertise the representative brings to the project.

The RACI Matrix

The RACI matrix is a powerful tool useful to illustrate usual responsibilities of the roles involved in planning and managing requirements. Note that the chart below has been completed only for Requirements Planning and Management, but the RACI approach is also very useful for documenting roles and responsibilities in any project activity area.

The table illustrated below may be broken down into further levels of task detail by the Business Analyst to provide further assistance in identifying roles and responsibilities during requirements planning and management.

[R]esponsible does the work,

[A]ccountable is the decision maker (only one)

[C]onsulted must be consulted prior to the work and gives input

[I]nformed is on a need to know basis after the work is done

An example of documenting overall high level responsibilities may be seen below:

Role in Requirements Planning and Management	RACI
Executive Sponsor	C
Business Analyst	R
Project Manager	A
Developer	C
Quality Assurance Analyst	I
Trainer	I
Application Architect	C
Data Modeller (See Information Architect)	C
Database Analyst (DBA)	C
Infrastructure Analyst	C
Business Architect	R
Information Architect	C
Solution Owner (See Executive Sponsor)	C
End user	I
Subject Matter Expert (SME)	C
Other Stakeholders	R, C, I (varies)

.5 Stakeholders

Stakeholders for this task are the same as for the previous task.

.6 Deliverables

The deliverable from this task will typically be a descriptive list of all team roles from the previous task with clearly defined responsibilities listed for all. It should also be a responsibility of the Business Analyst to achieve consensus and agreement on this list.

3.2.3

Task: Identify Stakeholders

.1 Purpose

Project stakeholders are the driving force behind each project, because the project goal is to design, create and implement solutions to fulfill one or more stakeholder needs. Understanding who the stakeholders are and their 'stake' in the project is vital to understanding what needs must be satisfied to successfully complete the project.

Identifying the project stakeholders at the beginning of the project is an important step that should not be overlooked or minimized. Stakeholders or stakeholder interests that are not identified until latter stages of the project can have a negative affect on all areas of

the project, including the cost, delivery, scope, and resource needs. Because project requirements are based on stakeholder needs, stakeholders and stakeholder needs that are identified late in the project could require a revision to requirements that will change or nullify completed tasks or tasks already in progress.

Stakeholders identified in latter stages of a project may also be reluctant to participate or may bring an adversarial presence into the project. A stakeholder added to the project after the initial may also bring to light gaps in the project scope, requiring a complete project review and re-scope.

.2 Description

The Business Analyst will create a list of all stakeholders associated with the project. If a stakeholder is not an individual, the listing should note the person or persons who will speak for the stakeholder group. If a stakeholder sends a representative, the Business Analyst should note the representative and which stakeholder is represented. The listing should include the persons name, their job title or job description, and some basic demographics (address, phone number, email, etc.).

.3 Predecessors

To identify the project stakeholders, the BA will need a list of project team members, a description of project team member roles and duties within the project, the Enterprise Analysis document(s) described in chapter 2, the organizational chart of the company or customer, and documentation on any existing processes or systems affected by the project. Also, the project charter, project scope, or any other documentation on existing systems or processes.

.4 Process

The Business Analyst will create a listing of project stakeholders using the documents and artefacts defined in section 3.3.2.3 above.

.5 Alternatives

N/A

.6 Key Features

N/A

.7 Strengths and Weaknesses

N/A

3.2.4 *Technique: Consult reference materials*

.1 Purpose

This technique will use existing project reference materials to identify people associated with the project and determine if they are project stakeholders. These reference materials include the documents noted in section 3.3.2.3.

.2 Description

The Business Analyst will use the existing project documents and artefacts to develop a listing of possible stakeholders. This listing will be reviewed by project management to identify the project stakeholders.

.3 Intended Audience

N/A

.4 Process

The Business Analyst should review existing project reference materials and create a listing of all potential resources and known stakeholders noted in these materials. This listing should note all information pertaining to the resource.

This listing should be reviewed with the project sponsor or sponsor's representative and project manager. The Business Analyst, Project Sponsor or representative, and Project Manager will identify and agree on the Stakeholders for the project.

The Business Analyst will create a Stakeholder Listing of all stakeholders identified and agreed to.

For each stakeholder on the list, the Business Analyst will update the listing with the stakeholder's name and contact details. An example of the stakeholder listing is shown below.

Stakeholder listing					
Name	Job Title or Job Description	Organization	Address	Phone	Email
Stakeholder 1	Project Manager	ABC Company	Address line 1 Address line 2 City, State/Province, Country	9.9.999.999.9999	stakeholder1@abc.com
Stakeholder 2	Executive Sponsor	ABC Company	Address line 1 Address line 2 City,	9.9.999.999.9999	stakeholder2@abc.com

Stakeholder listing					
			State/Province, Country		
Stake holder 3	Business Analyst	ABC Company	Address line 1 Address line 2 City, State/Province, Country	9.9.999.999.9999	stakeholder3@abc.com

.5 Key Features

N/A

.6 Alternatives

N/A

.7 Strengths and Weaknesses

The skills required to perform this task are minimal and do not require special technical support or training. But, the reference materials may not be up to date or complete and will require some additional time and research to determine whether the person or entity is a stakeholder.

3.2.5 *Technique: Questionnaire to identified stakeholders*

.1 Purpose

A questionnaire to identified stakeholders will determine, based on the questionnaire responses, if any additional stakeholders exist that were not mentioned in the reference materials. These stakeholders should be added to the stakeholder listing noted above in section 3.3.3.4.

.2 Description

A questionnaire is a group of questions posed to elicit a valued response. The questionnaire is distributed to the stakeholder list and responses are recorded. The responses to the questionnaire should either identify possible additional stakeholders or confirm that all stakeholders have been identified. Stakeholders from the Stakeholder List in section 3.3.3.4 may also be helpful in identifying other as yet unidentified stakeholders. The Business Analyst can prepare and distribute a brief questionnaire to existing stakeholders to determine if there are additional unidentified stakeholders.

.3 Intended Audience

The intended audience is the stakeholder listing developed in section 3.3.3.4.

.4 Process

The Business Analyst will prepare a listing of questions intended to identify additional stakeholders. Questions should be open ended and require more than a Yes or No response. Examples of the types of questions that can uncover additional stakeholders are:

- Who is initiating the change that will result from the project?
- Who owns the problem(s) to be solved or goals to be achieved by the project?
- Who is directly impacted by the project?
- What are their roles?
- Who executes activities in the immediate business process affected by the project?

The questionnaire is sent to each stakeholder with an explanation of the purpose of the questionnaire and the deadline for responding.

When the responses are returned to the Business Analyst, any person or entity mentioned in the responses from stakeholders should be reviewed with the Project Sponsor or representative and Project Manager. The Business Analyst, Project Sponsor or representative, and Project Manager will identify and agree on any additions to the Stakeholder List.

.5 Alternatives

Interview - The Business Analyst may choose to contact each stakeholder directly to pose each question and record each response.

Web Survey – The Business Analyst may contact each stakeholder and direct them to an internet site specializing in managing surveys and questionnaires where they can view the questionnaire and enter their responses. When the responses have been recorded, the Business Analyst can review the complete listing and review the listing with the Project Sponsor and Project Manager.

.6 Key Features

This technique requires special effort and skill from the Business Analyst to prepare questions that elicit the desired response.

.7 Strengths and Weaknesses

Questionnaire responses can identify stakeholders that have not been documented. But, Questionnaires require time to develop the right questions, distribute the questionnaire, and review the responses. If the project has a limited timetable, the Business Analyst may not have the time necessary to take advantage of this technique. Also, the Business Analyst may not receive responses from all stakeholders by the deadline or may receive incomplete responses, requiring a follow-up contact with stakeholders to request clarity or solicit a more complete response.

3.2.6 Task: Describe the Stakeholders

.1 Purpose

Stakeholder descriptions provide the Business Analyst with information about each stakeholder that is important to the project.

.2 Description

The Business Analyst will create a description of each stakeholder's key characteristics that affect the project.

.3 Predecessors

The Stakeholder listing from section 3.3.5.4 will be used as the primary input document for this task.

.4 Process and Elements

The Business Analyst will develop questions designed to solicit information from each stakeholder concerning their role and project responsibilities and authority. These questions will focus on each stakeholder's customers and suppliers, job functions, systems used, number of end users, paper and hard copy processes, and key business issues. The response to these questions will be summarized and combined with the Stakeholder listing into a single matrix like the one shown in section 3.3.5.6 below.

.5 Stakeholders

Not applicable

.6 Deliverables

The results of this task will be a stakeholder summary document like the one shown below. Every stakeholder from the Stakeholder List will be included in this summary and will include details on their project stake and stakeholder description.

Stakeholder Summary

Name & Job Title	Project Stake	Description
[The name and job title or description of job duties.]	[The stake or investment of the stakeholder.]	[Summarize the stakeholder's key characteristics with regard to the project.]
Jane Doe - Project Sponsor	Primary end user of project solutions. Success of the project solutions will increase the quality and quantity of output from Jane's department.	Oversees development of project charter, vision, scope, and requirements document preparation. Provides direction and oversight of requirements gathering.
John Smith – Executive Sponsor	Meeting or exceeding revenue and expense budgets for the fiscal year.	Ensures that project requirements and solutions match up with the Enterprise Analysis.
Bill Young – Project Manager	Implementing a successful solution to the sponsor's needs on time and within budget.	Define and develop project team, define and manage project timetables and milestones, define and manage project communications, oversee project development throughout the project life cycle.
Amanda Adams – Quality Assurance	Ensure that all project solutions are implemented within the company's quality standards	Testing development, implementation of quality controls, review of project quality levels throughout the project life cycle

3.2.7 *Technique: Interview Stakeholders to solicit description*

.1 Purpose

An interview of each stakeholder will solicit information used to document the stakeholder's involvement, authority, and project impact.

.2 Description

An interview is a discussion between the Business Analyst and the stakeholder to collect information from the stakeholder their relationship to the project. The stakeholder description will be created by the Business Analyst from the responses received from each stakeholder.

.3 Intended Audience

The audience for this technique will be the stakeholders noted in the Stakeholder Listing from section 3.3.3.4.

.4 Process

The Business Analyst will prepare a listing of questions intended to describe each stakeholder's involvement in the project, their authority in the project, and how the project will impact them. Each question should focus on a specific point of involvement,

level of project authority or project impact. Examples of the types of questions that can describe stakeholders are:

- Who are their customers or suppliers?
- What are their key job functions or duties?
- What are their key business issues?
- How many computer systems do they use?
- How many end users do they represent or manage?
- What are their paper or hard copy based processes affected by this project?
- What are their key business issues?
- Will one or more of their key issues be resolved by the project?
- Are they a change leader or a change recipient?
- What needs do they want to be met by the project?
- Are their needs included or involved in the project?
- Which needs are not included or involved?
- What is the impact of excluding stakeholder's needs?
- Do any of their needs conflict with other stakeholders? How?
- How will the project change their business processes?
- What business processes do they interface with that are related to the project?
- What are the inputs and outputs to / from their business processes?
- What key issues or roadblocks do they face in this project? (E.g. geographic distance, cost, technology, etc.)
- How many people in their organization are directly impacted by the project?
- Where are these people located geographically?
- What risks are they exposed to by this project?
- What level of risk are they able to tolerate?

- Have they ever been involved in a similar project?
- What level of success was achieved and were there lessons learned?
- Does the project's success create any negative impact for the stakeholder?
- What project goals can be eliminated or revised to remove the negative impact?
- Will one or more key business issues be resolved by this project?
- Will the project be successful if it does not remove all negative impact to them? Can they live with the negative impact?
- What is the importance of each key project success criteria (on time, within budget, agreed-to scope, and low risk)?
- Do all of their needs have to be met for them to define the project as successful?
- What is the priority for each need? Must this need be met for them to define the project as a success?
- Will they provide any requirements?
- Will they be a key or secondary source of requirements?
- What is their responsibility in the project (RACI: Responsible / Accountable / Consulted / Information Only)?
- Who is the key person that has authority to sign off for them? Does this key person have a backup?
- What is their availability in terms of resource and time? Is this sufficient according to their project responsibilities? Do they have management backing?

All Stakeholder responses will be recorded by the Business Analyst during the interview. The Business Analyst will summarize the stakeholder responses into a description for each stakeholder.

.5 Key Features

This technique requires direct contact with the stakeholder, either face to face, via telephone, or using technologies such as live video teleconferencing. The Business Analyst must be proficient in any technologies used to interview stakeholders and record responses. The Business Analyst must also have experience in developing the necessary interview questions and experience in the needed listening skills required to interview stakeholders.

.6 Alternatives

The Business Analyst could use the Questionnaire technique described in section 3.3.5 as an alternative to interviewing stakeholders.

.7 Strengths and Weaknesses

Interviewing stakeholders solicits immediate responses to questions, provides more in-depth responses than questionnaires, and can help develop a positive business relationship between the Business Analyst and the stakeholder during the interview. The Interview technique requires more of the Business Analyst's time and increases the cost of the project when remote stakeholders must be contacted via telephone or require purchase and interviewer training costs to acquire remote conferencing technologies.

3.2.8 Task: Categorize the Stakeholders

.1 Purpose

Grouping stakeholders into multiple categories uncovers commonalities. This may also assist the Business Analyst in other project phases, like planning a workshop based on stakeholders geographic locations.

.2 Description

The Business Analyst will define stakeholder categories based on various factors that are important in the project. The Business Analyst will enter a description in each category for every stakeholder, creating a matrix or cross reference of stakeholder categories.

.3 Predecessors

The Stakeholder Summary and Stakeholder Listing will be used to develop and complete the stakeholder categories.

.4 Process and Elements

The Business Analyst will create a document listing each stakeholder, stakeholder categories, and how each stakeholder is recognized within each category. Examples of stakeholder categories are:

- Key or secondary requirements sources
- Project impact
- Geographic distance
- Number of direct end users

- Number of business processes
- Number of existing systems in current business processes
- Number of interfacing business processes

.5 Stakeholders

Not applicable

.6 Deliverables

The end result of categorizing stakeholders is a matrix of stakeholders and categories. An example of how this might look is shown below.

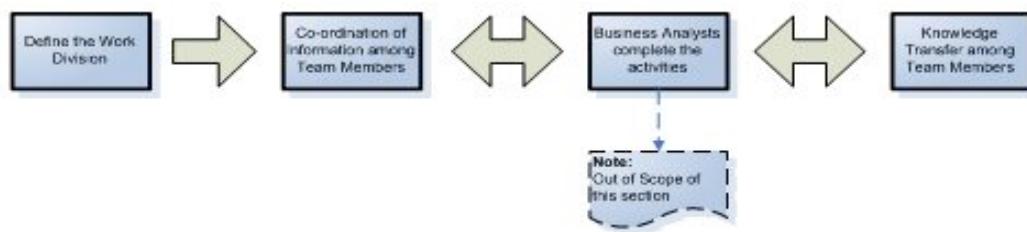
Stakeholder Classification			
Stakeholder Name	State/Province	Key stakeholder?	Number of end users
Stakeholder 1	Texas, USA	Yes	10
Stakeholder 2	California, USA	No	35
Stakeholder 3	British Columbia, CA	Yes	80
Stakeholder 4	Ontario, CA	No	225

3.3

Define Business Analyst Work Division Strategy

The Business Analyst work division strategy is a systematic plan of action intended to accomplish a specific goal. What are the different methods to divide the activities within the group? There are 5 Business Analysts and 72 requirement activities, how will the work be divided? What information/knowledge needs to be transferred between the Business Analysts to successfully deliver compatible requirements? The strategy is applicable for a Business Analyst team where there is more than one member. If there is only one Business Analyst assigned to the project, then all requirement activities are assigned to that Business Analyst. Within the Business Analyst team, the strategy is to define the work division and co-ordinate the information and knowledge transfer among the team members.

Figure 3.4-1 Business Analyst Work Division Strategy



3.3.1 Task: Divide Work amongst a Business Analyst Team

.1 Purpose

Dividing the work among the Business Analysts in a team removes obstacles of confusion and uncertainty that can be placed among the Business Analysts and their goals. It defines responsibilities and sets expectations. It clarifies both where the team wants to be and how to get there.

.2 Description

The lead or team will decide and implement the most suitable method for the team to achieve their specific goal(s). It is task of deciding which Business Analyst in the team is assigned to the requirement activity.

.3 Predecessors

The Requirements Activities or Requirements Work Plan

.4 Process and Elements

The Business Analyst and/or Lead and/or the team review the activities and the duration of the work effort.

The Business Analyst and/or Lead and/or the team decide on which strategy or strategies (detailed in 3.4.2) to apply and document the rationale.

Based on the decided work division strategy or strategies, the activity is assigned to a Business Analyst, either by another Business Analyst or by team consensus.

The task is completed when all the requirement activities are assigned to the Business Analysts.

.5 Stakeholders

The Stakeholders are the Business Analyst and the Stakeholders associated with the requirement activity.

.6 Deliverables

The resources (Business Analysts) assigned in the Requirements Work Plan.

3.3.2 *Technique: Business Analyst Work Division Strategy*

.1 Purpose

A work division strategy is an allocation of activities according to some distinct characteristic. It clarifies both where the team wants to be and how to get there. That clarity removes obstacles of confusion and uncertainty that can be placed among the Business Analysts and their goals. It defines responsibilities and sets expectations. The lead or team will implement the strategy that is most suitable for them to achieve their specific goal(s).

.2 Description

The following are different types of Business Analyst work division strategies:

Subject Matter Expertise

The Business Analyst who exhibits the highest level of expertise in performing a specialized job, task or skill within the team

The work division strategy is based on the skill set required. For example, the team is made up of three individuals where one specialize in data modeling, the other is a business matter expert and the last business analyst specialize in requirement planning, gathering and management. The strategy is that the first business analyst will take the lead in the modeling activities and decisions, the second takes the lead in business content related activities and decisions and the last business analyst takes the lead in requirements related activities.

Complexity

The work division strategy is based on the activities' level of complexity

For example, it has been determined that the workflow of the global underwriting system is complex; thus, assigned to the Senior Business Analyst. The intermediate and simple functions requirement activities will be assigned to the other Business Analysts on the team.

Previous Work Experience with Stakeholders

If a Business Analyst within the team has had favorable work experience with a Stakeholder(s) and the activity is based or related to that particular Stakeholder, the work division strategy is based on which business analyst has worked with which stakeholder.

For example, the Business Analyst team is made up of three individuals on an underwriting system development project. The Business Analysts' milestone is Requirements Sign-off. The stakeholders will sign-off on the requirements relating to

their department. One Business Analyst has had previous (favorable) work experience with the Group Underwriting Stakeholder, another Business Analyst has had previous (favorable) work experience with the Individual Underwriting Stakeholder and the third Business Analyst has had no previous work experience with any Stakeholder nor underwriting experience or training. Thus, the first Business Analyst is responsible of the Group Underwriting functional requirements activities; the second is responsible of the Individual Underwriting functional requirements activities and the last on the non-functional requirements activities. The work division strategy was based on the Business Analysts' previous work experience and dynamics with the Stakeholders.

Geography and Culture

The work division strategy is based on the physical location of the Business Analyst and/or the shared beliefs, values, customs and behavior of the society. It will save in time and money due to the long travel time.

For example, for the global underwriting system project, there are three Business Analysts. The first Business Analyst takes the lead for all requirement activities for Asia and Australia because she is located in Asia. The second Business Analyst takes the lead for all requirement activities for Europe and Africa because he is physically located in Europe. The last Business Analyst takes the lead for all North and South America requirement activities because she is geographical located in North America. Thus, the work division strategy is based on the geographical location of the Business Analyst.

For the global underwriting system project, it was decided that the three Business Analysts from Asia, Europe and North America to physically move to Europe to successfully deliver compatible requirements. The work division strategy continues to be the same as the above example. The Business Analysts have prior experience, knowledge and relationships with the Stakeholders, the business and the culture.

The Business Analyst work division strategy may be based on Culture. Continuing with the same example, for the Asia requirement activities, the work division strategy is altered where the North American Business Analyst has the particular linguistic skill as for Asia. For communication reasons, the North American Business Analyst will take the lead for the Asia requirement activities. Thus, the work division strategy is based on the shared beliefs, values, customs, dynamics, preferences and behavior of a society.

Area of Interests

The work division strategy is based on the business analysts' area of interest.

For example, the underwriting development system requirement milestone activities have been decomposed into functions: underwriting worksheets, insured information, policy information, accounting transactions and workflow. The three Business Analyst team divide the work on the basis of their functional area of interest or the function that has attracted their attention. They might not necessarily have any previous experience in

the function but they have demonstrated a willingness and capability to successfully deliver compatible requirements.

Physical Limitation

The work division strategy is based on the physical limitation, if any, of the Business Analysts.

For example, a Business Analyst on the team is located off-site (works from home). All research or non-functional requirement activities are assigned to the off-site Business Analyst. Another Business Analyst, on the same team, has a bad back and physically cannot travel. The requirement activities that involve travel are assigned to the off-site Business Analyst. Thus, the work division strategy is based on the physical limitation of the Business Analyst.

Business Analyst Availability

The work division strategy is based on the Business Analysts' availability or commitment to the project. Not all Business Analysts' time is committed 100% to a particular systems development component, process improvement or organization change. For example, a Business Analyst may be committed 10% of their time to the global underwriting system development component, 40% to the global claims system development component and 50% to the divisional claims system development component. Another example is that the Business Analyst is only available to the project at the beginning of the phase.

The activities assigned to a Business Analyst must be within their committed time to the project.

.3 Intended Audience

This technique is created by Business Analysts to obtain consensus and understanding among themselves.

.4 Process

The Business Analyst and/or the Lead and/or the team decide which strategy or strategies to use and document the rationale.

.5 Key Features

This technique is based on the Business Analyst skill set, previous experience and/or environment. An individual on the team may be a cross-functional or a functional Business Analyst where:

A cross-functional Business Analyst has a variety, and at different levels, of business analysis skills and experience, i.e. Junior Business Analyst vs. Senior Business Analyst vs. Business Analyst Lead

A functional Business Analyst has a specialty skill or training of business analysis, i.e. data modeling

Review section 3.4.1.2 pertaining to a Business Analyst's key features for a particular strategy. To obtain information on a Business Analyst's skill set, previous experience and/or environment, refer to the Business Analyst Team Skill Matrix.

.6 Alternatives

Please review the strategies listed in section 3.4.1.2

.7 Strengths and Weaknesses

The strength of this technique is that the Business Analyst Team work division may be based on one strategy or based on a number of strategies. It is flexible based on the team members' skill sets, previous experience and/or environment.

The work division strategy does not consider the Business Analysts' time commitment to the system development component, process improvement and/or organizational change project. Not all Business Analysts' time is committed 100% to a particular project. However, it does take into account the Business Analyst skill set, previous experience and/or environment.

For the Previous Work Experience with Stakeholders strategy, it might have been a favourable end result; but, the Business Analyst might feel that the Stakeholder was difficult to deal with in the past. Based on that experience, the Business Analyst may not want to work with the Stakeholder in the future.

3.3.3 *Technique: Co-ordination of Information within the Team*

.1 Purpose

An information platform is created for the Business Analyst pertaining to business concepts, functional and non-functional requirements, and how to handle requirement issues to successfully deliver compatible requirements. They are set at the applicable phase of the systems development component, process improvement and/or organizational change. Thus, the Business Analysts have the same understanding, information or tool to successfully deliver compatible requirements.

.2 Description

The following are examples of information that are co-ordinated among the Business Analyst team members:

Core Business Concepts and Policies

Organization Standards and Policies

Examples are the “look and feel” of the web application and/or the standard architecture platform or approved technology for the web application

Methodology

Examples are the company has incorporated the Information Technology Infrastructure Library (ITIL) for service support and service delivery and Rational Unified Process (RUP) for development.

Processes/Procedural Knowledge

Define and communicate Internal processes, i.e. requirement change request and external processes, i.e. approval process in governance with organization’s policy

Document Templates

Set by either the methodology or the organization

Artifacts

Methodology or organization requirement

Terminology

Examples are cheque vs. check or word or phrase definition

Business Documentation

Examples are newsletters, books, central repository and websites

Functional and Non-Functional Requirements

- Strong understanding of In Scope and Out of Scope items
- Legal requirements or limitations
- Requirement Document Templates

- Provide instructions and examples
- Artifacts
- Methodology
- Consistent Approach for the Requirement Activity
- For example, have a common method of requirement gathering (JAD and questionnaires)

Project Documentation

How to Manage Requirement Issues

Strong understanding of In Scope and Out of Scope items

Requirement Issues Communication Process

Approval Process in Governance with Organization's Policy

.3 Intended Audience

This technique is created by the Business Analysts to share the same understanding, information or tool to successfully deliver compatible requirements.

.4 Process

The Business Analyst begins by asking other Business Analysts or contacting other members of the organization to where he/she may find the organization or the department's or the team's standards, governance policies, methodologies, processes, procedures, documentation and templates or the Business Analyst is given this information, training and/or "welcome package" at the beginning of the activity or at time when Business Analyst is assigned to the project.

.5 Key Features

This technique is for sharing and co-ordinating information among the team members. It requires access to documentation, training, people and artifacts from different sources of the organization and project.

.6 Alternatives

N/A

.7 Strengths and Weaknesses

The benefits in co-ordinating information among the Business Analyst team are:

- To work together to create a new seamless and consistent way of thinking and operating
- To save time
- To avoid re-work
- The disadvantages in this technique are:
- Cost of training
- Technology/software not availability
- Lack of access
- Learning curve
- Individuals that are resistant to change
- Lack of time

3.3.4 *Technique: Knowledge Transfer*

.1 Purpose

Knowledge transfer is a systematic approach to capture, collect and share tacit knowledge in order for it to become explicit knowledge. Tacit knowledge is the know-how and explicit knowledge is the knowledge that has been articulated and captured in the form of text, diagrams, product specifications, etc. By doing so, this process allows Business Analysts to access and utilize essential information, which previously was known intrinsically by one or a small group of individuals, to successfully deliver compatible requirements.

.2 Description

Knowledge transfer may be done at the beginning, middle or at the end of the phase or project. It may be a one-time event or a scheduled event among the Business Analyst team. Examples of knowledge transfer methods/techniques within the Business Analyst team are:

.3 Information Exchange

Verbal

Non Verbal

- Electronic
- Document
- Fax

Structured Walk-Through/Peer Reviews

Status Meetings

Verbal or non verbal

Debriefing Meetings

To report, verbal or non verbal, after the activity is completed, in order to obtain useful information

Central Repository

Mentorship

Pair Senior and Junior Business Analysts for back-up, mentorship and knowledge transfer

.4 Intended Audience

This technique is created by the Business Analysts to share the same understanding, information or tool to successfully deliver compatible requirements.

.5 Process

The Business Analyst and/or Lead and/or the team decide what type of knowledge needs to be transferred, from whom to whom, when it will be done and how it will be transferred. Refer to 3.4.4.2; it may be a one-time event or a scheduled event among the Business Analyst team.

The Business Analyst and/or Lead and/or the team decide the method or methods of knowledge transfer and communicate it to all team members.

.6 Key Features

This technique is for sharing and co-ordinating knowledge among the team members.

.7 Alternatives

N/A

.8 Strengths and Weaknesses

The benefits to knowledge transfer are:

- To solve problems and make better informed decisions
- To avoid repetition of past mistakes
- To understand customer's behavior and preferences
- To work together to create a new seamless and consistent way of thinking and operating
- To save time
- To avoid working in silos within the Business Analyst team
- To obtain the basic knowledge of other requirement activities details

The disadvantages in this technique are:

- Individuals that are resistant to change
- Learning curve
- No time
- Priorities change
- Business Analysts availability

3.4

Define Requirements Risk Approach

This section focuses on the Business Analyst's role in requirements risk management and how the Business Analyst will manage requirements risks.

For the definition of Risk and Issue (when a Risk materializes, it then becomes an Issue), reference *Fundamentals* Knowledge Area, Chapter 8.

Requirements risks and their management is a subset of overall project risks and their management. Requirements risk relates to overall project risk in that there may be dependencies between the two risk types or requirements risk impacting or being impacted by overall project risks, and vice versa.

This section does not include discussion on detailed risk management for the overall project. Overall project risks are managed by the Project Manager. The Business Analyst's role in dealing with broader project risks is as defined by the Project Manager.

Typical Roles and responsibilities of risk management for the Business Analyst vs. Project Manager are as follows:

- End-to-End Requirements risk management: Business Analyst is responsible and accountable.
- End-to-End Project risk management: Project Manager is responsible and accountable. The project manager is also accountable for requirements risks.

For an understanding of Risk Management from a broader project perspective (not just requirements focused) reference PMI's PMBOK.

The risks and impacts resulting from poor quality requirements (such as re-work for the technical team or lack of ability to test the application) are discussed, along with how to recognize common risks that threaten good requirements, and how to respond to them.

The use of Requirements Attributes will allow for management of risks associated with specific requirements. For more information on Requirements Attributes please reference Requirements Analysis and Documentation Knowledge Area (Chapter 5, section 5.9 Determine Requirements Attributes). How to use Requirements attributes to understand risks are discussed.

This section includes discussion on:

- how requirements risk will be managed throughout the project
- how to decide what is the best risk management strategy for particular requirements risks: e.g. risk avoidance, mitigation or assumption.
- how to define a Risk requirements attribute (level of risk) associated with different attributes of requirements: e.g. difficulty of implementing, change management, new technology, etc.
- examples of common requirements risks, such as risks associated with bad requirements, and how to manage them
- techniques to use to manage requirements risk: planning, monitoring, and control

3.4.1 Task: Identify Requirements Risks

.1 Purpose

To identify a list of risks associated with each requirement based on the attributes defined for each requirement and based on common requirements risks.

.2 Description

The Business Analyst reviews each requirement and associated requirements attributes to identify the risks associated with each requirement. Also, there are common requirements risks across all requirements which the Business Analyst identifies.

.3 Predecessors

All requirements at a business or user level have been defined with attributes defined for each requirement.

.4 Process and Elements

The Business Analyst reviews each requirement along with its attributes and determines if there is a risk associated with each requirement attribute.

For example, for the attribute “difficulty of implementing”, the greater the difficulty, the greater the risk of implementation error.

For the “change management” attribute, if the degree of change in the end-user’s business process is high, so may be the risk of acceptance of the solution.

Additional requirements attributes, such as “new technology” or “degree of stability of the requirement”, once evaluated, may also produce additional requirements related risks.

Common risks across all requirements are identified. The Business Analyst reviews the requirements and identifies common risks that threaten good requirements.

Some examples of common requirements risks are:

- Insufficient level of user involvement in identifying, detailed, and analyzing requirements
- Ambiguous requirements. Not enough detail in the specification of the requirements.
- Missing, incorrect, and conflicting requirements
- Lack of requirements management and planning, such as requirements change control

- Scope creep

The risks are documented.

.5 Stakeholders

The Business Analyst reviews the requirements and their attributes with the key stakeholders: the requirements requesters and the Project Delivery Team. The BA is accountable to identify requirements risks throughout the requirements process as previously identified risks may disappear and new risks may surface.

.6 Deliverables

Once requirements risks have been identified, a list of requirements risks associated with requirements and their attributes and common risks across all requirements is available.

3.4.2 Task: Define Requirements Risk Management Approach

.1 Purpose

To detail a requirements risk management process to use in dealing with requirements risk throughout the requirements process.

.2 Description

The Business Analyst defines a requirements risk management approach.

.3 Predecessors

Requirements risk identification is complete, which is an output from the previous task.

.4 Process and Elements

The Business Analyst uses the techniques of Requirements Risk planning, monitoring and control to manage requirements risks throughout the requirements process.

Following risk identification, the risks require close and careful management, in a timely manner. Overlooking risk management can increase likelihood and impact of the risk, and can cause further problems.

.5 Stakeholders

The Business Analyst, with input from the Key Project Stakeholders and the Project Delivery Team, is responsible for managing requirements risk throughout the requirements process.

.6 Deliverables

A requirements risk response strategy is documented for each identified risk, and kept up to date as it is monitored and controlled. The strategy includes documentation resulting from use of the 3 techniques: requirements risk planning, monitoring, and control.

3.4.3 *Technique: Requirements Risk Planning*

.1 Purpose

To provide a well thought out and methodically planned risk response strategy to be used in monitoring and controlling of all identified risks, throughout the requirements process.

.2 Description

The technique provides information about each identified risk so that it can be managed in a methodical and logical manner. Planning for risks solves the problem of ad-hoc risk management, which can lead to risk and impact materialization.

Other variations on this described technique is any similar risk planning techniques used in specific industries.

.3 Intended Audience

This technique is executed by the Business Analyst to systematically plan for risks. All project stakeholders should be involved and aware of risk management activities. Many will be assigned to manage specific risks.

.4 Process

The Business Analyst begins by doing an initial risk assessment on each identified risk. This assessment will be reviewed and updated if/as it changes.

The following is determined for each risk:

- **Likelihood** – the likelihood that the risk will occur. Use a scale such as 1 is low, 5 is high.
- **Impact** - as forecast – the impact to the requirements process if the risk materializes and becomes an issue. Use a scale such as 1 is low, 5 is high. Determine the following categories of impact:
 - Cost Impact
 - Schedule Impact

- Scope Impact
 - Quality Impact
 - Benefits Impact
- **Intervention Difficulty** – determine how difficult it will be to intervene to prevent the risk from occurring
 - **Precision of assessment** – determine how precise the overall assessment is. Will be based on past experience with the type of risk, and how much is known regarding the risk.
 - **Mitigation Strategy** - as initially defined – determine the best approach to detail with the risk:
 - Avoid
 - Mitigate
 - Assume

Action Plan - as initially defined. Identify who will do what to implement the mitigation strategy of Avoid, Mitigate, or Assume. Determine Actionee and Date action should be executed.

Contingency Plan/Corrective Action to be taken – as initially defined, and related trigger event(s) (the trigger event indicates when to execute this plan). Determine what the plan is if the risk does materialize. Identify what event(s) will trigger risk materialization.

The next step is to document the risk response plan for each risk. Then, the business analyst will review the plans with all key stakeholders.

.5 Key Features

A risk response plan, no matter what format is used, must include the detailed assessment of each risk.

.6 Alternatives

N/A. There is no alternative to a requirements risk response plan.

.7 Strengths and Weaknesses

A requirements risk response plan is an effective method to document requirements risk assessment.

3.4.4 *Technique: Requirements Risk Monitoring*

.1 Purpose

To ensure risk status is assessed and up to date so that action can be taken in a timely manner if need be. Careful monitoring can lead to enhanced controlling of all identified risks, thereby reducing impact, throughout the requirements process

.2 Description

The technique provides a current status of each identified risk so that it can be controlled in a methodical, logical, and timely manner. Monitoring risks solves the problem of dealing with surprises that cause working in reactive, fire-fighting mode.

Other variations on this described technique is any similar risk monitoring techniques used in specific industries.

.3 Intended Audience

This technique is executed by the Business Analyst to systematically monitor risks. All project stakeholders should be involved and aware of risk monitoring activities. Many will be assigned to monitor specific risks.

.4 Process

The business analyst executes the following steps on an ongoing basis (e.g. once per week):

- performs weekly checks of risk status (e.g. red, yellow, green)
- Determine observed assessment if risk materializes. This allows comparison between initial and observed assessment.
- Determine how to react to a risk when it materializes. Ensure action plan is in place.

Finally, the Business Analyst will document the monitoring results on an ongoing basis.

.5 Key Features

Risk monitoring and documentation, no matter what format is used, must include the risk status and observation details.

.6 Alternatives

N/A. There is no alternative to requirements risk monitoring.

.7 Strengths and Weaknesses

Requirements risk monitoring is an effective method to ensure you have a good handle on up to date risk status.

3.4.5 *Technique: Requirements Risk Control*

.1 Purpose

To ensure risk is controlled by responding to it. Careful control can lead to reducing impact of the risk throughout the requirements process.

.2 Description

The technique provides a way to control each risk so that it can be controlled in a methodical, logical, and timely manner. Controlling risks solves the problem of dealing with surprises that cause working in reactive, fire-fighting mode.

Other variations on this described technique is any similar risk control techniques used in specific industries.

.3 Intended Audience

This technique is executed by the Business Analyst to systematically control risks. All project stakeholders should be involved and aware of risk control activities. Many will be assigned to control specific risks.

.4 Process

The business analyst executes the following steps on an ongoing basis (e.g. once per week):

- **Impact** - as materialized. Describe the impact that was observed on the requirements process/overall project when the risk materialized.
- **Mitigation Strategy** - as executed. Describe the mitigation strategy (Avoid/Mitigate/Assume) that was executed to prevent the risk from materializing. Compare against
- **Action Plan** - as executed. Document what was done by whom and when.

- **Contingency Plan/Corrective Action** - as executed. Document what was done by whom and when.
- **Lessons learned.** Describe the lessons learned from risk materialization

Finally, the Business Analyst will document the requirements risk control results on an ongoing basis.

.5 Key Features

Risk control and documentation, no matter what format is used, must include the risk materialization results and lessons learned.

.6 Alternatives

N/A. There is no alternative to requirements risk control.

.7 Strengths and Weaknesses

Requirements risk control is an effective method to ensure you understand risk materialization results. This will assist in dealing better with risks in the next execution of the requirements process.

3.5

Determine Planning Considerations

Requirements planning and management is typically a responsibility of the Business Analyst. This section is intended to discuss tasks that the Business Analyst should include in planning and managing requirements definition and documentation. It will explore how decisions made in these areas may impact requirements planning and management.

The importance of good planning cannot be overstated as it will have a great impact on achieving effective requirements identification, documentation and management. If sufficient time is not allowed for requirements definition, or if all needed tasks related to requirements are not identified; then requirements will not be sufficiently identified or defined likely resulting in a poorly accepted final product. The effective Business Analyst must be able to identify all relevant considerations in planning these activities.

Overall project planning is the responsibility of the Project Manager. The Business Analyst must work out a requirements planning approach in agreement with the project manager. For more detailed information on overall project planning, please refer to the Project Management Institute's (PMI) *Project Management Body of Knowledge* (PMBOK).

3.5.1 Task: Identify Key Planning Impact Areas

.1 Purpose

The Business Analyst will be able to do a more effective job of planning and managing requirements processing if they are able to identify those factors and considerations that will impact their requirements planning and management process.

.2 Description

Many of these considerations will be significantly impacted by organization and project specifics. These specifics must be strongly considered on an individual basis by the Business Analyst in creating the requirements management plan.

.3 Predecessors

The Business Analyst should use all current project documentation in identifying those areas that will impact their requirements planning. This will include the project charter and overall project objectives, any existing project and organization standards and procedures, as well as any personal knowledge of organization requirements. Project historical records may also be of great value in this task.

.4 Process and Elements

The factors listed below represent typical, important factors that the Business Analyst should consider in planning the requirements process for the project. It is not intended that the Business Analyst should limit their analysis to only these, as many projects may involve other factors as well. It should be further realized that not all of those factors listed may be relevant on all projects in all organizations.

These factors can often be conveniently grouped by type. An example of such a grouping is shown below.

The process that the Business Analyst will follow in their analysis of the potential impact on the requirements management plan of each of these areas will necessarily vary due to a number of individual, project and organizational factors.

Typically the Business Analyst will consider each of these areas in turn to determine their impact on the planning process and the proposed requirements management plan.

Methodology

In a software development project, there are often two distinct, related methodologies in use. These are the System Development Life Cycle (SDLC) methodology and the Project Life Cycle methodology. Each will impact the planning process and must be considered

by the Business Analyst. Some organizations do not distinguish between these but rather group methodology considerations together.

General Project Considerations

- Project Risk
- Project Expectations
- Organization standards
- Re-planning
- Stakeholder Needs and Location
- Project Type

.5 Stakeholders

Stakeholders for this task include all of the key stakeholders identified in Section 3.3 who may be involved in the requirements planning and management project process.

.6 Deliverables

The deliverable of this task will be a list of relevant items for the Business Analyst to utilize in the process of planning the requirements related activities for the project.

3.5.2

Task: Consider the SDLC Methodology

.1 Purpose

The particular SDLC, if any, in use in an organization will have a considerable impact on the planning activities of the Business Analyst.

.2 Description

The System Development Life Cycle (SDLC) is defined as the overall process of designing and developing information systems. This process is typically a multi phase approach beginning with an analysis of initial requirements through the steps of analysis, design, construction, implementation and eventual maintenance. A great variety of SDLC approaches exist with each consisting of a different series of phases.

.3 Predecessors

The Business Analyst will need to be aware of the particular SDLC chosen for their project as this will certainly influence the project tasks to be identified and included in the

requirements planning and management activities. In some organizations there may actually be a choice available regarding the SDLC to be used in a particular project. In some instances the Business Analyst may be involved in making this choice, while in others there may be no particular SDLC used.

.4 Process and Elements

The SDLC methodology in use will impact requirements planning. It will determine how the entire requirements process is executed and what deliverables are produced and when.

The Business Analyst must be familiar and knowledgeable with their organization's SDLC(s), as it will greatly influence the process steps, tasks and deliverables required or expected during the requirements planning and management phases of the project. Many organizations may also offer and encourage the use of planning templates by the Business Analyst in planning requirements planning and management.

Each of the SDLC approaches will define the requirements process in different ways and will have very significant impacts on the Business Analyst's planning efforts. Each will offer descriptions of the project phases and tasks that should be included in the project and will greatly impact the requirements plan.

E.g. The traditional waterfall method advocates gathering all requirements in the beginning of the project; while in the Iterative/Agile approaches requirements may be defined throughout the lifecycle. These differences will lead to different tasks being identified as well as perhaps different sequences of tasks also.

Examples of common SDLC's include:

- Waterfall
- Iterative
- Agile

.5 Stakeholders

Stakeholders for this task include all of the key stakeholders identified in Section 3.3 that will be involved in the requirements planning and management project process.

.6 Deliverables

The selected SDLC represents the major deliverable of this task. This choice will also cause the inclusion of the requirements related tasks to be part of the project plan.

3.5.3

Task: Consider the Project Life Cycle Methodology

.1 Purpose

The particular Project Life Cycle(PLC), if any, in use in an organization will have a considerable impact on the planning activities of the Business Analyst. The Business Analyst must be aware of the PLC(if any) used in their organization as the defined phases/events and related standards will impact on the requirements planning and management aspects of the project plan. Some Business Analysts may typically become involved in the project budgeting process and tasks also.

.2 Description

A Project Life Cycle (PLC) is defined as all of the project phases/events needed to complete the project. The names and number of these phases will certainly vary depending on the specific PLC in use. For example, the PMI defines the phases as Initiation, Planning, Executing, Close Out and Controlling. The PLC will include all of the steps defined in the SDLC (if used) but may also involve other steps and events. The SDLC phases will fit into the PLC events and the PLC processes will be used to manage the phases/events and tasks defined in the SDLC that may be used on any particular project.

.3 Predecessors

The Business Analyst will need to be aware of any PLC in use in their organization. The PLC may have been already chosen for the project or the Business Analyst may be involved in choosing the one to be used for their project.

.4 Process and Elements

The Business Analyst must consider the phases, tasks and subtasks defined in whichever PLC that is in use for the project, and decide which of them are relevant and must be included in the requirements planning and management activities in their project. They may also have to identify additional tasks as well.

A typical PLC, for example, may include the following phases:

- **Definition:** The project concept is defined, various alternatives evaluated, and the optimum alternative selected.
- **Planning:** The project is approved and the detailed project plan is created.
- **Initiation:** The project is kicked off with clear definition and defined agreed to objectives.
- **Execution:** The project plan is executed with the tasks and activities underway. Project deliverables listed in the project plan are created.

- **Close-Out:** The final product is completed. Any close out activities are carried out and the project terminated.

Each of these phases are typically further broken down into tasks and subtasks that should be considered by the Business Analyst. The PLC may also include organization/project standards that need to be considered and incorporated in the requirements planning and management activity.

.5 Stakeholders

Stakeholders for this task include all of the key stakeholders identified in Section 3.3 that will be involved in the requirements planning and management project process.

.6 Deliverables

The selected PLC represents the major deliverable of this task. This choice will cause the inclusion of the requirements related tasks described in the PLC to be part of the project plan.

3.5.4

Task: Consider Project Risk, Expectations, and Standards

.1 Purpose

The purpose of this task is to remind the Business Analyst that there are a number of project and organization related factors that have a considerable impact on the planning and execution of the requirements planning and management activities in the project. These factors are Risk, Stakeholder Expectations, and Organization Standards. Each of these should be analyzed and included by the Business Analyst in their planning activity.

.2 Description

The Business Analyst must include many factors in their requirements planning and management activity. Among these are the three factors listed above – project risk, key stakeholder expectations and organization standards for the project and for the product of that project.

Project risk is a key element in any project planning task and the Business Analyst must consider it in planning and managing the requirements process. The impact of risk and planned responses to it will have a considerable affect on the requirements plan. For example, there exists a risk that a requirement may be missed. The Business Analyst must consider this possibility and its possibility and impact. They may decide to add a review task to the plan to help avoid this risk.

Stakeholders will typically have their own expectations regarding project cost, schedule, quality, etc., for example. These must be identified and documented as they relate to

requirements so that the Business Analyst can insure that they are met to help achieve a successful project. This may well result in adding tasks to the project plan, in changing the sequence of tasks or perhaps in affecting resource assignments or other changes to the requirements plan. It is recommended that the Business Analyst take into account the changing priorities of stakeholder project expectations. Priorities should be clearly defined and communicated during project planning and execution. An example of how to address this might be to plan a recurring meeting with the Sponsor, Project Manager and key Stakeholders.

Organization standards for the project and/or the product may exist in a number of organizations. These should be identified by the Business Analyst and then accounted for in the plan.

.3 Predecessors

The major input to this task will be the current project plan. Along with the plan, other useful documents will include organization project historical records, the project RACI (Responsible-Accountable-Consulted-Informed) (see Section 3.2) chart and any relevant project/product standards that are in use in the organization.

.4 Process and Elements

The Business Analyst must consider the impact of project risk on their planning efforts for each project on an individual basis. E.g. how much risk are the project sponsors willing to assume? The Business Analyst must consider the impact of the risks inherent in defining functional requirements, and how these risks should impact the planning estimates and schedule. For example, if the project has an absolute scheduled completion date, then the scope and amount of functionality included in the requirements must be limited. The Business Analyst should consider the impact of missing the scheduled dates and or cost estimates for the project. Refer to the PMI PMBOK for more information concerning project risk and the recommended responses available to cope with it.

The Business Analyst must have a clear understanding of the project sponsor's and other key stakeholders expectations of the project cost, schedule, scope, quality, and other related areas. They must also be aware of the possible fluctuating priorities of these factors as the project progresses. Additionally roles, responsibilities and associated stakeholder expectations need to be documented, agreed to and officially signed off by the project team members. A clear RACI chart should be created and maintained for the entire project by the project manager and also maintained specifically for the requirements process by the business analyst.

Part of the expectations process may be a Business Analyst review of existing historical project records and comparing these to the project plan. If the business analyst has access to such records, they will prove valuable to planning requirements activities. Typically it

is the responsibility of the Business Analyst to insure that accurate collection of the requirements activities project task performance is done on each project.

An organization may have standards relating to the project planning process or to the standards for the product of the project. From a requirements perspective, the Business Analyst needs to understand what these standards are and how they will impact the requirements process.

For example, one organization may have a standard that dictates that all requirements will be gathered using the Joint Application Design (JAD) information gathering approach and that all JAD sessions will last a minimum of 1 day. This requirement will influence the Business Analyst's approach to requirements planning and management.

Project planning will certainly be affected by these considerations.

.5 Stakeholders

Stakeholders for this task would include all project stakeholders that are impacted by project risk as well as those affected by related organization standards and the project expectations of key project stakeholders.

.6 Deliverables

The deliverable from this task will be the modified requirements management plan as it is updated by the Business Analyst after their consideration of the areas of project risk, organization standards and the expectations of key stakeholders.

3.5.5

Task: Re-Planning

.1 Purpose

The Business Analyst typically will have the project requirement to manage the requirements management plan and to revise it as required during the project in order to accurately reflect any changes in the requirements process. This will result in having to modify and update the project plan and estimates periodically throughout the project.

.2 Description

Re-planning is defined as the process of modifying the project plan in response to events that have occurred during project execution. The Business Analyst must realize that project planning is an ongoing process, not an event that is done once in a project. The process of project planning occurs throughout the project.

.3 Predecessors

In order to accomplish the continuous task of re-planning, the Business Analyst will primarily use two inputs. These are the current baseline requirements plan and whatever changes have been uncovered to the existing plan.

.4 Process and Elements

The process of re-planning consists of evaluating the impact of the proposed change(s) in the project environment or requirements to determine the impact on the base lined plan. Impacts of re-planning may be considerable as it requires time and effort to actually execute the re-planning. The re-planning may also result in dramatically different plans as the project is executed.

As the project team becomes more involved with the project and the Business Analyst becomes more involved in the details of the requirements process; the project scope and/or non-functional requirements can be expected to change. As the new information and discoveries are revealed, the original allocated time may increase as the estimates, planned activities and assumptions are updated.

.5 Stakeholders

These include all stakeholders involved with the baselined requirements management plan.

.6 Deliverables

The deliverable from this task will be the updated requirements management plan as it is updated by the Business Analyst after their re-planning consideration. It is understood that Business Analyst re-planning is an ongoing activity that will occur throughout the project at any time that conditions and results of the project indicate that re-planning of the requirements activities is needed.

3.5.6

Task: Consider Key Stakeholder Needs and Location

.1 Purpose

The physical location and specific needs of individual key stakeholders can each have a significant influence on the requirements planning and management efforts of the Business Analyst and must be considered in the requirements plan and management.

.2 Description

The Business Analyst must take into account specific needs and location(s) of the project stakeholders in planning, defining and documenting requirements. Some projects will

have the stakeholders located in a single location while others will have some of their key stakeholders dispersed over a wide area. These latter projects increase the complexity of managing the requirements planning and management activity in the project. Typically, some stakeholders will also exhibit individual specific requirements that must be met in order to have a successful project. For example, perhaps one key stakeholder may have a history with the IT department and does not usually like or trust them. This information could obviously influence the planning of project tasks that must include this stakeholder. Or perhaps another stakeholder may have some experience with using a particular technology and be in favor of its choice for the current project.

If these can be identified and factored into the requirements planning and management process, the project has a better chance of success.

.3 Predecessors

The Stakeholder list showing the identity, location and interests of the project stakeholders developed in Section 3.3 is a major input to this task.

.4 Process and Elements

The Business Analyst must consider the location of the key stakeholders in their project. Two different types of projects can be identified regarding the location of these stakeholders:

.5 Centralized

All key stakeholders are located in the same local geographic area. There are no special considerations for the Business Analysis involved in these projects.

.6 Dispersed

These more difficult projects have some key stakeholders located in different geographic areas. The factors of distance, possible time differences and perhaps cultural and language differences increase the difficulty for the Business Analyst and require some special analysis to identify and account for these differences

An example of the impact of this type of situation might be the necessity to have teleconferences rather than face to face meetings due to the differences in physical location and the difficulty in scheduling everyone's availability in a single location. Another typical situation might involve an outsourced development project where the development team is physically located many time zones away. This type of situation must be accounted for during requirements planning by the Business Analyst and would require more detailed requirements documentation, perhaps more frequent review sessions or maybe a different more detailed documentation methodology, for example.

Individual stakeholders may have specific requirements that need to be identified in the requirements plan to insure their inclusion in the completed project output.

.7 Stakeholders

These include all key stakeholders involved with the baselined requirements management plan.

.8 Deliverables

The deliverable from this task will be the updated requirements management plan.

3.5.7 Task: Consider the Project Type

.1 Purpose

The Business Analyst must know or be able to ascertain the type of project that is planned in order to determine any impact on planning and management of requirements.

.2 Description

The type of project that the Business Analyst is assigned to may have a significant impact on the planning process. The impact differences may include types and durations of requirements planning and management tasks as well as the roles and responsibilities involved. For example, in a project to purchase a new software package, typically the level of detail required in requirements definition will be much less than in an in-house software development one.

.3 Predecessors

A major input to this task will be the current project plan. This document should contain information identifying the type(s) of project. In some cases, it is recognized that the actual type of project, i.e. package purchase or in-house development, may not be finalized until the project is underway based on information developed during the project.

.4 Process and Elements

Types of projects often worked on by Business Analysts include the following:

- New Software Development (in-house)
- Outsourced Development
- Software Maintenance

- Software Package Selection
- Process improvement
- Organizational Change

The differences in the requirements planning and management activities of the Business Analyst in these different types of projects will be very great; since the purpose of, objectives and tasks involved in the requirements planning, definition and documentation are different for these varying types of projects.

.5 Stakeholders

These include all key stakeholders involved with the requirements management plan.

.6 Deliverables

The deliverable from this task will be the updated requirements management plan.

3.6

Select Requirements Activities

The activities that are executed during the requirements process and how they are executed will determine the quality and timeliness of the requirements deliverables and ultimately of the solution. The Business Analyst should select a complete set of requirements activities such that the result is a clear, concise set of requirements on which the realization of the solution can be based. The resource types required to complete each activity also need to be defined.

To accomplish this, the Business Analyst will determine what activities need to be undertaken to complete the end-to-end requirements process, which consists of:

- *Requirements Elicitation* (Chapter 4)
- *Requirements Analysis and Documentation* (Chapter 5)
- *Requirements Communication* (Chapter 6)
- *Solution Assessment and Validation* (Chapter 7)

This section discusses:

- What the Business Analyst needs (inputs) to be able to select requirements activities.
- How the Business Analyst will select the activities needed (tasks).

Deliverables (outputs) of this activity are:

- A selection of all activities for the entire requirements process (*Requirements Elicitation to Solution Assessment and Validation*)
- List of activities with a detailed description of each activity, and the types of resources required to complete each activity e.g. a Work Breakdown Structure (WBS).
- Logical dependencies between activities i.e. determination of predecessors.

This section does not include:

- Selection of any non-requirements related activities

Assigning actual effort estimates (and duration estimates) and actual resources (who and the number of resources) to the activities. These activities will be covered in 3.8.

3.6.1

Task: Determine Requirements Elicitation Stakeholders and Activities

.1 Purpose

To determine which stakeholders will be involved in the requirements elicitation activities, which requirements elicitation activities need to be undertaken, and the types of resources required to complete them. The goal of requirements elicitation is to have a complete set of business and user requirements available once the activities are complete.

.2 Description

This task entails determining what activities should be undertaken by whom, to complete requirements elicitation.

The Business Analyst must select those business stakeholders from whom they will gather information from to develop the requirements. All key stakeholders or someone representing each key stakeholder's perspective should be included in the requirements elicitation process. The Business Analyst, in order to elicit requirements from them, should ensure that all people included in the requirements elicitation process have the necessary time and knowledge (are Subject Matter Experts in their business area). The Business Analyst should also be satisfied that all perspectives of the requirements are included to minimize changes during later phases of the project.

Once the stakeholders are identified, the BA will select the requirements activities by determining how requirements will be gathered. The methods or processes for elicitation requirements should align with the importance, impact, timing, and value of the project. The activities selected should make best use of the participants' time, they should stay focused on the project requirements elicitation process, and they should provide the Business Analyst with the information necessary to produce clear and accurate

requirements deliverables. The techniques used to gather requirements are discussed in detail in Chapter 4 *Requirements Elicitation*. Each of these techniques should be reviewed and the Business Analyst should select the technique or combination of techniques that will best fit their needs.

Throughout this process, the Business Analyst should determine what other project roles should be involved in requirements elicitation and review tasks. Some examples would be:

Technical resources may need to be involved to support the tools used by the Business Analyst

Internal or external Subject Matter Experts (SMEs) may be called in to help the Business Analyst review, codify, and analyze the data collected

Accounting or Finance department resources can assist the Business Analyst in better understanding financial information collected, organizational accounting practices, and tax implications.

An important part of involving other roles in requirements elicitation and review is getting their buy-in of the need to include them in various steps of the process. All resources participating in requirements elicitation and review should know the importance of their role, the reason(s) why they have been included, and the value that they add to the process.

.3 Predecessors

The BA will use as input to the task the outputs of *Section 3.3 Identify and Describe Stakeholders* and *Section 3.6 Determine Planning Considerations*. The key stakeholders identified and the software development methodology, for example, will determine the requirements elicitation techniques and activities.

.4 Process and Elements

The Business Analyst will determine the best way to gather requirements from the stakeholders. The BA will refer to *Chapter 4, Requirements Elicitation*, and select the appropriate techniques to elicit the requirements from the stakeholders.

For example, in a project where stakeholders are dispersed, one technique that could be appropriate is a survey.

In a COTS (Commercial Off-the-Shelf System) implementation, an appropriate technique could be to conduct a demo of several suitable products, and obtain stakeholder feedback on them.

In a project where an iterative software development approach is being utilized, a prototype can be used to elicit the next iteration of requirements.

Requirements Workshops, where face-to-face time yields added benefits, while especially well-suited to complex projects, is useful for all project types.

Note that there may be specific elicitation approaches that have been standardized by the organization, in which case those can be used.

.5 Stakeholders

The stakeholders in this task are the key stakeholders that have needs/goals for the project.

.6 Deliverables

The task is complete when there is a complete list of activities, such as a WBS, detailed for requirements elicitation. Each activity should be itemized with a detailed description and the types of resources required to complete it. Predecessors to the activities have also been defined based on logical dependencies of the activities.

3.6.2

Task: Determine Requirements Analysis and Documentation Activities

.1 Purpose

To determine which requirements analysis and documentation activities need to be undertaken, and the types of resources required to complete them.

.2 Description

The choice of requirements modeling and analysis techniques and documentation techniques should be made based on the availability of the desired tools or technologies or standards within the organization, the Business Analyst's familiarity with the desired techniques, the applicability of the desired technique, and the ability of the desired techniques to provide objective and accurate requirements deliverables.

The project's time constraints and budget should also be considered when selecting the best modeling and analysis techniques, and documentation techniques. Chapter 5 covers the most commonly used requirements modeling and analysis techniques and documentation practices. The Business Analyst should become familiar with each one and understand the advantages of each, the limitations or caveats associated with each technique, and the types resources necessary to properly perform each technique.

Selection of the best techniques to model and analyze requirements should also include the Business Analyst's justification or reasoning for the techniques selected. Selection of

the best techniques to document requirements should include the Business Analyst's justification or reasoning for the techniques selected.

The Business Analyst will determine the types of resources required to conduct each requirements analysis and documentation activity, as outlined in Chapter 5.

.3 Predecessors

The Business Analyst needs to have a good understanding of the type of project and the scope level of requirements already elicited to determine which analysis techniques and which documentation styles will be the most suitable. Requirements Elicitation activities must be complete and Business and/or User Requirements documented.

.4 Process and Elements

The Business Analyst reviews all of the stakeholder information, requirements elicitation results, and project scope information. Then the Business Analyst reviews each analysis technique and each documentation style. The Business Analyst then determines the best techniques to be used based on which techniques are best suited to what information is available, which techniques have been used before in the organization (familiarity) and types of resources required vs. available to accomplish the techniques.

For example, for a small/short 3 month project or a COTS system, use-cases may be used for the analysis technique and for the documentation technique. In this case the BA may choose to not have an SRS (Software Requirements Specification).

For a Data Warehousing project, the best requirements model to formulate and analyze would be a data model.

For a project where the Project Delivery Team is outsourced, a detailed SRS would be appropriate with formalized document walkthroughs.

.5 Stakeholders

The key stakeholders and SMEs should be involved in the requirements analysis phase to ensure that the modeling represents correctly the requirements and to be implemented. Constant collaboration between the key stakeholders and SMEs and the Business Analyst is required to develop a solution to the requirements that will meet the stakeholders' needs.

.6 Deliverables

The task is complete when there is a complete a list of activities, for example, a WBS, detailed for requirements analysis and modeling and documentation. Each activity should be itemized with a detailed description and the types of resources required to

complete it. Predecessors to the activities have also been defined based on logical dependencies of the activities.

3.6.3 Task: Determine Requirements Communication Activities

.1 Purpose

To determine which requirements communications activities need to be undertaken, and the types of resources required to complete them.

.2 Description

The Business Analyst must select the requirements documentation that best captures and most clearly communicates the project requirements. The Business Analyst should be familiar and comfortable with using the desired documentation and should have the necessary skills to accurately complete the documentation. The decision on how the requirements will be documented should also match the needs of all audiences associated with the project. Chapter 6 explains the communication of project requirements and shows the various ways that project requirements can be communicated. Each method and technique for communicating requirements discussed in Chapter 6 should be evaluated and selected, modified, or discarded to meet the needs of the project.

.3 Predecessors

The key stakeholders will assist the Business Analyst in determining who needs to be communicated to and how. All requirements, analysis models and results, and any other requirements documentation need to be complete and available as input to this activity. All preceding requirements related activities need to be successfully completed: Requirements Elicitation and Requirements Analysis and Documentation.

.4 Process and Elements

The Business Analyst reviews all of the stakeholder information, requirements, analysis results and models. Then the Business Analyst reviews each communication method available to them (e.g. Software Requirements Specification template). The Business Analyst then determines the best communication vehicles that are best suited to what information is available and who is recipient of the final requirements communication package.

For example, to communicate to Senior Level Management Stakeholders, a presentation can be prepared with all of the key highlights.

To communicate the product requirements to potential customers, a brief video message or webpage can be made available on the organization's website.

For the Project Delivery Team, detailed level business rules with decision trees can be packaged together in a CASE (computer aided software engineering) tool.

.5 Stakeholders

The key business stakeholders and SMEs should be involved in the review and signoff of the requirements to ensure that the documentation represents correctly the solution to be implemented.

.6 Deliverables

The task is complete when there is a complete list of activities, for example, a WBS, detailed for requirements communication, including reviews with key stakeholders, and signoff. Each activity should be itemized with a detailed description and the types of resources required to complete it. Predecessors to the activities have also been defined based on logical dependencies of the activities.

3.6.4 Task: Determine Solution Assessment and Validation Activities

.1 Purpose

To determine which *Solution Assessment and Validation* activities need to be undertaken, and the types of resources required to complete them.

.2 Description

The Business Analyst must select the Solution Assessment and Validation activities that best provides the design of the solution based on the requirements. The Business Analyst should be familiar and comfortable with executing the tasks identified in Chapter 7 and should have the necessary skills to determine best solution with the collaboration of the Project Delivery Team. The decision on how the requirements will be implemented to provide the final solution should align with the vision of the Organizations receiving the solution.

.3 Predecessors

The Business Analyst needs to have the final requirements document(s) signed off by the business, reviewed by the Project Delivery Team, and all questions and concerns regarding requirements, analysis, modeling, documentation, and communication, by both Key Stakeholders and Delivery Team(s) resolved. All preceding requirements related activities need to be successfully completed: *Requirements Elicitation*, *Requirements Analysis and Documentation*, and *Requirements Communication*.

.4 Process and Elements

The Business Analyst reviews all of the stakeholder information, requirements, analysis results and models, and the final set of requirements documentation. Then the Business Analyst collaborates with the Project Delivery Team to conduct and coordinate the tasks in Chapter 7 to determine the solution. Once the best solution has been determined by the Project Delivery Team and the Business Analyst, the Business Analyst reviews the solution with the Business to ensure it will meet their needs and to obtain buy-in.

For example, if the project involves implementation of COTS, an evaluation of several viable solutions can be conducted.

For an enhancement to an existing application, there may be only one viable solution. Since an existing production system will be impacted, all activities to move seamlessly to the new version should be detailed and resourced to decrease risk of problems occurring during and post-implementation.

.5 Stakeholders

The Project Delivery Team will be the key stakeholder involved in the design of the solution based on the requirements. The coordination of the activities in Chapter 7 will be the responsibility of the Business Analyst.

.6 Deliverables

The task is complete when there is a complete list of activities, such as a WBS, detailed for Solution Assessment and Validation. Each activity should be itemized with a detailed description and the types of resources required to complete it. Predecessors to the activities have also been defined based on logical dependencies of the activities.

3.7

Estimate Requirements Activities

Requirements planning and management essentially includes three basic parameters: scope (work to do), schedule (time to do it in), and resources (budget for the project). Often enough, Business Analysts make haphazard estimations of their requirements parameters. Rather than base the plan and activities on “gut feelings”, the requirements plan needs to be based on empirical data and methodologies. The assumption is that each task will usually be assigned to an individual resource and based on the skill level of a fully qualified BA.

3.7.1 Task: Identify milestones in the requirements activities development and delivery

According to the Project Management Institute's *Body of Knowledge* (PMBOK), a milestone is a significant point or event in the project. Milestones are important times to celebrate the completion or delivery of a major section of project work. Milestones are used to measure the progress of the project and compare actual progress to earlier estimates. An example of a major milestone of Requirements Planning and Management is the stakeholders' and sponsor's sign-off of the Requirements Document and/or other mandatory deliverables defined by the project (include other examples).

.1 Purpose

Milestones can be used by the Business Analyst to measure the progress and completion of significant phases of requirements activities.

.2 Description

A milestone can be a calendar date or the completion of a significant number or group of activities. The Business Analyst will define milestones that will occur within the listing of requirements activities defined in section 3.7.

.3 Predecessors

The Business Analyst will use the listing of requirements activities developed in section 3.7 as the basis for developing the requirements activities milestones. (include mention of project plan)

.4 Process and Elements

The Business Analyst will review the list of requirements activities with the Project Sponsor and Project Manager to define and agree on each milestone and the associated requirements activities that must be completed to recognize when the milestone has been reached. Each milestone should be distinctly identified by name or a unique calendar date to avoid confusion.

.5 Stakeholders

The Project Sponsor and the Project Manager are the key stakeholders for this task. Project team members who will be assigned a requirements activity or who are responsible for the completion of requirements tasks may also be consulted to identify each milestone and determine which activities will be associated with each milestone.

.6 Deliverables

The artifact produced from this task will be a listing of milestones and associated requirements activities, which should be included as part of the project plan. This information can also be appended to the requirements activities listing created in section 3.7 or developed as a separate document.

3.7.2

Task: Define Units of Work

(A unit of work is a task that cannot be decomposed further) Should we check how they define this in the PMBOK?

.1 Purpose

To create a complete outline of how requirements planning and management will proceed.

.2 Description

This task will document the steps or requirements planning activities that must be completed in order to achieve the defined milestones. It will define how each task will proceed and will provide a management tool for requirements activities to measure the progress of each task.

.3 Predecessors

The Business Analyst will use the listing of requirements activities developed in section 3.7 as the basis of defining discrete units of work and time estimate for requirements activities.

.4 Process and Elements

The Business Analyst will review each requirements activity listed in section 3.7 and break down each activity into sub-activities and then further into tasks. Each task should be completed within a 1-2 week time period and should be identified as an independent task, a task dependent on the completion of other tasks, or a task that must be completed before other tasks can start. For example, the activity of 'Interview Stakeholders' could be decomposed into sub-activities: Prepare interview questions, interview stakeholders, document interview responses. The sub-activity of interview stakeholders could be decomposed into the tasks of interview stakeholder 1, interview stakeholder 2, interview stakeholder 3, etc.

.5 Stakeholders

Project team members who will be assigned a requirements activities task or who are responsible for the completion of requirements tasks should be consulted to define and agree on each task component and any dependencies. Any resources outside of the project team that will perform a requirements activity should be contacted to review and agree on components associated with their task(s).

.6 Deliverables

The artifact produced by this task will be a listing of components and dependencies associated with every requirements activity defined in section 3.7. This listing can be combined with the deliverables from section 3.7 or created as a separate document.

3.7.3 Task: Estimate effort per Unit of Work

.1 Purpose

This task will document the resource assigned to each task and the estimated timeframe for completing each task. This estimate will provide the project team with a tool for measuring the status and progress of each task.

.2 Description

The Business Analyst will develop an estimate of effort (hours, days, or weeks) for each task identified in section 3.8.2.

.3 Predecessors

The Business Analyst will use the listing of requirements activities developed in section 3.8.2 and a listing of documented assumptions and risks.

.4 Process and Elements

(is this a technique, like historical data? – check PMBOK for alternate techniques)

The Business Analyst will assign an available resource and define a time estimate for each requirements task. Critical or complex tasks should be assigned to the more skilled and experienced resources. Related tasks should, if possible, be assigned to the same person. Tasks with specific geographic needs should be assigned to resources closest to the location unless the additional cost of remote resources can be justified in terms of experience or value. Tasks requiring multiple resources should consider assigning resources that work well together or have had past successful experiences working together. The assignment should show the name or role of the resource and the duration (in days) needed to complete the activity. Task assignments should be mindful of

potential personality issues or work styles when assigning multiple resources to an individual task.

.5 Stakeholders

The stakeholders for this task are project team members who will be assigned a task or who are responsible for the completion of a task. Also, resources outside of the project team that are assigned a task should be contacted to help define estimates.

.6 Deliverables

The artifact produced from this task will be a list of the estimated time to complete each requirements activity defined in section 3.8.2. This document can be combined with the requirements activities document(s) created in section 3.7 or developed as a separate artifact.

3.7.4 *Task: Estimate duration per unit of work*

.1 Purpose

This task will define the work period (calendar days) for each activity defined in section 3.8.2. These estimates will assist the Business Analyst in defining any sequences of activities, determine resource timing, and identify schedule constraints.

.2 Description

The Business Analyst will estimate starting and ending dates for each activity defined in section 3.8.2.

.3 Predecessors

The listing of activities from section 3.8.2 and the listing of estimated work effort from section 3.8.3 will be needed to complete this task.

.4 Process and Elements

The Business Analyst will enter a beginning and ending calendar date for each task defined in section 3.8.2. Estimates will assume that each task will be assigned to a single resource and that the assigned resource will be exclusively dedicated to the task until the task is completed.

.5 Stakeholders

The Business Analyst should discuss and get agreement on estimates for tasks defined in section 3.8.2 with the Project Manager and any resources that could be assigned to one or more of these tasks.

.6 Deliverables

The artifact produced from this task will be an estimated duration for every task defined in section 3.8.2.

3.7.5

Technique: Use documentation from past requirements activities to estimate duration

.1 Purpose

This technique will provide the Business Analyst with data to support estimating duration for the tasks defined in section 3.8.2.

.2 Description

The Business Analyst will review other projects in the organization that required the completion of tasks that are the same as or similar to those developed in section 3.8.2. For each completed task from other projects that match the tasks in section 3.8.2, the Business Analyst should use the actual duration from the completed task as the estimated duration for the matching or similar task in section 3.8.2. For each completed task from other projects that is similar to the tasks in section 3.8.2, the Business Analyst should adjust the estimate for the current project task to account for variations between the completed task and the similar task noted in section 3.8.2.

.3 Intended Audience

N/A

.4 Process

The Business Analyst will review documentation and artifacts created from other recent projects within the organization, looking for the actual duration of tasks that are the same as or similar to the tasks defined in section 3.8.2. For each task found in other projects that matches or is similar to tasks in the current project, the Business Analyst should set the duration estimate of the current task equal to the number of days in the completed task, taking into account any differences in project assumptions, business processes, technologies, or resource availability that should modify the duration estimate. The Business Analyst will then document the duration (start date and end date) for each task defined in section 3.8.2 based on the actual duration of a matching or similar task that has

been completed in a recent project. When estimating the duration of each activity, the Business Analyst should include time for conducting the work, resolving issues, meetings, conducting working sessions, review of project documentation, reviewing stakeholder feedback, and making revisions to project documents. Estimates should also account for time constraints, like holidays, and prior resource commitments to other projects or activities.

.5 Key Features

This technique requires access to documentation and artifacts from other completed or active projects in the organization and requires stronger judgment skills from the Business Analyst to determine how similar or different completed tasks from other projects are from the task list defined in section 3.8.2.

.6 Alternatives

Interview – The Business Analyst could interview resources in the organization who have performed tasks that are the same as or similar to the task list in 3.8.2 to solicit their opinions or information about the duration of these similar tasks then use the responses to develop duration estimates.

Duration Estimates from other projects – The Business Analyst could copy duration estimates from other active projects where the tasks were the same or similar.

.7 Strengths and Weaknesses

The actual duration for similar tasks from recent projects provide an objective baseline for the Business Analyst to use in estimating duration, but information can be incomplete, inaccurate, or may exclude important factors that affected the actual duration, like hiring an outside firm to research and develop all of the workflow analysis.

3.7.6 Task: Identify Assumptions

.1 Purpose

In each task, there are factors or conditions which are considered to be true or to exist without the need to provide documented evidence or empirical data. These factors should be documented as Assumptions and all estimates should support these assumptions.

.2 Description

The Business Analyst will identify and document assumptions that affect requirements planning and management activities. For example, the Business Analyst should document the assumption that all invited parties will attend JAD sessions.

.3 Predecessors

All project documentation developed to this point should be used in this task.

.4 Process and Elements

The Business Analyst should review all project documentation and prepare a list of all Assumptions identified in these documents that impact Requirements Activities and management. The Business Analyst will review and validate the Assumptions with the project sponsors, project manager, and stakeholders before they are included in the project documentation. During this review, each Assumption will also be assessed a degree of risk, which defines the frequency (how often the assumption will apply) and significance (how severe the assessment impact will be) of each assumption. Estimates should be based on documented Assumptions and identified Risks.

.5 Stakeholders

The stakeholders for this task are the project sponsor, project manager, and project team.

.6 Deliverables

The result of this task will be a listing of Assumptions, their degree of risk, their significance, and any justification if there is a conflict with an estimate.

3.7.7

Task: Identify Risks

.1 Purpose

Events or conditions that could have a positive or negative affect on estimating requirements activities and management are Risks and should be documented.

.2 Description

This task will identify and list Risks associated with requirements planning and management. Risks should be communicated to the project manager and documented in the master project plan.

.3 Predecessors

All project documentation developed to this point should be used in this task.

.4 Process and Elements

The Business Analyst should review all project documentation and prepare a list of all Risks identified in these documents. The Business Analyst will review and validate the

Risks with the project sponsors, project manager, and stakeholders before they are included in the project documentation. Each Risk should be clearly defined, showing which task is affected, the assumed affect of the event or condition, the affect of the event or condition on the task, and what actions can be taken to mitigate or minimize the affect.

Tasks in the critical path of requirements activities should be evaluated and changes to the task should be identified that could reduce the impact of the Risk. Examples of some ways to reduce or avoid Risks include:

- Complete tasks simultaneously rather than sequentially
- Assign lead or lag time to a task to work around scheduled resource limitations
- Adjust the start and end times/dates of non-mission-critical tasks
- Add resources to critical activities
- Change the completion date of some of the requirements to a future release
- Identify links between tasks
- Identify dependencies
- Remove the activity from the critical path

.5 Stakeholders

The stakeholders for this task are the project sponsor, project manager, and project team.

.6 Deliverables

The result of this task will be a listing of Risks, their affect, and any actions taken to mitigate or minimize their affect.

3.7.8

Task: Modify the Requirements Plan

.1 Purpose

When estimates assigned to project tasks become inaccurate because of changes to project scope, assigned resources, or project schedule, the Business Analyst should re-evaluate and modify the Requirements Plan to reflect the changes affecting the project.

.2 Description

As work evolves, more detailed and precise data is available to the project team. This task will modify the Requirements Plan to correct inaccuracies caused by changes and revise

the project task schedule to more accurately define the project's health, progress, and completion.

.3 Predecessors

The project plan and the current project status (mention the BABOK chapter referring to project reporting).

.4 Process and Elements

The Business Analyst should speak with the sponsor, the stakeholders and others on the project team to determine if any aspect (scope, schedule, resources) of the plan should be modified.

Also, the Business Analyst should consider options other than modifying task aspects, like identify any individual tasks that can be eliminated, determine if the duration of any individual tasks may be decreased, or revising task assignments.

The agreed upon changes will be made to the plan by the Business Analyst along with documentation noting the reason(s) for the changes.

.5 Stakeholders

The project sponsor or their representative, the project manager, and other project team members are stakeholders for this task.

.6 Deliverables

The deliverable from this task will be the revised plan along with documentation noting the purpose for the change. The format for the revised plan should be documented in a tool such as Microsoft© Excel or Microsoft© Project.

3.8

Manage Requirements Scope

Managing requirements scope relates to managing the list of the requirements of the systems development component and/or process improvement and/or organizational change project. The Business Analyst involvement in requirements scope management is to establish and maintain requirements baseline, tracing requirements, to identify impacts to external systems and/or other areas of the project, to identify scope changes resulting from requirements change, and maintain scope approval.

3.8.1

Task: Establish Requirements Baseline

Baseline is a line or standard by which the changes to requirements are compared; the established baseline for the list of requirements. It is the point of reference for the requirements, which is used as a basis for comparison. It becomes the official list of requirements and it becomes an internal agreement, like a contract, between the client and the project team. In some organizations, the list of requirements is officially signed-off at the business requirement level, in the form of the Business Requirement Document. In other organizations, sign-off to the list of requirements is done at the specification system requirement level, prior to the system design phase.

.1 Purpose

If the list of requirements is not baselined, then it will be very challenging for the Business Analyst to manage the Requirements Scope. It is difficult to evaluate what has changed if the Business Analyst does not know where to start or the point of reference. The requirements baseline is reviewed throughout the project by the Business Analyst to ensure scope containment and to identify scope creeps.

.2 Description

Once the requirements have been reviewed and approved, the baseline is established and becomes the first official document, which is available to all Stakeholders. For iterative and agile projects, all the requirements are not baselined at the same time. Because a group of requirements are known at certain phases of the project, a snapshot is taken of those known and approved group of requirements. The baseline (the snapshot) will be reviewed throughout the project to ensure its ongoing validity. It may be in the form of an official Business Requirements Document or an official Specification System Requirement Document. It is now considered under change control.

.3 Predecessors

The list of requirements, the deliverable from section 5.9 Document Requirements

.4 Process and Elements

The Business Analyst obtains a formal sign-off of the list of requirements in governance with the organization's approval process.

The Business Analyst takes a snapshot of the list of requirements.

Once the snapshot is taken, the list of requirements is under Change Control Management.

.5 Stakeholders

All Stakeholders listed in section 3.3 Identify Stakeholders

.6 Deliverables

The baselined List of Requirements, now considered under Change Control Management

3.8.2

Task: Structure Requirements for Traceability

.1 Purpose

Requirements traceability assists in managing changes to the requirements that will occur after the requirements are baselined. Traceability allows the Business Analyst to verify several items. First that the interests of all parties affected by a change to the project requirements are properly considered . Next that all impacts of changes to the solution scope are properly considered. Lastly, as the elapsed time between the specification of a requirement and its implementation increases, the need to be able to trace a requirement increases as well.

Requirements traceability has the following project benefits:

- Traceability aids scope management:
 - A functional requirement must be traced back to a business requirement or feature to prevent misunderstanding customer needs
 - A design function must be traced to a functional requirement to prevent scope creep
 - A feature must be traced to lower level requirements to prevent a gap in fulfilling customer needs.
- Traceability aids change impact analysis:

- Changes to higher-level requirement are traced to determine what may be impacted
- Proposed changes can be more thoroughly costed by understanding all impacts.
- Traceability aids risk based testing:
 - A high priority requirement must have a test condition/case
 - A low priority requirement traced to a large number of test cases may be over tested

.2 Description

Requirements traceability supports the ability to trace a requirement through the development life cycle. The ability to track the requirements is an important technique used to detect missing functionality or identify if implemented functionality is not supported by a specific requirement.

Traceability supports the following project goals:

Links downstream work products to the purpose for which they were created

Provides a process to confirm that the Requirements Elicitation process is complete

Ensures that project work is not authorized for items that are outside of project scope

Enables stakeholder notification during the change management process

Increases quality on all projects sizes and types

Facilitates the requirements change control process.

There are several different types of traceability information that the Business Analyst may maintain:

Source: Indicates where the requirement originated. Used by the Business Analyst to determine which stakeholders may need to be consulted in regards to a proposed change.

Rationale: Indicates the business goal that the requirement is intended to satisfy. Used by the Business Analyst to determine if a change in the goals of the business should mandate a re-evaluation or change in the requirements.

Requirements: Indicates which requirements are interrelated. Used by the Business Analyst to determine which additional portions of the solution may be indirectly affected by a proposed change.

Design or Test: Indicates which elements of the solution implement or test a requirement. Used by the Business Analyst and the Project Manager to determine what work must be done to implement a change.

Interfaces: Indicates where requirements affect an external interface to another system. Used by the Business Analyst to determine where changes may impact external systems.

.3 Predecessors

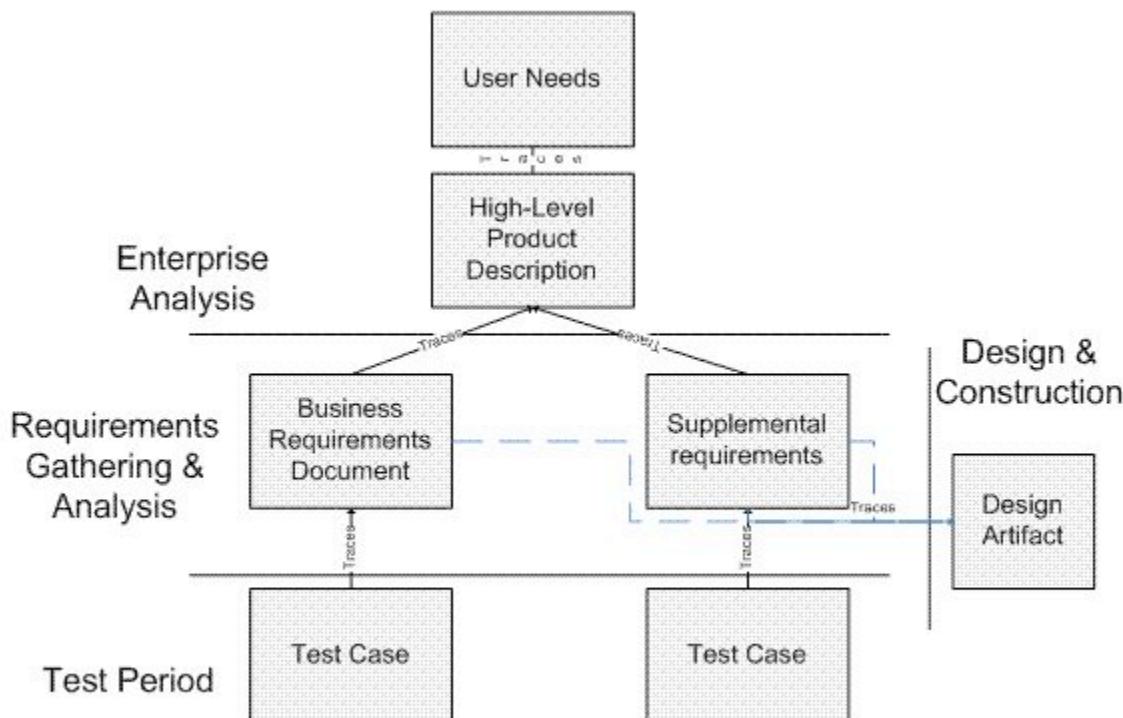
The Business Analyst can begin tracing requirements after *Structuring Requirements Packages*.

.4 Process and Elements

Projects can use many different types of tools or relationships between elements to create products and services. However, there is a common model and common tools that describes how small projects to complex programs create similar elements during the system requirements life cycle.

Model

Figure 3.5: Requirements Traceability



The user and stakeholder needs documented in a business case with high-level product descriptions will drive all lower level requirements and their dependent deliverables. Functional requirements are created from an upper level product description. Supplemental requirements are created from that document, along with inputs received during Requirements Elicitation.. Design and construction work products or artifacts are created as a response to specific requirements and can be traced to the upper level need. Test cases are also created from both the functional requirements and supplemental requirements.

.5 Techniques

Several techniques assist in ensuring that the project team is well prepared to have requirements traceable by the end of the analysis phases.

- Clear numbering scheme
- Unique and permanent number for each requirement
- Unambiguous requirements statements
- Assigned team role responsibility for creating or maintaining links
- Documented instruction set for project traceability requirements
- Documented requirements for which work products require direct traceability

Traceability Matrix

The traceability matrix relates one set of elements to another set. For example, requirements can be traced to the high-level product description, or test cases can be traced to specific requirements.

Figure 3.1: Tracing high-level product descriptions to Requirements

	Requirement 1	Requirement 2	Requirement 3	Requirement 4
Product Description 1	x	x	x	
Product Description 2	x			
Product Description 3	x			
Product Description 4	x		x	
Product Description 5				

Analysis can be conducted to determine if there are any missing connections. First we can look across the row: If a successor item does not have a predecessor item, the team needs to continue the decomposition and elaboration process to write a requirement. For example, a requirement needs to be written for high-level product description number 5.

Next we can look down a column: If a successor item is not traced to a predecessor item, the team needs to review why that requirement was written. It might be an orphan element that wasn't deleted with the deletion of its predecessor or a stakeholder may have added it without project team agreement.

If a predecessor has too many successors, it may be too complex. This will be dependent upon the project context but it could be considered for additional decomposition if to improve its clarity. For example, requirement 1 is included in many of the high-level product descriptions, it may be a common element or it may be too broad. If too many requirements are included in a product description, it will create a complex text scenario.

Projects can use matrixes to describe any key relationship between work products that are important to the success of the project.

.6 Stakeholders

Requirements traceability assists the project team in assessing the impact of change requests and in verifying that the requirements are complete and consistent.

.7 Deliverables

The Business Analyst can complete a traceability matrix showing the interaction of requirements that will be implemented by the solution.

3.8.3

Task: Identify Impacts to External Systems and/or Other Areas of the Project

.1 Purpose

In maintaining the list of requirements, the Business Analyst determines where changes to the requirements that may impact external systems and/or other areas of the project.

.2 Description

The impacts to external systems and other areas of the project ensure that the work is not authorized for items that are outside the baselined list of requirements. The requirement change may impact the project schedule, cost, risk and resources, and/or affect an external interface to another system or project.

.3 Predecessors

The Requirements Traceability Matrix, Interfaces column

.4 Process and Elements

The Business Analyst identifies any modified, added or removed Requirements that have information in the Interfaces column in the Matrix.

The Business Analyst communicates the change(s) to the Stakeholder(s). Refer to 3.9.3.5, below, for a list of possible Stakeholders.

Once the approval process has been completed, the Business Analyst updates the Requirements Traceability Matrix. The updated Requirements Traceability Matrix becomes the new baseline where changes to requirements are compared.

For example, for ID 1 in figure 3.9.2.4-1, due to the requirement change where the agent no longer needs to subscribe to the service, the Design B was removed and Design C was modified to Notify All Sales Agents. Because Interface is Microsoft Outlook for Design C, the Business Analyst communicates the change to all interested Stakeholders. In this case, it would be the Source (Jane Brown), the Developer, the Database Analyst, the Project Manager and the Lotus Notes owner. Once the approval process is completed, the updated Requirements Traceability Matrix is the new baseline.

.5 Stakeholders

- The Stakeholders identified in the Source column, i.e. the Solution Owner, in the Requirements Scope Matrix
- Executive Sponsor
- Project Manager
- The responsible project team member that is affected by the modification, i.e. Business Analyst, Developer, Quality Assurance Analyst, Data Modeller, etc...
- The responsible project team member of the external system or the external system owner

.6 Deliverables

The updated the Requirements Traceability Matrix

3.8.4 Task: Identify Scope Change Resulting from Requirement Change (Change Management)

.1 Purpose

Change Management is the process of controlling changes to the requirements of the systems development component, process improvement and/or organizational change

project, in a controlled manner. No meaningful performance (where are we now) measurements can be made where the requirements are not bounded and under some form of change control. It is particularly important that Change Management process have high visibility and open channels of communication to promote smooth transitions when changes take place.

.2 Description

Scope changes stem from the following types of requirement changes:

New

Modifications to requirements (fixing requirements errors or omissions)

Removal of requirements already in-scope (de-scoping)

In governance with the organization's change control policy, a formal change control process is used to identify, evaluate, trace and report proposed and approved changes to the requirements. In a change control process, approved changes are incorporated in such a way as to provide an accurate and complete audit trail of the changes.

Because customer requirements are changeable throughout the lifecycle, requirements are not often complete until the end of its implementation phase. Depending on the level of the requirement change, it may impact managing the requirements not-at-all or it may slightly change it or may change it drastically, which will impact the project scope, time, cost and/or quality.

.3 Predecessors

The baselined List of Requirements and the Requirements Scope Matrix, Requirements column/field

.4 Process and Elements

The Business Analyst evaluates any updated version of the list of requirements.

If and when a requirement has changed, the Business Analyst determines the impact by updating the Requirement Traceability Matrix, as preparation for the approval and/or negotiation process.

The Business Analyst determines if the requirement change is aligned with the objectives of the project. If it is not (i.e. scope creep), the Business Analyst starts the organization's change control process to deem it out of scope for the project.

The Business Analyst determines any gaps due to the requirement change. The Business Analyst takes the necessary steps to have the identified gaps fulfilled.

The Business Analyst review and compare the requirement change with existing requirements with all Key Stakeholders and determine its relative Priority and business value (Rationale).

The Business Analyst commence the organization's change control process to obtain approval and sign-off for inclusion or exclusion of the requirement in/out of scope for the project based on review and agreement of all relevant information. Disposition based on results as to when it will be delivered or if it will be deemed out of scope.

Once the approval process has been completed, the Business Analyst updates the Requirements Traceability Matrix. The updated Requirements Traceability Matrix becomes the new baseline where changes to requirements are compared.

.5 Stakeholders

All Stakeholders listed in section 3.3 Identify Stakeholders that are affected by the change to the requirement

.6 Deliverables

New baseline for the List of Requirements and the updated Requirements Traceability Matrix

3.8.5 *Task: Maintain Scope Approval*

.1 Purpose

The impact of not having an approved list of requirements is confusion regarding Stakeholders' expectations for the project. It is a mutual understanding between customer and team about the requirements. As the project progresses, it is more difficult and costly to repair requirements errors.

.2 Description

After the list of requirements is created, reviewed, verified and approved, it is put under configuration/change management in order to control the iterative changes that occur over the rest of the project lifecycle. It must be approved for every version of it.

.3 Predecessors

The baselined List of Requirements and the Requirements Traceability Matrix

.4 Process and Elements

For every version of the list of requirements, the Business Analyst commences the change control process in accordance with the organization's change control policy.

Once the approval process has been completed, the Business Analyst baseline the updated list of requirements and updates the Requirements Traceability Matrix. The updated list of requirements and the updated Requirements Traceability Matrix becomes the new baseline where changes to requirements are compared.

.5 Stakeholders

All Stakeholders listed in section 3.3 Identify Stakeholders that are affected by the requirements change.

.6 Deliverables

New baseline for the List of Requirements and the updated Requirements Traceability Matrix

3.9

Measure and Report on Requirements Activity

It is suggested from the high failure rate of many projects that many do not effectively keep track of the metrics of their teams and products. It is impossible to effectively manage anything without an effective system of measurement and comparison to standards or objectives.

A 1995 Standish Group study (CHAOS) found that only 16.2% of IT projects were successful and over 31% were canceled before completion, costing over \$81 B in the U.S. alone.

There was an increase in success by 2001 according to the Standish Group research.

"The reasons for the increase in successful projects vary. First, the average cost of a project has been more than cut in half. Better tools have been created to monitor and control progress and better skilled project managers with better management processes are being used. The fact that there are processes is significant in itself.¹"

A metric is a quantitative measure of a process or product. It is used to describe what is to be measured. It may also be used to set a goal/objective to be measured against to define when a goal is met (or not!).

In order for the Business Analyst (and Project Manager) to make effective decisions about the project and the product; then accurate, meaningful data is required.

¹ The Standish Group, "CHAOS 2001: A Recipe for Success" (2001)

Examples of questions to be answered (and the needed metrics to be collected) might include the following:

- Are we on schedule?
- How are we doing compared to the budget?
- What is the quality of the product?
- Do we have enough people assigned to the project?

Notice that we have assumed that schedule and budget metrics as well as product quality metrics will be determined and compared to the actual collected data.

By answering these and similar questions through the use of collected metrics, the Business Analyst will be able to take action to address any identified problem(s).

Every project has a project life cycle regardless of the product(s) created in it.

Every product has a product life cycle model that will vary considerably due to the nature of the product. Each of these must be measured and managed by the Project Manager and the Business Analyst.

Accordingly, there is a natural division in the kinds of metrics that the Business Analyst must determine, collect and report during the life of the project. These are the following:

- Project Metrics – measurements of the type associated with the project (Cost, effort, schedule, risk, resources, etc.))
- Product Metrics – measurements associated directly with the product of the project (Defects, performance, size, etc.)

Metrics collection and analysis must be regularly monitored and measured. The results should be reviewed on a scheduled basis, and must also allow for exception alarms on an emergency basis when needed. The actual schedule of metrics collection and reporting will be determined by the Business Analyst in conjunction with other key stakeholders based on the size, complexity, risk and other relevant project factors.

The Business Analyst must determine the Product and Project metrics needed to be able to effectively and efficiently measure and report on the requirements activities in the project.

It is important to the success of the project that all key stakeholders involved understand the metrics to be used.

For example, on some projects, the success will be more closely measured and evaluated based on the costs of the project rather than schedule related metrics. On others, the primary metric may be the number of defects that are found and fixed in the product.

During this activity, the Business Analyst must work closely with the Project Manager in identifying, understanding and documenting the best set of Project and Product metrics. The Business Analyst typically will be involved in all requirements related activities while the Project Manager is more naturally concerned with all project activities.

Different organizations may have metrics standards used in their projects. The metrics that are discussed in this section may be critical to some organizations; while in others or on other projects many metrics may not be used at all.

The Business Analyst should take any of their organization existing standards into account when reading this section and especially when executing these tasks in their project.

The remainder of this section will be involved in the three types of tasks for both product and project related metric – the Identification, Collection and Reporting of these key measurements.

A suggested sequence of steps for the Business Analyst includes the following:

- Determine relevant metrics for the requirements activities.
- Determine how the metrics will be collected, analyzed, documented, and communicated.

Execute the following steps on a continuing scheduled basis:

- Collect
- Analyze
- Store
- Report and distribute the metric results

It should also be noted by the Business Analyst that all metrics that are determined must be controlled under whatever change control process has been implemented for the project as these are certainly subject to change during the project.

3.9.1 *TASK: Determine the Project Metrics*

.1 Purpose

The purpose of this task is to identify and document all project metrics that will be used in the requirements related project activities. The Business Analyst must work closely with the Project Manager to identify these for each particular project.

Some of the metrics discussed below, as well as others that may be defined within an organisation, may or may not be used on any particular project. Some metrics may also be collected and reported only at specific points of the project, while others may be in existence throughout the entire project.

.2 Description

This task will enable the Business Analyst to identify and document the necessary project metrics. This will enable the Business Analyst to insure that all of these measurements will be collected and reported to the appropriate stakeholders.

.3 Predecessors

Inputs to this task will include the current project plan. Any available project standards documents may also prove useful in identifying the important project metrics. PLC and SDLC standards, if available, may also prove useful in this task. Other metrics may be determined by specific requirements of individual stakeholders, e.g. a cost metric to track costs chargeable to a particular resource on a specific task.

.4 Process and Elements

Many organizations may have standards applicable to defining project metrics for any type of project. For example, many PLC's will define milestone use as well as specific cost measurements that the Business Analyst must use in metrics collection and reporting. Specific report formats may also be defined in this task or typically may be deferred until the reporting task discussed below.

Typical project metrics might include the number of effort hours per standard tasks, number of defects per hour of tester time, cost per hour of various levels of resources, number of follow up sessions per a JAD session, etc. The key for the Business Analyst is to determine which of the unlimited number of metric possibilities would be the most valuable to him/her in managing and effectively controlling the requirements processes.

A suggestion for the Business Analyst is to ask the question of "What is our goal", how do we measure attainment of this goal, and what measurements are needed to check attainment. Another key consideration is the amount of effort needed to collect, analyze and report on this metric.

.5 Stakeholders

Stakeholders who should play a part in this task include any project stakeholders but will typically include those stakeholders responsible/involved with controlling or approving the requirements activities cost, schedule, and resource scheduling.

.6 Deliverables

The deliverables from this task will typically include a descriptive list of all of the currently identified project metrics for this specific project.

3.9.2

TASK: Determine the Product Metrics

Determining effective product metrics will demand a detailed and disciplined process as usually good metrics depend on both the product's goals and any assumptions that may have been made. It is part of the job of the Business Analyst to elicit and identify these during this task.

This task may prove to be especially difficult during software development projects since the optimum metrics to use are still poorly understood making the identification of the proper metrics to use more difficult. One approach that aids greatly in determining effective product measurements is to include an explanation of the "why" for a particular metric to be used.

.1 Purpose

The purpose of this task is to identify and document all product metrics that will be used with the requirements related project activities. The Business Analyst must work closely with the Project Manager to identify these for each particular project.

Some of the metrics discussed below, as well as others that may be defined within an organization, may or may not be used on any particular project. Some of the metrics may also be collected and reported at specific points of the project, while others may be in existence throughout the entire project.

.2 Description

This task will enable the Business Analyst to identify and document the necessary product metrics. This will enable the Business Analyst to insure that all of these measurements will be collected and reported to the appropriate stakeholders.

The Business Analyst is trying to determine the "fitness" of the product for its intended purpose as well as the "quality" of the product during this task.

.3 Predecessors

The major input for this task will be the detailed product requirements. Also typically used will be any standards available within the organization for the type of products created during the project.

.4 Process and Elements

The Business Analyst will use the product requirements list to identify any specific quality measurements that will be used to judge the product i.e. to answer the question of whether the product will meet the requirements. Specific reports content and formats may also be determined at this point but typically will be done in a later task.

The requirements identified in this task are closely related to the product itself and will usually not be created by the Business Analyst. The Business Analyst will question the product team members such as marketing and sales to determine what these requirements should be. It is more a task of eliciting these from other stakeholders rather than identifying/determining themselves. A clear requirement of the Business Analyst during this task is to uncover and document any assumptions held by any of the key stakeholders.

An example of a useful metric might be the rate at which the development team is finding and fixing product defects. This would have to be clearly defined regarding how to measure this and what the target for being able to ship the product might be.

Suggestions for initiating a product metrics program include the following:

- Select a small set of metrics initially and add to it carefully as needed
- The effort to collect and report must be less than their value
- Metrics must not be used as a personnel evaluation
- Explanation of the metrics selected to the team is critical
- Keep no secrets and share the data
- Define the data and formulas used.
- Trends are much more significant than individual data points
- Understand that metrics may be initially threatening to many team members

.5 Stakeholders

Stakeholders who should play a part in this task typically include such stakeholders as Executive Sponsor, Product Manager, as well as the project team members.

.6 Deliverables

The deliverables from this task will typically include a descriptive list of all of the currently identified project metrics for this specific project.

3.9.3 *TASK: Collect Project Metrics*

.1 Purpose

The purpose of this task is to collect the specific project metrics identified above for all requirements related tasks.

.2 Description

This task will enable the Business Analyst to collect the identified project metrics. This will enable the Business Analyst to insure that all relevant metrics are accurately collected for analysis and reporting.

.3 Predecessors

The primary input to this task will be the list of project metrics identified in a previous task.

.4 Process and Elements

Project metrics must be collected with as little effort and impact as possible. Ideally these should be collected automatically.

This task is typically completed by all team members – the often disrespected weekly task of entering their actual time spent on various assigned project tasks. It is critical that this collection of “actuals” be done accurately and in a timely manner. Besides project team members effort, the collection of these metrics may include the collection of other resources used on the project.

This task is an ongoing one that will be executed as long as there are any active requirements related activities going on in the project

.5 Stakeholders

Stakeholders for this task are typically all team members involved in any project tasks.

.6 Deliverables

The deliverable from this task will typically be a list of the identified project metrics with any current values as well as the updated automated data base for storage of them.

3.9.4

TASK: Collect Product Metrics

The process of collecting product metrics and the analysis of the collected data requires a considerable amount of time and effort. A primary purpose of this task is to raise appropriate alarms when and to whom as appropriate at the work product level.

.1 Purpose

The purpose of this task is to collect the specific product metrics identified above for all requirements related tasks.

.2 Description

This task will enable the Business Analyst to collect the identified and agreed to product metrics. In turn, this will enable the Business Analyst to insure that all relevant metrics are accurately collected for analysis and reporting. Much of the data collection in this task will take place during the various product testing and review tasks identified in the project plan.

This task is an ongoing one that will be executed as long as there are any active product testing/review activities going on in the project

.3 Predecessors

The primary input to this task will be the list of product metrics identified in the previous task as well as the appropriate defined processes to collect and process the collected data.

.4 Process and Elements

Product metrics must be collected with as little effort and impact as possible. Ideally these should be collected automatically. The identified metrics will be available from any of the product testing and review tasks.

.5 Stakeholders

Stakeholders for this task are typically all team members involved in any product testing and/or review project tasks.

.6 Deliverables

The deliverable from this task will typically be a list of the identified product metrics with any current values as well as an updated automated data base for storage of them.

3.9.5

TASK: Reporting Product Metrics

.1 Purpose

The purpose of this task is to report the specific product metrics for all requirements related tasks identified above. It is highly recommended that an automated system be used for collecting and reporting this information.

.2 Description

This task will enable the Business Analyst to report the identified and agreed to product metrics. This will enable the Business Analyst to insure that all relevant metrics are accurately analysed and reported.

Although this document discusses reporting the Project and Product metrics separately, it is possible although not typical some of these measurements might be combined in a single report. It should be a matter of what the responsible stakeholders are looking for and will be effective with. The reporting system should be capable of combining any and all of this information.

.3 Predecessors

The primary input to this task will be the product metrics collected in a previous task and the updated database of up-to-date metrics

.4 Process and Elements

Product metrics must be reported to the appropriate stakeholders. The Business Analyst is responsible for identifying the correct set of stakeholders to receive any of the various product metric reports that may be available. He/she is also responsible to identify those stakeholders who should have access to any ad-hoc reporting capabilities that are available. This capability is highly recommended if at all possible as it will, if properly implemented and controlled, save the busy Business Analyst and Project Manager a great deal of time in responding to stakeholder information requests.

A key task of the Business Analyst is to identify the optimum reporting periods for the different levels of product information, i.e. should status be reported daily, weekly, bi-weekly or monthly? How detailed should the reports be? Who should receive what metrics? These must often be negotiated among the stakeholders, Project Manager, and Business Analyst and ideally should be determined product, project and stakeholder considerations.

The Business Analyst must remember that “Trend Analysis” is often a key capability in metrics reporting and design the reporting capability accordingly.

.5 Stakeholders

Stakeholders for this task are all stakeholders involved with the creation of product metrics or those responsible for making project or organization decisions based on these measurements.

.6 Deliverables

The deliverable from this task will typically be a series of defined and ad-hoc reporting capabilities utilising the identified product metrics.

3.9.6

TASK: Reporting Project Metrics

Project status reports are most often used to report on the status of project metrics. The exact format and content is typically at least partially defined by the organization project standards or perhaps by the PLC. Generally speaking within any project management methodology, there can be seen five primary criteria that are common:

- Time (i.e. schedule)
- Cost (i.e. budget)
- Resources (Who and how much)
- Features (Any feature creep occurring)
- Quality (Defects versus plan)

These are the capabilities that should be designed into the project status reporting. It is up to the Business Analyst, in close co-operation with the project manager, to identify which stakeholders need to be recipients of which type, level of detail, and frequency of the available types of project metric data.

Naturally, the format and media of the “reports” may vary according to the needs of the audience.

.1 Purpose

The purpose of this task is to report the specific project metrics for all requirements related tasks identified above. The identified metrics will be available from any of the requirement activity project tasks.

.2 Description

This task will enable the Business Analyst to report the identified and agreed to project metrics. This will enable the Business Analyst to insure that all relevant metrics are accurately analysed and reported.

.3 Predecessors

The primary input to this task will be the project metrics collected in the previous task.

.4 Process and Elements

Project metrics must be reported to the appropriate stakeholders. The Business Analyst is responsible for identifying the correct set of stakeholders to receive any of the various project status reports that may be available. He/she is also responsible to identify those stakeholders who should have access to any ad-hoc reporting capabilities that are available on the project. This capability is highly recommended if at all possible as it will, if properly implemented and controlled, save the busy Business Analyst and Project Manager a great deal of time in responding to stakeholder information and status information.

A key task of the Business Analyst is to identify the optimum reporting periods for the different levels of project status information, i.e. should status be reported daily, weekly, bi-weekly or monthly? How detailed should the reports be? Who should receive what metrics? These must often be negotiated among the stakeholders, Project Manager, and Business Analyst and ideally should be determined by the size, complexity, criticality, and other relevant project and stakeholder considerations.

The Business Analyst must remember that “Trend Analysis” is often a key capability in metrics reporting and design the reporting capability accordingly.

.5 Stakeholders

Stakeholders for this task are all stakeholders involved with the input of project metrics or those responsible for making project or organization decisions based on these measurements.

.6 Deliverables

The deliverable from this task will typically be a series of defined and ad-hoc reporting capabilities utilising the identified project metrics.

3.10 Manage Requirements Change

3.10.1 *Plan Requirements Change*

- .1 Task - Determine who should be involved in handling requirements changes

Content will describe which roles on a project should be involved in reviewing and approving requirements changes; which project roles need to know about requirements changes

- .2 Task - Define how Requirements Changes will be administered and communicated

Material will describe mechanisms for logging changes and communicating changes.

3.10.2 *Understand the changes to requirements*

- .1 Task - Identify issues / changes

Capture any issues or requirements changes identified by the project stakeholders or project team

Communicate information to project change management team for impact analysis

- .2 Task - Participate in impact analysis

Participate in the project change management teams review of the identified issues or requested changes

Present additional background information and/or supporting documentation

3.10.3 *Document the changes to requirements*

- .1 Task - Create Formal Change Request

Ensure changes are formally included in the revised Requirements Documents

- .2 Create Formal Change Request

Once the change has been approved, a formal change request shall be generated

The change request is a mandatory deliverable when a change occurs but does not have a mandatory template

.3 Task - Define links to other requirements

- Revisit requirements document to ensure all impacted requirements are updated
- Note changes within the 'Revision History' section

3.10.4 *Analyze change requests*

.1 Task - Conduct fact-finding to obtain a greater understanding of the requirements change, operational context, and potential issues

- Interview stakeholders or project team members to better understand the issue or request
- Determine if the requested change is within the scope of the project
- Trace impact of the change back to other high level or detail project requirements
- Determine impact of executing the change on external processes, people or systems
- Validate analysis with other team members

.2 Task - Categorize / prioritize requirements

- Determine how critical this change is to the success of the project and the impact of not executing it
- Classify the change request into one of the major groups / types of requirements identified within the HLRD or DRS
- Prioritize the changes by level of criticality (e.g., high, medium, low)
- Calculate cost and development effort to implement the requested change

.3 Task – submit changes for approval

- Submit to requirements approvers and project sponsor for sign-off
- Track changes to requirements
- Make sure client requirements are captured accurately, completely and succinctly

- Ensure each changed requirement is traceable back to its source
- Identify change request information within the ‘Revision History’ section of the High Level Requirements Document and the Detailed Requirements Specifications
- Define links to other requirements
- Revisit requirements documents to ensure all impacted requirements are updated
- Note changes within the ‘Revision History’ section

3.11 References

Chapter 4: Requirements Elicitation

4.1 Introduction

Eliciting requirements is a key task in business analysis. Because the requirements serve as the foundation for the solution to the business needs it is essential that the requirements be complete, clear, correct, and consistent. Leveraging proven means to elicit requirements will help meet these quality goals.

The word elicit is defined¹:

1. to draw forth or bring out (something latent or potential)
2. to call forth or draw out (as information or a response)

These definitions highlight the need to actively engage the stakeholders in defining requirements.

This chapter includes details for eliciting requirements for a target system. The system in question may be a business system, an automated system, or both. The scope may be a new system or an enhancement to an existing system.

The business analyst should understand the commonly used techniques to elicit requirements, should be able to select appropriate technique(s) for a given situation, and be knowledgeable of what is required to prepare, execute and complete each technique.

Eliciting requirements is not an isolated, compartmentalized activity. Typically, requirements are identified throughout the elicitation, analysis, and review activities performed by a business analyst. For example: requirements may be elicited in interviews and/or facilitated meetings. Later, when those requirements are used to build and verify model(s) the business analyst may discover gaps in the requirements. This will then require eliciting details of those newly identified requirements, using techniques outlined in this chapter.

4.1.1 Relationships to Other Knowledge Areas

.1 Input to Requirements Elicitation

The techniques included in this Requirements Elicitation KA can be used to effectively elicit many types of requirements.

Input to eliciting Enterprise Analysis requirements: A variety of means may be used to elicit business requirements and are dependent on the type of study, e.g. Creating a Business Architecture or Identifying Business Opportunity.

¹ Merriam Webster

Input to eliciting user requirements: In the situation where Enterprise Analysis has been completed and the project is ready to elicit user requirements, the following inputs are typical:

- The Enterprise Analysis KA activities define the overall scope of the problem and solution domain and the goals. The business analyst uses the scope definition and goals to provide the boundaries for all requirements elicitation.
- The Requirements Planning and Management KA activities identify and describe:
 - the stakeholders,
 - the requirements documentation and the deliverables that will be created,
 - the appropriate technique(s) to elicit requirements that will be employed,
 - the requirements traceability strategy that will be followed,
 - the requirements' attributes that will be captured, and
 - the outputs of requirements elicitation.

.2 Output of Requirements Elicitation

Unlike other knowledge areas, e.g. Requirements Analysis and Documentation, the Requirements Elicitation KA does not have a prescribed set of deliverables. It is expected that the business analyst will reach a point during requirements elicitation when he/she feels that sufficient material has been elicited from the business experts to enable analysis and documentation to begin. The combined results of all the elicitation techniques used will serve as input to building the selected analytical models. Missing, incomplete or incorrect requirements will ideally be exposed during the analysis activities thus requiring additional requirements elicitation.

A number of techniques listed in this chapter are difficult to separate from the analysis tasks defined in the Requirements Analysis and Documentation KA. For example, Requirements Workshops (which are described later in this chapter) start by eliciting requirements and often end with the creation of models such as activity diagrams, prototypes, or even data models. Such tightly coupled techniques are cross referenced in both Chapter 4 and Chapter 5.

4.2 Task: Elicit Requirements

4.2.1 Purpose

The Business Analyst engages the stakeholders to elicit the essential needs of the system.

4.2.2 **Description**

Determine business requirements, assumptions, current reality, and constraints by communicating with stakeholders using a variety of techniques.

4.2.3 **Knowledge**

The business analyst must have knowledge of:

- Elicitation and research approaches
- Effective elicitation techniques
- The business organization and domain.

4.2.4 **Skills**

The business analyst must be skilled in:

- Eliciting and assessing information
- Interviewing
- Facilitating collaborative sessions
- Observation
- Resolving conflicts; eliminating root cause of conflicts; reaching consensus
- Thinking abstractly; finding and leveraging patterns
- Writing, business documentation
- Listening and oral communication.

4.2.5 **Predecessors**

A definition of the system's scope is the minimum requisite needed to frame and contain the requirements elicitation activities. See 4.1.1.1 for details on input to this task.

4.2.6 **Process**

.1 Prepare for Elicitation

Participants: Eliciting requirements is highly dependent on the knowledge of the stakeholders, their willingness to participate in defining requirements, and the group's ability to reach consensus. The business analyst must be certain to include all defined stakeholders during elicitation of requirements. The business analyst may find it necessary to further clarify and possibly restate the requirements to encompass all

stakeholders' perspectives. See Chapter 6, Requirements Communication, for details on Managing Requirements Conflicts/Contradictions and techniques to reach consensus.

Techniques: The business analyst is responsible for coordinating the activities and employing the appropriate techniques used to elicit requirements.

To fully examine and define the requirements a combination of complementary elicitation techniques is typically used. The Requirements Planning and Management KA activities include evaluating and selecting the appropriate requirements elicitation techniques. A number of factors (the business domain, the corporate culture and environment, the skills of the analyst and the requirements deliverables that will be created) guide which techniques will be used.

The following requirements elicitation approaches are defined in this chapter:

Elicitation Technique	Synonym(s)
Brainstorming	
Document Analysis	Review existing documentation
Focus Group	
Interface Analysis	External Interface Analysis
Interview	
Observation	Job Shadowing
Prototyping	Storyboarding, Navigation Flow
Requirements Workshop	Elicitation Workshop Facilitated Workshop Joint Application Design (JAD)
Reverse Engineering	
Survey	Questionnaire

Table 4-1 Commonly used Requirements Elicitation Techniques

.2 Conduct Elicitation

Tracing requirements: While eliciting the requirements the business analyst must guard against “scope creep”. Tracing requirements back to the business goals/objectives helps to validate whether a requirement should be included. See Chapter 3, Requirements Planning & Management, Section 3.9.4 for details on traceability.

Capturing requirement attributes: The business analyst will document the attributes which can be initially identified during requirements elicitation such as each requirement's source, value, and priority. See Chapter 3, Requirements Planning & Management, Section 3.9.5 for details on requirement attributes.

Use of glossary: Creation and use of a business glossary is an essential asset for all requirements elicitation techniques. The glossary should contain key domain terms along with their business definitions.

4.2.7

Stakeholders

- Business Owner

- Business User
- Domain Expert
- Project Manager
- Project Team

4.2.8 *Deliverables*

See 4.1.1.2

4.3 *Technique: Brainstorming*

4.3.1 *Purpose*

Brainstorming is an excellent way of eliciting many creative ideas for an area of interest. Structured brainstorming produces numerous creative ideas about any given "central question" or topic.

4.3.2 *Description*

In 1939, a team led by advertising executive Alex Osborn coined the term "brainstorm." According to Osborn, "Brainstorm means using the **brain** to **storm** a creative problem and to do so "in commando fashion, each *stormer* audaciously attacking the same objective."

Brainstorming is a technique that promotes diversion type of thinking. Diversion refers to those team activities that produce a broad or diverse set of options. Brainstorms help answer specific questions such as (but not limited to):

- What options are available to resolve the issue at hand?
- What factors are constraining the group from moving ahead with an approach or option?
- What could be causing a delay in activity 'A'?
- What can the group do to solve problem 'B'?

Brainstorming works by focusing on a topic or problem, and then coming up with many radical solutions to it. This technique is best applied in a group as it draws on the experience and creativity of all members of the group. In the absence of a group, one could brainstorm on one's own to spark new ideas.

4.3.3 *Intended Audience*

Ideas generated in a brainstorming session are consumed by any or all of the following:

- Project team
- Stakeholders

4.3.4 Process

- .1 **Prepare for Brainstorming**
 - Develop a clear and concise definition of the area of interest.
 - Determine a time limit for the group to generate ideas, the larger the group, the more time required.
 - Decide who will be included in the session and their role – participant or facilitator. Aim for participants (ideally 6 to 8) who represent a range of background and experience with the topic.
 - Establish criteria for evaluating and rating the ideas.
- .2 **Conduct Brainstorming session**
 - Share new ideas without any discussion, criticism or evaluation.
 - Visibly record all ideas.
 - Encourage participants to be creative, share exaggerated ideas, and build on the ideas of others.
 - Don't limit the number of ideas as the goal is to elicit as many ideas as possible within the time period.
- .3 **Wrap-up the brainstorming**
 - Once the time limit is reached, using the pre-determined evaluation criteria, discuss and evaluate the ideas.
 - Create a condensed list of ideas, combine ideas where appropriate, and eliminate duplicates.
 - Rate the ideas. There are many techniques that can be used to prioritize the ideas, e.g. multivoting.
 - Distribute the final list of ideas to appropriate parties.

4.3.5 Usage Considerations

- .1 **Strengths:**
 - Able to elicit many ideas in a short time period.

- Non-judgmental environment enables outside-the-box thinking.

.2 Weaknesses:

- Dependent on participants' creativity.

4.4 Technique: Document Analysis

4.4.1 Purpose

Document analysis is a means to elicit requirements of an existing system by studying available documentation and identifying relevant information.

Document analysis is used if the objective is to gather details of the “As Is” environment such as existing business rules, entities, and attributes that need to be included in a new system or need to be updated for the current system. This technique would also apply in situations where the subject matter experts for the existing systems are no longer with the organization, or are not going to be available throughout the duration of the requirements elicitation process.

4.4.2 Description

Requirements elicitation typically includes analysis of documents such as business plans, market studies, contracts, requests for proposals, statements of work, memos, existing guidelines, procedures, training guides, competing products literature, published comparative product reviews, problem reports, customer suggestion logs, and existing system specifications to list a few. Identifying and consulting all likely sources of requirements will result in improved requirements coverage assuming the documentation is up to date.

4.4.3 Intended Audience

- Project Team
- Subject Matter Experts

4.4.4 Process

.1 Prepare for Document Analysis:

- Evaluate which existing system and business documentation are relevant and appropriate to be studied.

.2 Analyze the documents:

- Study the material and identify relevant business details.
- Document business details as well as questions for follow-up with subject matter experts.

- .3 Post Document Analysis wrap-up:
- Review and confirm the selected details with subject matter experts.
 - Obtain answers to follow-up questions.

4.4.5 Usage Considerations

- .1 Strengths:
- Not starting from a blank page.
 - Leveraging existing materials to discover and/or confirm requirements.
 - A means to cross-check requirements from other elicitation techniques such as interviews, job shadowing, surveys or focus groups.
- .2 Weaknesses:
- Limited to “as-is” perspective.
 - Existing documentation may not be up-to-date or valid.
 - Can be a time-consuming and even tedious process to locate the relevant information.

4.5 Technique: Focus Group

4.5.1 Purpose

A focus group is a means to elicit ideas and attitudes about a specific product, service or opportunity in an interactive group environment. The participants share their impressions, preferences and needs, guided by a moderator.

4.5.2 Description

A focus group is composed of pre-qualified individuals whose purpose is to discuss and comment on a topic. This is an opportunity for individuals to share their own perspectives and discuss them in a group setting. This could lead participants to re-evaluate their own perspectives in the light of others’ experiences. A trained moderator manages the administrative pre-work, facilitates the session and produces the report.

As this elicitation technique is considered a form of qualitative research, the session results are analyzed and reported as themes and perspectives, rather than numerical findings. The report may also include selected quotations to support the themes.

A traditional focus group gathers in the same physical room. An online focus group allows members to be located remotely while participating by a network connection. Each approach has pros and cons in terms of logistics and expenses.

A focus group can be utilized during any life-cycle state: exploratory, under development, ready to launch, or in production. If the group's topic is a product under development, the group's ideas are analyzed in relationship to the stated requirements. This may result in updating existing requirements or uncovering new requirements. If the topic is a completed product that is ready to be launched, the group's report could influence how to position the product in the market. If the topic is a product in production, the group's report may provide direction on the revisions to the next release of requirements. A focus group may also serve as a means to assess customer satisfaction with a product or service.

4.5.3 Intended Audience

Depending on the topic of the focus group, the report may be directed to the:

- Stakeholders
- Business analyst
- Marketing.

4.5.4 Process

.1 Prepare for the Focus Group

Recruit Participants

A focus group typically has 6-12 attendees. It may be necessary to invite twice as many individuals in order to allow for no-shows. If many people need to participate, it may be necessary to run more than one focus group.

The topic of the focus group will influence who should be recruited. If the topic is a new product, it is likely that existing users (experts and novices) should be included. There are pros and cons that should be considered when using homogeneous vs. heterogeneous composition.

- Homogeneous – individuals with similar characteristics. Caution: Differing perspectives will not be shared. Possible solution: conduct separate sessions for different homogeneous groups.
- Heterogeneous – individuals with diverse backgrounds, perspectives. Caution: Individuals may self-censor if not comfortable with others' background resulting in lower quality of data collected.

Assign the moderator and recorder

The moderator should be experienced in facilitating groups. Typical skills include: promote discussion; ask open questions; facilitate interactions between group members; engage all members; keep session focused; remain neutral; be adaptable and flexible.

Create discussion guide

The guide includes goals/objectives of the session and five to six open questions.

Reserve site and services

Select the location for the session. Arrange for technical support to transcribe the session and, if used, audio/video taping equipment.

.2 Run the focus group session

The moderator guides the group's discussion, follows a preplanned script of specific issues and ensures the objectives are met. However, the group discussion should appear free-flowing and relatively unstructured for the participants. A session is typically 1 to 2 hours in length. A recorder captures the group's comments.

.3 Produce Report

The moderator objectively analyzes and documents the participants' agreements and disagreements and synthesizes them into themes.

4.5.5 *Usage Considerations***.1 Strengths:**

- Ability to elicit data from a group of people in a single session saves time and costs as compared to conducting individual interviews with the same number of people.
- Effective for learning people's attitudes, experiences and desires.
- Active discussion and the ability to ask others questions creates an environment where participants can consider their personal view in relation to other perspectives.

.2 Weaknesses:

- In the group setting, participants may be concerned about issues of trust, or may be unwilling to discuss sensitive or personal topics.
- Data collected (what people say) may not be consistent with how people actually behave.
- If the group is too homogenous the group's responses may not represent the complete set of requirements.
- A skilled moderator is needed to manage the group interactions and discussions.
- It may be difficult to schedule the group for the same date and time.

- If the goal of the focus group is to elicit ideas on a new or changing product, a focus group is not an effective way to evaluate usability.

4.6 Technique: Interface Analysis

4.6.1 Purpose

An interface is a connection between two components. Most systems require one or more interfaces with external parties, systems or devices. Interface analysis is initiated by project managers and analysts to reach agreement with the stakeholders on what interfaces are needed. Subsequent analysis uncovers the detailed requirements for each interface.

4.6.2 Description

Interfaces types include:

- User interfaces - includes human user directly engaged with the system as well as reports provided to the user
- Interfaces to and from external systems
- Interfaces to and from external hardware devices

The users, external systems and systems that own the devices are considered stakeholders.

Interface analysis helps to clarify the boundaries of the system. It distinguishes which system provides specific functionality along with the input and output data needs. By clearly and carefully separating the requirements for each system, while jointly defining the shared interface requirements, a basis for successful interoperability is established.

It is important to look at the requirements across all interfaces. For example, data used for one interface may also be used for other activities and interfaces. Building a comprehensive glossary and data dictionary where all data is captured consistently and non-redundantly is critical. The data can then be referenced, even traced, to all interfaces where it is used.

4.6.3 Intended Audience

- Business Analysts and UI Designers working on detailed User Interface requirements.
- Designers and Data Modelers designing system-to-system requirements.

4.6.4 **Process**

.1 Prepare for Interface Analysis:

Identify the necessary interfaces. An effective means to visualize the interfaces is to draw a Context Diagram. See Chapter 2 for details on the technique “Context/Business Domain Diagram”, also Chapter 3 for details on “Stakeholders”.

.2 Conduct Interface Analysis:

For each interface:

- Determine its type: user interface, system-to-system interface, external hardware device interface
- Elicit specific details about the interface, depending on its type.
 - For an interface where the user directly engages the system, see Chapter 4, Prototyping and Chapter 5 for details on the technique “Usage Models”.
 - For an interface where a stakeholder receives a report, see Chapter 5 (reference is yet to be determined)
 - For a system-to-system interface or an interface with an external hardware device see Chapter 5 for details on the task “Define Supplementary Specifications, Interface Requirements”.

4.6.5 **Usage Considerations**

.1 Strengths:

- The elicitation of the interfaces’ functional requirements early in the system life cycle provides valuable details for project management:
 - Impact on delivery date. Knowing what interfaces are needed, their complexity and testing needs enables more accurate project planning and potential savings in time and cost.
 - Collaboration with other systems or projects. If the interface to an existing system, product or device and the interface already exists, it may not be easily changed. If the interface is new, then the ownership, development and testing of the interface needs to be addressed and coordinated in both projects’ plan. In either case, eliciting the interface requirements will require negotiation and cooperation between the owning systems.

.2 Weaknesses:

- Does not provide an understanding of the business process since this technique only exposes the inputs, outputs and key data elements related to the interfaces.

4.7 Technique: Interview

4.7.1 Purpose

An interview is a systematic approach to elicit information from a person or group of people in an informal or formal setting by talking to the person - the interviewee, asking relevant questions and documenting the responses. (This section considers the business analyst in the role of interviewer.)

4.7.2 Description

In an interview, a business analyst formally or informally directs his/her questions to: a stakeholder / a subject-matter-expert / a potential user to obtain answers that finally take the shape of requirements. One-on-one interviews are typically most common. In a group interview (more than one interviewee in attendance) the interviewer must be careful to solicit responses from all attendees.

For the purpose of eliciting business requirements, interviews are of two basic types:

- Structured interview, where the business analyst has a pre-defined set of questions and is looking for answers.
- Unstructured interview, where, without any pre-defined questions, the business analyst and the interviewee discuss in an open-ended way what the business expects from the target system.

Successful interviewing depends on several factors such as, but not necessarily limited to:

- Level of understanding of the business analyst in that business domain.
- Experience of the business analyst in conducting interviews.
- Skill of the business analyst in documenting the discussions.
- Readiness of interviewee to provide the relevant information.
- Degree of clarity in interviewee's mind about what the business wants/expects from the target system.
- Rapport of the interviewer with the interviewee.

4.7.3 Intended Audience

The Business Analyst for use in analyzing and documenting the requirements.

4.7.4 Process

.1 Prepare for the interview

- Define the interview's focus or goal.
- Identify potential interviewees. The stakeholders identified in the Requirements Planning KA may be the primary interviewees and/or will designate appropriate persons who should be interviewed. The sponsor considers the following questions when identifying who should be interviewed:
 - Who holds the most authentic and the most current information on the subject of interest?
 - What is his/her stake in the project?
 - What is the relative importance of information held by one person vis-à-vis that held by another person? This information is helpful when analyzing conflicting comments across interviews.
- Design the interview. The business analyst may need to custom-design the interview for each identified interviewee. The interviewee's ability to participate and the desired outcome of an interview govern the design of an interview. In addition, these factors are also considered:
 - The format for the interview, structured vs. unstructured
 - If a structured interview, the type of questions:
 - Closed-ended questions: Questions that are used to elicit a single response such as: yes, no, 3 Example: How many hours does it take for the claim process to be completed?
 - Open-ended questions: Questions that are used to elicit a dialog or series of steps and cannot be answered in a yes or no fashion but need explaining. Example: What does a claim processor do on receipt of a claim form?
 - Organization of the questions: use a logical order or an order of priority/significance. Examples of order would be: general questions to specific questions; start to finish; detail to summary, etc. The actual organization is based on the interviewee's knowledge, the subject of the interview, etc. The goal is to follow a logical order rather than jump around when asking questions.

- Location of participants. An interview can be conducted in-person or via telephone, or by means of other multi-media tools such as video-conferencing over the Internet or intranet.
- The interview time and site are convenient to the interviewee.
- Determine if a scribe is needed and if so, include that person in the scheduling process. Determine if a tape recorder is needed. If so, discuss the purpose and usage with the interviewee.
- Contact potential interviewees - The business analyst contacts the selected interviewees and explains to them why their assistance is needed. This initial contact is established in person, by mail or by telephone. The purpose is to explain the objective of the interview to the potential interviewee.

.2 Conduct the interview:

- Opening the interview - the business analyst as the interviewer gives an introduction, states the purpose of the interview, addresses any concerns raised by the interviewee, and explains that notes will be taken and shared with the interviewee after the interview.
- *During the interview:*
 - The interviewer maintains focus on the established goals and pre-defined questions.
 - All concerns raised by the interviewee are addressed during the interview or documented for follow-up after the interview or in a subsequent interview.
 - The interviewer practices active listening to confirm what he/she understood from the information offered at various times during the interview.
- *Closing the interview* – the business analyst asks the interviewee for areas which may have been overlooked in the session. Lastly, the business analyst summarizes the session, reminds the interviewee of the upcoming review process and thanks the interviewee for his/her time.

.3 Post interview follow-up and review:

After the interview is complete, the business analyst organizes the information elicited and sends the notes to the interviewee for review. Documenting the discussion for review allows the interviewee to see all of the information in context. This review may point out items that are incorrect or missing because the interviewer (or scribe) missed documenting them, or because the interviewer (or scribe) documented them incorrectly, or because the interviewee missed discussing them. This review is not intended to address whether or not the requirements are valid nor whether they will ultimately be approved

for inclusion into the deliverables but solely to determine if the interview has been adequately documented.

4.7.5 Usage Considerations

.1 Strengths

- Encourages participation and establishes rapport with the stakeholder.
- Simple, direct technique that can be used in varying situations.
- Allows the interviewer and participant to have full discussions and explanations of the questions and answers.
- Enables observations of non-verbal behavior.
- The interviewer can ask follow-up and probing questions to confirm own understanding.
- Maintain focus through the use of clear objectives for the interview that are agreed upon by all participants and can be met in the time allotted.

.2 Weaknesses

- Interviews are not an ideal means of reaching consensus across a group of stakeholders.
- Requires considerable commitment and involvement of the participants.
- Training is required to conduct good interviews. Unstructured interviews, especially, require special skills. Facilitation/virtual facilitation and active listening are a few of them.
- Depth of follow-on questions may be dependent on the business analyst's knowledge of business domain.
- Transcription and analysis of interview data can be complex and expensive.
- Resulting documentation is subject to interviewer's interpretation.

4.8 Technique: Observation

4.8.1 Purpose

Observation is a means to elicit requirements by conducting an assessment of the subject matter expert's work environment. This technique is appropriate when documenting details about the current processes or if the project intends to enhance or change a current process.

4.8.2

Description

Observation relies on studying people performing their jobs, and is sometimes called "job shadowing" or "following people around." For instance, some people have their work routine down to such a habit that they have difficulty explaining what they do or why. The business analyst may need to watch them perform their work in order to understand the flow of work. In certain projects, it is important to understand the current processes to better assess the process modifications that may need to be made.

There are two basic approaches for the observation technique:

- **Passive / invisible.** In this approach, the business analyst observes the subject matter expert working through the business routine but does not ask questions. The business analyst writes notes about what he/she sees, but otherwise stays out of the way, as if he/she was invisible. The business analyst waits until the entire process has been completed before asking any questions. The business analyst should observe the business process multiple times to ensure he/she understands how the process works today and why it works the way it does.
- **Active / visible.** In this approach, while the business analyst observes the current process and takes notes he/she may dialog with the worker. When the business analyst has questions as to why something is being done as it is, he/she asks the questions right away, even if it breaks the routine of the person being observed. In this approach, the business analyst might even participate in the work to gain an immediate appreciation for how the current process works.

Variations of the observation technique:

- In some cases, the business analyst might participate in the actual work to get a hands-on feel for how the business process works today. Of necessity this would be limited to activity that is appropriate for a non-expert to perform and whose results would not negatively impact the business.
- The business analyst becomes a temporary apprentice.
- The business analyst watches a demonstration of how a specific process and/or task are performed.

4.8.3

Intended Audience

- Business Analysts for analysis of work flow, process modeling, business process reengineering.
- Designers and Human Factors experts designing the detailed interface requirements.

4.8.4 **Process**

.1 Prepare for observation

- Determine what sampling of users (e.g. experts and novices, just experts) to observe and which activities.
- Prepare questions to ask during or after the shadowing.

.2 Observe

- Observer introduces himself to the person being observed and:
 - Reassures the user that their work is not being questioned but rather the observation of the work and resulting documentation will serve as input to requirements analysis. Informs the user that the observer is present only to study their processes and will refrain from discussing future solutions to any problems.
 - Explains to the user that they may stop the observation process at any time if they feel it is interfering with their work.
 - Suggests to the user that they may “think aloud” while they are working as a way to share their intentions, challenges, and concerns.
- Conduct observation.
 - Take detailed notes.
 - If using the active observation approach, ask probing questions about why certain processes and tasks are being done.

.3 Post Observation wrap-up

- Obtain answers to original questions, or new questions that surfaced during the observations.
- Feedback a summary of notes to the shadowed worker, as soon as possible, for review and any clarification.
- When observing many users, compile notes at regular intervals to identify commonalities and differences between users. Review findings with the entire shadowed group to ensure that the final details represent the entire group, not selected individuals.

4.8.5 ***Usage Considerations***

.1 **Strengths:**

- Provides a realistic and practical insight into the business knowledge by getting a hands-on feel for how the business process works today.
- Elicits details of informal communication and ways people actually work around the system that may not be documented anywhere.

.2 **Weaknesses**

- Only possible for existing processes.
- Could be time-consuming.
- May be disruptive to the person being shadowed.
- Unusual exceptions and critical situations that happen infrequently may not occur during the observation.
- May not well work if the current process involved a lot of intellectual work or other work that is not easily observable.

4.9 **Technique: Prototyping**

4.9.1 **Purpose**

Prototyping, when used as an elicitation technique, aims to uncover and visualize interface requirements before the application is designed or developed. For additional details on prototyping see Chapter 5 Requirements Analysis and Documentation Section 5.14 Usage Models.

4.9.2 **Description**

Initial prototyping produces “mock ups” of the screens or report layouts for an application. Business users often find prototyping to be a comfortable, concrete means to identify, describe and verify their interface needs.

Prototyping can be categorized in two ways:

The functional scope of the prototype:

- Horizontal prototype: Models a shallow, and possibly wide, view of the system’s functionality. Typically does not have any business logic running behind the visualization.
- Vertical prototype: Models a deep, and usually narrow, slice of the entire system’s functionality.

The use of the prototype throughout the system development lifecycle:

- ‘Throw-away’ Prototype: This exploratory approach seeks to quickly uncover and clarify interface requirements using simple tools, sometimes just paper and pencil. As the name suggests, ‘Throw-away’, such a prototype is usually discarded when the final system has been developed. The focus is on functionality that is not easily elicited by other techniques, has conflicting viewpoints, or is difficult to understand.
- Evolutionary Prototype: This rigorous approach extends the initial interface requirements into a fully functioning system and requires a specialized prototyping tool or language. This prototype produces “running” software. It emerges as the actual system downstream in the lifecycle.

4.9.3 Intended Audience

Designers and Human Factors experts designing the detailed interface requirements.

4.9.4 Process

.1 Prepare for prototyping

Determine the prototyping approach: throw-away vs. evolutionary; vertical vs. horizontal.

Identify the functionality to be modeled.

.2 Prototype

Build the prototype.

.3 Evaluate the prototype

Verify the prototype represents the user’s needs.

4.9.5 Usage Considerations

.1 Strengths

- Supports users who are more comfortable and effective at articulating their needs by using pictures, as prototyping lets them “see” the future system’s interface.
- A prototype allows for early user interaction and feedback.
- A throw-away prototype is an inexpensive means to quickly uncover and confirm user interface requirements.
- A vertical prototype can demonstrate what is feasible with existing technology, and where there may be technical gaps.

- An evolutionary prototype provides a vehicle for designers and developers to learn about the users' interface needs and to evolve system requirements.

.2 Weaknesses

- Depending on the complexity of the target system, using prototyping to elicit requirements can take considerable time if the process gets bogged down by the "hows" rather than "whats".
- Assumptions about the underlying technology may need to be made in order to present a starting prototype.
- A prototype may lead users to set unrealistic expectations of the delivered system's performance, reliability and usability characteristics.

4.10 Technique: Requirements Workshop

4.10.1 Purpose

A Requirements Workshop is a structured way to capture requirements. A workshop may be used to scope, discover, define, prioritize and reach closure on requirements for the target system.

Well-run workshops are considered one of the most effective ways to deliver high quality requirements quickly. They promote trust, mutual understanding, and strong communications among the project stakeholders and project team and produce deliverables that structure and guide future analysis.

4.10.2 Description

A requirements workshop, (also generically referred to as JAD, Joint Application Design), is not a traditional meeting. Instead, it is a highly productive focused event attended by carefully selected key stakeholders and subject matter experts for a short, intensive period (typically one or few days).

The workshop is facilitated by a team member or ideally, by an experienced, neutral facilitator. A Scribe (also known as a Recorder) documents the business requirements elicited as well as any outstanding issues. A business analyst may be the Facilitator or the Scribe in these workshops. In situations where the business analyst is a subject matter expert on the topic, the business analyst may serve as participant in the workshop.

A workshop may be used to generate ideas for new features or products, to reach consensus on a topic, or to review requirements. Other outcomes are often detailed requirements captured in models, such as the business domain model (Chapter 5.3), data and behavior models (Chapter 5.12), process/flow models (Chapter 5.13) and or usage models (Chapter 5.14).

4.10.3 *Intended Audience*

Project team

4.10.4 *Process*

- .1 **Prepare for the Requirements Workshop**
 - Clarify the stakeholder's needs, and the purpose of the workshop.
 - Identify critical stakeholders who should participate in the workshop.
 - Define the workshop's agenda.
 - Determine what means will be used to document the output of the workshop.
 - Schedule the session(s).
 - Arrange room logistics and equipment.
 - Send materials in advance to prepare the attendees and increase productivity at the meeting.
 - Conduct pre-workshop interviews with attendees.
- .2 **Conduct/Run the Requirements Workshop**
 - Elicit, analyze and document requirements.
 - Obtain consensus on conflicting views.
 - Maintain focus by frequently validating the session's activities with the workshop's stated objectives.

The Facilitator has the responsibility to:

- Establish a professional and objective tone for the meeting.
- Enforce discipline, structure and ground rules for the meeting.
- Introduce the goals and agenda for the meeting.
- Manage the meeting and keep the team on track.
- Facilitate a process of decision making and build consensus, but avoid participating in the content of the discussion.
- Ensure that all stakeholders participate and have their input heard.

- Ask the right questions, analyze the information being provided at the session by the stakeholders, and follow-up with probing questions, if necessary.

The Scribe's role is to document the business requirements in the format determined prior to the workshop.

.3 Post Requirements Workshop wrap-up done by Facilitator

- Follow up on any open action items that were recorded at the workshop.
- Complete the documentation and distribute it to the workshop attendees and the sponsor.

4.10.5 Usage Considerations

.1 Strengths:

- A workshop can be a means to elicit detailed requirements in a relatively short period of time.
- A workshop provides a means for stakeholders to collaborate, make decisions and gain a mutual understanding of the requirements.
- Workshop costs are often lower than the cost of performing multiple interviews. A requirements workshop enables the participants to work together to reach consensus which is typically a cheaper and faster approach than doing serial interviews as interviews may yield conflicting requirements and the effort needed to resolve those conflicts across all interviewees can be very costly.
- Feedback is immediate, e.g. facilitator's interpretation of requirements is fed back immediately to the stakeholders and confirmed.

.2 Weaknesses:

- Due to stakeholders availability it may be difficult to schedule the workshop.
- The success of the workshop is highly dependent on the expertise of the facilitator and knowledge of the participants.
- Requirements workshops that involve too many participants can slow down the workshop process thus negatively impacting the schedule. Conversely, collecting input from too few participants can lead to overlooking requirements that are important to users, or to specifying requirements that don't represent the needs of majority of the users.

4.11 Technique: Reverse Engineering

4.11.1 Purpose

In situations where the software for an existing system has little or outdated documentation and it is necessary to understand what the system actually does, reverse engineering is an elicitation technique that can extract implemented requirements from the software code.

4.11.2 Description

Forward engineering is the traditional process of moving from high level abstractions to physical implementation. Reverse engineering is a process of analyzing a subject system/product to identify underlying business processes, data and rules. Based on the identification work, representations of the system/product may be created at a higher level of abstraction.

There are two general categories of reverse engineering:

- Black Box Reverse Engineering: The system/product is studied without examining its internal structure.
- White Box Reverse Engineering: The inner workings of the system/product are studied.

The results of reverse engineering can provide:

- An understanding of how a product works more comprehensively than by merely observing it.
- A means to investigate errors and limitations in existing programs and a help in correcting them.
- Details to help make products and systems compatible.
- Details to help evaluate a product and understand its limitations.
- Determining whether someone else has literally copied elements of one's own technology.
- Documentation of a product whose manufacturer is unresponsive to customer service requests.
- Details to help transform obsolete products.

4.11.3 Intended Audience

- Project team

4.11.4 Process

- .1 **Prepare for reverse engineering:**
 - Determine the scope of the functionality that needs to be reverse-engineered.
 - Evaluate the cost-benefit. As reverse engineering can be time-consuming and expensive, consider whether the financial investment is warranted by evaluating the potential benefits gained from improved documentation and/or derived abstraction in terms of maintenance of the existing system or development of a new system/product.
- .2 **Perform reverse engineering:**
 - Disassemble or decompile the original system.
 - Document the results in a manner that can be reviewed and verified by a business subject matter expert. These can serve as baseline details to elicit requirements for extending the existing system

4.11.5 Usage Considerations

- .1 **Strengths**
 - Protects investment in existing system/product by enabling the analysts to ‘build-up’ existing functionality/business implementation.
 - Provides detailed, current, information that can be used to update documentation of an existing system/product.
- .2 **Weaknesses**
 - Expensive and time-consuming.
 - Often restricted by copyright laws when a system/product of another manufacturer is involved.
 - Existing tools that support reverse engineering have limited capabilities and require training to use.
 - Requires specialized skills:
 - Ability to abstract from ‘specific’ to ‘general’.
 - Ability to draw inferences, especially, when documenting business rules.
 - Ability to co-relate the functions of component(s) of a system with the current and/or intended business processes.

4.12 Technique: Survey/Questionnaire

4.12.1 Purpose

A survey is a means of eliciting information from many people, anonymously, in a relatively short time. A survey can collect information about customers, products, work practices and attitudes. A survey is often referred to as a questionnaire.

4.12.2 Description

A survey administers a set of written questions to the stakeholders and subject matter experts. Their responses are analyzed and distributed to the appropriate parties.

Questions in a survey are of two types:

- **Closed:** The respondent is asked to select from available responses. Useful when the issues are known but the range of user responses to them is not. The responses to closed questions are easier to analyze than those gained from open-ended questions.
- **Open-ended:** The respondent is free to answer the questions as they wish. Useful when the range of users responses is pretty well understood, but the strength of each response category needs to be determined. The responses to open-ended questions may provide more detail and a wider range of responses than those gained from closed-ended questions but open-ended questions are more difficult to quantify and summarize.

4.12.3 Intended Audience

The survey questionnaire may be directed at any or all of the following:

- Marketing
- Project team
- Subject matter experts
- Primary and secondary stakeholders
- Current/potential users of a system.

4.12.4 Process

.1 Prepare

A survey requires detailed preparation to ensure the needed information is obtained while minimizing the responders' time to complete it.

- *Define the purpose of the survey and the target survey group:* Identify the objectives and the likely user group to be surveyed. Confirm with the sponsor.
- *Choose the appropriate survey type:* Initial steps of a survey are the same as for interview design (see *Section 4.7.2 Interview*), keeping in mind that semi-structured interviews are similar to ‘open-ended’ surveys; and structured interviews are similar to ‘closed-ended’ surveys.
- *Select the sample group:* Consider both the survey type (‘open-ended’ or ‘close-ended’) and the number of people in the identified user group to determine if the entire group should be surveyed. For example: When the sample group is small, it may be practical to survey all members of the group. When the sample group is large and the desired survey type is ‘open-ended’, it may be necessary to identify a subset of users. For such situations use of a statistical sampling method will help ensure that survey results are not biased.
- *Select the distribution and collection methods:* For each sample group determine the appropriate communication mode – surface mail; e-mail; web-based, telephone.
- *Project the desired level of response:* Determine what response rate would be acceptable. If the actual response rate is lower than the use of the survey results may be limited. Offering an incentive can raise the response rate to 80% and above but the cost of the incentive must be justified and budgeted.
- *Determine if the survey should be supported with individual interviews:* As a survey does not provide the depth of data that can be obtained from individual interviews consider:
 - Pre-survey interviews may provide ideas for survey questions.
 - Post-survey interviews can target specific survey responses or themes to elicit a greater level of detail.
- *Write the survey questions:*
 - Communicate the purpose: Explain the objectives of the survey. If the stakeholders can see the reason for completing the survey, they are more likely to do so.
 - Be cognizant of the group’s characteristics: Understand the background of the target group including their environment and specific terminology. Use this information when writing the questions. If there is significant diversity in the group’s background it may be useful to divide a large group into smaller and *homogenous* groups during the preparation stage

and then produce variations of the survey that fit each group's background.

- Focus on the requirement: All questions should be directed towards the stated objectives and the objectives should be supported by a comprehensive set of questions.
- Keep the survey short. Less than 10 items is preferable limit in terms of the content.
- Make the survey easy and fast to complete, ideally no more than five or 10 minutes.
- Make sure that the question wording is clear and concise.
- Avoid double questions in a single question.
- Avoid questions involving negatives.
- Avoid complex branching structures.
- Avoid asking questions that make respondents feel uncomfortable.
Trying to elicit information that is restricted by regulations is likely to put respondents on the defensive.

- *Test the survey.* Perform a usability test on the survey. Use the results to fine-tune the survey.

.2 Distribute the survey

.3 Communicate survey results

- *Collate the responses.* For the responses to 'open-ended' questions, evaluate the details and identify any emerging themes.
- *Analyze and summarize the results.*
- *Report findings to the sponsor.*

4.12.5 Usage Considerations

.1 Strengths

- When using 'closed-ended' questions, effective in obtaining quantitative data for use in statistical analysis.
- When using open-ended questions, the survey results may yield insights and opinions not easily obtainable through other elicitation techniques.

- Does not typically require significant time from the responders.
- Effective and efficient when stakeholders are not located at one place.
- May result in large number of responses.
- Quick and relatively inexpensive to administer.

.2 Weaknesses

- Use of open-ended questions requires more analysis by the business analyst.
- To achieve unbiased-results, specialized skills in statistical sampling methods are needed when the decision has been made to survey a sample subset.
- Some questions may be left unanswered or answered incorrectly due to their ambiguous nature.
- May require follow up questions or more survey iterations depending on the answers provided.
- Not well suited for collecting information on actual behaviors.

4.13 Bibliography

Alexander, Ian and Richard Stevens, *Writing Better Requirements*. Addison-Wesley, 2002

Gause, Donald, and Gerald M. Weinberg, *Exploring Requirements: Quality Before Design*. Dorset House Publishing, 1989

Gottesdiener, Ellen. "Requirements by Collaboration: Workshops for Defining Needs." Addison Wesley, 2002

Gottesdiener, Ellen. "The Software Requirements Memory Jogger" Goal/QPC, 2005

Hofmann, Hubert F., and Franz Lehner. "Requirements Engineering as a Success Factor in Software Projects." IEEE Software July/Aug. 2001: 58-66.

Kotonya, Gerald and Ian Sommerville, *Requirements Engineering: Processes and Techniques*. John Wiley & Sons, 1998

Lauesen, Soren, *Software Requirements: Styles and Techniques*. Addison Wesley, 2002

Leffingwell, Dean, and Don Widrig. "Managing Software Requirements: A Unified Approach." 2000: 103-111.

Sommerville, Ian and Peter Sawyer, *Requirements Engineering: A Good Practice Guide*. Wiley & Sons, 1997

United States General Accounting Office, *Program Evaluation and Methodology Division. Using Structured Interviewing Techniques* <http://archive.gao.gov/t2pbat7/144388.pdf>

Wiegers, Karl, *Software Requirements*. Microsoft Press, 2002, second edition.

Young, Dr. Ralph R. "Recommended Requirements Gathering Practices". STSC Cross Talk April 2002

Chapter 5: Requirements Analysis and Documentation

5.1 Introduction

5.1.1 Knowledge Area Definition and Scope

Requirements analysis and documentation describes how stakeholder needs are analyzed, structured and specified for use in the design and implementation of a solution. The objective is to define and describe the characteristics of an acceptable solution to a business problem, so that the project team has a clear understanding of how to design and implement it. The primary focus of this activity is to develop the analysis models and determine the gaps in the information provided by the stakeholders.

Deliverables from this process will be used by the project team to develop estimates for the time, resources, and budget required to implement a solution or solutions that will fulfill the requirements. The documentation itself is only one of several techniques the Business Analyst will use to ensure that a consensus between all the stakeholders exists as to the behavior of the solution. The primary focus of documentation activity is to refine the models based upon stakeholder feedback and iteratively ensure feasibility of the proposed requirements to support the business and user needs, goals and objectives.

5.1.2 Inputs

INSERT Figure 5.1: Inputs to Requirements Analysis and Documentation

During requirements analysis and documentation, the Business Analyst continues to refine the overall scope of the problem domain and the scope of investigation. This is by reviewing the analysis and documentation with key project stakeholders and the project team. The stakeholders evaluate whether to increase or decrease project scope based on project work revealing missing or new requirements. The documentation formally acknowledges agreement on funding the proposed scope at the end of this knowledge area.

The Business Analyst and the project team work with stakeholders to conduct requirements analysis and documentation activities. The stakeholders consulted may include:

- Users
- Senior management
- Customers
- Public

- Other systems owners or process owners that are impacted by the proposed solution.

The Business Analyst has a defined a set of deliverables that will be the outcome of requirements documentation. They include:

- Documentation
- Organizational assets e.g., templates for documentation or models
- Supplemental work records e.g., back-up information for models

The Business Analyst has collected a set of requirements, in the form of goals, needs, or objectives set by the project stakeholders. Requirements Elicitation continues in conjunction with requirements analysis until:

- Requirements are validated with the project stakeholders
- Consensus is obtained on a shared understanding of the defined requirements
- The project team is capable of implementing those requirements

The Requirements Communication Knowledge Area describes how the Business Analyst works with stakeholders to achieve a shared understanding of and agreement to the solution requirements.

5.1.3 Tasks

Requirements are typically developed iteratively, with the Business Analyst describing a requirement based on available information about stakeholder needs and then presenting the requirement to interested parties for review. Information gathered in that review is incorporated into a revised version of the requirement, which will again be presented by the Business Analyst. The *Requirements Communication KA* includes information on this process.

The tasks defined as part of the Requirements Analysis and Documentation KA include:

- Structure requirements
- Create business domain model
- Analyze user requirements
- Analyze functional requirements
- Analyze supplementary quality of service requirements
- Determine assumptions and constraints
- Determine requirements attributes

- Document requirements
- Validate requirements
- Verify requirements

5.1.4 *Outputs*

Fully specified requirements are the primary output of this KA. These requirements will be submitted to stakeholders that have the authority to review and amend the requirements. These stakeholder reviews may cause an iterative series of changes to the requirements documentation. The iterative process continues until it is agreed that consensus on requirements is obtained and they are feasible and implementable. Fully specified requirements are stable enough to be implemented by the project team.

5.1.5 *Analysis Techniques and Solution Development Methodologies*

There are many techniques available to the Business Analyst for requirements analysis. These techniques include graphical, textual and matrix style modeling and documentation. A Business Analyst should be capable of working with more than one technique, even if he or she prefers a particular one. This will allow the Business Analyst a wider range of options for expressing requirements, and will allow the Business Analyst to understand documentation and models that have been prepared by others.

Selecting an appropriate solutions development methodology for a project falls outside the scope of the BA Body of Knowledge. The decision will be determined by the culture and standards of the organization. If the methodology in use does not mandate the use of certain techniques, then the Business Analyst selects a set of analysis techniques that are appropriate for the project as described in the Requirements Planning and Management Knowledge Area.

There are three broad types of solution development methodologies that a Business Analyst will use, each of which has a corresponding favored set of analysis techniques:

- Business process analysis
- Object-oriented analysis
- Structured analysis.

.1 *Business Process Analysis*

Business Process Analysis focuses on improving the processes of an enterprise in order to maximize the achievement of its business mission, objectives and priorities. Because the use of information technology is a primary enabler of process improvement, many Business Process Analysis projects include an information systems or information technology component in the solution design.

Most projects require use of business process analysis techniques. The industry or project type doesn't necessarily alter the choice of techniques. A Business Analyst should be familiar with analysis techniques used in both structured and object-oriented methodologies, to easily work with documentation, people or processes that were created with different model types.

Business Process Analysis (also referred to as Business Process Mapping) is a component of larger methodologies such as Business Process Engineering, Business Process Transformation, Business Process Reengineering, and Business Process Modeling. The differences between these methods are minimal.

Business Process Analysis projects employ a model to describe both current processes and recommended future processes. There are number of different diagram types and conventions that support Business Process Analysis, such as Activity Diagrams (5.6.1), Flowcharts (5.6.4) and Workflow Models (5.6.8).

.2 Object-Oriented Analysis

Object-Oriented Analysis views a information management system as a collection of classes that pass messages to one another, and which contain both data (attributes) and the operations that are used to create and modify those attributes. Data and processes are not modeled separately.

Object-oriented modeling techniques are supported by the Unified Modeling Language (UML) notation which is a standard defined by the Object Management Group.

In object-oriented methodologies, analysis typically begins with the identification of Use Cases (5.14.3 and 5.14.4) that describe how people will interact with the system to achieve their goals. Activity Diagrams (5.13.1) may be used to depict complex use case interactions or to show how a process extends across multiple use cases. As objects are identified in the problem domain, they will be abstracted into a Class Model (5.12.2). Finally, Sequence Diagrams (5.13.5) describe how those classes interact in each possible use case flow.

.3 Structured Analysis

Structured Analysis views a system primarily as a collection of processes executed by the system, and analysis is therefore process-centric. Another characteristic of this approach is a focus on data that is an input and output from these processes. Data and processes are generally modeled separately.

Modeling techniques commonly used to support Structured Analysis include Flowcharts (5.13.4), Data Flow Diagrams (5.13.2), functional decomposition diagrams, and Entity Relationship Diagrams (5.12.6). Standards bodies have not codified most of the models used in Structured Analysis, and so the Business Analysis Body of Knowledge defines a set of common conventions for these techniques.

5.1.6

Significant Changes from Version 1.4

The following tasks have been changed:

- A new task has been added to describe the existing *Business Domain Model*.
- *Define Solution Model* has been renamed to *Structure Requirements Packages*.
- *Validate Requirements* has been divided into two tasks: *Validate Requirements* (which describes how the Business Analyst determines that the functional and quality of service requirements will fulfill the original business requirements) and *Verify Requirements* (which describes how the Business Analyst determines that the requirements documentation is of sufficient quality to begin solution development).
- Analysis models have been separated into an appendix. The content of those models has not been updated. The Body of Knowledge Committee is currently considering whether a detailed treatment of these models is a useful addition to the Body of Knowledge or whether they should simply be listed. In the latter case, Business Analysts who need to understand the details of each model can refer to the standards body responsible for the model definition or to one of the texts used to compile this knowledge area. We welcome feedback from the community to help determine whether this content adds value.

5.2

Task: Structure Requirements Packages

5.2.1

Purpose

The purpose of structuring requirements into packages is to refine the problem boundary and solution scope definitions developed in Enterprise Analysis. The Business Analyst may decompose the problem model - to provide an increasing amount of detail on each requirement. The goal of this task is to ensure that the problem model continues to accurately provide the boundary for requirements analysis and solution development while providing clarification of functional requirements and supplemental requirements for downstream development activities.

5.2.2

Description

Concurrent to the *Requirements Elicitation KA*, the solution domain model is updated so that it continually reflects the developing understanding of the problems to be solved, the relationship between those problems, and the scope of the required solution. Failure to do this may result in wasting of project resources on a solution that does not meet stakeholder needs.

This iteration continues until the requirements have been structured.

This task is optional and may not be required if the Business Analyst is specifying a small set of requirements—for instance, an iteration in some Agile development methods or an enhancement to an existing system.

5.2.3

Predecessors

The Business Analyst has determined the scope of the Problem Domain as described in Enterprise Analysis.

Project work is initiated when an organization or customer funds solving a specific problem. The tasks and techniques associated with high-level definition of the problem and the scope of the required solution work are described in the Enterprise Analysis Knowledge Area.

The business analyst conducts the tasks defined in the Requirements Elicitation KA. During this activity additional requirements will be discovered which may change the project team's understanding of the problem and/or the required solution. New opportunities or additional complexity may be identified and priorities may change. This could have significant impact on the project scope and allocation of resources.

5.2.4

Process and Elements

The BA will iteratively structure the requirements model throughout requirements analysis and documentation. The process follows the following principles:

Define Solution Boundary

The Business Analyst identifies the solution boundary. System boundaries are determined by ownership. The business analyst documents:

- Where other actors interact with the solution.
- Where other systems provide or extract information from the solution.
- Where time initiates activities for the solution

Structure Solution Definition

Definition focuses on project work that can be accomplished in the current project or the next release of a phased project release. The team reviews whether there is sufficient funding to develop a solution for the high-level problem defined in the charter. If not, the team escalates to senior management or the customer.

Most problems are too complex to be effectively managed as a whole. The business analyst decomposes the solution into subsets that can have high-level estimates developed to confirm early project feasibility. Decomposition is structuring the problem domain into similar function, similar organizational relationships, models used to describe the problem or some other logically breakdown. This is usually presented in graphical models. The primary goal of problem decomposition is to ensure that the

problem is separated into sub-problems that interact as independently as possible, so that work can be assigned to different groups. This provides the ability to scale and manage larger projects.

Defining the solution boundary and structure the solution definition can be accomplished by goal decomposition, feature list decomposition, functional decomposition and solution-driven decomposition. The techniques will depend on your organization's culture and the complexity and type of project.

.1 Goal Decomposition

Goals are developed by stakeholders in the Enterprise KA. Goals are prioritized during the Planning and Managing KA and competing goals are addressed by senior management or the customer to provide guidance to the team. The purpose of goal decomposition is to focus the solution on satisfying high-priority stakeholder needs. Goal decompositions consider the goals of stakeholders who will directly interact with the solution (i.e. users) and the interests of stakeholders who will not interact with the solution but do have concerns, interests or concerns that they expect the solution to satisfy. Techniques for identifying a complete list of stakeholders can be found in the Requirements Planning and Management KA.

Goals are business requirements. Goals are textual. Either functional or supplemental Quality of Service requirements trace to these business requirements. Goal decomposition breaks down high-level stakeholder goals into lower-level goals that have measurable objectives..

The high-level goals in the charter may be an objectively measured target or a subjective one, but all lower level goals must be objective. A lower level goal should include objective criteria allowing stakeholders involved in the process and/or the system being designed to determine whether the goal has been accomplished.

Lower level goals (or objectives) must either be achieved by the solution or by external entities. If responsibility for the lower level goal is handed over to an actor outside the scope of the solution, the solution should be prepared to cope with the failure of that actor to fulfill the goal.

.2 Feature List Decomposition

A feature is a service that the solution provides to fulfill one or more stakeholder needs. Features are high-level abstractions of the solution that must later be expanded into fully described functional and supplemental requirements. They allow for early priority and scope management and for validating the stakeholders' view of the solution.

Features can be textual or graphical such as use cases. A high-level summary is provided, and later decomposed into additional levels of detail. An example of a feature scheme structure follows.

- 3.x System Feature X
- 3.x.1 Description and Priority
- 3.x.2 Stimulus/Response Sequences
- 3.x.3 Functional Requirements

Figure 5.2: Sample Feature List

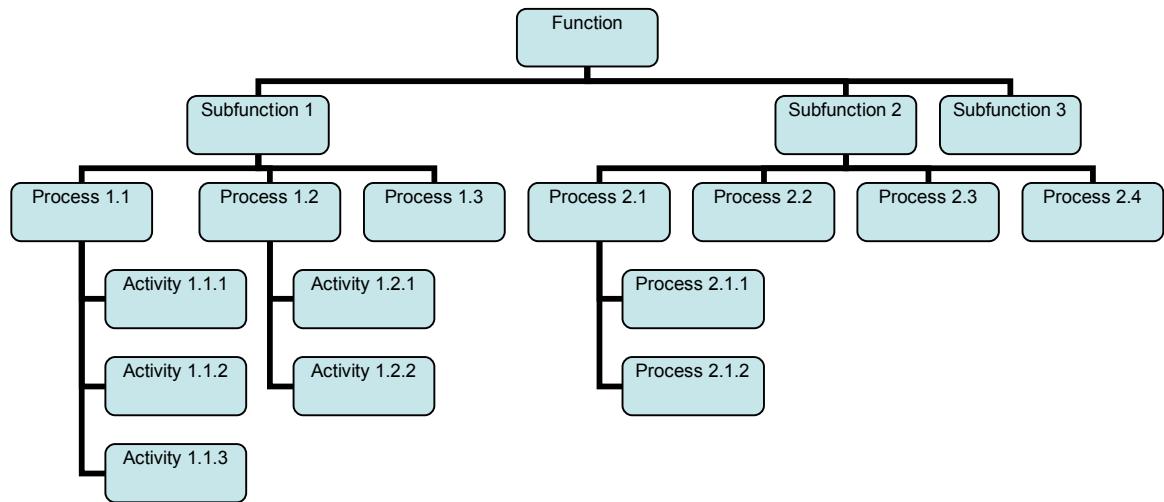
ID	Feature Description	Priority	Complexity	Schedule
FEA001	Allow user to log in	High	Low	Release 1
FEA002	Validate user authority level	High	Medium	Release 1
FEA003	Lockout user after three failed attempts and notify sysadmin	Medium	Medium	Release 2

.3 Functional Decomposition

Functional decomposition identifies the high-level functions of an organization or proposed solution and then breaks down those processes into sub-processes and activities. This can be done as part of a systems development or business process analysis project. The goal is to break functions down into smaller pieces to allow for analysis of the detail processes and to ensure coverage of all significant processes.

Models start with a top-level function, typically corresponding with an organizational unit and continue to drill down into sub-functions, representing the processes carried out by that unit, and beneath those sub-processes and individual activities (the names for each level are conventions only, and do not imply that decomposition must halt after the fourth level is reached). These can be represented by a hierarchical diagram, a tree diagram, or by numbering each sub-function. Each function consists of the sub-functions beneath it. The process of functional decomposition continues until a sub-function cannot be broken down into two or more lower level functions.

Figure 5.3: Functional Decomposition Diagram



.4 Solution-driven Decomposition

In some projects, the solution architecture is determined at the time of project initiation. Many organizations need to comply with existing business processes or the enterprises technical architecture. The business analyst documents how the proposed enhancement aligns to the current architectures.

5.2.5 Stakeholders

Stakeholders are impacted by analysis techniques. They need to verify and validate the deliverables. Decomposition is used to help them understand how requirements impact their business area or their system. Therefore the Business Analyst create model needed to tailor the representation of the proposed solution for key stakeholder groups.

Project Management used the decomposed solution models to verify the scope of the solution and assess the work that needs to be done in the project. The implementation team can be assigned to specific lower-level problems. Business Analysts can choose to structure the information in the models by the lower-level problems assigned to each person, project team or vendor team. Clear alignment between the models and who is assigned to the work facilitates tracking and reporting of project progress.

The Business Analyst(s) works within established project procedures and milestones to provide all stakeholders with the opportunity to review and approve the solution model. Additional refinement of the models is needed if the information is not decomposed in a way that is easily reviewed or agreed too by the various stakeholder groups.

5.2.6 Deliverables

The deliverable of this task is a documentation set that describes the solution model. This documentation may be represented by text, by diagrams and models, or by a

combination of both. Any of the techniques described in this Knowledge Area may be used. Stakeholder approval, in particular by representatives of the business area, is a key component to ensure agreement that solution requirements are based on an accurate model of the problem to be solved.

5.3 Task: Create Business Domain Model

5.3.1 Purpose

The purpose of this task is to describe the current and future state of the enterprise. This model is used by the Business Analyst and the stakeholders to ensure that they have an accurate understanding of the current as-is of the enterprise. It is used to verify that stakeholders have a shared understanding of the proposed to-be of the solution.

5.3.2 Description

The objective is to create a complete description of existing and proposed organizational structures, processes, and information used by the enterprise.

5.3.3 Predecessors

The Business Analyst will make use of tasks and techniques defined in the Requirements Elicitation Knowledge Area to gather information on the current state of the business domain.

5.3.4 Process and Elements

The following are guiding principles in analyzing functional requirements. The Business Analyst time spent on this task is dependent on the following research and resolution.

.1 Domain and User variation.

Developing a business model will frequently reveal areas of disagreement or confusion between stakeholders. The Business Analyst will need to document the following variations in the as-is model

- **Multiple work units perform the same function:** Document the variances in the as-is model. This may be different divisions or geographies.
- **Multiples users perform the same work.:** different stakeholders may do similar work differently. The variation may be the result of different skill sets and approaches of different business units or the result of differing needs of external stakeholders serviced by the enterprise. Document the variances in the as-is model.

.2 Resolution

The Business Analyst will document whether the to-be solution will accommodate the inconsistencies in the current business model or whether the solution will require

standardization. Stakeholders need to determine which approach to follow. The to-be model will reflect their decision.

5.3.5 Stakeholders

All project stakeholders are impacted by the as-is and to-be models.

5.3.6 Deliverables

A high-level description of the as-is system and processes and to-be proposed solution.

5.4 Task: Analyze User Requirements

5.4.1 Purpose

To capture and describe requirements that affect a particular user or user group and insure that the needs of individual stakeholder groups are addressed by a solution.

5.4.2 Description

User requirements describe the needs of a particular set of stakeholders in regard to a proposed solution. They may be used to describe how a particular set of users of a solution will interact with it or how a product will meet the needs of different customer groups.

Not all solution development efforts require the development of a separate category of User Requirements. Some of the factors the Business Analyst should consider when determining whether to develop separate user requirements include:

- How the application will be distributed and used
 - A commercial product may have different versions available for sale targeted at distinct customer groupings with different needs.
- The number of stakeholder groups involved in the development of the solution
- The complexity of the solution
- The level of consensus among stakeholder groups (low consensus may make this a valuable step in describing distinct needs)

5.4.3 Predecessors

The Business Analyst must have *Elicited the Requirements* (see *Requirements Elicitation* KA) from representatives of the user group.

5.4.4***Process and Elements***

The process of analyzing and specifying user requirements is identical to the processes used to Analyze Functional Requirements (5.5), Quality of Service Requirements (5.6) and Assumptions and Constraints (5.7).

5.4.5***Stakeholders***

A set of User Requirements is intended to capture the needs of a particular stakeholder group, and so the primary stakeholder in the completion of this task is that group.

The Business Analyst and other stakeholders will be concerned with ensuring that conflicts between sets of user requirements can be resolved.

5.4.6***Deliverables***

The Business Analyst, may, if required, express the User Requirements in a requirements document. User Requirements are often developed as an intermediate step in Requirements Analysis and Documentation and so may not need to be placed in a deliverable of their own.

5.5**Task: Analyze Functional Requirements****5.5.1*****Purpose***

Functional requirements are analyzed to describe the desired behavior of a solution.

5.5.2***Description***

Functional requirements describe the behavior that the solution will manage. They describe capabilities the system will be able to perform in terms of behaviors or operations – a specific system action or response.

Behavior also includes:

- An effect that a solution must have within the problem domain in order to bring about a desired result,
- How a person or system will interact with the proposed solution,
- A standard that must be complied with

The functional requirements are well-written when they do not unnecessarily constrain the solution design. Functional requirements can be organized and presented in various ways. A selection of generally accepted techniques for analyzing and expressing functional requirements can be found in the appendix to this knowledge area.

5.5.3***Predecessors***

Analysis of functional requirements requires that the boundary of the solution model has been defined. This is completed when business domain models are completed.

5.5.4

Process and Elements

The following are guiding principles in analyzing functional requirements:

Uniqueness

All requirements should be stated in one and only one place within a requirements document. Additional models can provide clarity on an aspect of the requirement but the requirement should not be stated in multiple places.

.1 Textual Documentation

Some requirements are best stated in simple textual sentences and paragraphs. As an example, business rules are often described textually. Requirements are best stated simply.

- Avoid complex conditional clauses
- Use terminology is used consistently
- Don't assume your reader has domain knowledge,
- Expressed as a verb or verb phrase.
- Express one and only one requirement.
- Paragraphs should be short so that they can be more easily understood.
- Write in the in the active voice, clearly describing who or what is responsible for fulfilling the requirement.

Well-formed Requirements

A well-formed textual requirement must describe the capabilities of the solution, any conditions that must exist for the requirement to operate, and any constraints that may prevent the solution from being able to fulfill the requirement. Each of the following elements should be considered when structuring a requirement to ensure that it is well-formed:

- **Event/Condition:** Describes when the requirement must be fulfilled. This may be an external event that triggers the requirement, or a condition under which the solution is operating.
- **Subject:** Who performs the operation. This may be a person or a system, but the subject responds to the event or condition in an effort to fulfill the requirement.
- **Imperative:** See above.

- **Action Verb:** Describes what the subject must do. Common actions include *advise, assign, check, create, delete, display, obtain, and update*.
- **Object:** The entities or data that are involved in fulfilling the requirement.
- **Rules:** Describes any rules that govern the outcome of the requirement. Complex rules may require that additional requirements be described.
- **Outcome:** Describes the desired result, including any criteria used to determine that the requirement has been successfully fulfilled.

.2 Matrix Documentation

A table is the simplest form of matrix. A table is used when the Business Analyst is looking to convey a set of requirements that has a complex but uniform structure which can be broken down into elements that apply to every entry in the table. Requirements Attributes (5.8) and Data Dictionaries (5.12.4) are often expressed in tabular form. Matrices are often used for traceability of requirements to each other, from requirements to test cases, and for gap analysis. Matrices are also used for prioritizing requirements by mapping them against project objectives.

A more complex matrix will also express information in the rows of the table. Rather than presenting repeating information, this form of matrix is usually intended to indicate that two elements are related in some fashion (for instance, that a requirement affects a particular data element). Examples of this kind of matrix can be found under Business Rules (5.12.1) and to document Requirements Traceability (See the *Requirements Planning and Management* KA).

.3 Diagrams

Diagrams are effective for showing the relationship between items of information in a requirements specification. They are often easier to follow than textual descriptions of structure or relationships, and for helping readers to understand the entirety of a problem. Diagrams may be supported by textual descriptions of the requirement. This knowledge area includes a number of diagrams that are commonly used in Requirements Analysis and Documentation, but the Business Analyst is not restricted to using those diagrams when a visual model is useful.

Diagrams are particularly useful when the Business Analyst seeks to:

- Show the relationship between entities in an organizational structure or between portions of a solution.
- Show events that occur in a particular order, especially if some of those events can occur in parallel.

- Show the physical location of aspects of the solution that will be present in the real world, such as the user interface of a system or the relative location of an organization's facilities.

Make diagrams as simple as possible. Graphical elements should be of a consistent size and their appearance should only differ when that difference conveys information to the viewer.

Diagrams that are intended to show a hierarchical relationship between elements of the diagram should place the most important elements at the top of the page. Similarly, Western audiences will expect a diagram that shows events occurring over time to have those events flowing either from the top of the page to the bottom or from the left to the right.

.4 Models

A model is a template for expressing requirements that may combine textual elements, matrices, and diagrams. A number of modeling techniques commonly used by Business Analysts are described in the Appendix to this Knowledge Area.

A model serves as an abstraction which represents some or all of the proposed solution. It is not imperative on part of the business analyst to model everything and at all times. For example, the BA may choose to rule out modeling when:

- The problem domain is well known.
- The solution is relatively easy to construct.
- Very few people need to collaborate to build or use the solution (often only one).
- The solution requires minimal ongoing maintenance.
- The scope of future requirements or needs is unlikely to grow substantially.

As the complexity of a solution increases, communication needs dictate modeling. Each model looks at the problem or solution domain from a different perspective, requiring that the Business Analyst must decide which perspectives are the most appropriate to the needs of a specific project. In some cases, the organization may prescribe as a standard the use of a particular modeling technique or set of techniques.

The benefits of using modeling techniques are:

- A model is a simplification of reality that allows analysts to focus on what is considered important and filter out the “noise”.
- Models help us understand and describe complex systems that otherwise might be difficult to comprehend.

- Every system may be described from different perspectives using different models.
- Models assist the Business Analyst to ensure that all aspects of a problem are completely considered, as they include a number of mandatory elements that the Business Analyst must evaluate.
- Models may more easily translate into a solution design.

Formal or Informal

A model may be formal, highly structured and detailed, or it may be informal and general. The approach chosen will be dictated by the nature of the project and its time and cost constraints, or by the system life cycle methodology of the organization.

Model Viewpoints

A requirements model may be intended to reflect a specific view of the requirements. A view captures only the requirements that are relevant from the perspective of a specific stakeholder or group of stakeholders, such as specific user groups, a set of related functions, or a perspective required by the development team. The difference between a view and a model decomposition is that a view is not exclusive—a requirement may be referenced in all views in which it is relevant.

One of the most common sets of viewpoints in use is the development of separate physical and logical models for a solution. Many of the modeling techniques used by Business Analysts to describe the logical structure of the requirements will also be used by developers to design the solution. In general, the Business Analyst will design a logical model, and the solution developers will design a physical model.

Logical Models are typically used by Business Analysts to represent the requirements of a business area. They generally show the entities that are visible to the problem domain and show how they interact with one another and with users of the solution.

Physical Models are based on the Logical Model but are modified to represent the implementation of the solution in a specific technology environment. Physical data models are not usually the responsibility of Business Analysts—they are designed by the implementers of the solution to express the solution design.

.5 Related Tasks

The Business Analyst should execute *Determine Requirements Attributes and Structure Requirements for Traceability* (see *Requirements Planning and Management KA*) in parallel with this task.

5.5.5

Stakeholders

When analyzing the current state of a solution, the product of analysis must be verified with stakeholders to verify that it is a full and accurate description of that solution.

When analyzing a desired future state of a solution, the products of the analysis effort must be validated with the project team (to determine that there is sufficient information at the end of analysis to proceed with implementation of the requirements) and by the stakeholders (to validate that the requirements as expressed meet their organizational needs).

From the perspective of various stakeholders, a complete requirement must meet the following criteria:

- Business Users: The requirement must capture the business objective and, if implemented, will fulfill a business need. Requirements must provide value to the users.
- Project Team: The requirement must be stated completely enough to allow for construction and implementation of the solution.
- Quality Assurance: The requirements must be stated clearly enough and completely enough that the QA group can test whether they are met by the solution.

5.5.6

Deliverables

A full description of the behavior of a proposed solution.

5.6

Task: Analyze Quality of Service Requirements

5.6.1

Purpose

Quality of Service requirements capture conditions that do not directly relate to the behavior or functionality of the solution, but rather describe environmental conditions under which the solution must remain effective.

5.6.2

Description

Quality of service requirements are most often used to describe some of the attributes of the system or system environment. These requirements are constraints on the solution. They are also known as *non-functional requirements*.

5.6.3

Predecessors

Understanding quality of service requirements begins during Requirements Elicitation and documentation can begin concurrent with defining functional requirements.

5.6.4

Process and Elements

There are several types of supplemental requirements. The following are typically part of projects but specific project needs may require additional elements.

.1 Environmental Requirements

Environmental requirements are environmental constraints imposed by the atmosphere outside of the system boundaries. The Business Analyst must specify political, regulatory, market, standards, policies, cultural norms, physical constraints and globalization requirements that apply to their project type. The most common environmental requirements are:

Audit

Audit requirements define information that the process or system does not need in the normal course of events but must be possible to produce when required by an outside agency. Audit requirements may be expressed through Metadata Definition (5.12.7).

Globalization and Localization

These requirements are applicable to projects that must be implemented across multiple cultures or nationalities. They may include support for multiple languages, date and currency formats, number displays, text sorting, and other considerations.

Legal

Legal or regulatory requirements include rules and regulations imposed by governments or other regulatory bodies outside the enterprise.

.2 Interface Requirements

Interface requirements define the interactions between computer systems. The different types of external interfaces include hardware interfaces, software interfaces and communication interfaces. Interface requirements impact the hardware selection options, the connection to other software components and the communication functions the system will use.

- *Hardware interface* requirements describe the characteristics of each interface between the system and hardware components of other systems. Examples of information described include support device types, the data and control interactions between the software and hardware and communication protocols.
- *Software interface* requirements describe the connection to other software components e.g., databases, operating systems, tools, libraries and commercial components. The information should include the purpose of the message, as well as the data and control items exchanged. The requirement includes the services needed by external software components and the nature of the inter-component communications. The data shared across systems is identified and any new data-

sharing mechanisms are identified. See also Data Transformation and Mapping (5.12.5).

.3 Glossary

A *glossary* defines terms that have special meaning to the organization. It is used by the project team to consistently use terminology. It also provide definitions of common problem domain terms for other project team members.

.4 Operational Requirements

Operational requirements define how the system will run and interact with operators. Examples include how many users may use the system concurrently, user access requirements, and the maximum acceptable downtime.

.5 Performance Requirements

Performance requirements for various system components indicate how much information the system must be capable of processing in a given period of time.

.6 Privacy

Privacy requirements restrict the distribution of personal information without the express or implicit consent of the parties involved. They describe what information is considered private and under what circumstances it may be made available to internal and external parties. They are distinct from security requirements (below) in that they presume that the parties in question have legitimate access. Privacy requirements may in some cases be expressed through Business Rules (5.12.1) or a CRUD Matrix (5.12.3).

.7 Quality Requirements

Quality requirements describe the designability, reliability, usability, maintainability, efficiency, human engineering, testability, understandability, maintainability, scalability, and portability expectations for the system. These characteristics should be specific, prioritized, quantitative and verifiable.

Some of the key quality requirements are described below.

Failure and Disaster Recovery

Failure and Disaster recovery requirements describe how the system is to be secured against catastrophic failure and data loss. They may include procedures designed to maintain data in a separate location, alternate means of making a system operational, and other considerations. Scenarios should be considered for partial and complete system failure. IN the case of complete failure it may be necessary to specify other systems or manual procedures that will be used.

Maintainability

Maintainability requirements describe how likely future changes to the solution are and what should be done to facilitate those future changes in the present.

Scalability

Scalability requirements describe the likely growth of use of the solution over time, allowing the project team to plan for increasing capacity.

.8 Safety Requirements

Safety requirements specify those requirements that are concerned with possible loss, damage or harm that could result from the use of the system. Define any proactive safeguards that must be taken, as well as preventative actions to avoid potentially dangerous results from use of the system.

.9 Security Requirements

Security requirements are important when the nature of the data that is traded is sensitive or access to the information must be either monitored or restricted.. Security requirements protect the data that the system uses or creates. They describe the potential risk that individuals will attempt to gain illegitimate access to information stored within the solution or that individuals with legitimate access will use the information in illegitimate ways. They include strategies to prevent access and mitigate the risks involved.

.10 Training

Training requirements describe the educational needs of stakeholders who will interact with the solution. They describe the types of stakeholders affected, the changes from the present situation that each type of stakeholder will encounter, and how those stakeholders will be informed of those changes in a way that allows them to make effective use of the solution.

5.6.5 Stakeholders

See 5.4.5.

5.6.6 Deliverables

See 5.4.6.

5.7 Task: Determine Assumptions and Constraints

5.7.1 Purpose

Assumptions and constraints identify aspects of the problem domain that are not functional requirements of a solution, and will limit or impact the design of the solution.

5.7.2 Description

Constraints are limitations or restrictions on solutions. Constraints are provided to the project team to inform them that options they would normally be allowed to consider are not available. They place limitations on how the problem described by the requirements may be solved.

Assumptions are things that are believed to be true but have not been confirmed. *Business assumptions* are provided to the project team to inform them of key stakeholder expectations. *Requirements assumptions* are added by the Business Analyst to transfer business domain knowledge to the project team.

5.7.3 Predecessors

The documentation of assumptions and constraints will likely begin during enterprise analysis.

5.7.4 Process and Elements

The Business Analyst documents all identified requirements Assumptions and Constraints. Since these do not fit within a model they are usually handled as Textual Documentation (5.5.4.1).

.1 Business Constraints

Business constraints describe limitations on the projects flexibility. to adopt a desired solution. They may reflect budgetary restrictions, time restrictions, limits on the number of resources available, restrictions based on the skills of the project team and the stakeholders, a requirement that certain stakeholders not be affected by the implementation of the solution, or any other organizational restriction.

Business constraints are things like budget limitations, restrictions on the people who can do the work, the skill sets available, etc. Constraints should be carefully examined to ensure that they are in fact justified

.2 Technical Constraints

Technical constraints include any architecture decisions that are made. These may include development languages, hardware and software platforms, and application software that must be used. Constraints may also specify restrictions such as resource utilization, message size and timing, software size, maximum number of and size of files, records and data elements. *Technical constraints* include any enterprise architecture standards that must be adhered to.

.3 Assumptions

Assumptions are used to document two types of issues relevant to the project:

- Things that the Business Analyst believes to be true but is unable to verify.

- Things that the Business Analyst knows to be true at the present that would impact the project negatively if they change (that are distinct from a requirement).

5.7.5 Stakeholders

The primary consumers of assumptions and constraints are the project team, who will have to integrate them into their proposed solution. The stakeholder responsible for defining the assumption or constraint should be involved in any discussion that involves changing that constraint.

5.7.6 Deliverables

See 5.3.6.

5.8 Task: Determine Requirements Attributes

5.8.1 Purpose

Requirements attributes provide information about the requirement, such as the source of the requirement, the importance of the requirement, and other metadata (see 5.12.7). Attributes aid in the ongoing management of the requirements throughout the project lifecycle. They should be gathered along with the requirement themselves, but are not in themselves part of the solution definition. The information documented by the attributes helps the team efficiently and effectively make tradeoffs between requirements, identifying stakeholders affected by potential changes, and understanding the impact of a proposed change.

5.8.2 Description

Attributes are information attached to each individual requirement. Attributes allow the requirements team to associate information with individual or related groups of requirements and facilitate the requirements analysis process by expressing which requirements may add project risk or require additional analysis.

5.8.3 Predecessors

Which attributes that should be documented will be determined during Requirements Planning and Management KA. The requirements attributes needed for the project will be determined by the complexity of the project and the change management strategies adopted by the project team. In general, requirements attributes become increasingly important as change becomes more difficult to accomplish.

A requirement must be defined (at least in a preliminary form) before the requirements attributes for it can be provided.

5.8.4 **Process and Elements**

.1 Process

During Requirements Elicitation KA the Business Analyst must record any information supplied by stakeholders that may assist in the definition of the requirements. During requirements analysis, each requirement must be assessed after it is analyzed to determine the values of the required attributes. The Business analyst involves other stakeholders and does not independently create the attribute values.

.2 Use of Imperatives

The Business Analyst may use imperatives to describe the priority of each requirement, in the absence of a more explicit method of recording attributes. One scheme for doing so is as follows:

- “Shall” and “Must” indicate that the requirement is mandatory.
- “Should” indicates that the requirement is highly desirable.
- “May” indicates that the requirement is optional.
- “Will” indicates that the requirement will be fulfilled by something outside the scope of the solution.

.3 Elements

Some common requirements attributes include:

- **Absolute reference** is a unique numeric or textual identifier. The reference is not to be altered or re-used if the requirement is moved, changed or deleted.
- **Acceptance criteria** describes the test that would demonstrate that the requirement has been met to the customers, end users and stakeholders.
- **Author** of the requirement. If the requirement is later found to be ambiguous the author may be consulted for clarification.
- **Complexity** indicates how hard the requirements will be to implement.
- **Ownership** indicates the individual or group that needs the requirement or will be the business owner after the project is released into the target environment.
- **Priority** indicates which requirements need to be implemented first. See the *Requirements Planning and Management KA* for further discussion or prioritizing and managing requirements.

- **Source** of the requirement. Every requirement should originate from a source that has the authority to specify requirements. The source must be consulted if the requirement changes, or if more information regarding the requirement or the need that drove the requirement has to be gathered.
- **Stability** is used to indicate how mature the requirement is. This is used to determine whether the requirement is firm enough to start work on.
- **Status** of the requirement, indicating whether it is proposed, accepted, verified with the users, or implemented.
- **Urgency** indicates how soon the requirement is needed. It is usually only necessary to specify this separately from the Priority when a deadline exists for implementation.

Additional attributes may include information such as cost, assigned-to, location, revision number, traced-from and traced-to. Minimally, attributes must indicate verifiability and must contain acceptance criteria.

5.8.5

Stakeholders

The primary consumers of requirements attributes are the project team, who will use them in the design and development of the system. They assist the project team in determining when a requirement should be implemented, what trade-offs to make during design and implementation, and who should be involved in the review of change requests.

5.8.6

Deliverables

Requirements attributes must be populated for each attribute used in the project. They may be captured in the requirements document or in a requirements management tool.

5.9

Task: Document Requirements

5.9.1

Purpose

The Business Analyst must create a requirements document to facilitate a common understanding of the requirements among all of the stakeholders and document that understanding for future reference.

5.9.2

Description

A requirements document describes a set of related functional and quality of service requirements. It does not include project deliverable information such as cost and time but formalizes the project scope. This document can be a contractual document when the work is performed by groups outside the project organization.

5.9.3***Predecessors***

Requirements documentation requires the Requirements Elicitation and requirements analysis activities to be complete. Iteration continues to occur as the document is formally reviewed by stakeholders for corrections or to perform requirements triage.

5.9.4***Process and Elements*****.1 Selecting a Document Format**

The format of the Requirements document is likely to be determined by the methodology and process adopted by the enterprise. Using a predefined format can assist the Business Analyst in ensuring that all requirements types are properly covered and facilitate stakeholder understanding of the requirements for a given solution.

.2 Common Document Formats

There are many terms for requirement documents. The documents described below are some examples of formats that are common to particular solution development methodologies. Their inclusion here is intended as a guide only—the IIBA does not endorse or reject any particular methodology or prescribe any particular set of deliverables.

Figure 5.4: Common Document Contents

Document Type	Business Requirements	Requirements Model	Current Business Model	User Requirements	Functional Requirements	Quality of Service requirements	Assumptions and Constraints	Requirements Attributes	Traceability Matrix	Other*
Vision	●									
Software Requirements Specification		●		●	●	●	●	●	●	●
Business Requirements Document		●		●	●	●	●			
RFQ/RFP	●									●
Business Process Description				●	●	●				
Other: Requirements Tool/Repository		●			●	●	●	●	●	

*See Document Description for details.

Vision

A Vision Document may be created as an output of Enterprise Analysis. It documents a high-level consensus among stakeholders as to the overall scope of the solution domain. It can describe either a specific release or a roadmap. It is most commonly written when a solution is to be developed iteratively.

Business Process Description

A business process description is an executive summary of an initiative. It describes the problem and the proposed solution in high-level terms.

Business Requirements Document (BRD)

The business requirements document describes the behavior required of a software application. The primary target audience for a BRD is the customer and users.

This document should primarily describe the business requirements as defined in the *Enterprise Analysis* KA.

Request for Proposal/Request for Quotation (RFP/RFQ)

An RFP or RFQ is a document that is distributed to parties outside the organization to serve as the basis for the contracting of solution development services.

Software Requirements Specification (SRS)

A Software Requirements Specification (also known as a System Requirements Specification) describes the behavior and implementation of a software application. The primary target audience for a SRS is the development team that will be required to implement the solution.

An SRS includes a description of the Problem Domain (see Enterprise Analysis), a decomposition of the problem domain (5.2), a description of the functional requirements that govern the solution (5.3—usually a selection of techniques from each class of model is included), the relevant quality of service requirements (5.6), assumptions and constraints affecting the solution (5.7) and may include requirements attributes (5.8) and traceability information (**Error! Reference source not found.**) if the solution is complex enough to warrant it.

5.9.5 Stakeholders

See 5.3.5

5.9.6 Deliverables

A requirements document that contains a fully analyzed set of requirements for a formal presentation and sign-off from key stakeholders.

5.10 Task: Validate Requirements

5.10.1 Purpose

To ensure that the stated requirements correctly and fully implement the business requirements as defined during Enterprise Analysis.

5.10.2 Description

To be added in later drafts...

5.11 Task: Verify Requirements

5.11.1 Purpose

Requirements verification ensures that requirements are defined clearly enough to allow solution design and implementation to begin. Customer, user and project team collaboration is required to complete this activity.

5.11.2 Description

Requirements can be considered to have been verified when the analyst can demonstrate that they have enough information to allow the solution development process to begin. This requires that project stakeholders agree that the requirements are correctly understood and that the business analyst validates with the customer and user that the requirements completely describe what is to be implemented and meets the relevant quality standards.

5.11.3 Predecessors

Validation represents a final check by the Business Analyst to determine that the requirements analysis has been correctly performed and that the requirements are ready for review by the stakeholders. All tasks in this knowledge area must have been completed prior to validation.

5.11.4 Process and Elements

The Business Analyst must verify that requirements have been specified uniquely in well-written, unambiguous requirements statements.

- There is an absence of duplicate or overlapping requirements
- The requirements are feasible, implementable, and are not outside the capability of current technology
- The requirements that will be implemented in the current release have been stated in their entirety
- The requirements are used to conduct further analysis
- There is more effective use of project resources because of reduced rework caused by defects in requirements
- The requirement does not make assumptions about how it will be implemented except where mandated by constraints placed upon the solution. User interface requirements are the most likely to require implementation assumptions.

Good requirements are unambiguous, complete, verifiable, consistent, correct, modifiable, traceable, testable, and usable after development.

.1 Criteria for Assessing Requirements Quality

Figure 5.5: Criteria for Assessing Requirements Quality

Criterion	Description
Allocatable	The requirement can be allocated to an element of the system design where it can be implemented.
Attainable	Attainable means that the requirement is technically feasible and fits within the project funding and timing constraints. Even if a requirement is technically feasible, it may not be attainable due to constraints, e.g., weight or speed.
Complete	To be complete, all known requirements are documented and all conditions under which a requirement applies are stated. Each requirement must contain all the information necessary for the technical team to design, build and test that component of the system.
Consistent	Consistency demands that the requirement can be met without causing conflict with any of the other requirements.
Correct	Each requirement must accurately describe the functionality to be built. Only the customer, user or stakeholder who was the source of the requirement can determine its correctness.
Does Not Prematurely Determine Solution	The requirement should be stated in a way to allow the widest possible selection of implementation options.
Feasible	Feasible means that it is possible to implement each requirement within the capabilities and limitations of the technical and operational environment.
Measurable and Testable	Requirements that are testable are designed to demonstrate that the system satisfies requirements. Tests may include functional, performance, regression, and stress tests.
Necessary	A necessary requirement is one that is essential to meet the business goals and objectives. If the system can meet prioritized, real needs without it, the requirement is not necessary. The requirement should be traceable to a goal stated in the project charter, vision document, business case, or other initiating document.
Prioritized	A priority is assigned to each functional requirement or feature to indicate how essential it is to a particular system release. If all requirements are considered equally important, it is difficult for the Business Analyst and the Project Manager to respond to budget cuts, schedule overruns, staff turnover or new requirements added during development.
Traceable	The origin (source) of the requirement must be known, and the requirement can be referenced or located throughout the system. (Note: an automated requirements traceability tool enables finding the location in the system where each requirement is met.) Traceable backwards: each requirement should be traced back to specific customer, user or stakeholder input, such as a use case, a business rule, or some other origin. Traceable forward: each requirement should have a unique identifier that assists in identifying, maintaining change history, and tracing the requirement through the system components.
Unambiguous	To be unambiguous, all readers of a requirement should arrive at the same interpretation of its meaning. Requirements that are written in simple, concise, straightforward language are more likely to be unambiguous. All specialized terms and terms that might be subject to confusion should be well defined.
Understandable	Understandable means that the requirements must be clear, concise, simple and free from ambiguity. Ambiguous requirements are often misunderstood, resulting in rework and corrective actions during the design, development and testing phases. If the requirement can be interpreted in more than one way, it should be removed or clarified.

Criterion	Description
Verifiable	<p>When writing requirements, the author should use simple, short sentences and imperative phrases using shall. Statements indicating goals or using the word will are not imperatives.</p> <p>Verifiable means that the requirement states something that can be confirmed by examination, analysis, test, or demonstration. A good requirement does not contain words that are not testable and measurable. If it is impossible to ensure that the requirement is met in the system, it should be removed or revised. The verification method and level (i.e., the location in the system where the requirement is met) at which the requirement can be verified should be determined explicitly as part of the development of each requirement. Requirement statements that include words that have relative meaning are not verifiable. For example:</p> <ul style="list-style-type: none"> • Easy • Maximum • Minimum • Better than • Adequate • Substantial • Quality product • Comparison • More efficient

Business analysts are challenged with writing “good” or “valid” requirements. Typical problems that are encountered when writing requirements include:

- An incomplete understanding of the requirement; failing to ask for clarification
- Incorrect interpretation of the requirement; applying personal filters to the information that alter the intent
- Writing about implementation (the *how*) instead of requirements (the *what*). Implementation decisions should be deferred to as late a point in the Requirements Elicitation process as possible.
- Using undefined acronyms
- Using incorrect sentence structure

During the requirement analysis and documentation process, requirements are often categorized as *valid* or *invalid*. Invalid requirements are incomplete in some way – vague, ambiguous, inconsistent, incorrect, untestable or not measurable – and therefore it is impossible for a solution to be tested to determine whether or not it meets that requirement.

Figure 5.6: Valid vs. Invalid Requirements

Invalid Requirements	Valid Requirements
Lightweight	Weight \leq 20.0 oz.
Must be better than current system	Operational availability \geq 0.95
High quality	Operational availability \geq 0.95 of the time

100% reliable	Kill probability </= 0.9
Range > 500 mi.	Range >/= 500 mi.

.2 Checklists

Checklists are useful as a quality control technique. They may include a standard set of quality elements that the Business Analyst or other reviewers should use to validate the Requirements Specification or be specifically developed to capture issues of concern to the project. The purpose of a checklist is to ensure that

5.11.5 Stakeholders

The Business Analyst, in conjunction with the solution delivery team, will have the primary responsibility for determining that this task has been completed. Problematic requirements may be discovered by other stakeholders during requirements communication.

5.11.6 Deliverables

The Business Analyst will revise the requirements specification (5.9) to ensure that the requirements stated there are fully valid and ready for stakeholder review.

Appendix

5.12 Technique: Data and Behavior Models

Data and Behavior models may also be referred to as *static* models. They describe the kinds of things that exist within the scope of the solution, the information that the system records about those things, the way that they relate to one another, and the rules that govern their behavior. The data and behavior model does not show how the solution behaves through time, or how persons outside the solution scope interact with the solution.

5.12.1 Business Rules

.1 Purpose

The purpose of Business Rules Management is to provide a formal structure for the identification, documentation and maintenance of business rules, and allow for the implementation of those rules in a separate repository to facilitate making changes to them in the future.

.2 Description

The organization and operation of most business enterprises is directed and constrained by internal and external (e.g. by regulatory bodies) policies, or business rules. For example, there may be a business rule that "Payment of employee expenses requires the

approval of a manager at Level 5 or above". Business rules, and changes to them, may have a significant impact on business processes, business data and business systems.

A business rule describes a policy, guideline, standard, or regulation upon which the business operates. A Business Rule is a statement that defines or constrains some aspect of the business. It is intended to assert business structure, or to control or influence the behavior of the business.¹The business rules that concern the project are atomic, that is, they cannot be further decomposed, and they are not process-dependent, so that they apply at all times.

.3 Intended Audience

Coming soon...

.4 Process

Coming soon...

.5 Key Elements

A Business Rule is usually captured as a textual statement that defines the rule exactly and unambiguously. Each Business Rule has a unique identifier.

Because a single Business Rule may impact a number of different business processes, Business Rules are usually documented separately in some form of Business Rule Catalog. This allows Business Rules to be documented and managed non-redundantly.

The Business Rule Catalog is managed as an on-going process, and may be supported by rules management software.

Textual Rules

- A business rule should be a well-formed written requirement (5.5.4.1) and must be uniquely identified. Common types of Business Rules include:
- **Term:** A term defines the meaning of a word or phrase with a specific meaning to the stakeholders. The term must be unique and includes a definition of what is known about the thing in question.
- **Fact:** A fact describes the relationship between two or more terms. Relationships may include one term being part of another, one term interacting with another, or any other relevant connection between the two. A derived fact is one that is computed or inferred from other facts (e.g. if *a* always relates to *b*, and *b* always relates to *c*, then *a* must relate to *c*).
- **Derivation:** Derivations are used to create new information from existing information. A derivation may be the result of a calculation (e.g. the duration of a

¹ The Business Rules Group. www.businessrulesgroup.org

process is the elapsed time between the start date and the end date) or the result of a logical inference based on known information.

- **Assertions:** Assertions state what values of a term or fact are considered valid by the business under given circumstances. Assertions can be further broken down into three types:
 - **Authorization:** An authorization rule determines whether a person may perform a specified action.
 - **Condition:** A condition specifies a circumstance under which another business rule may be applied.
 - **Integrity Constraint:** Specifies which values of a term or fact are permissible, given a specified value of another term or fact.
- **Action Enabler:** Action Enabler rules trigger an activity or a message if a certain condition becomes true.
- BR654 Payment of employee expenses requires the approval of a manager at Level 5 or above.
- BR728 Claims for employee expenses must be submitted for approval no later than 15 days following the date that the expense was incurred.

More complex Business Rules may require a more extensive textual description, or a diagram such as a Flowchart or Activity Diagram. It may be necessary to provide an example to clarify understanding of a Business Rule.

Decision Tables/Trees

Decision tables are used to structure the presentation of a series of closely related Business Rules. Anything that is presented in a decision table or a decision tree can be stated as a series of sentences, but the tabular format makes it easier for stakeholders to understand the essential similarities and focus in on the differences.

A decision table may also be used when multiple rules may apply to a situation...

Note: Needs expansion and completion.

.6 Usage Considerations

Business Rules Management may be used whenever it is necessary to ensure that the policies that constrain and direct the operation of a business are well understood and correctly implemented.

The strength of Business Rules Management is that it provides a structured, rigorous and non-redundant approach to the management of Business Rules. This serves to ensure that Business Rules are properly implemented, and that the impact of changes to Business Rules can be assessed more easily.

Business Rules Management, however, does require an additional set of documentation to be developed and maintained, and additional effort to ensure that the impact of the business rules on other functional requirements is properly understood. This technique is most effective when business rules are applied across multiple processes, or when the solution includes a separate component for managing and enforcing the Business Rules. If neither condition is met there is little value in separating the business rules from the other models used to describe the solution.

.7 Complementary and Alternative Techniques

Business Rules may be encapsulated in Process/Flow Models (5.13), a Metadata Definition (5.12.7) or in a Use Case Description (5.14.3).

Terms and Facts may be fully described by a Data Dictionary (5.12.4), Class Model (5.12.2), or Entity-Relationship Diagram (5.12.6). Other Business Rules may be encapsulated in Process/Flow Models (5.13), a Metadata Definition (5.12.7) or in a Use Case Description (5.14.3).

5.12.2 Class Model

.1 Purpose

The purpose of a Class Diagram is to show the entities relevant to the solution, along with each entity's internal structure and relationships with other entities.

.2 Description

Class Diagrams show a set of related classes that exist within the solution domain and the associations that each class has with other classes. A class represents a distinct concept within the solution domain, which may represent a physical item, a logical collection of information, a piece of functionality within the system, or an action that may be taken. Each particular instance of a class (the actual physical thing, the execution of an action, etc.) is an object.

A class has attributes that describe it and operations which it knows how to perform. A typical class has the following characteristics that distinguish it from other classes:

- **Attributes:** Attributes of a class describe the information that may be recorded about an particular instance, or object. They may include a description of the possible states (5.13.6) or other data that may be of interest. Attributes are created, modified, and deleted through a class's operations.
- **Operations:** Operations describe what a class can do. Operations accept attributes, modify them, and output a result. This result may be communicated to other classes. Classes may only affect one another by requesting that an operation be performed through a message. Classes must be associated in order to send messages.

.3 Intended Audience

Class Models, when developed by a Business Analyst, are used to communicate the logical view of the requirements or the problem domain to the system architects or designers to help them design the technology-specific solution. System Architects (or designers) and developers also study the class models to understand the existing system and dependencies of various business entities therein. Old or previously developed class models are also used by business analysts themselves to model a business's current assets and resources, such as account ledgers, products, or geographic hierarchy.

.4 Process

Coming soon...

.5 Key Features

The format and elements of the Class Diagram are defined in the UML standard maintained by the OMG.

.6 Usage Considerations

Strengths

- A logical class model also makes it easier to build and design system architecture.
- A logical class model is the best way to create visualizations of code and other forms of implementation.

Weaknesses

- Class models result from an object-oriented analysis and design approach and may not be as useful for non-OO solutions.

.7 Complementary and Alternative Techniques

The Entity-Relationship Diagram (5.12.6) may also be used to describe the entities of interest to the solution domain and the relationships between them.

Variations

Many variant notations for the class diagram were used prior to the development and adoption of the UML standard.

The *Object-Role Model* is a variant technique that serves a similar purpose to the Class Model in analysis. Unlike the Class Model, the Object-Role Model does not include data elements other than those required to describe how entities relate to one another.

5.12.3 *CRUD Matrix*

.1 Purpose

The CRUD Matrix is used to define different levels of access rights to data stored within a software solution.

.2 Description

The CRUD (Create, Read, Update, Delete) Matrix cross-references user groups against the entities managed within a system. For each data element, it states which user groups are allowed to create, read, update, delete, or list those entities.

.3 Intended Audience

The CRUD Matrix will be used by stakeholders to validate which data is available to each group of end users and by the development team to implement system security.

.4 Process

The CRUD Matrix requires that the Business Analyst identify sets of users who have different access rights to the data stored in the system. User Profiles (5.14.6) may be used as the basis for these user groups, as may Actors identified through Use Cases (5.14.3 and 5.14.4).

The CRUD Matrix also requires that a detailed data model be defined for the system, generally through a Class Model (5.12.2) or an Entity-Relationship Diagram (5.12.6). A Data Dictionary (5.12.4) may also serve as the basis for a CRUD Matrix, but as the Data Dictionary is likely to contain many more entities than a Class Model or Entity-Relationship Diagram, the CRUD Matrix will be harder to develop and maintain.

The Business Analyst should consider which user groups require access to the information stored in each data element. The appropriate access level should be determined through consultation with the stakeholders, from the Functional Requirements defined for the system, and from any Privacy (5.6.4.6) or Security (5.6.4.9) requirements. Create, update, and delete rights should be carefully examined to ensure that data within the system is properly managed.

As a final validation step, the Business Analyst should check that each entity in the CRUD matrix can be created, read, updated and deleted by one or more user groups (in other words, that each of these rights levels appears in the column beneath the data element). At least one user group must have each of these rights for every data element managed by the system, unless the data element is managed in a different system.

.5 Key Features

The CRUD Matrix breaks access rights down into five possible levels of security:

- **Create:** members of the user group may instantiate new instances of that data element.
- **Read:** members of the user group may view all data stored in the data element.
- **Update:** members of the user group may change the data stored in the element.
- **Delete:** members of the user group may delete instances of the data element.
- **List:** members of the user group may list all instances of the data element but do not have access to internal data. This is optional and often subsumed into **Read**.

User groups may have none, one, some, or all of these access levels to any particular entity. If no rights are specifically granted, the group is not allowed to access the data. Users with Update access to an entity will likely have Read access to it as well.

The CRUD Matrix organizes these access levels into a matrix for easy reference, as shown in the following example:

Figure 5.7: CRUD Matrix Example

		Entities				
		Entity 1	Entity 2	Entity 3	Entity 4	Entity 5
User Group	Group 1	C	R	RU	D	
	Group 2	CLD	RU			
	Group 3	CRUD		RU	R	
	Group 4				RD	CRU
	Group 5	CRD	R	R	R	RU

.6 Usage Considerations

The CRUD Matrix is intended for use in software development projects and is unlikely to be of much value in Business Process Analysis.

The Business Analyst must be careful to keep the CRUD Matrix consistent with the user groups and entities identified elsewhere in the requirements.

.7 Complementary and Alternative Techniques

The information expressed in a CRUD Matrix may also be captured in Use Case Descriptions (5.14.3) or in Business Rules (5.12.1).

Business Analysts working with use cases may also use the CRUD Matrix to verify that a use case exists that is able to update each entity. In this case the use cases will replace the user groups in the matrix.

5.12.4 Data Dictionary

.1 Purpose

A data dictionary defines the data that is recorded or used by an organization.

.2 Description

A Data Dictionary defines the data that relates to the solution, including both the primitive data elements and the more complex data structures that will be built out of them.

.3 Intended Audience

The data dictionary is typically aimed at non-technical stakeholders in a solution, such as managers and end-users. Technical stakeholders will generally require that the Data Dictionary be elaborated into a Class Model (5.12.2) or Entity-Relationship Diagram (5.12.6). Business Process efforts may not require that a more detailed data model be developed.

.4 Process

The Data Dictionary is collected throughout the Requirements Elicitation process by collecting definitions of terms from stakeholders as data that they must use is encountered. When contradictory definitions are encountered or aliases for the same data elements are found to be in use, the Business Analyst must work with stakeholders to reach an agreed definition.

.5 Key Features

A data dictionary contains definitions of each primitive data element and indicates how those elements combine into composite data elements.

Primitive Data Elements

The following information must be recorded about each data element in the data dictionary:

- **Name:** a unique name for the data element, which will be referenced by the composite data elements.
- **Aliases:** alternate names for the data element used by various stakeholders.
- **Values/Meanings:** a list of acceptable values for the data element. This may be expressed as an enumerated list or as a description of allowed formats for the data (including information such as the number of characters). If the values are abbreviated this will include an explanation of the meaning.
- **Description:** the definition of the data element in the context of the solution.

The primitive data element can also be expressed in a short form, as follows:

Data Element Name = [enumerated list 1 | enumerated list 2] *description, including format*

In other words, all information regarding the data element is contained within a comment, which is delineated by an asterisk on each end of the comment. The only information that is not included in the comment is a list of values for the data element. Those values are contained within brackets.

Composite Data Elements

Composite data is assembled from primitive data elements. The composite data element is assigned a unique name, which is followed by an equals sign before the primitive data elements are listed. Composite structures include:

- **Sequences:** show primitive data elements in order, separated by a '+'. The primitive elements must always occur in the specified order.
- **Repetitions:** show that one or more primitive data elements occur multiple times in the composite element. The repeated element or elements are enclosed within curly braces ('{' and '}'). The allowed number of repeats are shown before the braces, with a colon separating the minimum and maximum. The minimum may be 0. If the maximum is unlimited, the letter 'm' is used.
- **Optional Elements:** may or may not occur in a particular instance of the data element. They are enclosed in parentheses.

Example:

- Composite Data Element = Primitive 1
 - + Primitive 2
 - + 1:20 {Primitive 3 + Primitive 4 + Primitive 5}
 - + (Primitive 6)

.6 Usage Considerations

The Data Dictionary is useful for ensuring that all stakeholders in a solution are in agreement on the format and content of information relevant to the system. Capturing these definitions in a single model ensures that these terms will be used consistently.

If the project will result in the implementation of a software system, the Business Analyst may prefer to use an alternate method (below).

.7 Complementary and Alternative Techniques

The Business Analyst may choose to capture Business Rules (5.12.1) governing the data while the Data Dictionary is compiled.

In software development projects, the data dictionary is likely to be an intermediate analysis product that will be refined into a Class Model (5.12.2) or an Entity-Relationship Diagram (5.12.6). The Business Analyst may choose to bypass the development of a Data Dictionary in favor of one of those techniques.

5.12.5 Data Transformation and Mapping

.1 Purpose

Data Transformation and Mapping is used on application development projects that require use of existing business data records. The organization has made a decision to have these business records available in a new business process.

Planning for data transformation and mapping must occur before moving data records into a new business solution. This ensures that the historical business data records are consistent with the new business solutions needs.

Variants on Data Transformation and Mapping include:

- *Extraction, Transformation, and Loading (ETL)*, which describes the end-to-end project process:
 - Extraction is the task of acquiring the data from different source systems.
 - Transformation is analyzing the data formats of the acquired data records and understanding how to cleanse the records to support the new applications business goals. Business rules are developed to understand what to correct or reject. The conversion involves changing the original data into a form needed by the target system.
 - Load accomplishes writing the transformed data into the new data store.

.2 Description

Data Transformation and Mapping provides a way for a project to understand several data challenges.

Different places: This data may lie in heterogeneous systems. For example data records may be in a mainframe legacy application, an off the shelf vendor database, a flat file or an excel spreadsheet. This data is moved to support a business process or a requirement to view historical information.

Different definitions: The data may be defined differently. For example a customer site may either be the billing site or a installed at location. Therefore the data transformation and mapping process involves gaining agreements on names and fields and determining how to map various systems to the new business solution names and fields. This planning is done to develop the value case needed to enforce consistency with the stakeholders.

Varying levels of quality: The data may not be accurate. For example, multiple records for the same customer may exist. Therefore the data transformation and mapping process quantifies the extent of the cleansing the data needed to remove duplicates. This as-is analysis and metrics will lead to suggested to-be process improvements or system enhancements that prevent future data pollution.

Tools used in preparing a Data Transformation and Mapping analysis may be software based, but is intended to be an analysis of the data that doesn't require complex tools.

.3 Intended Audience

Data Transformation and Mapping planning is a cross-functional effort facilitated by an analyst to gain agreement between business process users, business process champions, data record business owners, data administrators, operations groups and the subject matter database experts on the plan to accomplish the data migration. The purpose is to identify data issues, business rules issues and a framework for moving data from a current system to the new business solution with minimal disruption to the users.

.4 Process

This process covers requirements planning activities for Data Transformation and Mapping. While there can be a sequential process, many of these steps can be accomplished concurrently.

High level data modeling: Projects use Data Transformation and Mapping to review the existing data record structures against a proposal for a high-level model of the new business solution. This process is iterative and varies based on the number of different data record resources and the amount of data records that need to be analyzed.

Data Analysis: Current data records are reviewed for consistency against the proposed high-level data model. Metrics are gathered to understand the size of the issues. Stakeholders are asked to resolve inconsistencies between the source data records and the proposed business solution.

Iterative Review of analysis model and project assumption: Document discovery of new assumptions, requirements, constraints or data inconsistencies that require updates to the high-level analysis models or project plans.

Enterprise Data Model: Align and review project specific Data Transformation and Mapping efforts with the enterprise architecture vision.

.5 Key Features

There is no formal, universally accepted standard for Data Transformation and Mapping. The level of detail required in a Data Transformation and Mapping and the format used in the documentation must be selected by the business analyst to match the specific needs of stakeholders, project team, data types and target data repository.

A Data Transformation and Mapping process, no matter what methodology is used, must include the following:

- Hi-level data model that provides a description of the entity-relationships. Other attributes can be completed during design.
- Data business rules: Identification and stakeholder agreement on business rules for use in cleansing and project requirements. Ownership of the data is defined along with documented processes for business changes and approvals.
- Data cleansing plan: Documentation of responsibilities of deliverables needed for source data records that can be used by the target data repository. These deliverables are aligned with the proposed business process needs.
- Environment plan: The data can not be directly moved from the source data records to a production system. A migration plan for staging the data transfer should be developed with clear responsibilities, deliverables and business solution data quality criteria.

Other elements may be required in specific methodologies or under specific circumstances. These may include:

- Business data categories: This is also called business meta data and provides context or organization of the data through a business viewpoint.
- Source and Target Record Naming conventions: For code and document naming to assist in project organization

.6 Usage Considerations

This is the early analysis phase of a project process that allows an enterprise to develop analysis that supports the plan to:

- move data from multiple sources
- reformat and cleanse it.
- load it into another database, a data warehouse for analysis, or onto another operational system

Data Transformation and Mapping is used to uncover issues that will occur during the data loading or eventually be discovered by users. Business-focused data analysis allows alignment of the project with the enterprise business needs. This is completed with stakeholder review of models, rules and migration plans.

This will be a difficult process if neither business owners nor development subject matter experts are available to the project. This can increase development time or cause surprises after roll-out process issues if as-is usage is not understood or documented.

Data migrations are done infrequently. Therefore many enterprises do not have personal or tool experience needed to complete these projects.

Models, rules, and reviews must be completed to minimize the risk that an improperly implemented Data Transformation and Mapping destroys or corrupts data in the target system.

.7 Complementary and Alternative Techniques

Data Transformation and Mapping process has no alternatives if data needs to be moved from source systems into a target business solution. There may be tailoring of the project depending on the size of the project or to mitigate risks in known data integrity issues.

5.12.6 Entity Relationship Diagrams

.1 Purpose

An Entity Relationship Diagram (ERD) is a visual representation of a data structure. Because they describe things that are significant to the enterprise (e.g. Customers, Products, Employees, Invoices, etc.), ERDs are useful in describing the structure of the business itself, and many of the rules by which it is governed.

.2 Description

An Entity Relationship Diagram is a visual representation of the entities of interest to the solution, the information that must be retained about each entity, and the relationship between them.. Primarily it shows rectangles representing “things” (entities) about which data is needed, lines that represent relationships between entities, and annotations on these lines to represent the numerical constraints of these relationships.

Standard

ERDs were first introduced in 1976 by Peter Chen and have since been extended and improved by additional contributors. No formal standard exists.

.3 Intended Audience

Business Analysts use Entity Relationship Diagrams to communicate data requirements to business area experts. They are also used by analysts to communicate the agreed requirements to developers.

.4 Process

Developing an ERD is an iterative process. It typically proceeds as follows:

- From descriptions of the business area, identify what appear to be the things of significance about which data will be required. This will provide an initial list of candidate entities that will be refined as analysis proceeds.
- From continued analysis identify the attributes of each entity and the relationships between them. Continue to develop the model as these are identified.
- From the identified attributes, decide on an appropriate unique identifier for each entity. In the absence of attributes that will serve this purpose, assign a surrogate (e.g. Employee Number).
- When the model is complete, ensure that each entity is normalized to third normal form.
- Validate the model with business area experts.

.5 Key Features

An Entity Relationship Diagram has four main components:

Entities: an entity represents a group of uniquely identifiable people, places, things or concepts about which a business area needs information. (e.g. Customers, Products, Employees, Invoices, etc.).

Attributes: an attribute is one of the individual pieces of information that describes an entity (e.g. Customer Name, Product Price, Employee Number, Invoice Date).

Unique Identifiers: a unique identifier is an attribute, or a combination of attributes, that will uniquely identify each separate occurrence of an entity (e.g. Customer Number, Invoice Number, Social Insurance Number).

Relationships: a relationship is a significant business association between two entities. It reflects how data from one entity needs to be used in conjunction with data from another entity. It also reflects a “business rule” of the enterprise.

At each end of a relationship line, a notation indicates the minimum and maximum number of occurrences of one entity that may be associated with the other entity. This notation is known as the “cardinality” of the relationship. A variety of notations are in popular use, all expressing the same general concept.

The possible permutations of minimum and maximum cardinality are:

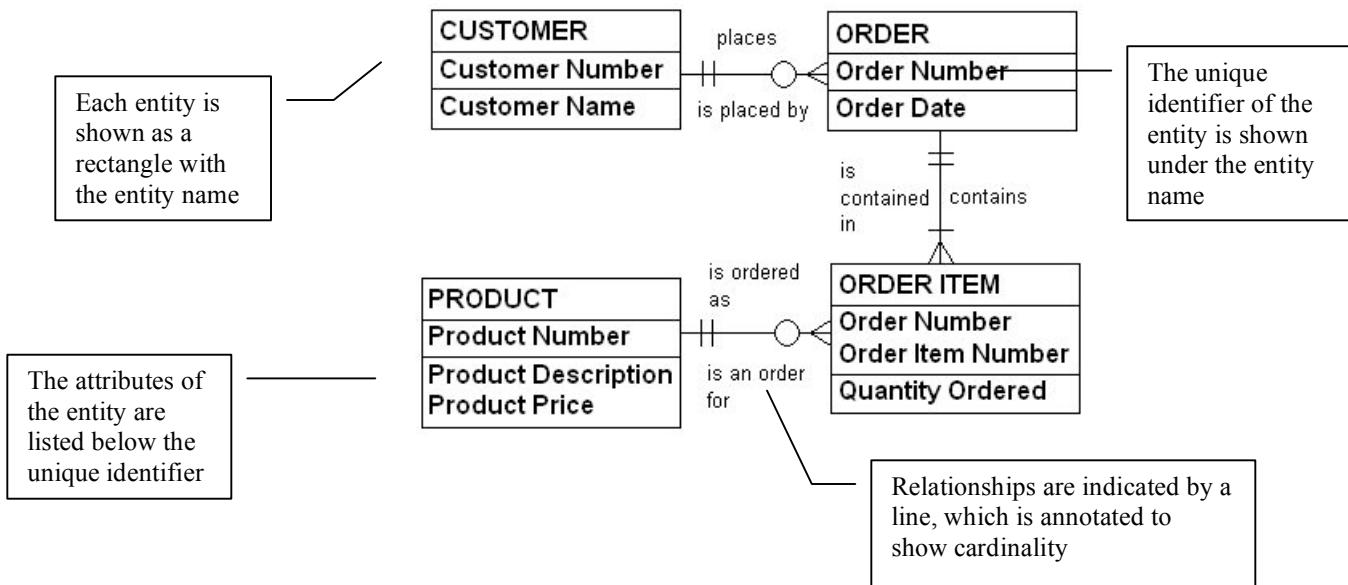
- Zero or one

- Zero or more
- One and only one
- One or more

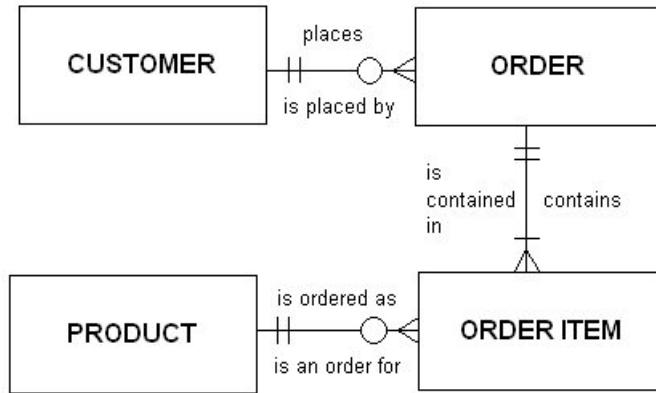
The following diagram illustrates these components and expresses the following business rules:

- Each customer places zero or many orders
- Each order is placed by one and only one customer
- Each order contains one or more order items
- Each order item is contained in one and only one order
- Each order item is for one and only one product
- Each product is ordered as zero or many order item

In addition, the diagram describes the attributes and unique identifiers of the Customer, Order, Order Item and Product entities.



ERDs may also be shown with less detail, as follows:



.6 Usage Considerations

Logical Entity Relationship Diagrams can be used by a Business Analyst to:

- Develop and document an understanding of the entities of significance to a business area and the rules that govern the relationships among them.
- At a high level, simplify and clarify complex issues and explain concepts
- At a detailed level, document the data requirements of a business area
- Present a specification of data requirements to a database designer in a single comprehensive document.

Strengths

- Flexibility, in that they can be used at a high level to develop a conceptual model with minimum detail, or at a detailed level to fully describe the data requirements of a business area.
- A useful and comprehensive deliverable to a database designer, especially in a relational database environment.
- Rigor, in that they are based on mathematical concepts (relational calculus) that provide some stringent rules for correctness and completeness.

Weaknesses

- Complexity. If not properly presented, they can be difficult for users to understand and relate to.
- Data-centric. Process modeling must be completed with separate models.

.7 Complementary and Alternative Techniques

Entity-Relationship Diagrams should be supplemented by Business Rules (5.12.1) and Metadata Definition (5.12.7).

Entity Relationship Diagrams may be replaced with:

- Textual documentation that categorizes and describes entities, attributes and relationships
- Object Role Models. These are a more complex diagram type that also cover data structures.
- Class Diagrams. There are many similarities and shared concepts between Entity Relationship Diagrams and Class Diagrams. They are both static, or structural, models that describe “what” is important to the enterprise.

Variations

There are several variant notations for the Entity-Relationship Diagram.

Logical Data Models are used in the SSADM methodology. They are functionally almost identical, although the notation is slightly different.

5.12.7 *Metadata Definition*

.1 Purpose

Metadata is information about data used by a solution that helps the Business Analyst to explain the context in which the data is used.

.2 Description

Metadata is information that describes the context, use, and validity of business information. The definition of metadata is “data about data”, that is, it describes information that the solution or system needs to know in order to make the data intelligible and to ensure that the data is valid.

.3 Intended Audience

.4 Process

To be defined...

.5 Key Features

The capture and maintenance of metadata is normally a byproduct of the functioning of the system. Since metadata primarily concerns the usage...

Note: define key features of metadata...

.6 Usage Considerations

Metadata must eventually be recorded within the solution to be of any value. That means that the process and/or the system must be structured to facilitate its capture and maintenance, even if the users of the solution never directly update it.

.7 Complementary and Alternative Techniques

Metadata includes information that a business analyst is likely to capture and describe using other techniques in this knowledge area. In particular:

- The structure of the primitive data element and composite data elements that include the data element will be described using a Class Model (5.12.2), Data Dictionary (5.12.4), or Entity-Relationship Diagram (5.12.6).
- Ownership of and access to the data element may be described using a CRUD Matrix (5.12.3).
- Business Rules (5.12.1) may also describe ownership of the data, the relationship between data elements, what values of that data element are valid under given conditions, and rules governing when and how that data may be changed.

The techniques above describe those concerns more fully. However, if a Business Analyst is not using some or all of those techniques, then those issues should be resolved as part of Metadata Definition.

5.13

Technique: Process/Flow Models

A process/flow model may also be described as a *dynamic* model. These models show how the system behaves over the course of time, through the execution of a business process or as the result of events that occur inside the solution scope. They do not describe the entities that are relevant to the solution outside of the context of a particular series of events, nor do they describe how persons may interact with the solution from a user perspective.

5.13.1

Activity Diagram

.1 Purpose

The purpose of an Activity Diagram is to graphically represent the flow of a sequence of activities, and the logic that controls the flow. It shows the dynamics, or behavior, of the sequence of activities represented in the diagram.

.2 Description

An Activity Diagram is a visual representation of the sequential flow and control logic of a set of related activities or actions.

An Activity Diagram can be useful whenever it is necessary to communicate the details of a complex process.

Standard: The format and elements of the Activity Diagram are defined as part of the UML standard maintained by the OMG. This description complies with version 2.0 of that standard.

.3 Intended Audience

An Activity Diagram may be used by a Business Analyst to communicate the details of a sequence of related activities to a business area expert or to a solution developer. The sequence of activities communicated by the diagram may document an existing process, or may represent an anticipated or recommended future process. The activities represented may be manual activities, or automated, or a combination of both.

.4 Process

Completion of an Activity Diagram is generally accomplished by:

- Deciding the boundaries (start and end points) of the set of activities to be modeled
- Determining details of the activities such as sequence dependencies, conditional logic, and (optionally) performance responsibilities
- Completing the diagram
- Preparing brief textual descriptions, if necessary to avoid misinterpretation, of the symbols shown in the diagram

.5 Key Features

An Activity Diagram typically has the following components:

- Activities, represented by rounded rectangles
- the sequential flow of activities, represented by an arrow-headed line
- the start point of the sequence, represented by a filled circle
- The end point of the sequence, represented by a bounded filled circle
- Branches, represented by a diamond, from one path to two or more mutually exclusive alternative paths
- Merges, also represented by a diamond (or simply by converging flow lines) of independent flows into a single flow
- forks, represented by a bar, from a single flow into two or more parallel flows

- joins, also represented by a bar, of a number of independent parallel flows into a single flow
- responsibility for completion of activities in the diagram, represented by labeled “swim-lanes” in which are shown only the activities for a specified area of responsibility.

These components are illustrated in the following diagram.

.6 Usage Considerations

Activity Diagrams can be used to:

- Analyze and describe a complex Use Case scenario
- Analyze and document business workflows (current or future)

- Describe any complex sequence of activities, or complex algorithms
- Document activities together with responsibility for their completion

Strengths

- Ability to visually represent complex flows with multiple decision points and parallel flows
- Easy to develop and easily understood by most audiences

Weaknesses

- Complex sequences of activities documented with swim-lanes are often difficult to organize for simplicity and easy comprehension.

.7 Complementary and Alternative Techniques

There are a number of other diagramming conventions that serve a similar purpose to the Activity Diagram. These include:

- The IDEF3 diagram type developed by the U. S. Department of Defense.
- Flowcharts (5.13.4).
- Workflow models (5.13.7).

5.13.2 **Data Flow Diagram**

.1 Purpose

To show how information is input, processed, stored, and output from a system.

.2 Description

The Data Flow Diagram (DFD) provides a visual representation of the:

- External Entities that provide data to, or receive data from, a system
- The Processes of the system that transform data
- The Data Stores in which data is collected for some period of time
- The Data Flows by which data moves between External Entities, Processes and Data Stores

It provides a data-centric view of the scope of the project, representing what the system does, not how it does it. It is intended as a communication method between business and system stakeholders. It may be used to represent an automated system or a business system.

.3 Intended Audience

Data Flow Diagrams are used as a communication between business stakeholders, analysts and developers, data base designers, architects and other system stakeholders. They should be written to be understandable by business representatives, but still be specific about the data elements being processes.

.4 Process

Data Flow Diagrams are prepared by successive decompositions of a process hierarchy. The first diagram (known as the Context Diagram) will show the system or business area as a single process with data flows coming from and going to External Entities.

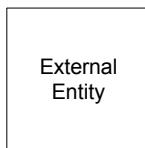
The single process in the Context Diagram is then decomposed successively into a number of more detailed diagrams that show data inputs to and outputs from Data Processes within the system or business area.

.5 Key Elements

The DFD uses a set of standard symbols for External Entities, Data Stores, Processes and Data Flows

External Entities

An external entity is a source or a destination of data. Represented as a labeled rectangle.



Data Store

Data store represents a location where data is not moving or transforming but is being stored passively for future use. Data stores are represented as a label between two parallel lines or a labeled rectangle with a square.

Data Store

Data Process

A data process is a process that transforms the data in some way, either combining the data, reordering the data, converting the data, filtering the data or other such activities. An asterisk within the process is used to identify data processes that have further decomposition models. Data Processes are represented as a labeled circle or a rectangle with curved corners. Standard labeling is to use a Verb-object structure.

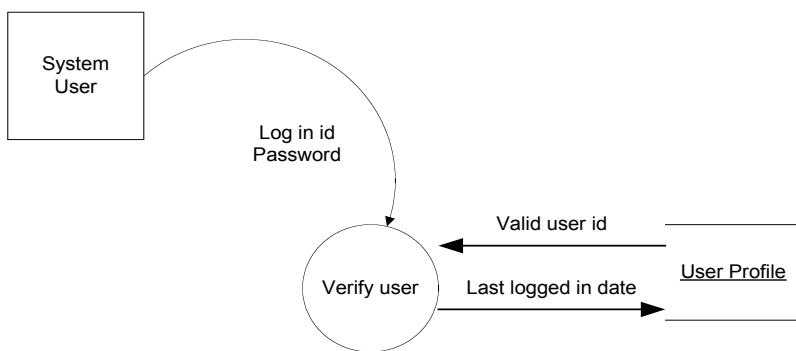


Data Flow

A Data flow identifies where Data is being moved between a Data Process and an External Entity, a Data Store or another Data Process. The label should be a noun phrase that identifies data being moved. Can be further specified into Result flows, Control flows and Update flows. Data Flows are represented by a single or forked line with an arrow. Lines must be labeled with a descriptor of the data being moved.



Example



.6 Usage Considerations

Data Flow Diagrams are used as part of a “structured analysis” approach. They are used to get an understanding of the range of data within the domain. They are typically used after a context diagram has been completed and as a prerequisite or concurrent activity to data modeling.

Strengths

May be used as a discovery technique for processes and data, or as a technique for verification of a Functional Decomposition and Entity Relationship Diagram that have already been completed.

Most users find these diagrams quite easy to understand

Generally considered a useful analysis deliverable to developers in a structured programming environment.

Weaknesses

May not be the most useful analysis deliverable to developers in an object-oriented environment.

.7 Complementary and Alternative Techniques

The Data Flow Diagram conveys similar information to that found in Activity Diagrams (5.13.1), Flowcharts (5.13.4), Workflow Diagrams (5.13.7) and Use Cases (5.14.3 and 5.14.4).

Sequence diagrams also look at messaging of data between entities.

5.13.3 Event Identification

.1 Purpose

The purpose of Event Identification is to facilitate the discovery of the processes of a system (either a business system or an automated system). There is no specific diagramming technique associated with Event Identification. The processes identified through the use of this technique are usually diagrammed by using a process modeling diagram such as a Data Flow Diagram (5.6.2.) or a Process Decomposition (5.6.5.).

.2 Description

Event Identification asks the question “what are the events to which the system must provide a response?”. Events may be of different types:

- External Events are those that are initiated by an entity that is external to the system, for example “Customer places an Order”
- Temporal Events are those that are initiated by the passage of time, for example “Month End”
- Internal Events are those that are initiated within the system, for example “Inventory falls below re-order level”.

When events have been identified, the next question asked is “What processes are required to provide a complete response to this event?”. The answers to this question identify the processes of the system. These processes may then be documented, and further analyzed, using an appropriate process modeling technique.

.3 Intended Audience

Event Identification is used by the Business Analyst to identify external triggers that begin processes of interest to the stakeholders in the solution. It is primarily used by stakeholders outside the project team.

.4 Process

Event Identification is usually completed by interviewing individuals who are familiar with the system that is being analyzed, and are familiar with the events/responses that

activate the system. Where the system being analyzed is a business area, then business area experts who are themselves responsible for responding to business events would be interviewed.

Through these interviews, the events, and the processes required to fully respond to them, are identified. Documentation of the processes would follow, usually in the form of a process model such as a Process Decomposition or Data Flow Diagram.

.5 Key Elements

.6 When to Use

Event Identification can be used as an initial approach to any type of process modeling where it is necessary to first identify what the processes are that make up the system or business area that is the focus of analysis.

In particular, it is useful when it is necessary to identify processes at a lower level more quickly than would be possible using top-down analysis.

The strengths of this technique are that:

- Business area experts usually find it easy to respond to this approach, because they find events and their responses easy to identify from their work responsibilities.
- This technique provides a quicker way than top-down process decomposition to discover lower level processes

However, the event identification approach does not provide as structured an approach to the analysis of complex processes as does top-down decomposition.

.7 Complementary and Alternative Techniques

Event Identification is a technique for identification and analysis of processes and it may be used in conjunction with other techniques. Other approaches to process analysis include top-down process decomposition, data flow diagramming, use case analysis and workflow modeling.

5.13.4

Flowchart

Flowcharts are a visual representation of the sequential flow and control logic of a set of related activities or actions.

Standard

Flowcharts are defined by the American National Standards Institute (X3.6 - 1970) and the International Standards Organization (ISO 5807 – 1985).

.1 Purpose

The purpose of a Flowchart is to graphically represent the flow of a sequence of activities, and the logic that controls the flow. It shows the dynamics, or behavior, of the sequence of activities represented in the diagram.

A Flowchart can be useful whenever it is necessary to communicate the details of a complex process.

.2 Description

A Flowchart is made up of a number of graphical symbols. These are described, and an example is shown, in the sub-section “Key Features” below.

.3 Intended Audience

A Flowchart may be used by a Business Analyst to communicate the details of a sequence of related activities to a business area expert or to a solution developer. The sequence of activities communicated by the diagram may document an existing process, or may represent an anticipated or recommended future process. The activities represented may be manual activities, or automated, or a combination of both.

.4 Process

Completion of a Flowchart is generally accomplished by:

- Deciding the boundaries (start and end points) of the set of activities to be modeled
- Determining details of the activities such as sequence dependencies, conditional logic, and (optionally) performance responsibilities
- Completing the diagram
- Preparing brief textual descriptions, if necessary to avoid misinterpretation, of the symbols shown in the diagram

.5 Key Features

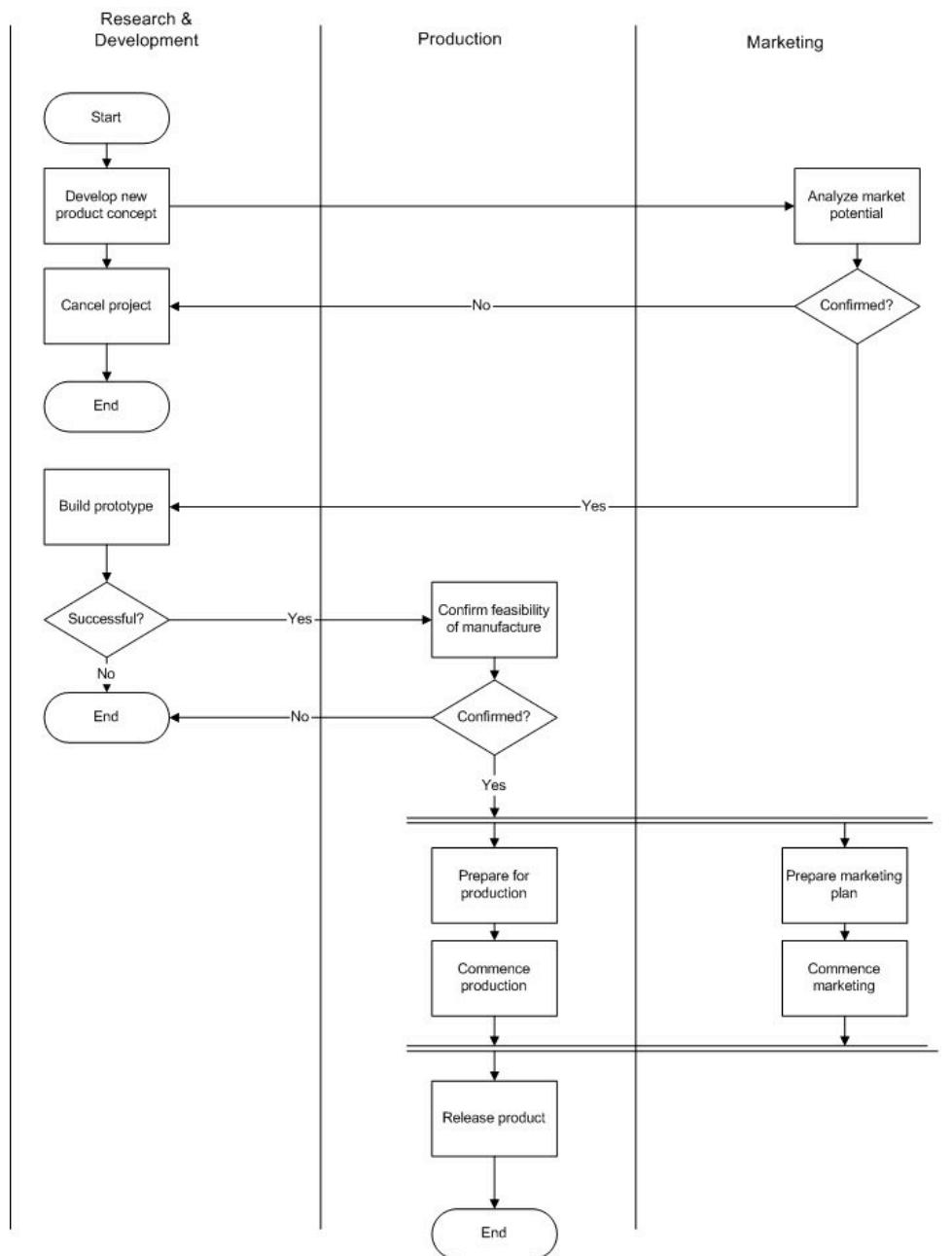
A Flowchart typically has the following components:

- Activities, represented by rectangles
- the sequential flow of activities, represented by an arrow-headed line
- the start point of the sequence, represented by a rounded rectangle
- The end point of the sequence, represented by a rounded rectangle

- branches, represented by a diamond, from one path to two or more mutually exclusive alternative paths
- merges, also represented by a diamond (or simply by converging flow lines), of independent flows into a single flow
- forks, represented by parallel bars, from a single flow into two or more parallel flows
- joins, also represented by parallel bars, of a number of independent parallel flows into a single flow

A number of other symbols representing, for example, documents, databases, storage and input/output media, etc. are also available but are less frequently used.

The major components are illustrated in the following diagram.



.6 Usage Considerations

Flowcharts can be used to:

- Analyze and describe complex Use Cases
- Analyze and document business workflows (current or future)
- Describe any complex sequence of activities, or complex algorithms
- Document activities together with responsibility for their completion

Strengths

- Ability to visually represent complex flows with multiple decision points and parallel flows
- Easy to develop and easily understood by most audiences

Weaknesses

- Does not explicitly support the concept of “swim-lanes” to identify responsibility for execution of a process.

.7 Complementary and Alternative Techniques

There are a number of other diagramming conventions that serve many of the same purposes as a standard Flowchart. These include:

- The IDEF3 diagram type developed by the U. S. Department of Defense
- Activity Diagrams (5.13.1)
- Workflow Models (5.6.8).

5.13.5 Sequence Diagram

.1 Purpose

Sequence diagrams are used to model the logic of usage scenarios, by showing the information passed between objects in the system through the execution of the scenario.

.2 Description

A sequence diagram shows how a use case scenario (5.14.3) is executed by the class model (5.12.2). The classes required to execute the scenario are displayed on the diagram, as are the messages they pass to one another (triggered by steps in the use case). The sequence diagram shows how objects used in the scenario interact but not how they are related to one another.

.3 Intended Audience

The sequence diagram is used by the Business Analyst to verify that Use Case Descriptions (5.14.3) and Class Models (5.12.2) are consistent with one another. They are used by developers during system implementation.

.4 Process

The Business Analyst identifies ...

.5 Key Features

The sequence diagram shows particular instances of each class (i.e. objects) with a lifeline beneath each object to indicate when the object is created and destroyed. The

earliest events in the scenario are depicted at the top of the lifeline, with later events shown further down. The sequence diagram only specifies the ordering of events and not the exact timing.

The sequence diagram shows the stimuli flowing between objects. The stimulus is a message and the arrival of the stimulus at the object is called an event. There are two types of objects:

- A passive object is active only while handling the event, and is shown with the box representing the active state existing only while it handles a message;
- An active object is active for its entire lifetime, and is shown with the box for the entire scenario.

A message is shown as an arrow pointing from the lifeline of the object sending the message to the lifeline of the object receiving it. Message control flow describes the types of messages sent between objects.

- **Procedural Flow** is usually indicated by a solid line with a filled arrowhead. An object can send only one procedural message at a time and control is transferred to the receiving object and the sender is blocked until a return (indicated by a dashed line and open arrowhead) is received.
- **Asynchronous Flow** (also known as a signal) is indicated by a solid line and an open arrowhead. The object after sending a signal may continue with its own processing which implies parallel processing. The object may send many signals simultaneously, but may only accept one signal at a time.

.6 Usage Considerations

The sequence diagram is most commonly used to validate the domain model in preparation for solution design. As such, it is likely to be produced by developers during the design of a solution for validation by a Business Analyst.

The sequence diagram may be used during analysis to validate the Class Diagrams against the Use Case Descriptions, or to show the timing of interactions between entities within the system scope.

.7 Complementary and Alternative Techniques

The sequence diagram can be used to model interactions with the user interface of a software system. In this case the messages on the diagram will represent interactions between the user of the application and various user interface elements. If the sequence diagram is used for this purpose the Business Analyst may not use a Class Model for the basis of the Sequence Diagram, as the relevant classes will be specified by the solution designers at a later date.

5.13.6 ***State Machine Diagram***

.1 Purpose

The State Machine Diagram is ...

.2 Description

A **state machine** specifies a sequence of states that an object goes through during its lifetime, in response to events, and also the responses that the given object makes to those events. The state machine has one or more possible states that a transitioned or triggered by a signal.

There are usually many state chart diagrams describing the many complexities of any software or system. It is possible to have composite states in a UML state machine. This is a way simplifying the complexity of the requirements by defining a sub-state with a state chart of its own.

.3 Intended Audience

.4 Process

As the Business Analyst further defines the requirements from the user's language into a more refined system requirement, it is necessary to also consider the business rules that may be directly applicable to such things as a state machine. There may be policy and legal implication to impose a specific state and transition. Again we see the emphasis on traceability from the element to the requirement, but also to the other related requirements (business rules) to ensure completeness of the model and the requirements management process.

.5 Key Features

The State Chart Diagram helps detail the life of the object using the following three main elements:

The possible states are depicted by boxes with round corners

The transitions that show how the object moves between states are depicted by a line with direction arrow.

The events that cause the transitions are the labels on the lines

.6 Usage Considerations

.7 Complementary and Alternative Techniques

5.13.7 Workflow Models

A workflow model is a visual representation of the flow of work in a business area. Workflow models are used to document how work processes are carried out, and to find opportunities for process improvement.

.1 Purpose

Workflow models are used to depict the sequential flow of a work process.

.2 Description

A workflow model represents:

- business activities,
- the sequential flow of these activities,
- the persons who perform the work,
- key business decisions that affect the flow of work, and
- the start and end points of the process flow.

In addition to the diagram, some textual information is also required to ensure that the diagram is useful and understandable. For example, each activity requires at least a meaningful description. Other information, such as process volumes (e.g. time, costs, resources), may also be collected.

.3 Intended Audience

Workflow models are used by analysts to develop and communicate their understanding of business workflows to business area experts.

They are also used to communicate details of current and recommended future business workflows to solution developers. A workflow model might be used to clarify a set of use case scenarios that has complex logic and many alternative paths.

.4 Process

Completion of a process model where the current and future states are both modeled generally proceeds as follows:

- Establish the scope of the process to be modeled by determining the event that triggers it, the customer(s) who benefit from it, and the specific result(s) it is intended to achieve

- Understand the current process, and its strengths, weaknesses, and problem areas. Develop an “AS IS” workflow model to describe the current process. Validate the model with business area experts.
- Identify opportunities for process improvement, and decide a process improvement strategy. Develop one or more “TO BE” workflow diagrams to describe recommended solutions.
- Present the recommendations to stakeholders for approval.

.5 Key Features

A workflow model typically has the following components:

Activities/Tasks: rounded rectangles show the individual steps or pieces of work that must be completed in order to execute the business process.

Sequential flows: arrows indicate the direction of the step by step sequence of the workflow.

Decision points: diamond shapes show forks where the flow of work proceeds in two or more mutually exclusive flows and, optionally, where separate flows merge together.

Parallel flows: solid bars indicate branch points where the flow of work proceeds in two or more parallel paths which subsequently join together again.

Swim-lanes: horizontal or vertical divisions indicate responsibility for performance of the activities.

Terminal: symbols indicating the start and end points of the flow.

.6 Usage Considerations

Workflow models can be used by a Business Analyst when it is necessary to define how and by whom business processes are carried out. This may be to:

- Develop and document an understanding of the current workflows in a business area.
- Identify opportunities for process improvement, and recommend alternative solutions.
- Understand and communicate complex business logic.
- Document business processes for user manuals and training documentation.

Strengths

- Ability to visually represent complex flows with multiple decision points and parallel flows
- Easy to develop and easily understood by most audiences
- Support the identification of problems and alternative solutions
- Can show a workflow across the enterprise, or within one functional area

Weaknesses

Multiple sets of diagramming conventions (ANSI/ISO, UML, IDEF3, BPMN etc.)

.7 Complementary and Alternative Techniques

Use Cases are sometimes used to document business processes, but these do not have the same capability for visual representation of sequence, control logic and parallel paths. A workflow diagram can be depicted using the traditional ANSI/ISO standard flowchart or with a UML Activity Diagram.

Variations

Other similar diagramming conventions exist but are less widely used. These include, for example, the IDEF3 standard and IBM's Line of Vision approach.

5.14 Technique: Usage Models

Usage models describe the interaction of a user with the solution. They describe how a person interacts with the solution to fulfill the requirements. They do not describe anything that exists within the solution scope unless that thing is visible to an external user, nor do they describe processing that is invisible to an outside observer.

5.14.1 **Prototyping**

.1 Purpose

A prototype is a simplified representation of the user interface of a proposed software application. They allow more realistic visual representation of user interaction with a system. This allows end users to better understand the software solution and to either provide confirmation that it supports their requirements or to provide feedback for improvement. A prototype may also be used to demonstrate technical feasibility.

Variants on Prototypes include:

- *Rapid prototyping*, which describes quickly developed codes to demonstrate functionality or feasibility of a complex feature or difficult interface or a portion of an untested integration. It is developed quickly, altered or replaced after design

feedback. The special problems of reliability, throughput and response time as well as system features are addressed in the best prototypes.

- *Throw-away prototyping*, see *rapid prototyping*.
- *Proof of concept*, see *rapid prototyping*.
- *Evolutionary prototyping*, which describes coding incremental functionality. This demonstrates a portion of the system to the end user for feedback that is incorporated in successive iterations in development. Code is retained in the final implementation.

.2 Description

A prototype is an iterative design technique that allows end users to view a working model and provide feedback that can be quickly incorporated to create a design more suitable for the user community.

.3 Intended Audience

Prototypes are requested by analysts to get agreement from project stakeholders on requirements that are hard to understand.

Prototypes may be used to obtain funding for development of the business solution.

.4 Process

The business analyst begins by identifying preliminary requirements that will be used to build the prototype.

The project team decides what project elements contribute to risk. Technical team members can advise on which features would be good candidates for prototyping. A prototype should be built only for the elements where the business analyst needs more insight from the stakeholders/users or to reduce the probability of failures found later in construction.

Areas of risk need to be prioritized. Prototypes address the highest risk, highest value to the end user first. Delivering what is easy only delays discovery of issues that may cause the project to fail.

Next align the choice of a prototyping process with the development life cycle. The use of throw-away prototyping is appropriate during an early feasibility assessment but is a poorer choice for an iterative development life cycle where code is desired to be used in the final production version.

Also align the choice of a prototype process with the available tool sets. Prototyping on unfamiliar tools contributes to project risk. Prototyping activities are coordinated with

the systems analyst data models to ensure that the prototyping results can be used in the project.

The prototype process is managed with a timeline, budget and exit criteria. The timeline must be realistic to develop, evaluate and document the prototype. The budget must allow for development of the model, recruiting end users, interviewing them while they are using the prototype and evaluating the users design feedback. The process must allow iterations needed to gain valid user feedback. The prototype must have predefined exit criteria goals. This may be either number of users, number of iterations or quality of feedback.

The business analyst walks an end user through a feature. The end user gives additional requirements based on their experience. The application running the prototype is then changed and the process is repeated with additional end users. This repetitive process continues until the exit criteria are met.

Finally, the business analyst updates functional and supplemental requirements based on the prototype.

.5 Key Features

There is no formal, universally accepted standard for prototypes. The level of detail required in a prototype and the coding standards used in build must be selected by the business analyst in conjunction with the project manager and in alignment with the development life cycle.

A customer facing prototype, no matter which type is built, must include the following:

- Shell. This is the application that contains the online screens. There is only enough programming of the core business processes to allow the prototype to go from screen to screen. The user should see a screen and enter some information. The logic will then go to the next screen or screens, passing whatever information made sense from the first screen. In fact, user input could be accepted but ignored, and all the screen values could just be hard-coded. The point is to provide a visual representation of the application, not the complex business logic that goes behind it.

Other elements may be required in specific methodologies or under specific circumstances. These may include:

- Documentation for development

.6 Usage Considerations

A prototype is an effective risk reduction technique when working with an unfamiliar business domain or which end users who needs are not understood. A tangible product is very helpful in validating requirements in these situations. It is also valuable where there

is a high amount of technical risk that can be reduced by demonstrating feasibility of a particular design alternative.

They are less effective for enhancement projects or when the domain and technical expertise is very high.

They do not eliminate the need to provide functional requirements.

They may not be the best technique to describe features as they may only describe a small portion of a user experience.

.7 Complementary and Alternative Techniques

Prototypes may be replaced by Storyboards (5.14.2) and User Interface Designs (5.14.5).

5.14.2 Storyboards/Screen Flows

.1 Purpose

Storyboards/Screen Flows do not involve working software code. They do provide an early mock-up of proposed business solution functionality. This collaboration with end users provides a low cost and quick design feedback for incorporation into improved requirements documentation. For the purpose of this discussion they will both be referred to as storyboards.

Variants on storyboards include:

- *Paper based prototyping*, which describes any paper-based simulation of an interface or system.
- *User experience storyboards*, which describes user interface processes and techniques needed to execute use case analysis models.

.2 Description

A storyboard provides a simple simulation of an interface or a use case using commonly available office tools, e.g., white board, markers, index cards, post-it™ notes, scissors, or transparency film. This is a low cost modeling technique that provides early design feedback from users and is quicker than providing a working, coded user interface prototype.

Tools used preparing storyboards may be software based, but the storyboard has no code behind it.

.3 Intended Audience

Storyboards descriptions are created by analysts to get agreement between project stakeholders on user interface issues. The purpose is to identify complex interfaces and determine early ways to improve usability. Early identification of usability issues reduces

project risk and increases user acceptance, user satisfaction and customer adoption of the proposed business process or solution.

.4 Process

The business analyst begins by identifying ambiguous project areas that require user involvement to clarify requirements. This involves creating the use cases if this has not been completed yet and having the customer prioritize the use cases or usage models that provide the most business value. Project do not have unlimited time to storyboard all interfaces, especially those that are common or known to the end user community.

The business analyst also identifies the key end user types or classes that will utilize the business process or solution. These user groups also are prioritized for participation in the storyboarding process.

Usability factors are identified that are the target of the study. This may be behavior needed, required sequence of tasks, user help, or end user ease of understanding navigational elements. Options are unlimited so documentation of the goal is required.

The project core team then creates a prototype of a use case or a specific portion of a use case or equivalent usage model. If this is high ambiguity about the requirements, several different choices could be created for storyboarding.

The team then requests individual users that represent the end user types to step through the prototype. A facilitator may guide a participant through the selections. A team member responds to user storyboard choices and presents the next selection that is made. This simulates a computer environment. Modifications can be made immediately to test different navigation paths, supply additional input fields, or change field names.

Notes or a video record are taken of the session. Issues and their severity and a list of suggested improvements are documented.

This process continues iteratively through multiple users from a user type or to provide coverage from all different user types. Again, different designs may be refined and tested to respond to new requirements and new insights about user behavior.

Finally, the analyst will document or update user requirements, usability supplemental requirements, requirements-related issues and risks.

.5 Key Features

There is no formal, universally accepted standard for storyboard descriptions. The level of detail required in a storyboard description and the format used in the documentation must be selected by the business analyst to match the specific needs of stakeholders and the project team.

A storyboard description, no matter what format is used, must include the following:

- Screen shot. This may represent a design element or a screen and can be sketched on a whiteboard or created on paper.

Other elements may be required in specific methodologies or under specific circumstances. These may include:

- Modeling standards or notation to comply with organizational standards, contractual or government regulations.

.6 Usage Considerations

The Business Analyst will develop storyboards to rapidly develop a description of the user interface for a proposed system without requiring the use of development resources.

Storyboards can bring a development team into contact with a business domain that they may not have experience or understanding. Because everyone on the team can work directly with end user feedback, they carry this collaborative team building experience back into the design and construction phase of the project for improved work product results.

Storyboards can be used initially during early planning to discover additional requirements. They are also used during any time in the project when additional information is required about user behavior.

They are less effective for making minor enhancements on products already released to the field where the business analyst and development team already have a strong business domain knowledge.

Storyboards are used where it is easy to simulate user behavior. It is used early in a project before a design or construction of code while it is still easier and less costly to make design changes.

Storyboards also encourage communication. Collaboration is increased among all team members as they work to create, support and interpret this activity. Discovery of requirements is increased by including end users in the development process.

Storyboards are a quick, inexpensive and iterative modeling method that can be used by team member and users alike. Evaluation of different options can occur quickly and without the process waste of rework when discovery is made later in the development process. This process is intuitive and easy to understand and doesn't require significant training or explanation to yield good results.

They do not eliminate the need to provide functional requirements.

They may not be the best technique to describe usability issues associated with data intensive systems or minor system enhancement requests. This doesn't provide a full, detailed or comprehensive design.

.7 Complementary and Alternative Techniques

Storyboards may be replaced by a user interface design (5.14.5).

5.14.3 Use Case Description

.1 Purpose

To describe how a person or system may interact with the solution to achieve a goal.

.2 Description

Use Case Descriptions are written as a series of steps performed by actors (q.v) or by the solution that enable an actor to achieve a goal. The primary or basic flow represents the simplest way to accomplish the goal of the use case. Special circumstances and exceptions that result in a failure to complete the goal of the use case are documented in alternate flows.

Standard

No formal standard exists for the use case description. This section describes elements common to most variants of the technique.

.3 Intended Audience

Use case descriptions are created to gain agreement between project stakeholders on what behavior they expect from the system. Use cases allow non-technical readers to understand the proposed functionality and therefore the scope of the project. Use cases can be used to identify technical or complex areas that require interface prototypes to reduce project risk. Use cases are reviewed by developers to assist in feasibility analysis. Use cases in many environments are the basis of test cases. Use cases can be used by technical writers to write help manuals and by trainers to create training manuals.

.4 Process

Inputs to this process include a set of user profiles (5.14.6) and a list of stakeholder goals (5.2.4.1). The balance of this process assumes a textual description of the use case. The business analyst first determines which stakeholders will interact directly with the solution in order to accomplish their goals, and which goals are interests that will be satisfied in other ways. The goals that will be satisfied directly through the system are candidates for expansion into a use case.

Once the Business Analyst has determined the Actor and the goal that will be satisfied through a successful execution of the use case, the basic flow of the use case must be defined.

Next, all possible exceptions or error conditions are identified. These conditions may include missing or incorrect information, alternative circumstances, or system failures.

Postconditions for successful and unsuccessful completions of the use case are documented.

.5 Key Features

The presentation and structure of a Use Case Description varies, as there is no universally accepted standard. The following are generally accepted as common elements of a Use Case Description:

Name

The use case must have a unique name within the project. The use case name should describe which goal the use case will satisfy. The Business Analyst may also assign a unique reference number for convenience.

Actor(s)

An actor is any person, system, or event external to the system under design that interacts with that system through a use case. Each actor must be given a unique name that represents the role they play in interactions with the system. This role does not necessarily correspond with a job title and should never be the name of an actual person. A particular user may fill the roles of multiple actors over time.

Caution: A temporal event is rarely modeled as an actor initiating a use case. The most common use of a temporal event as an actor is the use of a “Time” actor to trigger a use case that must be executed based on the calendar date (such as an end-of-month or end-of-year reconciliation of a system). Some authors recommend against this use.

Preconditions

A precondition is any fact that the solution can assume to be true when the use case begins. This may include textual statements, such as “user must be logged in” or “Item must exist in catalogue”, or the successful completion of other use cases.

Flow of Events.

Describes what the actor and the system do during the execution of the use case. Most use case descriptions will further break this down into a **basic flow** (representing the shortest successful path that accomplishes the goal of the primary actor) and a number of **alternate flows** that show more complex logic or error handling. If a circumstance still allows the actor to successfully achieve the goal of the use case, it is defined as an alternative. If the circumstance does not allow the actor to achieve their goal, the use case is considered unsuccessful and is terminated. This is defined as an exception.

Postconditions

Any fact that must be true when the use case is complete. The postconditions must be true for all possible flows through the use case. The Business Analyst may distinguish between postconditions that are true for successful and unsuccessful executions of the use case.

Extension Points

The use case should include any considerations that may arise from interactions with other use cases. These may also be described as includes and extends relationships which are not covered in this material.

Special Requirements

These represent any Supplemental Requirements (5.6) that cannot be expressed as part of the Use Case's flow, but nevertheless are relevant to its execution.

.6 Usage Considerations

The Business Analyst should use Goal Decomposition (5.2.4.1) before developing Use Cases, as each use case must satisfy a goal for one or more actors.

Use cases are good at clarifying scope and providing a high-level understanding of user behavioral goals , normal situations , alternatives or exception situations . They provide a graphical or textual listing that combines the who i.e., actor with the what i.e., behavioral requirements and the why i.e., use case goals.

They are the basis for other more detailed analysis types, user interface design and prototyping activities. Use cases share most of the characteristics of a process/flow model and may be used to describe dynamic characteristics of a solution—they have been placed with the usage models largely because they focus on the system from the perspective of an actor.

They are not the best technique to describe the functional requirements of a system that has very little interaction with an actor. They are less effective for data intensive projects that are better captured through requirements statements or decision matrixes.

.7 Complementary and Alternative Techniques

Use cases can be and often are used to describe business process flows. As a result, projects that define their requirements using use cases may not need to use an additional process/flow model.

Use cases may be replaced by a feature list (5.2.4.2), user stories (5.14.7) or textual requirements statement (5.5.4.1).

They are frequently used in conjunction with a *Use Case Diagram* (5.5.4). They are often supplemented with some or all of the following:

- Data and Behavior Models
- User Interface Design
- State Diagrams
- Activity Diagrams

- Sequence Diagrams

Variations

Variants on use cases include:

- *Business Use Cases*, which describe a business process in the format of a use case
- *Change Cases*, which outline expected future changes to a system
- *Misuse Cases*, which detail incorrect usages of the system (often used to describe security requirements).
- *Scenarios*, which represent one possible path from the initiation of a use case to its termination, passing through any number of alternate flows.

5.14.4 Use Case Diagram

.1 Purpose

Use Case diagrams present a graphical representation of the problem domain. They display the boundary of the solution, and shows how the actors interact with the use cases supported by that solution. It also can be used to display relationships between use cases and between actors. The Use Cases shown in the diagram must be fleshed out with Use Case Descriptions (5.14.3).

.2 Description

A use case diagram is a visual model of actors, a set of use cases and the relationships between these elements.

A Use Case is a group of related requirements that combine to bring value to an Actor. The Use Case is modeled as an Oval with the name of the use case within or below the oval. Each Use Case is given a unique name. The oval represents the complete Use Case, including the main flow and all alternative and exception flows.

Standard

The format and elements of the Use Case Diagram are defined as part of the UML standard maintained by the OMG. This description complies with version 2.0 of that standard.

.3 Intended Audience

The Use Case diagram is used by business analysts and the business stakeholders to agree on the scope of the project. It is used by all project stakeholders to get an understanding of the components of the problem space.

.4 Key Elements

Figure 5.8: Example Use Case Model

uu use case model

Actor

An actor is represented by a stick figure. Some methods use a different notation (typically a rectangle) to show that an actor is a system or an event.

Association

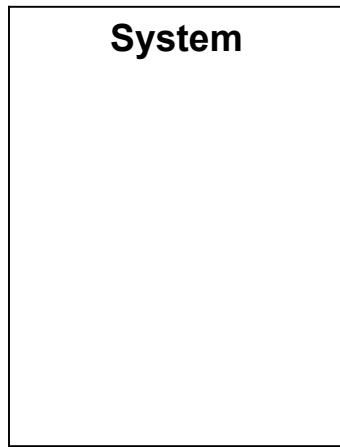
An association is shown as a solid or dotted line linking actors and/or use cases. Associations between actors and use cases are typically non-directional.

Two actors may also have a *generalization relationship* (represented as a line with a filled arrowhead at one end). The actor who the line originates from may also do everything that the actor touched by the arrowhead may do.

The relationships between actors and use cases, or between use cases, do not imply a process flow and should not be used to imply one. UML mandates that the *activity diagram* be used for that purpose.

Boundary

The boundary is represented as a rectangle and identifies the scope of the system, subsystem or business area being modeled. It is optional in a use case diagram. More than one boundary may be included in a use case diagram to indicate different phases of system development, packages of related functions, or other information that the analyst may seek to convey. The boundary is labeled either at the top or bottom of the rectangle.



Use Case

A Use Case is represented on a use case diagram as an oval.

Use Case to Use Case Associations

There are two associations that may exist between use cases:

Extend: allows for the insertion of additional behavior into a use case. The use case that is being extended must be completely functional in its own right. The extending use case does not need to be complete without reference to the base use case. An extension is functionally identical to an alternate flow, but is captured in a separate use case for convenience.

Include: allows for the base use case to make use of functionality present in another use case. The included use case does not need to be a complete use case in its own right, if it is not directly triggered by an actor. This relationship is most often used when some shared functionality is required by several use cases.

.5 Process

Business Analysts may begin the development of a Use Case Diagram by working from an existing agreed upon list of Actors and Use Cases and modeling them into a diagram, or analysts may use the diagram to initiate the discovery of Actors and Use Cases.

When an actor is identified, the analyst must then indicate which use case that actor will initiate (if any). Each Use Case must have one and only one initiating Actor. If two actors can initiate a use case, use a generalization relationship between the different actors. For example, if both a clerk and a supervisor can approve an application, but only a supervisor can delete an application, it would be modeled as follows:

Figure 5.9: Actor Inheritance

The analyst will then review each use case to identify other actors who communicate with the use case. The Use Case oval represents all scenarios for that use case, so if any of the alternative or exception scenarios involve other actors those relationships need to be identified.

If there are use cases identified with no actors, then either these use cases are not needed or an Actor is missing. If an actor does not interact with a use case the actor must either be removed from the use case diagram or further analysis should be performed to identify the use cases related to that actor.

.6 Usage Considerations

A Use Case diagram may be used whenever Use Cases are used as a method for documenting requirements on a project. It is used to provide an overview of the problem space and to get agreement on the scope of a project.

.7 Complementary and Alternative Techniques

The Use Case Diagram must always be supported by Use Case Descriptions (5.14.3) or User Stories (5.14.7) once analysis is complete.

If it is necessary to show how use cases interact in a process flow, the Activity Diagram (5.13.1) may be used.

Variations

A variant of the use case diagram is the Business Use Case Diagram. Business Use Cases extend this technique to describe the problem domain. A Business Use Case symbol has a diagonal line through the oval in order to differentiate it from the System Use Case.

Business Use Cases typically model the behavior of an organization from the perspective of its customers. This variant is not part of the UML standard.

5.14.5

User Interface Designs

.1 Purpose

User interface design focuses on early modeling of user interaction with specific system elements, e.g., screen or input field. This improves the future system usability by involving users early in the requirements process.

.2 Description

User interface design involves users in mocking-up user system interfaces. Early modeling is usually with paper, post-it™ notes index cards and white boards. A user interface design involves creating general ideas, not a detailed design implementation. The goal is too allow users to state their preference for navigating a specific element, how to achieve their goals, and how to accomplish their work. Effective user interface design does not concern the user with the implementation details of the system.

Standard

There is no formal, universally accepted prototyping or user design standard for a user interface design. Standards or guidelines may be defined for a particular operating system or environment—Windows, Apple OSX, and GNOME all have such guidelines.

.3 Intended Audience

A user interface design is created by analysts to gain agreement between project stakeholders on what are user's goals with an understanding of their system usage experience to better support their needs. Analysis can reveal different usage from different user classes. The customer or product champion will need to provide prioritization of different user classes to the project team.

.4 Process

The business analyst begins by identifying different user profiles (5.14.6).

The next step is to work with users to understand the usage of the part of the system they are responsible for. Business analysts facilitate a discussion of the usage of the system and begin to document items that the business process can contain.

Next, they discuss major elements that will be required in the business process. This involves capturing items that will be part of a navigation screen and move post-it™ notes around for logical grouping of ideas or tasks.

When discussion has been captured for higher level usage elements such as screens, drill down on smaller items to understand how users might interact, i.e., with an input field.

Finally, elicit user's opinions on what usability means to them. This analysis may not be captured in this model but provides additional documentation for user profiling or for supplemental requirements.

.5 Key Features

The level of detail required in a user interface design and the format used in the documentation must be selected by the business analyst to match the specific needs of stakeholders and the project team.

User interface design must consider the following:

- User profiles or user classes. This provides a documented understanding of the users that will interact with the system. This is consistent with the business case and charter documents and is driven by the stakeholder analysis.
- Elements for discussion. Provide a prioritized list of elements if they are not understood in an early analysis phase, represent risk to the project. These may include screens, sequences, or input elements. Do not get too detailed or implementation focused.
- Organization standards. Comply with organization standards so that design and development can use the output.

Other elements may be required in specific methodologies or under specific circumstances. These may include:

- Modeling standards or notation to comply with organizational standards, contractual or government regulations.

.6 When to Use

The user interface design technique is an effective method to document requirements for interface intensive systems, systems for unfamiliar user classes or for new markets.

They are less effective for enhancement projects where usage is understood or data intensive systems where system behavior is not a key factor of project success. They are also less effective for making architectural design choices or to make implementation coding decisions.

User interface design is good at focusing on system usage.

They do not eliminate the need to provide usability requirements.

They are not the best technique to describe system features so it is a tool best used in conjunction with another usage model that focuses on system features, e.g., user stories or use cases.

.7 Complementary and Alternative Techniques

User interface design may be replaced by Prototyping (5.14.1). It may be used in conjunction with Storyboards (5.14.2)

Variations

Variants on user interface designs include:

- *Dialog maps* which is a notation that models user interfaces.
- *Essential user interface design* that represents user interface requirements in a technology independent manner. This is also called an abstract prototype or paper prototype.
- *User Interface Design Style Guides*, which are graphical user interface (GUI) or operating specific (OS) specific standards or guidelines. If a project is required to comply with either external standards or internal organizational standards, these style guides are listed as references in business requirements document on a project and act as a design constraint.

5.14.6 User Profiles

.1 Purpose

User profile descriptions include identifying, studying and modeling current and future intended end users of the business solution. The goal is to propose business solutions that provide positive and effective user experiences or a reengineered business process that better supports end users of the proposed business solution.

Variants on user profiles include:

- *User task analysis*, which describes specific focus on a task rather than identification of unique user groups.

.2 Description

User profile descriptions are created by analysts to highlight differences in user groups that require different user interface solutions or use cases.

A user profile analysis gathers all known information about end users of the proposed business solution, and then breaks them into specific profiles for use in designing a product. This validates that a design will optimally work for each end user class of the intended audience.

.3 Intended Audience

User profiles are developed for consumption by the project team to ensure the correctness of other analysis products.

.4 Process

The business analyst begins by reviewing the stakeholder analysis completed by the project manager. The stakeholders that will interact with the proposed business solution are identified as user types. Additional review can be provided by subject matter experts or business domain experts to initially identify user groups.

The next step is to elicit additional user requirements from the identified users about their usage of a feature, screen or input field.

Finally, the analyst will document the results and incorporate the results or conclusions for improvements in user interface requirements in the business requirements document.

.5 Key Features

There is no formal, universally accepted standard for user profile descriptions. The level of detail required in a user profile description and the format used in the documentation must be selected by the business analyst to match the specific needs of stakeholders and the project team.

A user profile description, no matter what format is used, must include the following:

- User types. Each unique user class is identified with justification as to why they will receive a unique benefit. If a unique benefit or usage can not be determined, the user types are refined by combining the user types into a new set of logical user type groupings. User types are also referred to as user classes.
- User type attributes. Attributes are defined for each user type that provides unique differentiation. This may include demographics, system usage familiarity or usage, likes and attitudes.
- Elicitations. Interviews and other types of user observations are used to gain insight into user behavior on needs, interactions and proposed solution improvements.
- Revised user types. After the analysis is complete, the conclusions are validated by subject and business domain experts and the customer. The conclusions are then documented as a baselined document.

Other elements may be required in specific methodologies or under specific circumstances. These may include:

- User task analysis of existing system i.e., as is analysis
- Prototyping

.6 Usage Considerations

A user profile is an effective method to document requirements for an end user group for which the business analyst or the development groups may have limited familiarity or domain expertise.

They are less effective for explicitly stating user requirements.

User profiles are good at identifying user work flow and user task improvements. The analysis can directly translate into design of user interfaces.

They may not be the best technique to describe business requirements. This is also not useful for describing the complete scope of user requirements and so they augment other usage models.

.7 Complementary and Alternative Techniques

Variations

User Profiles may be replaced by Personas, User/Task Matrix, and User Analysis.

5.14.7 User Stories

.1 Purpose

User story descriptions capture high-level behavioral business system requirements. This represents a piece of functionality that is perceived as project progress by the customer. User stories are written by the user and create customer ownership of the requirements discovery process. This ownership is facilitated by a light set of requirements documentation.

.2 Description

A user story is a textual description, written by the customers, about things that the business system needs to accomplish.

.3 Intended Audience

User story descriptions are used by the project team to get agreement between project stakeholders on key features and to gain time estimates needed to accomplish the coding that feature. This facilitates communication between the project team and the customer on feature prioritization for each release cycle.

.4 Process

The Business Analyst begins by working with the customer to identify key features. The customer writes down their needs. Each of these needs becomes a story that can be tracked. Many user stories are captured on index cards. A user story should be implementable by the project team in a period of between one and three weeks.

When project team is ready to implement the User Story, the Business Analyst will need to elicit additional user task information, create additional models to understand how the user will accomplish the story and plan the development tasks needed to accomplish this unit of functionality.

.5 Key Features

There is no formal, universally accepted standard for user stories descriptions. The level of detail required in a user story description and the format used in the documentation must be selected by the developer to match the specific needs of stakeholders. The business domain experts write the user stories and therefore may require training in the process, benefits and their project role.

A user story description, no matter what format is used, must include the following:

- Story card. This is a written card, possibly an index card. Each user story has a unique story card. These cards are maintained as a record throughout the development process.
- Description. This provides a several sentence description of the problem to be solved. This is from the perspective of the user, and is written by the user. It is high-level and implementation and solution free. The only detail that needs to be included is information that reduces the risk of misunderstanding by developers that create the estimate.

The following requirements attributes should be included with the user story:

- Estimate. This provides information on development resources needed to code and successfully pass a customer acceptance test.
- Priority. This provides the user identified value that they place on having this feature. It can be updated as project requirements change or project environment changes.
- Unique identifier. This provides a tracking of the user story.

Other elements may be required in specific methodologies or under specific circumstances. These may include:

- Expanded Description: When developers are ready to code, they request additional information from the users. This may be documented as needed by the project team members.
- Constraints. This may be design, economic or operational limitations identified by the user or developer during the initial conversation.
- Business rules. This documents high-level business process constraints.

.6 When to Use

A user story is an effective method to document requirements for an iterative, incremental XP (extreme programming) development methodology that assumes that developers have close access to an end user or customer. This allows a highly interactive communication that precludes the need for extensive formal documentation.

They are less effective for a development methodology that doesn't accept deferment of detailed requirements development and documentation.

User stories create an environment of customer ownership of features and prioritizations in an incremental, iterative development environment. They defer investment of team resources to Just-in-time i.e., JIT when coding begins.

They may eliminate the need to provide functional requirements in some environments. This supports an oral culture whereas in other cultures, these spoken requirements are documented.

They may not be the best technique for some environments with regulatory or when an organization mandates documentation. This modeling technique may not be effective when participants are not co-located. This technique does not explicitly address how to document supplemental requirements.

.7 Complementary and Alternative Techniques

User stories may be replaced by other development methodologies:

- *Use cases*, which describes a listing of the actor and system interactions, alternatives paths and exceptions but user stories, are smaller than use cases.
- *Feature list*, which describes a prioritized list of customer requirements.

Variations

- *Themes or initiatives*: A larger size scenario comprised of user stories.

5.15 Issue and Task List

This section includes descriptions of work that needs to be done or issues that need to be resolved before the release of version 2.0 of the Body of Knowledge.

Section	Task/Issue	Other KAs	How Affected
All	Designing requirements for COTS systems—how best to incorporate when many aspects of the solution are constrained by existing solutions?	Planning and Management	Shapes requirements planning because some efforts not needed.
All	Business Process development—current draft emphasizes software solutions. Revise toward neutrality where possible, otherwise give both equal treatment.		

Section	Task/Issue	Other KAs	How Affected
	Should process improvement techniques (e.g. Six Sigma) be covered within the scope of the BA BoK? How about task analysis? Should there be specific treatment of compliance issues (Sarbanes-Oxley, PIPEDA) as a general class?		
All	Review content to ensure that it is methodology neutral. Definitions should be workable for waterfall and iterative approaches, as well as enhancements to existing systems.		
All	Stakeholders should reference a consistent list of the stakeholder types as defined in Requirements Planning and Management. All tasks should reference this list.		
All	Examples—should we have samples of each kind of requirements artifact? It has been suggested that a case study that shows examples from one problem domain across all tasks and techniques would be useful.		
All	Edit entire KA to make sure style, tone etc. are consistent.		
All	Create a standard template for describing the elements of a model diagram (that is, for the particular graphics used in the diagram) so that the various techniques are described consistently.		
5.1	Include an expanded rationale for the inclusion of this KA in the BoK and its importance to the BA.		
5.1	The problem model definition needs to be inserted as a task into the BoK. The concepts of problem and solution domain are also fundamental and may need to be moved into the introduction (as was the definition of a requirement).	Introduction Enterprise Analysis	This may go under Enterprise Analysis or be included in this KA. It is closer in purpose to the objectives of Enterprise Analysis but tends to use the techniques described in this KA, so it may be easier to talk about here.
5.1.1 5.1.4	Update the figure plus the text to reference specific sections in other KAs. Create additional diagrams to depict the process flows.		
5.1.3	Create diagram to show interrelationships between the tasks and techniques in this KA.		
5.1.5	The distinction between a project/software methodology and an analysis methodology is not sufficiently clear, based on the comments of several readers. The term methodology should probably be reserved for the former.		
5.2.4.3	Functional Decomposition is a useful analysis technique in Structured Analysis and should receive some further expansion, plus a link to DFDs.		
5.3	One of the goals for 2.0 should be to develop a metamodel for requirements techniques in order to improve the classification and description of the current set of techniques. That includes defining a set of common diagram types (for instance, both the ERD and class model show relationships between entities, etc.) and showing how those common elements are combined in each technique. The goal is to use these		

Section	Task/Issue	Other KAs	How Affected
	commonalities in structure to make it easier for BAs to pick up additional techniques.		
5.4.3	Expand CRUD Matrix to include other uses, such as validating which use cases update entities, etc.		
5.5.7	Revise workflow model to use the BPMN notation and describe basics of business process modeling.		
5.6.1 5.6.2 5.6.5	Under the current definition of the scope of this KA Prototyping does not belong here. UI Design covers the analysis part; Prototyping is a communication piece that presents a proposed user interface to end-users to gather feedback.	Requirements Communication	Falls under that KA as that KA is responsible for the presentation of the results of analysis to end users. Should discuss with BoK Committee as without the Documentation element I think the Communication KA is hard to conceptualize apart from Gathering and this KA.
5.6.7	User Profiles—modify description of this technique to cover the capturing of an actor list (for use cases) plus the usability stuff. Spell out the differences between the two.		
5.11	Need to determine appropriate coverage for the formatting and contents of requirements documents. The BoK cannot mandate specific documents that a BA should create or state the contents of those documents in more than general terms as that is the domain of a methodology (and the requirements documents are often domain-specific).		
???	Should there be a task for “triaging requirements” to determine which ones really are vital, and to package them for releases?	Requirements Planning and Management	Again, can fall within both KAs. Pick one.

5.16 References

The following sources were consulted during the development of this Knowledge Area. This list is not intended to represent an endorsement of the quality of the source material by the IIBA, and the lack of a reference to any source is not a negative comment.

Adelman, Sid; Moss, Larissa, and Abai, Majid. *Data Strategy*. Prentice Hall, 2005.

Ambler, Scott W. *The Object Primer: Agile Model-Driven Development with UML 2.0*, Third Edition. Cambridge University Press, 2004.

Armour, Frank, and Miller, Granville. *Advanced Use Case Modeling: Software Systems*. Addison-Wesley, 2001.

Baird, Jim; Little, A. Ross; LeBlanc, Valerie, and Molnar, Louis. *Business Requirements Analysis: Applied Best Practices, Fourth Edition*. The Information Architecture Group, 2001.

Bittner, Kurt, and Spence, Ian. *Use Case Modeling*. Addison-Wesley, 2002.

- Cockburn, Alistair. *Writing Effective Use Cases*. Addison-Wesley, 2000.
- Constantine, Larry, and Lockwood, Lucy. *Software for Use: A Practical Guide to the Models and Methods of Usage-Centered Design*. Addison-Wesley, 1999.
- Davis, Alan M. *201 Principles of Software Development*. McGraw-Hill, 1999.
- Eriksson, Hans-Erik, and Penker, Magnus. *Business Modeling With UML: Business Patterns at Work*. John Wiley & Sons, 2003.
- Fowler, Martin. *UML Distilled Third Edition: A Brief Guide to the Standard Object Modeling Language*. Addison-Wesley, 2003.
- Gottesdiener, Ellen. *The Software Requirements Memory Jogger*. GOAL/QPC, 2005.
- Halpin, Terry. “Business Rules and Object-Role Modeling”, *Database Programming and Design*, October 1996. Available at <http://www.orm.net/>.
- Harmon, Paul. *Business Process Change: A Manager’s Guide to Improving, Redesigning, and Automating Processes*. Morgan Kaufman Publishers, 2003.
- Hay, David C. *Requirements Analysis: From Business Views to Architecture*. Prentice Hall, 2003.
- IEEE Computer Society. *IEEE Std. 830-1998: IEEE Recommended Practice for Software Requirements Specifications*. Institute of Electrical and Electronics Engineers, 1998.
- IEEE Computer Society. *IEEE Std. 1233-1998: IEEE Guide for Developing System Requirements Specifications*. Institute of Electrical and Electronics Engineers, 1998.
- Jackson, Michael. *Software Requirements and Specifications: A Lexicon of Practices, Principles and Prejudices*. Addison-Wesley, 1995.
- Jacobson, Ivar, and Ng, Pan-wei. *Aspect-Oriented Software Development with Use Cases*. Addison-Wesley, 2004.
- Kovitz, Benjamin L. *Practical Software Requirements: A Manual of Content and Style*. Manning Publications Co., 1999.
- Larman, Craig. *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, Third Edition*. Prentice-Hall, 2004.
- McConnell, Steve. *Rapid Development*. Microsoft Press, 1996.

- Mooz, Hal, Forsberg, Kevin, and Cotterman, Howard. *Communicating Project Management, The Integrated Vocabulary of Project Management and Systems Engineering*, John Wiley and Sons, Inc., 2003
- Moss, Larissa T., and Atre, Shaktu. *Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications*. Addison Wesley, 2003.
- National Information Standards Organization. *Understanding Metadata*. NISO Press, 2004.
- Page-Jones, Meilir. *The Practical Guide to Structured Systems Design, Second Edition*. Yourdon Press, 1988.
- Paul, Debra, and Yeats, Donald, eds. *Business Analysis*. The British Computer Society, 2006.
- Project Management Institute. *A Guide to the Project Management Body of Knowledge, Third Edition*. PMI, 2004.
- Rational Software Corporation. *Rational Unified Process*. 1987-2001.
- Robertson, Suzanne and James. *Mastering the Requirements Process*. Addison-Wesley Inc., 1999.
- Rumbaugh, James, Jacobson, Ivar, and Booch, Grady. *The Unified Modeling Language Reference Manual, Second Edition*. Addison-Wesley, 2004.
- Sharp, Alec, and McDermott, Patrick. *Workflow Modeling: Tools for Process Improvement and Application Development*. Artech House, 2001.
- Sodhi, Jag and Sodhi, Prince, *Managing IT System Requirements*, Management Concepts, Inc. 2003
- Sommerville, Ian, and Sawyer, Pete. *Requirements Engineering: A Good Practice Guide*. John Wiley and Sons, 1997.
- Stevens, Richard; Brook, Peter; Jackson, Ken, and Arnold, Stuart, *System Engineering, Coping with Complexity*, Pearson Education, 1998
- Thayer, Richard H. and Dorfman, Merlin. *Software Requirements Engineering Second Edition*. IEEE Computer Society, 1997.
- United States Department of Justice, *The Department of Justice Systems Development Life Cycle Guidance Document*. <http://www.usdoj.gov/jmd/irm/lifecycle/table.htm>.

von Halle, Barbara. *Business Rules Applied: Building Better Systems Using the Business Rules Approach*. John Wiley & Sons, 2003.

Wiegers, Karl E., *Software Requirements, Second Edition*, Microsoft Press, 2003

Young, Ralph R., *Effective Requirements Practices*, Addison-Wesley, Inc. 2001

Chapter 6: Requirements Communication

6.1 Introduction

6.1.1 ***Knowledge area definition***

The Requirements Communication Knowledge Area is the collection of activities and considerations for expressing the output of the requirements analysis and documentation to a broad and diverse audience. Requirements communication is an ongoing, iterative activity that is done in parallel with Requirements Gathering and Requirements Analysis and Documentation. It includes presenting, communicating, verifying, and gaining approval of the requirements from the stakeholders and implementers of the project.

Communicating requirements is an important aspect of business analysis because the BA is working to bring the stakeholders to a common understanding of the requirements. Because the stakeholders represent people from different backgrounds and knowledge areas, this communication is essential. For example a business person from the payroll processing department and a developer from the IT group must have the same understanding of how employee pay amounts are to be calculated and distributed. To facilitate this communication the BA must consider when and where communications need to take place, what communication approach is appropriate in each situation, and how each communication should be presented.

6.1.2 ***Rationale for inclusion***

The rationale for including this knowledge area is that as requirements are gathered, analyzed and documented, they must be communicated to the interested stakeholders. An effective business analyst must be able to clearly present the requirements in a format and structure that is appropriate for its intended audience.

The business analyst acts as a liaison between the “customer” and the technology team. To effectively play this role, the business analyst must communicate the requirements to all stakeholders in a clear and concise manner.

6.1.3 ***Knowledge area tasks***

This knowledge area contains five main tasks that the business analyst may perform depending on the project needs.

- 6.2 Create a requirements communication plan
- 6.3 Manage requirements conflicts
- 6.4 Determine the appropriate requirements format
- 6.5 Create a requirements package

- 6.6 Conduct a requirements presentation
- 6.7 Conduct a formal requirements review
- 6.8 Obtain requirements signoff

6.1.4 Relationship to other knowledge areas

.1 Inputs

- Requirements document(s) from the Knowledge Area Requirements Analysis and Documentation
- Notes from requirements gathering sessions from the Knowledge Area Requirements Gathering
- Project stakeholder analysis from the Knowledge Area Requirements Planning and Management
- Communication plan from the Knowledge Area Requirements Planning and Management

.2 Outputs

- Amendments to requirements (going back to the Knowledge Area Requirements Analysis and Documentation)
- Outstanding requirements issues needing further gathering, analysis and documentation
- Project scope changes (going back to the Knowledge Area Requirements Planning and Management)
- Requirements package (used in the Knowledge Area Requirements Implementation)
- Signoff/approval of requirements

Note: all references to other knowledge areas within the BOK will be italicized.

6.2 Task: Create a requirements communication plan

6.2.1 Purpose

A requirements communications plan documents the intentions of a Business Analyst in terms of project communications about requirements. The BA documents and organizes how and when they will handle the requirements communication activities. It is developed to:

- The BA plans and estimates requirements communication needs
- The BA determines how he or she will communicate with each stakeholder on the project who will be involved with requirements
- The BA determines how best to receive requirements information from project stakeholders
- Provide a basis to set expectations for project meetings and other communications

6.2.2 *Description*

As soon as a BA is assigned to a project he or she should begin to plan the requirements work to be done. A significant part of that planning is the communications plan.

The requirements communication plan describes how and when the BA will work with project stakeholders. On small projects it may be very brief and may not be formally documented. On large and complex projects; and projects with many stakeholders, it may be included as part of the project initiation documentation and is essential as part of the overall project timeline.

6.2.3 *Predecessors*

- Stakeholder identification (from KA-Requirements Planning and Management)
- Initial project requirements and scope information
- Organizational standards and methodology

6.2.4 *Process and Elements*

To develop the requirements communications plan the BA should think about each deliverable in terms of:

- What needs to be communicated and what is the appropriate delivery method?
- Who is the appropriate audience?
- When the communication should occur?
- Additionally, the BA should be aware of the stakeholder needs and constraints for each communication deliverable in terms of:
 - Time available to commit to the project
 - Physical Location/time zone/communication approach for the stakeholder
 - Authority level (signoff authority or review only)

- What types of requirements will be elicited (business vs. functional, high level vs. detailed)
- How best to elicit requirements (see KA – Requirements Elicitation for options)
- How best to communicate requirements conclusions/packages

Example requirements communications plan:

There are many different ways of presenting the communication plan. The focus is on effective stakeholder communication. The larger the project with more stakeholders, the more formal the plan.

What	When	Who
Requirements Phase Kick-off Method: Formal presentation at business location	00/00/0000 (Prior to any formal requirements sessions)	All stakeholders Project Manager
User Survey Method: web survey tool	00/00/0000	Key users
Requirements Elicitation	00/00/0000 (could be one or many sessions depending on the size and scope of the project and requirements to be gathered)	John Doe Jane Smith (Key users and Subject Matter Experts)
Requirements Elicitation session #1 Method: JAD Session	00/00/0000	Facilitator John Doe Jane Smith Scribe (Key users and Subject Matter Experts)
Requirements Elicitation session #2 Method: Group Brainstorm	00/00/0000	Jane Smith John Doe (Key users and Subject Matter Experts)
Requirements Validation Method: Group presentation	00/00/0000 (could be one or many sessions depending on the size and scope of the project and requirements to be validated)	Jane Smith John Doe (Key users and Subject Matter Experts)
Requirements Sign-off Method: Email, voting button confirmation	00/00/0000	Project Manager Business Project Sponsor (Key users and others as necessary)

6.2.5 Stakeholders

All stakeholders should be considered when creating the requirements communication plan.

The BA is the chief communicator for everything about requirements on the project. The BA ideally will communicate directly with all project stakeholders or a representative of each. A representative should be used when a group of stakeholders is too large for

individual participation. For example: On a project for an insurance company with 5000 agents, a few agents may be selected to work on the project as representatives for all of the agents.

6.2.6 *Deliverables*

The Requirements Communications plan.

6.3 Task: Manage requirements conflicts

6.3.1 *Purpose*

To acknowledge, address and resolve any disagreements or conflicts that stakeholders may have for requirements.

6.3.2 *Description*

When requirements must serve more than one stakeholders' needs, there may be conflict in the expectations of each stakeholder from the requirements. Requirements themselves could also be in conflict, where different, but valid requirements from different stakeholders cannot be met by the same solution.

The Business Analysts' responsibility lies in ensuring the requirements meet the overall business needs for the project. If there is conflict, the BA may gather all parties together to resolve the conflict, or they may leave the resolution to the involved parties. Conflicts can be addressed by face to face meetings, interviews with other parties, or BA research.

It is important that all issues and conflicts about requirements are documented in a Requirements Issues log so that all impacted parties are able to see the same information.

6.3.3 *Predecessors*

The requirements that are in conflict

6.3.4 *Process and Elements*

When a conflict arises between stakeholders on one or more documented requirements, the first thing that needs to take place is to record the conflict in the Requirements Issues Log. This log can be a simple table structure to contain pertinent information, or it can be a more comprehensive document, depending on the organization and its' policies.

Once the issue has been documented, there will be communication between the stakeholders that are in conflict over the requirement to resolve the issue. Often, the BA can resolve the conflict through research or other communication without facilitating a formal stakeholder session.

Requirements conflicts must have an audit trail of the activity taken. The BA will coordinate the resolution of the conflict by organizing the meetings, documenting and distributing the results, and obtaining sign off for the resolution.

6.3.5 *Stakeholders*

Key stakeholders participate in the resolution of requirements conflicts. The project sponsor may also want to be included.

6.3.6 *Deliverables*

The agreed upon requirement.

6.4 *Task: Determine appropriate requirements format***6.4.1 *Purpose***

Requirements can be presented in various formats. This task describes the work required to decide which format(s) are appropriate for a particular project and its stakeholders. Requirements should be presented in formats that are understandable for the reviewer; they must be clear, concise, accurate, and at the appropriate level of detail.

Presenting requirements in the appropriate format is primarily the responsibility of the analyst. This is a critical business analysis task in order to obtain stakeholder understanding and approval of the requirements.

6.4.2 *Description*

Each requirement that has been gathered, analyzed, and documented must be presented to one or more project stakeholders for review, revision, and approval. To make the review process as efficient and effective as possible, the Business Analyst should present each requirement in an effective format to facilitate communication. This requires that the Business Analyst thoroughly understand each requirement and present it in accordance with each stakeholder's communication preference.

The Business Analyst needs to understand that more technical requirement formats may not be appropriate for a non-technical audience because the requirement may be either too technical, or may be documented in a diagram that is unfamiliar to the stakeholder, and therefore, difficult to understand. The Business Analyst must be able to ascertain the needs of the stakeholder audience and choose a presentation format that is appropriate to the audience. This may necessitate creation of multiple formats in order to convey the same requirement to varied stakeholders.

6.4.3 *Predecessors***.1 Stakeholder communication needs**

The Business Analyst must know who are the project stakeholders and understand their roles in the project.

See the *Knowledge Area Requirements Planning and Management, Task 3.3 Identify and Describe Stakeholders for stakeholder analysis*.

.2 Requirements format options

The Business Analyst will employ various tools to document requirements and make decisions on the most effective way of communicating the requirements. Depending on the type of requirement, the presentation technique may vary. Often, the project methodology will specify what tools will be used for documentation. The Business Analyst will work within these guidelines and select the best tool that will convey the requirement effectively. There will likely be a combination of many formats in one requirements document. Some examples of techniques employed are the following:

- Diagrams - Process Workflows, Entity Relationship and Process Decomposition diagrams, Use Cases
- Text - Textual templates
- Prototyping

In addition to formal requirements, BAs sometimes need to communicate in formats that are not requirements or that don't flow directly into project documentation. Some examples of these are:

- User manuals
- Presentation slides
- User stories
- The ultimate goal is to gain consensus with stakeholders about all solution components.

See the *Knowledge Area Requirements Analysis and Documentation* for a list of requirements documentation formats.

The best format choice is the one that best communicates the specific content of the requirement. Each organization may have standards that the Business Analyst will be required to follow, and the project team will utilize the techniques appropriate for their project. Usually, each organization also has an approved suite of tools that are used for documentation. MS Word, for example, is normally a standard employed for documenting text, and organizations may already have templates available in a library that the analyst can utilize. To create diagrams, such as an Entity Relationship diagram, organizations may have Erwin or MS Visio as standard tools. The Business Analyst should keep in mind that the tool used will drive the look and feel of the requirement, and this will affect how clearly the requirement is understood by each stakeholder.

6.4.4 ***Process and Elements***

.1 Identify Each Stakeholder's Presentation Requirements & Preferences

Each stakeholder who will review the requirements may have different communication needs. The Business Analyst must determine what the level of detail, language, and formatting is appropriate for each type of stakeholder and devise the best way to effectively convey information. The following are some sample considerations:

- Executive sponsors and management often want summaries and high level requirements. Their primary goal is to understand that the software will meet the return on investment expectations in accordance with their business plan.
- Stakeholders in the customer/business area need requirements that are written in business language, and simple to understand and review. They must fully understand each requirement in detail, since it is this group that will be most affected by the solution implemented.
- Implementers of requirements will need very detailed descriptions of what success criteria for the new procedures and processes must be met.
- Technical designers and developers will need to understand all the business requirements, but will need very detailed information on the functional, user interface and technical requirements in order to build the solution.
- Quality assurance analysts will need to understand what business benefits the software must produce so that they can develop a detailed testing strategy to ensure that the system is not just built right, but that the right solution is built to meet the expectations of the end business user.
- External suppliers will need detailed technical interface requirements to order to construct the proper network and security protocols in accordance with corporate policies.
- Verbage is best for specifying specific information like project objectives, assumptions and business risks. Diagrams and models are useful for showing relationships between requirements components.

.2 Assess presentation format options for each stakeholder

When assessing the stakeholders that will need to review the requirements, the Business Analyst will consider which format option is the most appropriate communication vehicle for the group. This assessment will take into consideration the level of formality that is needed.

Requirements documentation will be more formal under the following circumstances:

- The project is very large and may be delivered in phases

- The business area(s) involved are very complex
- The technology employed is new
- The project is considered to be mission critical
- The executive sponsor requires formality
- The requirements are likely to be subject to regulatory review
- The requirements will be presented to an outside organization and an RFQ/RFP will be issued

The Business Analyst must present requirements in a format that supports the project methodology and ensure that the stakeholders will review, understand, and approve them. Working within the framework of these guidelines, the Business Analyst will decide the appropriate communication vehicle and level of formality to employ for each stakeholder that will review the requirements.

In addition, the Business Analyst should keep in mind that while there are advantages to constructing different presentation formats depending on the unique needs of each stakeholder, and wanting to consider the desires of the audience regarding communications, there are also disadvantages that result with maintaining multiple requirements packages. The Business Analyst should develop a check list that will help determine what communication vehicle to use and content that needs to be included. The analyst should always keep in mind that the primary goal of the requirements document is to convey information clearly and in an understandable fashion to the audience that must review the content. To help decide how to present requirements, the analyst should ask the following types of questions:

- How detailed do the requirements need to be?
- What information is important to communicate? What is the appropriate level of detail to include?
- What will the particular stakeholder understand based on the type of audience they represent and on that stakeholder's preferred style of communication or learning (e.g., technical vs. business owner, executive sponsor)
- Is each requirement a true business requirement, or is it an implementation/technology constraint? Is the requirement appropriate for the type of audience that needs to review it?
- How does the requirement support the previous and subsequent phases (i.e. testing, construction) or project activities and deliverables to facilitate traceability?

Although there is no right answer to each of these questions, the Business Analyst must be able to make these decisions, and the analyst should provide a list of questions and issues to help guide these decisions.

In addition, when developing multiple presentation formats, the analyst must carefully consider the downside of providing different requirements packages to different audiences, and be prepared to maintain versions that ensure the information is conveyed consistently. Managing various formats requires work, and the analyst must be flexible and organized in order to support this as a viable solution... If the analyst cannot keep multiple versions synchronized, or if the requirements are conveyed inconsistently or conflict in the various presentation packages, this may result in the following issues:

- The message will be perceived differently by different audiences, and perhaps, incorrectly.
- This may mislead the stakeholders.
- This will confuse the stakeholders.
- Ambiguity can result in the wrong solution being built.

.3 Determine the formality of requirements

There is a spectrum of the formality in which requirements may be documented and presented. A requirement may be presented very formally or very informally. A formal presentation example would be use of a standard, structured model like an entity relationship diagram, including all of the associated diagrams, supporting text, detailed attributes, and revision information. A requirement may be presented informally in an e-mail message, a note, or even verbally. The Business Analyst should assess the project requirements and determine the level of formality appropriate for each requirement. Generally:

- The larger the project, the more formal the requirements should be. This is because more stakeholders are typically involved and more communication is required.
- The more formal the requirement, the more time that will be required to prepare the presentation.
- The less formal the requirement the more risk that it will be misunderstood and/or misinterpreted.

.4 Select appropriate presentation format for each audience

The Business Analyst when selecting the appropriate presentation format for an audience must also make sure that there is differentiation between what is a “work product” versus

what is considered to be the final “deliverable”. Not every document that the Business Analyst produces is appropriate to communicate to the stakeholders.

A “work product” is a document or collection of notes or diagrams that is used by the Business Analyst to organize and analyze the requirements. The work product may or may not become a deliverable, although during different phases of the requirements gathering process, the Business Analyst may need to share this information with stakeholders in order to clarify requirements or drive down to more detail. Examples of work products might be:

- Meeting agendas and minutes
- Interview questions and notes
- Facilitation session agendas and notes
- Issues log
- Work plan, status reports
- Presentation slides used during the project
- Trace-ability matrices

A “deliverable” is a document that is required by the project methodology showing the work that has been completed on the project. A requirement deliverable is used in subsequent phases of the project to implement the solution. Not every note and document that a Business Analyst creates is necessary to be included in a formal requirements package for review and signoff. The Business Analyst must understand the difference between these two concepts and use the “deliverables” as communication mechanisms. The Business Analyst will assess the needs of the audience, determine the level of detail that needs to be communicated, and ascertain which deliverables to include in each presentation package.

6.4.5

Stakeholders

The Business Analyst must clearly understand the variances in the audiences that will review the requirements, and realize that different audiences often require different requirements presentation formats.

For example, the following are potential audience/stakeholders that the Business Analyst will need to consider:

- Executive sponsor of the project

- Business representative of each affected business area specifically involved during requirements gathering
- Technology solution providers
- Quality assurance area
- Security personnel
- Governing agencies/bodies
- Outside customers/suppliers

6.4.6 *Deliverables*

The result of this task is an appropriate format(s) for presenting requirements to stakeholders.

6.5 Task: Create a requirements package

6.5.1 *Purpose*

This section covers the considerations that must be addressed when devising a plan for successfully creating a requirements package.

6.5.2 *Description*

Business analysis work results in many deliverables. The deliverables must be “packaged” into a comprehensive requirements document for presentation to the stakeholders.

Documenting requirements is a complex process, and communicating the requirements correctly to stakeholders is a key success factor which can be facilitated by packaging the requirements effectively.

Misunderstanding of requirements will have a negative impact downstream on project implementation. It leads to re-work and cost overruns, particularly if deficiencies are uncovered late in the process during the development or user acceptance testing phases of the project.

There are various points in the Requirements phase where a requirements package may be created and presented, not just at phase end.

6.5.3 *Predecessors*

The documents contained in a requirements package will vary, depending on the project and the type of requirements that were gathered. See the Knowledge Area *Requirements Analysis and Documentation* for deliverables.

Requirements may be “packaged” at any point in a project. Whenever requirements are being presented to stakeholders, packaging them into a cohesive package will make them easier to review.

If the package is created at the end of the requirements phase, the requirements documentation must be complete in order to prepare the formal requirements package. The requirements package is used in the formal review of the requirements, which will result in the sign off of the requirements.

If the package is being created at some other point within the requirements phase, subsets of the requirements may be all that is required.

6.5.4 *Process and Elements*

Creating a requirements package should encompass the following tasks:

.1 Determine which components of the overall comprehensive requirements document should be grouped together

At this point in the process, the business analyst will consider the best way to combine and present the materials, so that they convey a cohesive, effective message to one or more audiences that will participate in the requirements review process. This may result in more than one requirements package being created for the same project.

.2 Assess the audience to whom the requirements will be presented

Different audiences may necessitate various forms of presentations. This task will identify the needs of the stakeholders and reviewers, and determine the most effective package for each group.

.3 Evaluate the documentation required based on the type of project

There are many factors about a specific project that will determine what components are included in a requirements package. Samples of variables to be considered are:

- The size and scope of the project
- Whether requirements are for an internal project or for an external vendor
- The type of project (i.e. application development vs. software version upgrade)

Each project may necessitate a different format or style of requirements package and there are numerous methods to categorize and document the requirements effectively [See the Knowledge Area Requirements Analysis & Documentation.] A good requirements package will include all or a portion of the overall project requirements, such as project scope, as well as business, functional and technical requirements. It may contain text, diagrams and graphics, or combinations of different formats.

Overall, the Business Analyst must become adept in building an effective requirements package in order to ensure that the requirements are complete, understandable, and can be clearly conveyed to the intended audience.

.4 Package the requirements for presentation

Each requirements package should have a Table of Contents outlining what is included in the package. Grouping of the requirements into categories should be clearly identified in the Table of Contents for ease of navigation.

It is essential that the Business Analyst recognize that careful consideration must be given to what types of information should be included in a formal requirements package, and that the content may vary among different projects. Some key factors to help guide the analyst's decision will be the type of project, and also the individual needs of the audience that will have review and sign off responsibility for the project.

The Business Analyst should consider:

- (1) The size and scope of the project.

Different projects will necessitate different deliverables, and the extent of documentation that is needed in the final package will vary depending on the project. Some examples are:

- A new, customized in-house software development project. In this scenario, all requirements may need to be included.
- Upgrading the technology or infrastructure of a current system. In this scenario, only the technical requirements may need to be included in the package.
- Change in a business process or new data for an existing application. In this scenario, the process and data requirements, business rules, functional and technical requirements will be needed.
- Purchase of a software package. This type of project will likely require an Request For Proposal, and the package will need to include the business requirements, technical requirements, limited functional requirements and other vendor specifications.

- (2) The varied interests of the audience.

The audience must clearly understand the requirements that the Business Analyst has documented, and it is the responsibility of the analyst to ensure that the requirements are conveyed correctly by bundling them effectively for presentation. The Business Analyst must adequately understand the communication needs of the audience, since it is often how the message is conveyed and not the message itself that results in miscommunication

and comprehension failure. Even though the requirements may be thoroughly documented, the inability to convey them accurately to the audience will put the overall project implementation at risk.

The following factors should be considered:

- i. Assessing the needs of the audience and realizing that different stakeholders may require a different communication strategies. The Business Analyst should try where possible to minimize creating and maintaining multiple versions of a requirements document that may be difficult to synchronize going forward. Creation of multiple versions may be unavoidable, but the Business Analyst should try to identify which components of the overall documentation should be the focus for each recipient of the information, and then determine how to present the right level of detail to that audience so that the message is accurately conveyed.
- ii. Categorizing the audience into groups. The following typical group classifications should be considered, but the needs of each project will differ depending on the participants:
 - Executive Business Sponsors. This group will require an executive summary level of detail. The project scope may suffice, including the ROI (Return on Investment) assessment, business benefits, project cost and target implementation date(s). Requirements sign off may be provided at this level.
 - Subject Matter Experts. This group will be primarily concerned how operational processes are affected by the implementation of the project, and will be interested in ensuring that the requirements they provided to the Business Analyst during the Requirements Gathering phase are achieved. The subject matter experts will need to understand the user interface requirements, the workflows, and the data and quality requirements.
 - Quality Assurance Analysts. This group will focus on understanding the critical success factors of the project based on the needs of the business users, and they must obtain a thorough understanding of the functional requirements and systems use cases in order to build an effective testing strategy. This group is concerned that the quality expectations of the business users are met.
 - Outside customers/suppliers. This group will be concerned with the technical requirements, primarily the interfaces, security requirements and any documented technical constraints.
 - Security, legal and audit representatives. This group will ensure that the corporate standards are met regarding security, legal and audit requirements.

- Technical solution providers. This is the technical group that will build the system. They will need to obtain an understanding of the overall requirements for the project, and will focus on the functional specifications and technical requirements, based on which they will design the solution.
- External Vendors. Depending on the project and the vendor, the Business Analyst may participate in, or be responsible for, the RFI (Request For Information), the RFQ (Request for Quote) or the RFP (Request for Proposal)

The above are only examples of disparate audience considerations that the Business Analyst must address when determining how to package requirements effectively for review and sign off. To create an effective requirements package, the analyst needs to understand the primary concerns of each group, then determine what message must be conveyed to them. The Business Analyst can employ different strategies, such as creating a presentation that highlights the primary area of concern for each group, and couple this deck with the requirements package. The presentation can help focus attention on the area that the stakeholder is primarily concerned with understanding, and help ensure that the stakeholder is fully focused on the requirements that will bring them the return on investment they are expecting to achieve.

6.5.5 Stakeholders

In preparing a Requirements package for presentation, the Business Analyst may seek assistance in confirming the package is appropriate for the intended audiences, prior to distribution of the package. This is not to be confused with the stakeholders defined as part of the Project Charter. Examples are:

- The Project Manager
- Other Business Analysts
- Counterpart at a vendor

6.5.6 Deliverables

The result of this task is a formal requirements presentation (document) or package of requirements ready to be reviewed by stakeholders. A package may contain all of the project requirements or may be broken into several sub-packages. A package should also contain a table of contents for ease of use and a revision log to document changes along with any supporting associated documentation. A package of requirements will be reviewed, revised, and approved by project stakeholders.

6.6 Task: Conduct a requirements presentation

6.6.1 Purpose

The Business Analyst may conduct one or more presentations throughout the project phases. Before making any presentations of requirements to an audience the Business Analyst must first understand the objective of the presentation and the intended audience.

The objective of the presentation may be:

- to review, prioritize or to communicate status
- to ensure quality or enhance clarity
- to obtain stakeholder buy-in and sign off

6.6.2 Description

Presentations may be informal or formal. The Business Analyst should consult with the Project Manager to ensure that the reason for the presentation is clearly understood.

These are some examples of requirements deliverables that may be the subject of a presentation. [See the Knowledge Area *Requirements Analysis & Documentation* for a detailed discussion of documentation formats.]:

- Business requirements
- Functional requirements
- Data and behavior models
- Process/ flow models
- Other ‘diagrammatic model’

6.6.3 Predecessors

The project communication plan should outline formal and informal presentation needs. [See the Knowledge Area *Requirements Planning and Management*.] The Business Analyst may plan presentations at the beginning of a project or may determine ad-hoc needs throughout the project. Alternatively, the Project Manager or stakeholders may request presentations to facilitate communication or consensus.

6.6.4 Process and Elements

The BA must determine an appropriate format of the presentation. The formality of the presentation is driven by the objective of the communication and the audience needs. For example the Business Analyst may be required to present key points using a formal

presentation (i.e. presentation slides.) This may be necessary to present to senior business users who are not actively involved in the detail of the project but need to understand requirements at a higher level.

.1 Formal presentation

A formal presentation is used:

- to ensure that internal project quality standards have been adhered to
- to ensure cross-functional fit with other business process areas within the same project
- to obtain business acceptance and sign-off
- to obtain delivery team sign-off
- to obtain testing team sign-off
- as a precursor to delivery i.e. to start to examine solution options with a delivery team
- to prioritize a set of requirements before proceeding to next project stage
- as a de-scoping/project review exercise

Alternatively, the presentation may consist of the Business Analyst walking through his/her requirements document while other parties follow the document in an informal presentation.

.2 Informal presentation

An informal presentation is used:

- as informal status check of requirements (e.g. completeness, correctness, impact on other areas)
- to communicate requirements to the delivery team or testing team to ensure there is no ambiguity
- to communicate requirements to affected business areas (those not having sign-off authority but where knowledge of changes is required)
- to communicate requirements to other project teams e.g. training, communication.
- as a facilitation exercise to enhance requirement clarity (e.g. by bringing business users and technical teams together, a common understanding can be reached on

the relevance/importance of individual requirements as well as the feasibility of delivering individual requirements).

Where the objective of the presentation is a formal review or inspection, further information is detailed in section 6.5 “Conduct a formal requirements review”.

Whether formal or informal, the Business Analyst should ensure that the presentation has a structure consisting of the following:

- Introduction of parties attending presentation
- Statement of presentation objectives
- Project background
- Presentation/review of deliverable
- Agreement of actions/changes required
- Review of deliverable status (e.g. signed off, not signed off, etc.)

6.6.5 Stakeholders

- The Project Manager
- The business owners and subject matter experts
- Development, delivery and testing teams

6.6.6 Deliverables

The objectives of the presentation should be stated and agreed at the start of the presentation.

The outputs from the presentation are likely to include the following (depending on the purpose of the presentation):

- List of agreed amendments (possibly containing de-scoped requirements)
- List of actions for Business Analyst
- Actions for business users requiring clarification
- Delivery team actions (e.g. clarify feasibility of delivering a particular requirement)
- Agreement as to whether the objectives of the presentation were met (and could be one of the following)

- Requirements approval
- Requirements approval with minor amendments
- Requirements not accepted/ not approved
- List of unresolved issues with associated assumptions

6.7 Task: Conduct a formal requirements review

6.7.1 Purpose

The purpose of a formal requirements review is to have project stakeholders verify the accuracy of the requirements. A requirements review may be conducted at any time during the project. Typically reviews are an iterative activity beginning with BA peer reviews during the requirements development and becoming more formal over time. The audience for the reviews expands to include project stakeholders and ultimately the review process will lead to approval of the requirements by all of the stakeholders.

The purpose of the review should be clearly stated and may encompass any of the following:

- completeness of requirements (all requirements have been captured)
- removal of superfluous requirements
- clarity of requirements (removal of ambiguity)
- correctness of requirements (the requirement reflects the business need or business rule)
- scope (the requirement fits within the stated scope of the project)
- conformance to project/organizational quality standards
- feasibility of requirements
- prioritization of requirements

6.7.2 Description

A formal requirements review is a working group session where invited participants meet after reviewing the requirements on their own. During the working session, the requirements are reviewed and discussed by the group, each participant expressing his or her questions, comments and suggestions. As this feedback is discussed the group may also notice other issues with the clarity or completeness of the document. All questions,

comments, concerns, and suggestions are recorded. If the group can agree on a particular change, that change is recorded. After the session the author of the document performs additional requirements gathering, analysis and documentation and makes the appropriate changes. Significant changes often necessitate a second review.

Reviews are also referred to by other names such as walkthroughs or inspections.

6.7.3 Predecessors

To conduct a formal requirements review the business analyst must have:

- A complete requirements document
- A list of appropriate reviewers
- A meeting vehicle
- Facilitation skills

A complete requirements document: At least one of the technique specific requirements models (or deliverables) described in the Knowledge Area *Requirements Analysis and Documentation* must be complete to schedule a formal review. The review may cover only one requirement document, several related documents, or an entire requirements package.

A list of appropriate reviewers: Reviewers may be project stakeholders, other business analysts, or other resources with specific expertise in the type of requirement being reviewed. Appropriate reviewers will include:

- Knowledgeable representatives of stakeholders who contributed to the requirements
- Knowledgeable representatives of stakeholders who will use the requirements in development of the solution

Reviewers representing the project's customers must be approved by the customer's management and be authorized to make decisions as the customer's representative.

A meeting vehicle: A formal review may be held in a conference room with all participants present or it may be held using a technical facility allowing participants in remote locations to participate (i.e. videoconference, internet meeting ware).

Facilitation skills: See the BA Fundamentals for a description of facilitation skills.

6.7.4

Process and Elements

A formal requirements review involves a very structured process and has key elements (roles).

The process of conducting a formal requirements review consists of the following steps:

- Prepare the document(s) to be reviewed
- Organize and schedule the review
- Determine participants
- Secure a location/facility
- Deliver document(s) to participants
- Conduct the review
- Compile notes and results of the review
- Re-review if necessary.

.1 Prepare the document(s) to be reviewed

The requirements document should be complete and presented with any appropriate legend and supporting documentation so that reviewers can perform a thorough review.

.2 Organize and Schedule Review.

The Business Analyst must ensure that sufficient notice is given prior to the review. This will be determined by the deliverable under review and should be agreed with the Project Manager.

The document to be reviewed should be issued to all review parties prior to the review meeting to allow sufficient time for each reviewer to familiarize themselves with the document. The attendees of the review should be agreed by the Project Manager and as a minimum will include the stated signatories for the deliverable.

The Business Analyst must understand the structured, formal nature of a formal review session.

- Determine appropriate reviewers
- Tell reviewers what they should be looking for
- Schedule review time
- Conduct review

- Record changes/suggestions
- Update requirements

Reviewers should understand that the purpose of the review is to find and remove faults.

.3 Conduct the Review

The Business Analyst should ensure that the review has a structure consisting of the following:

- Introduction of parties attending presentation
- Statement of purpose of the reviewed deliverable
- Statement of review objectives
- Project background (if required for external parties)
- Formal walkthrough/review of deliverable
- Agreement of actions/changes required
- Review of deliverable status (e.g. signed-off, not signed off, etc.)

.4 Compile notes and results of the review

The BA is responsible for making sure that all participant comments are recorded and considered for revisions to the requirements document.

At the end of the review, it should be agreed whether:

There are quality improvements that can be made to the requirements document

The requirements document is not acceptable in its current form

Additional reviewers are required to comment on or approve the requirements document

.5 Re-review if Necessary

A decision will also be made as to whether another formal review/inspection is required if the deliverable has not been accepted.

Roles involved in a formal requirements review

The following roles are often involved in a formal requirements review.

Role name	Played by	Description
Author	Author of the requirements document, typically the BA. This role is mandatory. A review should not be conducted without the	Answers questions about the document, listens to suggestions, comments. Incorporates changes into the document

	presence of the author.	after the review session.
Recorder	This role may be played by any project team member who is familiar with the project. This role may be played by the author.	Person who documents all suggestions, comments, issues, concerns, outstanding questions that are raised during the review.
Moderator	A neutral facilitator. Often is played by a BA or a QA analyst. This role is mandatory. It is best if the author of the document is not the moderator although resource constraints often necessitate this situation.	Facilitates the working session, keeping participants focused each section of the requirements document as it is discussed. Verifies that all participants have reviewed the document before the session begins. Ensures that all participants are participating in the review.
Peer of the author	This is another BA who has experience preparing similar requirements documents.	The peer reviews the document for its adherence to good requirements documentation standards.
Other reviewers	Any person with interest in the project. See stakeholders section below.	Reviews the document prior to the working session. Presents questions, comments, suggested changes and discusses them with the group.

Rules to be followed during the review

There are several rules that should be followed when conducting a requirements review. The moderator is responsible for making sure that all participants adhere to the rules.

- Supervisors (especially of the author) should not attend the review
- Reviewers must review and comment on the content, not on the author
- Participants must review the document before the formal session

6.7.5 Stakeholders

The business analyst must determine the appropriate project stakeholders to participate in a formal review.

A few examples are provided below:

Stakeholder	Requirement being reviewed	Rationale for participation
IT architect	Logical data model (presented in an Entity relationship diagram)	The technical architect will be using the logical business requirements to build a solution data structure and as such must understand the business needs for the data. He or she will also be able to ask key questions about the data structure and help to find any missing pieces.
Executive Sponsor	Project statement of purpose and objectives	The executive sponsor is responsible for funding the project and as such must approve of the project purpose and objectives. He or she will have questions about the stated purpose to assure that his or her needs will be met.
Business area manager (SME)	Process decomposition diagram	A business area manager understands the business area from a high level and is able to review process descriptions and hierarchy to verify that the business analyst has accurately captured the business processes.
Business area worker (SME)	Workflow diagram Use Case description	A business area worker understands the detailed processes of the business and can

Stakeholder	Requirement being reviewed	Rationale for participation
		review a detailed requirements document that represents the business work.
IT developer	Use case description	A developer will use the use case description to develop a feature of the application and as such can assess the quality of the requirement and its usefulness of the requirements.
QA analyst	Any document	QA analysts are excellent reviewers of any requirements document because they are trained to look for inconsistencies and inaccuracies.
Project manager	Project scope (presented in a context level data flow diagram)	The project manager is responsible for project change control and as such must agree on the boundaries of the business area for which requirements will be gathered.

6.7.6 ***Deliverables***

The deliverable of a formal requirements review is a list of questions, comments, concerns, and suggestions that are compiled during the working session.

The outputs from the presentation are likely to include the following (depending on the purpose of the presentation):

- List of agreed amendments (possibly containing descoped requirements)
- List of actions for Business Analyst
- List of actions for business users requiring clarification
- List of agreed issues with associated assumptions

6.8 Task: Obtain requirements signoff

6.8.1 ***Purpose***

Requirements signoff formalizes agreement by project stakeholders that the content and presentation of the requirements, as documented, are accurate and complete. Formal agreement reduces the risk that, during or subsequent to implementation, a stakeholder will introduce a new (previously unencountered) requirement.

6.8.2 ***Description***

Obtaining requirements signoff typically involves a face-to-face final review of requirements, as documented, with each project stakeholder. At the end each review, the stakeholder is asked to formally approve the reviewed requirements document. This approval may be recorded either physically or electronically.

6.8.3

Predecessors

Obtaining requirements signoff is typically the final task within Requirements Communication. The Business Analyst will require the output from the Formal Requirements Review(s), including accommodation of any comments or objections which were raised during the review process.

6.8.4

Process and Elements

On an ideal project, all stakeholders will review and sign off on all requirements. Comprehensive signoff by each stakeholder tends to promote more detailed review, resulting in greater consistency of stakeholder understanding and expectation.

However, in projects where many requirements apply to only a subset of stakeholders, it may be more practical to ask each stakeholder to sign off only on those requirements which are directly pertinent. In such case, a specific list of the requirements specifications the stakeholder is approving, and a complementary list of the requirements specifications which the stakeholder is not approving (but to which the stakeholder explicitly has no objection) should be prepared. Under such circumstances, it is incumbent upon the Business Analyst to assure that each individual requirements specification is explicitly approved by at least one appropriate project stakeholder.

6.8.5

Stakeholders

The Business Analyst will take steps to obtain signoffs from all stakeholders identified during Requirements Planning and Management.

In the event that any identified stakeholder declines to sign off, the Business Analyst will notify the Project Manager of the absence of approval, which may or may not be deemed sufficient cause to delay subsequent tasks or to reduce project scope.

6.8.6

Deliverables

The task is complete when all project stakeholders have signed off. Completion of requirements signoff should be announced to the project team, and may constitute a project milestone.

The complete set of stakeholder signatures/approvals should be filed in the project archives.

6.9

References

The following sources were consulted during the development of this Knowledge Area. This list is not intended to represent an endorsement of the quality of the source material by the IIBA, and the lack of a reference to any source is not a negative comment.

Handbook of Walkthroughs, Inspections, and Technical Reviews: Evaluating Programs, Projects and Products. Dan P. Friedman and Gerald M. Weinberg. 3rd edition

Chapter 7: Solution Assessment and Validation

7.1 Introduction

7.1.1 *Knowledge Area Definition*

Once this solution design has been agreed upon, the BA assists the technology team with detailed design work including splitting a large project into phases, reviewing technical design deliverables, and helping to build usability into the application software. In the case of a purchased solution, the BA will assist with any package customization decisions that need to be made and with interface requirements.

As the solution is built and available for testing, the BA's role involves supporting the Quality Assurance activities. The BA should understand the tasks performed by their QA department and be available to answer questions about the testing of the solution. The BA may be asked to review QA deliverables such as test plans and test cases to assure that the business risks will be mitigated by thorough testing. The BA may help their business stakeholders with user acceptance testing, defect reporting and resolution.

The BA also is involved with making sure that the production rollout of any change is completed as smoothly as possible. This may require the BA to help with the training of business area workers on the new procedures and software, creation of employee procedure manuals, communication of change impacts to employees and customers, and development of conversion plans. The BA may also assist the technology team with rollout strategies that will lessen any negative impact to the business area.

Finally, after production implementation, the BA will be involved with problem resolution, adjustments to new procedures, and managing change requests including new requirements, next phase issues, and any other post implementation support.

7.1.2 *Rationale for Inclusion*

Although the business analyst rarely implements a change by himself, he or she must be involved in selecting or designing the solution because the business analyst is the most knowledgeable team member about the business requirements. He knows the business environment, and can assess how each proposed solution would impact that environment.

Also, the business analyst is able to assess the impact of a change on the business workers because he or she has observed and analyzed the current work environment. The business analyst can assist with an implementation plan for the project that will include business worker training, conversion of existing information, creation of new employee procedure manuals, and user acceptance testing of any software/hardware component of the solution.

7.1.3 *Knowledge Area Tasks*

- 7.2 Develop alternate solutions
- 7.3 Evaluate technology options
- 7.4 Facilitate the selection of a solution
- 7.5 Ensure the usability of the solution
- 7.6 Support the Quality Assurance process
- 7.7 Support the implementation of the solution
- 7.8 Communicate the solution impacts
- 7.9 Post implementation review and assessment

7.1.4 *Relationship to other Knowledge Areas*

The tasks in this knowledge area typically are done near the end of the project although implementation planning should really start during the project planning phase.

All of these inputs and outputs will not apply to every project. Note these lists are in alphabetic order.

.1 Inputs

- Approved design
- Constructed build
- High level understanding of technology potential
- Implementation plan
- Organization's RFP/RFQ standards
- Organization's usability requirements
- Prioritized, approved business requirements
- QA standards and procedures
- Recommended design
- Technical constraints
- Technology solution options

- Test plan
- .2 Outputs
- Assessment of the solution usability
 - Assured compliance with organizational standards
 - Conversion plan
 - Description of software releases/phases
 - Employee procedure documentation
 - Employee training
 - Feedback on problems/issues/concerns
 - High level requirements for next release
 - Implemented solution
 - Recommendation that aligns with requirements
 - RFP/RFQ
 - Solution design
 - Test plan aligned to requirements

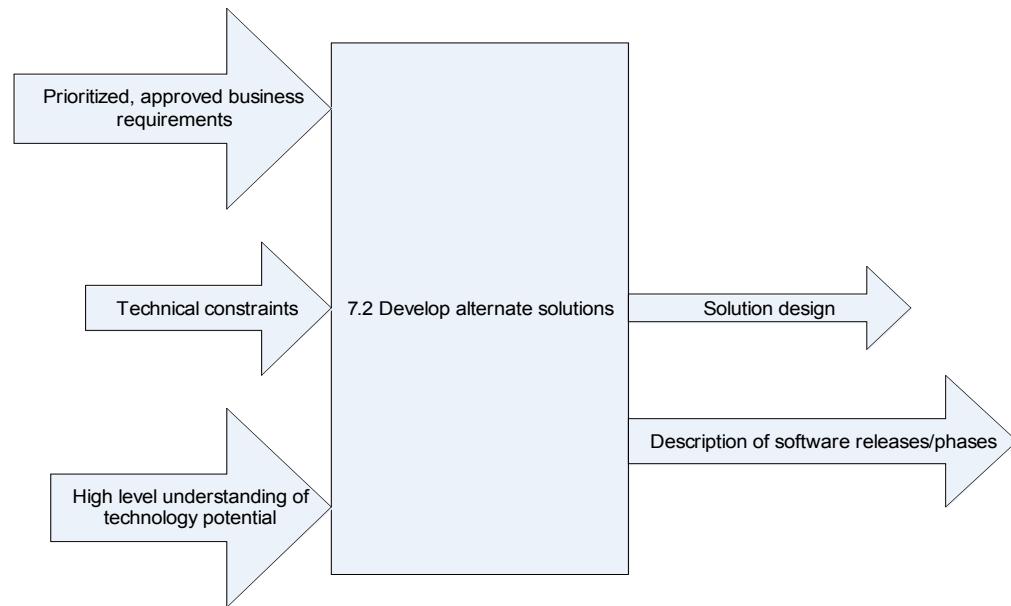
7.2 Develop Alternate Solutions

7.2.1 Purpose

The Business Analyst will be highly involved in developing the design strategy for the project. Several tasks that the Business Analyst performs during this stage of implementing the project will be mapping out the design plan, helping to resolve which processes will be automated and determining how the system will interact with the end users. During this stage, the technical team led by a designer will be responsible for the construction of the software and they will be the key drivers of the implementation process. However, the Business Analyst plays a critical role in ensuring that the requirements are fulfilled by the technical design solution.

The Business Analyst will be responsible for communicating the proposed design solution to the business stakeholders, and will help guide decisions regarding tradeoffs that impact the requirements. The technical team may need to propose alternate design solutions due to environmental or technical constraints that may not have been fully realized during the requirements gathering phase, and the Business Analyst will be the

intermediary to discuss and negotiate alternative solutions once the impact to the requirements is known. In addition, the Business Analyst will help both the stakeholders and technicians scope the design phases of the project. There are many factors that govern the number of construction phases a project will undergo regardless of the methodology (e.g., waterfall, iterative) employed by the project team.



.1 Review User Classes

As described in the *Requirements Gathering* and the *Requirements Analysis & Documentation Knowledge Areas*, the Business Analyst will have uncovered and documented information regarding the user profiles which identifies the characteristics of the end users who will interact with the system. The user class list will be used as input to guide the solution built during the design phase. Some of the characteristics captured that the Business Analyst and the design team must consider are the following:

- Functions - What processes involve the user class?
- Location - Where are the end users located, are there global implications?
- Number - How many end users are there in the class?
- Tasks - What tasks are performed by the user class?

Concerns - What is this group's usability requirements, preferences, and their proficiency level regarding interaction with computer systems. For example, if one of the goals of the project is to contemporize the software by replacing a mainframe 3270 terminal interface

with a web or client server application it is important to consider the challenges that the user class currently interacting with the mainframe system today will have in using the new software. Mainframe applications provide rigid and limited navigation paths. Web and client server applications provide more free form navigation techniques, such as links, menus, tool bars, and icons. What experience does this group even have currently with using a PC and a mouse? What is the best way to design the new user interface? How can the technicians optimally design the application to make the transition as easy as possible for the user class?

When mapping out the design plan, the Business Analyst will use this list as input to help determine what solution best supports the needs of the user classes. The technical designer will consider the characteristics of the user class when designing the user interface, and there may be tradeoffs with the business users that the Business Analyst will be responsible to present on behalf of the technicians.

.2 Review Functions and Features List

As noted in the Requirements Analysis & Documentation Knowledge Area, functional requirements describe the behavior and information that the software will manage for the end user. A feature is defined as a “service that the system provides to fulfill one or more stakeholder needs” [1], or “a coherent and identifiable bundle of system functionality that helps characterize the system from the user perspective” [2]. Features are categorized into functional or quality of service requirements, and some of the latter may not be uncovered until the design phase. When creating the design plan, the Business Analyst will review the documentation that was created during the Analysis and Documentation phase. Depending on the methodology followed by the project, features may have been documented in different ways (e.g., in business use cases, object classes, process descriptions, a features list or model, etc.). The Business Analyst will begin to map out a strategy with the stakeholders and technical design team to develop at least one design and possibly alternative design solutions.

.3 Map the Requirements to the Design

The Business Analyst will begin to document a design plan at this stage by creating a list of the processes analyzed during the Requirements Analysis and Documentation phase. This list can be documented in many formats, such as a spreadsheet or in a text table that contains rows and columns. The rows can list the requirement, and the columns can include a variety of categorizations that will help to determine at which design phase the requirement will be implemented, such as the business priority of the process, and a designation of whether or not the process will be automated. For processes that will not be automated, there may be other manual improvements that can be implemented to streamline the process. As a separate task, the Business Analyst may document the recommended improvements in detail during the design phase.

When the technical designer reviews the business rules, data needs and process description documented for the process in the requirements package, the designer in turn will rate the complexity to implement a solution, and may also designate a technical

priority for the requirement. There are many factors related to constraints in the technical environment that will dictate if the requirement must rated high priority by the technical team, even though the business may have rated it low. Upon reviewing the requirements documentation at this stage, the technicians may even identify new requirements that must be implemented due to environmental factors or technical constraints. At this stage, the designer may also be able to provide a projected cost estimate to implement a solution as well as some possible ways to do it (e.g., on line screen, report, interface to another external system, etc.). The designer will provide this information to the Business Analyst to include in the design plan.

When creating the design plan, the Business Analyst and technicians will consider the following factors to evaluate and rate the priority and complexity for each process:

Functional Requirements

Features and Functionality - The requirements that were provided by the stakeholders regarding the business processes, data, and business rules that describe the desired functionality.

Quality of Service Requirements

Quality of service requirements are not usually provided by the stakeholders, since they are not typically visible characteristics that an end user describes, so these requirements must be elicited from them by the Business Analyst, or they will be introduced by the technicians.

Quality of service requirements will often guide the design solution proposed, and are as important as functional requirements in framing a design solution. Often, these requirements are not uncovered until the design phase of the project. As the design phase unfolds, both functional and quality of service requirements will impact the solutions that are recommended. If there are technical or environmental constraints, the designer will propose alternative solutions which the Business Analyst will need to communicate to the stakeholders, and this may change the functional requirements. The Business Analyst will need to obtain consensus from the stakeholders to ensure that they agree with the approach before the design phase moves forward.

Some quality of service requirements that will affect the design solution are the following:

- System Performance
- Operational Needs - Reliability, Disaster Recovery, Maintainability
- Political
- Legal Constraints
- Security

- Technical Constraints
- Physical Environment Constraints
- Global and Local Needs
- External System Interfaces and Protocols

.4 Propose Design Phases

At the end of the requirements mapping exercise, the design plan will be formed. This plan will describe the number of design phases the project will entail as well as a mapping of the requirement to the appropriate design phase.

.5 Determine Number of Design Phases

Based on the business priority, technical priority, cost, need for process automation and the complexity to implement the process, the stakeholders and technicians, assisted by the Business Analyst, will determine the number of design phases that will need to occur to implement the solution. There are many factors that will guide these decisions, such as the overall project budget, the need to implement a solution, or parts of the solution, by a certain date, resource constraints, training schedule and ability for the business to absorb changes within a defined timeframe.

.6 Map Requirements to Design Phases

The Business Analyst will assign each requirement to a design phase, document a description of each design phase, and summarize what the goals are for each phase and the requirements that will be delivered. Each requirement should be assigned a unique identifier so that it can be tracked going forward through each design iteration.

.7 Update Requirements Traceability Matrix

In the *Requirements Planning & Management KA*, the importance of creating a requirements traceability matrix and a numbering schema having a unique identifier for each requirement was discussed. It helps the Business Analyst trace a requirement from its inception through design to testing and implementation. It also helps the stakeholders realize how a requirement evolves into a solution that is tangible for them to see. Traceability ensures that functionality is not missed, and conversely, it helps to prevent the introduction of extraneous requirements and guarantee that only approved requirements are developed.

Traceability may be mandatory for a project, if there are regulatory or internal control standards that must be adhered to, and the Business Analyst will be responsible to follow the process as defined. If not, then the project team will need to decide how much traceability is required to ensure a successful outcome.

The important concept for the Business Analyst to keep in mind is that traceability ensures completeness since it proves that all lower level requirements stem from higher

level requirements documented during the Requirements Gathering phase. It helps the Business Analyst to manage requirements scope and change requests, and it provides a framework for testing the solution. “Requirements traceability is the ability to describe and follow the life of a requirement in both a forward and backward direction, i.e., from its origins through its development and specification, to its subsequent deployment and use, and through periods of ongoing refinement and iteration in any of these phases” [3].

During the design phase of the project, the Business Analyst should map the design artifacts back to the matrix created during the Requirements Documentation & Analysis phase. There are numerous tools and techniques the Business Analyst can employ to trace requirements. The decision on how to model the matrix, as well as whether or not automated tools will be used to assist the traceability process throughout the project lifecycle, will have been decided at an earlier phase when requirements are in process of being documented. The approach will have been sanctioned by the project manager and the project team. Regarding tools, most software vendors that manufacture an array of office products will have spreadsheet and database capabilities, so at the very least, these office tools can be used to create and maintain the traceability matrix. There are also many commercial workbench products that support more comprehensive solutions, such as the ability to list requirements and track them through design and testing in an automated, bi-directional way, tracing the links between the artifacts and providing history on requirements changes throughout the project lifecycle.

The traceability matrix described in the Requirements Planning and Management KA depicts a standard model that is common to most projects. It details a hierarchy structure that begins with the high level business requirements at the top of the structure chart which are traced down to more detailed requirements which are then mapped further to the testing and implementation domains. Creating a matrix to trace requirements from their definition through the implementation and testing domains usually cover the needs of most projects.

Examples of Traceability Mapping Tools

Tracing business requirements to design features

There are many ways to trace the requirements to the features that fulfill them. The Business Analyst can create a variety of tables based on the original requirements matrix documented during the Requirements Analysis & Documentation phase. These tables can assist the Business Analyst in identifying either gaps or extraneous requirements that may have been introduced during later stages. The following is an example of a simple tabular format to trace requirements to features:

	Feature 1	Feature 2	Feature 3	Feature ...
Requirement #1	X			
Requirement #2		X	X	
Requirement ...				

In the above example, the Business Analyst designates which features fulfill the requirement, and at the conclusion of this exercise, a number of deductions can be made that will surface potential issues, such as:

If a row does not contain an “X” in any of the columns, then it is likely that a feature is missing that the design did not fulfill

If a column exists that does not have an “X” in any of the rows, then a feature was possibly introduced erroneously, or the meaning of the feature was misunderstood by the Business Analyst and further investigation is required.

Tracing Features to Use Cases

If the Business Analyst and designer are documenting the end user interactions with the software by developing system use cases, then the Business Analyst can create another matrix to trace the feature to the use cases which will help ensure that the design is complete. The following is an example of tracing features to the use cases that implement them:

	Use Case 1	Use Case 2	Use Case 3	Use Case ...
Feature #1	X		X	
Feature #2		X	X	
Feature ...				

Since Phase 1 requirements will be implemented first, each process that is assigned to Phase 1 will undergo further elaboration by the design team and the Business Analyst. If Use Cases are being used by the project team to document the end user/system interactions, then the process will be assigned a use case id for tracking purposes. System use cases will be built as a collaborative effort between the Business Analyst and the designer, and reviewed for completeness and accuracy by the stakeholders.

During system use case specification, alternative design solutions may be offered depending on the complexities of the features that must be implemented. The designer may need to propose variations on how the screens will interface with the end user and how much data can be presented on a screen. Usability requirements may need to be negotiated. The design is a collaborative effort, and tradeoffs between the desires of the stakeholders and the design team always occur, with the Business Analyst playing a key role in the communication and negotiation process. It is important that all changes agreed to during the design phase are signed off by the stakeholders and documented by the Business Analyst to ensure that all parties understand and are in agreement with the design solution.

.8 Recommend Improvements for Non-Automated Processes

Document Manual Business Process Improvements

Not every process analyzed will be transformed by a software solution, so processes that are flagged in the design plan as not being a candidate for automation will not undergo further elaboration during technical design. However, during Requirements Analysis &

Documentation, the process owner and Business Analyst may have determined new manual steps that may streamline and improve the current process. The Business Analyst will have likely decomposed and modeled the process and identified new procedures. During this stage, the Business Analyst may have documented the “as is” state of the process, and a “to be” end state.

When mapping out the design plan, if a decision is made not to automate a process, which may result from a variety of reasons, the Business Analyst should consider documenting any recommendations that can still transform the process even though they are outside the scope of software automation. These recommendations should be presented to the project stakeholder to determine if these proposed improvements should be considered for implementation.

7.2.2 *Description*

7.2.3 *Predecessors*

7.2.4 *Process and Elements*

7.2.5 *Stakeholders*

7.2.6 *Deliverables*

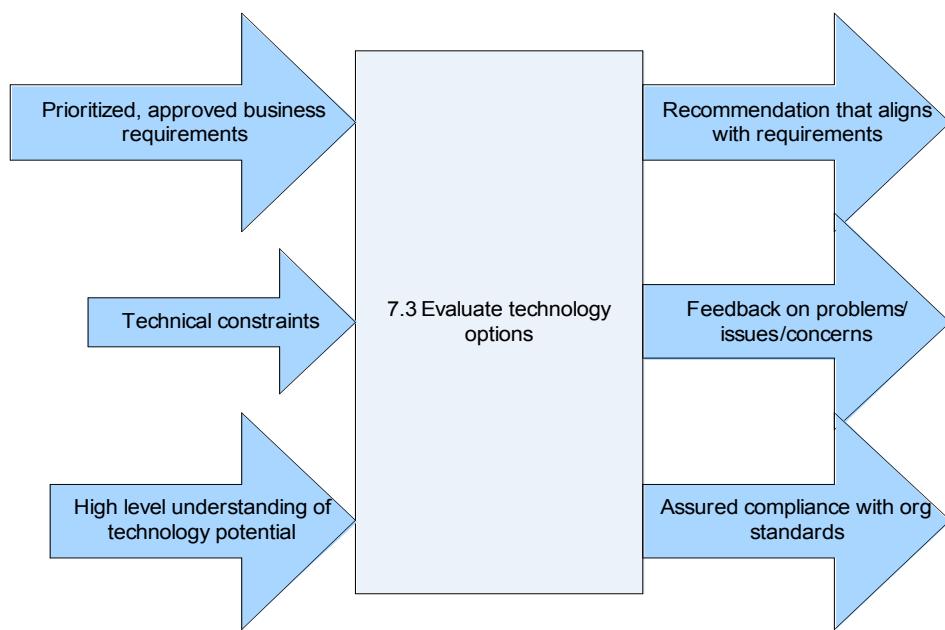
7.3 *Evaluate technology options*

7.3.1 *Purpose*

The Business Analyst works with the technical team to evaluate the options available to solve the business problem or opportunity. The Business Analyst will be able to assess each option for its applicability to the business area.

7.3.2 *Description*

7.3.3 *Predecessors*



7.3.4 *Process and Elements*

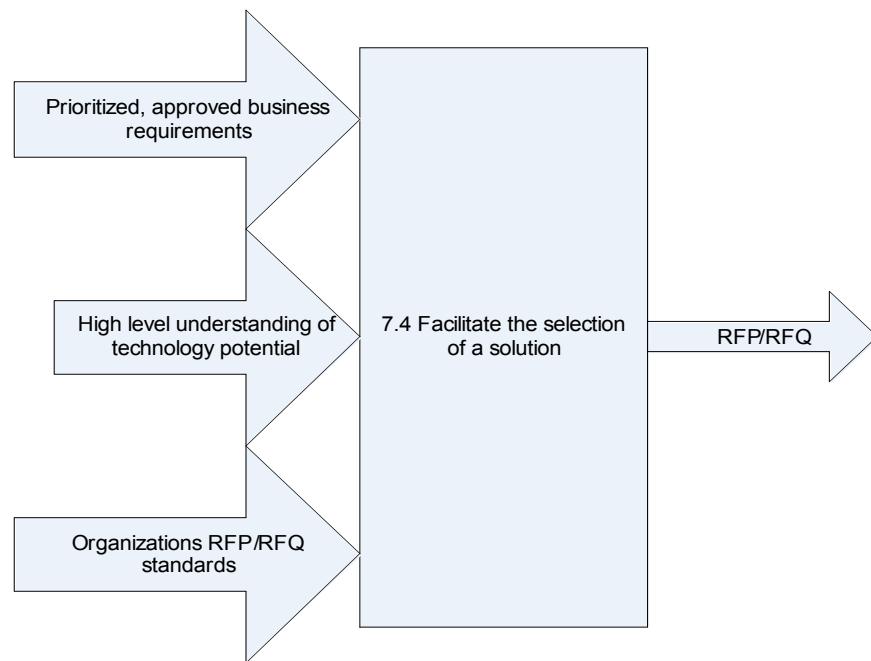
7.3.5 *Stakeholders*

7.3.6 *Deliverables*

7.4 *Facilitate the selection of a solution*

7.4.1 *Purpose*

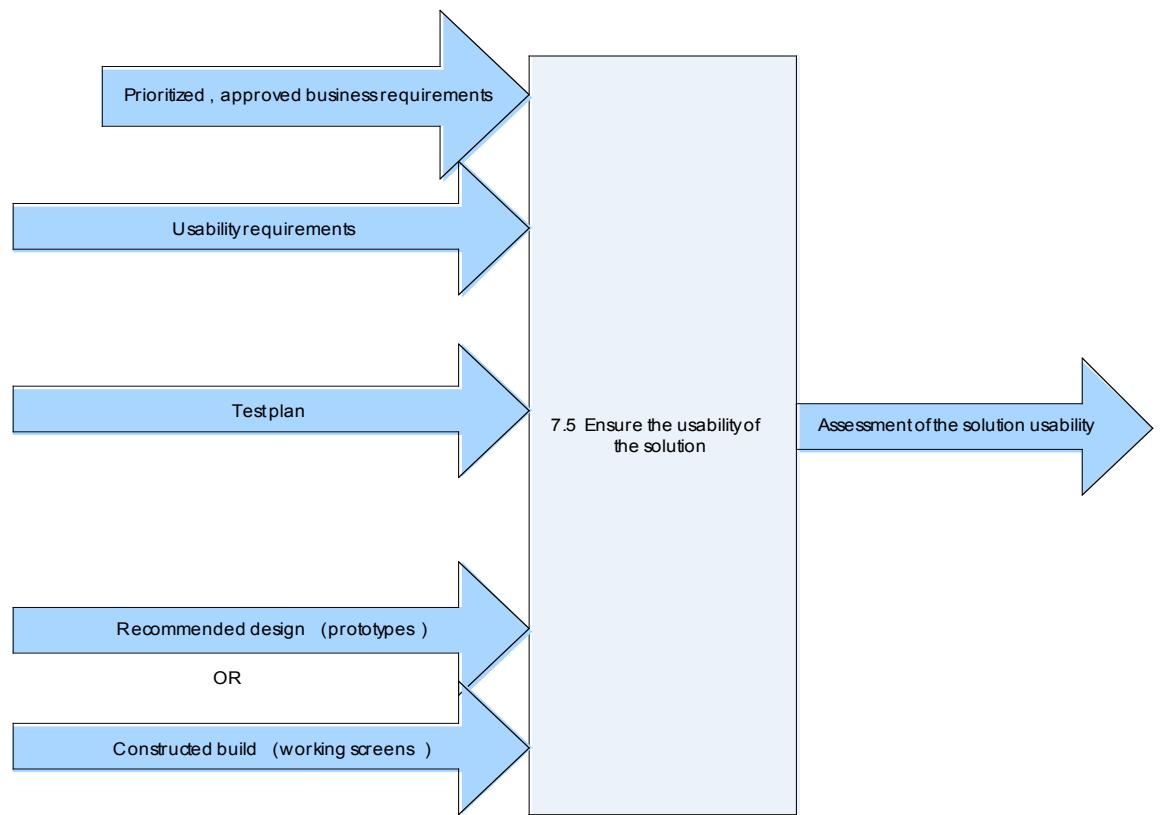
When the organization is considering buying or leasing a software package the Business analyst will help to evaluate the options and assess the applicability of each option for the business.

7.4.2 *Description***7.4.3 *Predecessors*****7.4.4 *Process and Elements*****7.4.5 *Stakeholders*****7.4.6 *Deliverables*****7.5 *Ensure the usability of the solution*****7.5.1 *Purpose***

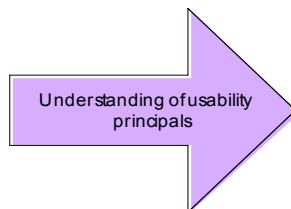
It is important that the solution provided to the business stakeholders is as “usable” as possible. The Business Analyst will assist the Usability Engineer (if available) and the technology team in designing usability into the solution.

7.5.2 Description

7.5.3 Predecessors

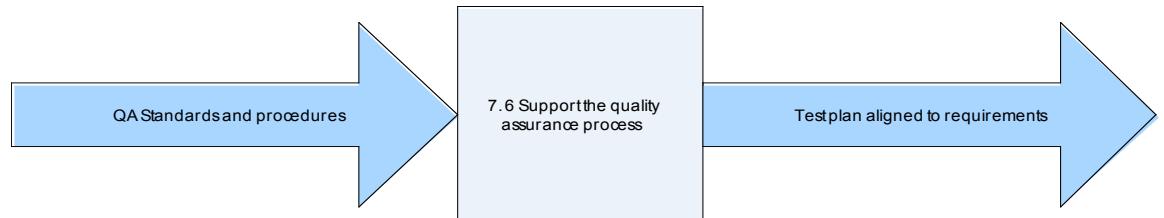


Move to BA fundamentals



7.5.4 *Process and Elements***7.5.5 *Stakeholders*****7.5.6 *Deliverables*****7.6 *Support the Quality Assurance process*****7.6.1 *Purpose***

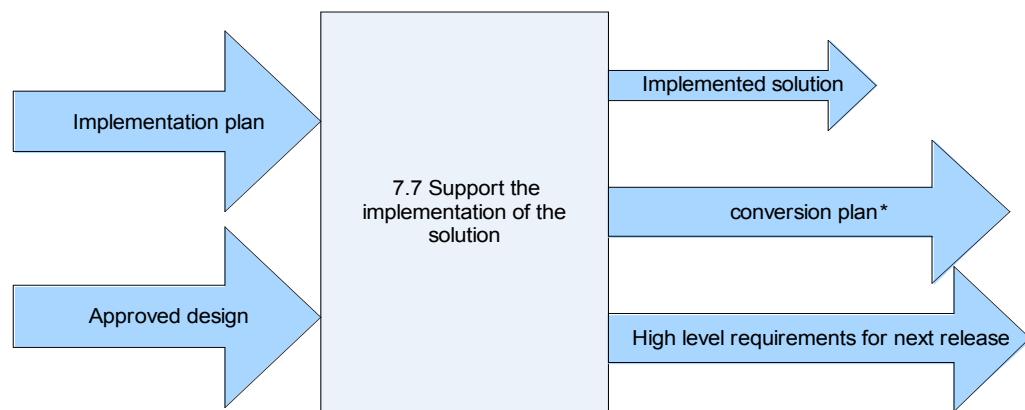
The Quality Assurance process includes development of a test plan/strategy for the solution, execution of the test plan, and incident (defect) tracking of problems. The Business Analyst will assist these activities by providing detailed business knowledge and helping to find the cause of any problems.

7.6.2 *Description***7.6.3 *Predecessors*****7.6.4 *Process and Elements*****7.6.5 *Stakeholders*****7.6.6 *Deliverables*****7.7 *Support the implementation of the solution*****7.7.1 *Purpose***

The Business Analyst should be very involved with the implementation of the solution, providing support to the business stakeholders as they make the transition to a new business process. This implementation support may include data conversion requirements and business transition strategies.

7.7.2 *Description*

7.7.3 *Predecessors*



Conversion plan includes:
 -mapping of data from old to new system
 -Business rules for conversion
 -Timing of conversion

7.7.4 *Process and Elements*

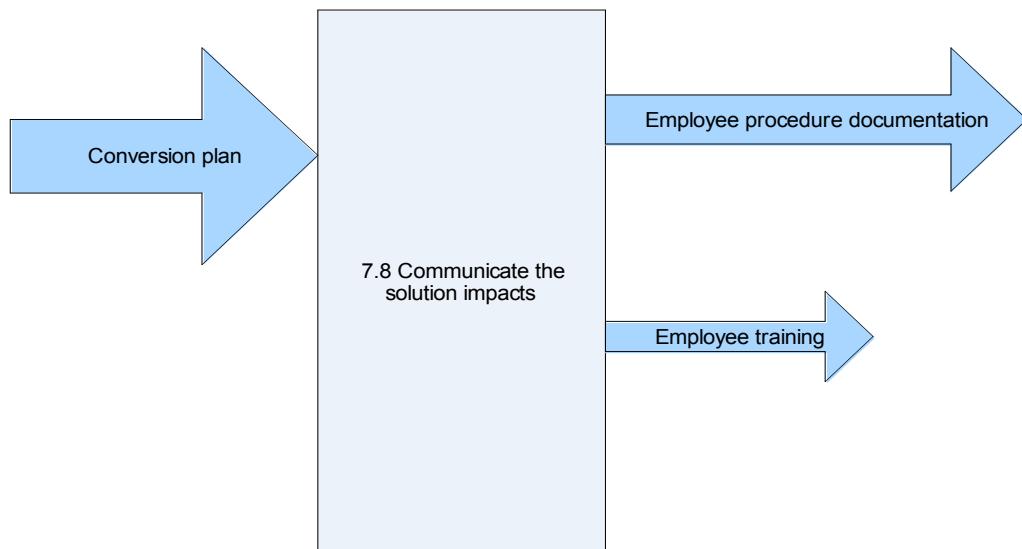
7.7.5 *Stakeholders*

7.7.6 *Deliverables*

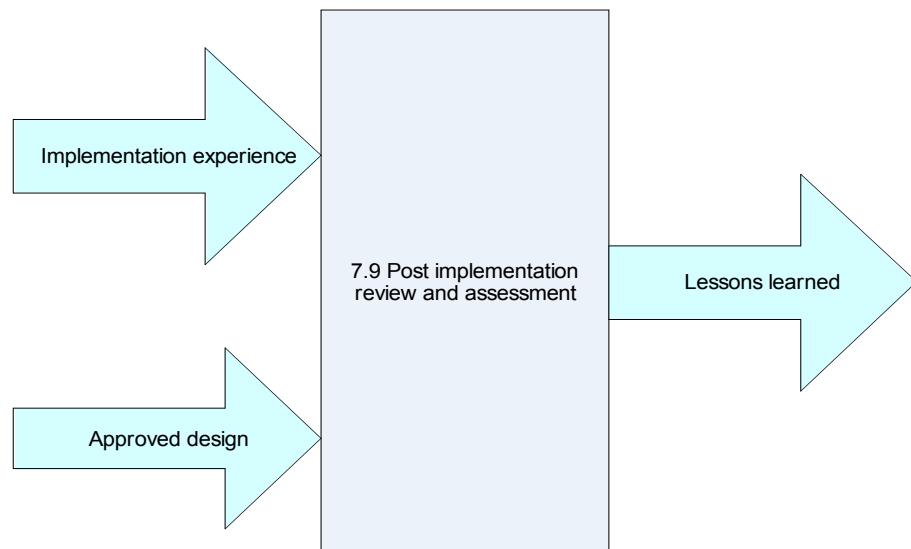
7.8 **Communicate the solution impacts**

7.8.1 *Purpose*

Communicating the impact of the solution to the business stakeholders is a critical task for the Business Analyst. The BA understands the solution design and the business requirements and as such is in the unique position to clearly articulate how the solution will impact the business area.

7.8.2 *Description***7.8.3 *Predecessors*****7.8.4 *Process and Elements*****7.8.5 *Stakeholders*****7.8.6 *Deliverables*****7.9 *Post implementation review and assessment*****7.9.1 *Purpose***

The Business Analyst should conduct a post implementation assessment (in conjunction with the QA team) to formally document improvements to the BA approach in subsequent projects. The BA may also collect solution enhancements during this assessment.

7.9.2 *Description***7.9.3 *Predecessors*****7.9.4 *Process and Elements*****7.9.5 *Stakeholders*****7.9.6 *Deliverables*****7.10 *References***

Usability Engineering, Jakob Nielsen. Morgan Kaufmann. San Diego. 1993.

The Complete Guide To Software Testing. Second Edition. Bill Hertzel. Wiley-QED Publication, 1993

Software Testing in the Real World. Edward Kit. Addison-Wesley Publishing Company, 1995

Art of Software Testing. Second Edition. Glenford J. Myers. John Wiley and Sons. 2004

Chapter 8: Underlying Fundamentals

8.1 Introduction

8.2 Basic Skills

8.2.1 *Analysis Skills*

- .1 Structured Analysis Techniques
- .2 Issue Management
- .3 Communication Skills
- .4 Learning Skills
- .5 Usability

8.2.2 *Business/Domain Knowledge*

- .1 Products
- .2 Processes
- .3 Markets
- .4 Systems
- .5 Sources of Knowledge

8.2.3 *IT Knowledge*

- .1 Paradigms
- .2 Methodologies

8.3 Advanced Skills

8.3.1 *Meeting Management*

8.3.2 *Presentation Skills*

8.3.3 *Decision-making Skills*

- 8.3.4 *Facilitation Skills***
- 8.3.5 *Communication Skills***
- 8.3.6 *Conflict Resolution***
- 8.3.7 *Negotiation Skills***
- 8.3.8 *Relationship Skills***
- 8.3.9 *Questioning Skills***
- 8.3.10 *Systems Thinking***
- 8.3.11 *Escalation Skills***
- 8.3.12 *Logic***
- 8.3.13 *Cultural Awareness***
- 8.4 **Leadership Skills****
 - 8.4.1 *Coaching Skills***
 - 8.4.2 *Facilitating Long-term Goal Setting***
 - 8.4.3 *Motivational skills***
 - 8.4.4 *Appraisal Skills***
 - 8.4.5 *Interviewing Skills***
 - 8.4.6 *Role Definition***
 - 8.4.7 *Behavioral Coaching***
 - 8.4.8 *Delegation skills***
 - 8.4.9 *Succession Planning***
 - 8.4.10 *IT Architectural Skills***
- 8.5 **Peripheral Skills****

8.5.1 *Sales***8.6** **References**

Chapter 9: Glossary

9.1 Introduction

9.2 Terms

Body of Knowledge Glossary Terms	
Activity Diagram	A type of diagram defined by UML that can be used to show activities and decision points, and the roles with responsibilities to those activities and decision points. This type of diagram can be used to illustrate use cases and business use cases.
Business Analyst	<p>Business Analysts are responsible for identifying the business needs of their clients and stakeholders, to determine solutions to business problems.</p> <p>The Business Analyst is responsible for requirements development and requirements management. Specifically, the Business Analyst elicits, analyzes, validates and documents business, organizational and/or operational requirements. Solutions are not predetermined by the Business Analyst, but are driven solely by the requirements of the business. Solutions often include a systems development component, but may also consist of process improvement or organizational change.</p> <p>The Business Analyst is a key facilitator within an organization, acting as a bridge between the client, stakeholders and the solution team.</p> <p>Business analysis is distinct from financial analysis, project management, quality assurance, organizational development, testing, training and documentation development. However, depending on an organization, an individual Business Analyst may perform some or all of these related functions.</p>
Business Requirements Document	See Requirements Document.
Class Model	A type of diagram defined by UML that describes one or more Objects with a uniform set of attributes and services, including a description of how to create new objects in the Class.
Constraint	A constraint describes any limitations imposed on the solution. Business constraints are things like budget limitations, restrictions on the people who can do the work, the skill sets available, etc. Technical constraints include any architecture decisions that are made.
Deliverable	On the highest level a deliverable is the solution due to the customer at the end of a project. But, during a project there are a number of project artifacts and solution components due by project team members to other project team members.
Diagram	Graphic representation or Picture.
Discovery session	See Requirements Discovery Session.
Enterprise Analysis	This is a Knowledge Area within the BA BOK. This Knowledge Area covers pre-project activities and approaches for capturing the necessary view of the business to provide context to requirements and functional design work for a given initiative and/or for long-term planning. In some organizations this work is treated as an investigative, feasibility or business architecture project and may be managed as a project.
Feature	A feature is a service the system/solution provides to fulfill one or more stakeholder needs. Features are typically fairly high-level abstractions of solution and will turn into functional or non-functional requirements. They allow for early priority and scope management and for getting a high-level sense of the stakeholders view of the solution.
Functional Design	Observable behaviours of the solution; as opposed to technical design.
Functional Requirements	Functional requirements describe both the systems behaviour in detail and the information the system will manage.
Modeling	Representations of a business or solution that often include a graphic component along with supporting text and relationships to other components.
Needs	A type of high level requirement that is a statement of a business objective, or an impact the solution should have on its environment.
Non-functional Requirements	Required system capabilities that do not describe functionality. Examples of non functional

	requirements include: the number of end users, response times, fail-over requirements, usability and performance. Also known as supplementary requirements.
Object Oriented Modeling	An approach to software engineering where software is comprised of components that are encapsulated groups of data and functions which can inherit behaviour and attributes from other components; and whose components communicate via messages with one another. In some organizations, the same OO approach is used for business engineering to describe and package the logical components of the business.
Product	A solution or component of a solution that is the result of a project.
Project	A temporary endeavor undertaken to create a unique product, service or result.
Requirements	A requirement is a condition or capability needed by a stakeholder to solve a problem or achieve an objective.
Requirements Analysis & Documentation	This is a Knowledge Area within the BA BOK. Requirements analysis and documentation is the knowledge area of business analysis that describes how business, functional, and non-functional requirements can be assessed, documented and presented. Requirements analysis defines the methods, tools and techniques used to structure the raw data collected during Requirements Elicitation, identify gaps in the information, and define the capabilities of the solution, which must be documented. The documentation approaches used must clearly communicate the requirements to the stakeholders and to the project team. Business Analysts must understand the documentation options and select the appropriate format(s) for their project.
Requirements Attribute	Characteristic of a requirement that captures additional information about the requirements, such as the priority of the requirement or level of risk associated with it.
Requirements Communication	This is a Knowledge Area within the BA BOK. This knowledge area is a collection of activities and considerations for presenting and communicating requirements to stakeholders and getting approval.
Requirements Discovery Session	A forum (like a JAD) where stakeholders, Subject Matter Experts (SME) get together to provide information about the target system. This forum needs to be led by a Business Analyst who is a skilled Facilitator, and assisted by a Scribe whose role is to document the business requirements discovered. Synonym: Requirements Elicitation, Requirements Discovery Session (RDS), Joint Requirements Planning Session (JRPS)
Requirements Document	The document or artifact that captures gathered requirements and serves to communicate them.
Requirements Elicitation	This is a Knowledge Area within the BA BOK. This Knowledge Area describes the collection of activities and approaches for capturing the requirements of a target system, from the stakeholders.
Solution Assessment and Validation	This is a Knowledge Area within the BA BOK. This Knowledge Area includes the tasks necessary to ensure that the solution meets the stakeholder objectives, is thoroughly tested, and is implemented smoothly.
Reverse engineering requirements	Identifying requirements by interviewing developers, reading code, testing applications.
Requirements Planning and Management	This is a Knowledge Area within the BA BOK. The Knowledge Area includes the activities involved with determining and planning the requirements activities a BA will perform on a particular project, what deliverables they will produce, and how they will control and manage changes to the deliverables.
Requirements Workshop	Also known as a Requirements Discovery Session.
Sequence Diagram	A type of diagram defined by UML that shows object interactions in time sequence. In particular, it shows objects participating in interactions and the messages exchanged. This type of diagram can be used to depict Use Cases, by capturing the actors involved in the use case and the system under development as objects.
Traceability	An association that exists between requirements when more detailed requirements are associated with the higher level requirements (needs and features) those detailed requirements support. Traceability associations can also exist between detailed requirements and both design models and test cases. Traceability between requirements and other project artifacts allows a BA to manage scope creep and ensure all requirements have been met.
Use case Diagram	A type of diagram defined by UML that captures all actors and use cases involved with a system or product.