Module 5:

Requirements Engineering in Business Analysis (Cont.)

Requirements Management

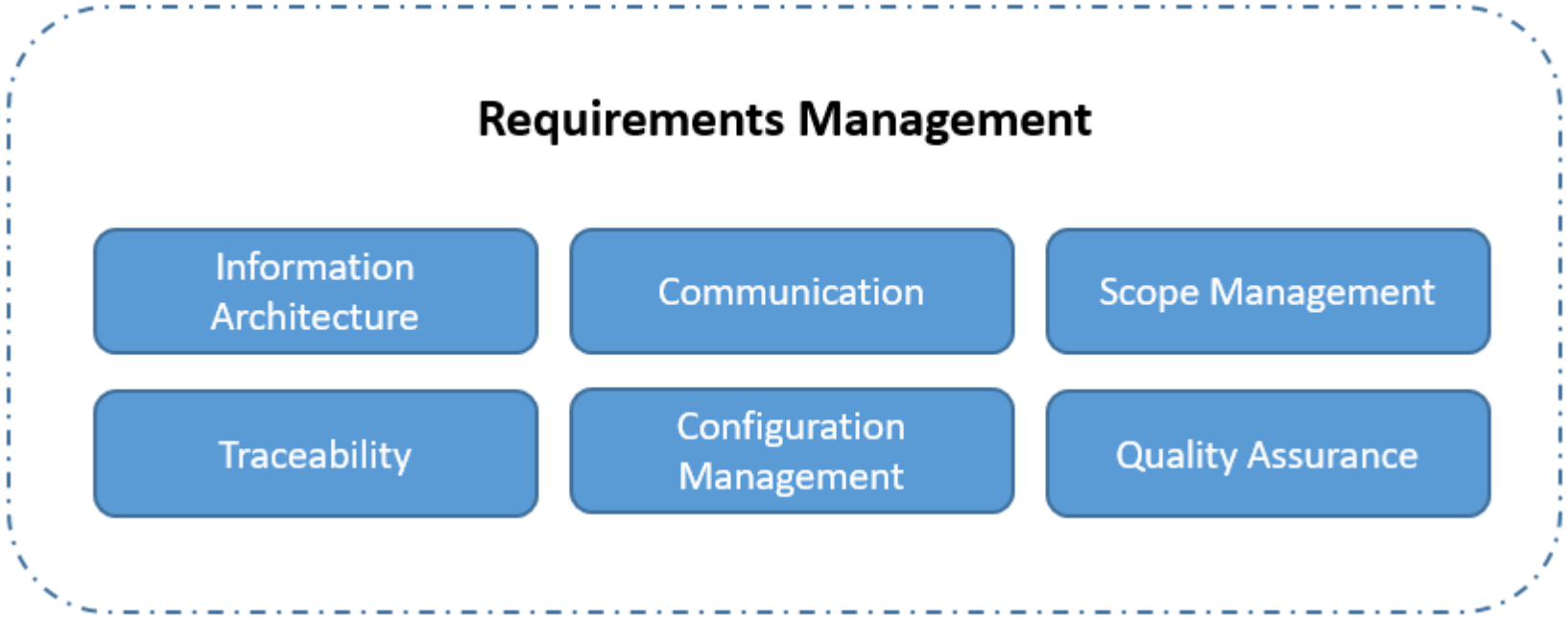
Section Learning Objectives

The learning objectives for this section are:

- Requirements management
- Information Architecture
- Requirements Communication
- Traceability - Requirements traceability matrix
- Configuration Management and Change Management
- Solution Scope Management
- Requirements Quality Assurance

Requirements Management definition

- The purpose of Requirements Management is to manage:
  - the requirements of the change or development project's products
  - product components and to ensure alignment between those requirements and the project's plans and work products.



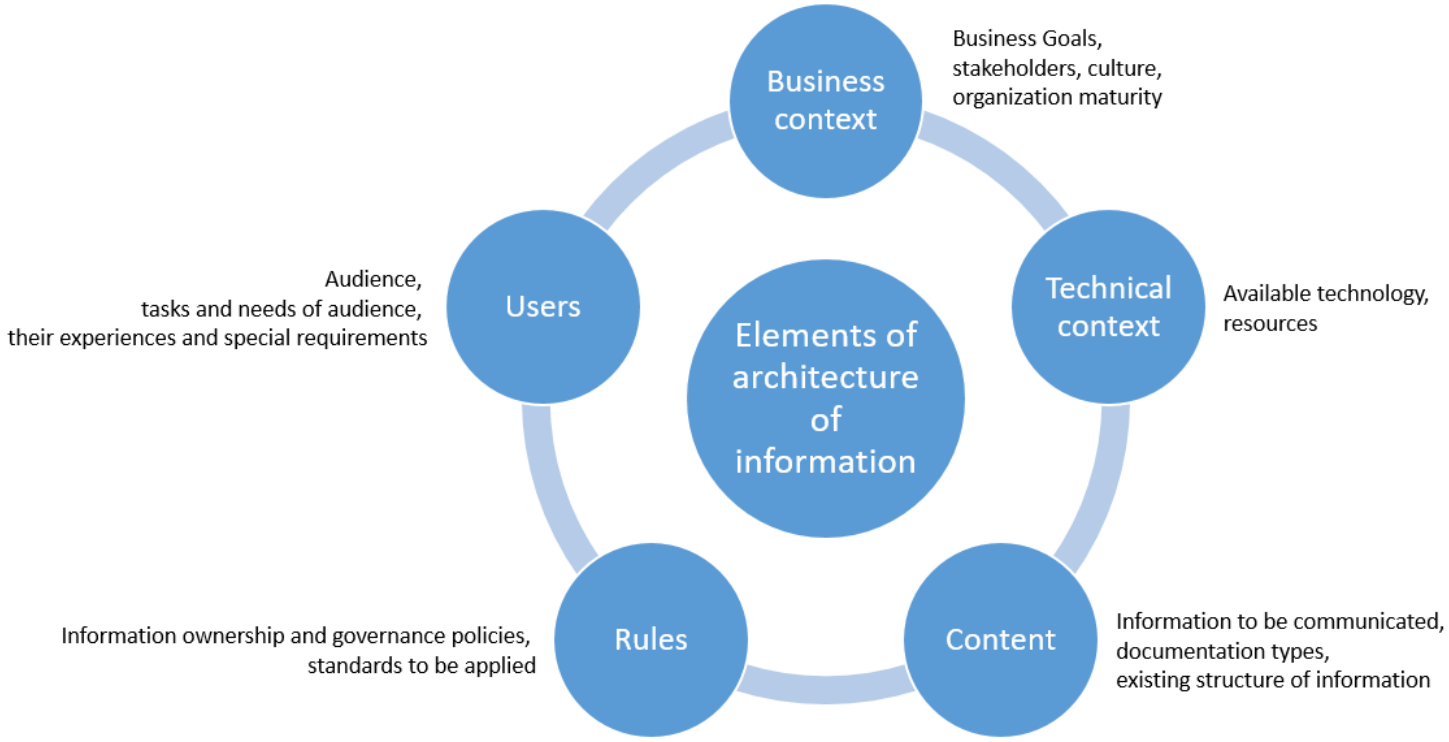
Requirements Management activities

- Requirements Management includes activities with the aim to:

  - Define and maintain the information architecture
  - Effectively understand and communicate the requirements
  - Maintain traceability
  - Manage configuration of the requirements and other Business Analysis work products
  - Ensure quality of the requirements and other Business Analysis work products

Information Architecture

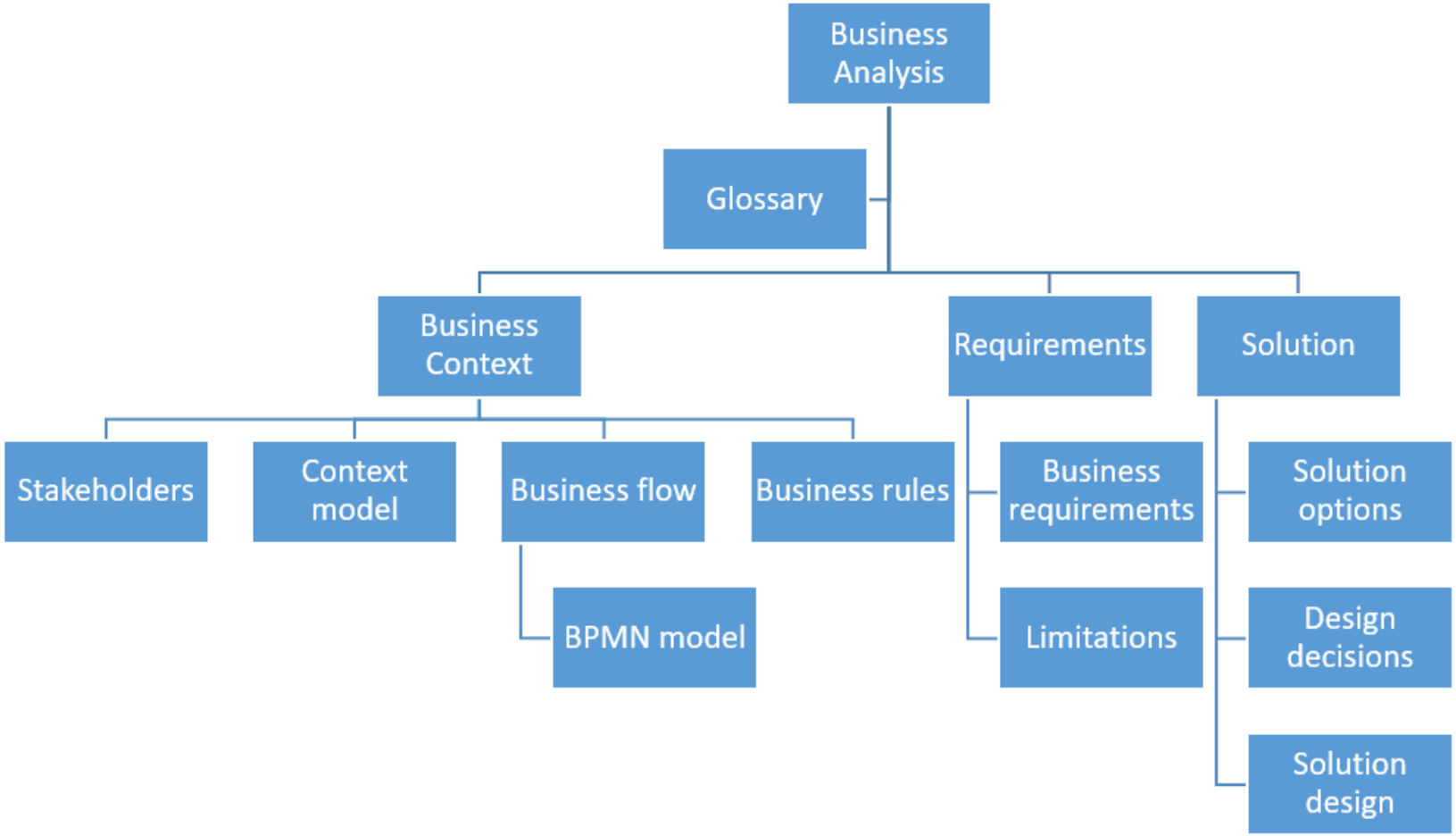
- Information architecture (IA) is a set of practices whose goals are to organize, arrange and label content (information) in an effective and understandable way.
- **IQBBA: Information Architecture –** structure and rules for organizing information in an organization or project.



Information architecture main components

- In the context of Business Analysis and Requirements Management, IA can be applied to understand and structure information collected in a way that would be accessible and understandable for all key stakeholders and users of this information. Sample applications of IA include:
  - Defining appropriate levels of information (e.g., strategy analysis, business requirements, solution requirements, design options)
  - Defining relevant deliverables for specific activities
  - Defining required content and structure for analysis deliverables and work products (e.g., templates, available methods of representing information)
  - Establishing communication methods for accessing, browsing and navigation through the information

Example

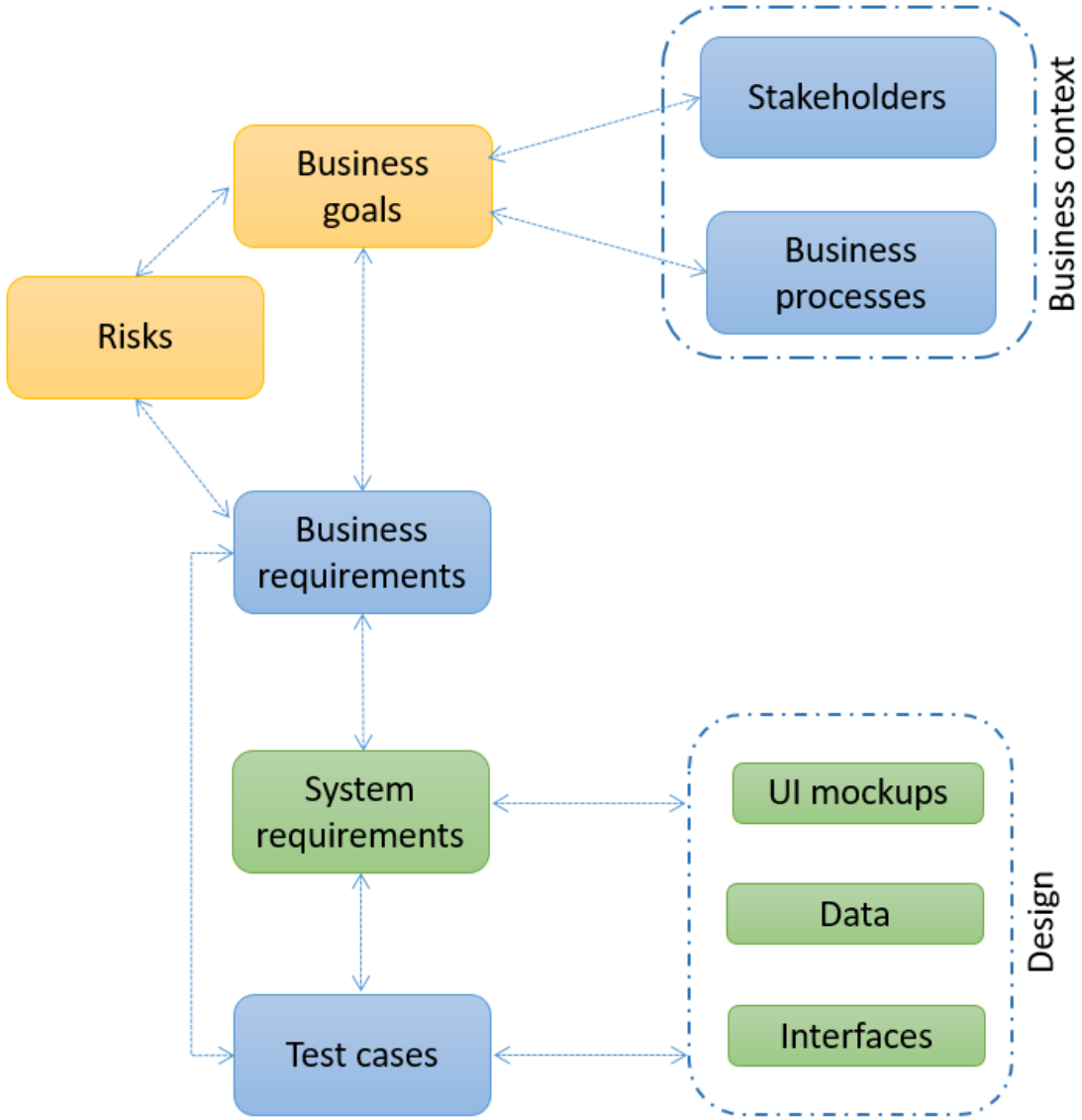

Business Analysis
Glossary
Business Context
Requirements
Solution
Stakeholders
Context model
Business flow
Business rules
Business requirements
Solution options
BPMN model
Limitations
Design decisions
Solution design

Traceability

- In the context of Business Analysis, traceability can exist between high level Business Needs, and business requirements, then between business requirements and solution requirements, etc.

- Tracing allows:
  - Proper management of artifacts;
  - Traceability between requirements and other solution delivery artifacts (such as design elements to test cases), allows the Business Analyst to ensure all requirements have been fulfilled.

Treacebility



Requirements Traceability Matrix

- A **requirements traceability matrix** is used to form relationships between requirements and designs;
- Starting with stakeholder needs through to the solution components for the purpose of ensuring product scope is maintained and the solution delivers what it is intended to.

Requirements Traceability Matrix Example

	Req 1	Req 2	Req 3	Req 4	Req 5	Req 6	Req 7
Feature 1	X	X					
Feature 2		X		X			X
Feature 3	X		X		x		
Feature 4							
Feature 5		X			X		X
Feature 6			X	x			X

Requirements Traceability Matrix Example

REQUIREMENTS TRACEABILITY MATRIX													
Project Name:					<requiredl>								
Project Description:					<required>								
ID	***Req ID***	***Req Version***	***Status***	***Priority***	***Requirement Description***	***Use Case ID(s)***	***Documents***	***Class/ Method/ Function/ Procedure***	***Developer(s)***	***Test Case Number***	***Test Case***	***Tester***	***Additional Comments***
001													
002													
003													
004													
005													

Maintain requirements

The purpose of Maintain Requirements is to retain requirement accuracy and consistency throughout and beyond the change during the entire requirements life cycle, and to support reuse of requirements in other solutions

- Requirements are maintained so that they remain correct and current after an approved change.
- For requirements to be properly maintained they must be clearly named and defined, and easily available to stakeholders.

Requirements Attributes

Reference/ Identifier	The unique identifier of the requirement
Name	The name of the requirement, typically a short description
Description	The definition of the requirement **Structure:** The system shall/should/will provide (whom/actor) with the ability to <process verb>
Type	Functional/Non-functional
Author	The business analyst who defined the requirement and needs to be consulted should the requirement later be found to be ambiguous, unclear, or in conflict
Source	The person or document, originator for the requirement
Priority	The relative importance of requirements
Status	Indicates the state of the requirement, whether it is proposed, accepted, verified, postponed, cancelled, or implemented
Related Requirements	Any requirements related to current requirement

Configuration Management

- **Configuration Management –** a discipline applying technical and administrative direction and surveillance to:
  - Identify and document the functional and physical characteristics of a configuration item, control changes to those characteristics, record and report change processing and implementation status, and verify compliance with specified requirements.

- The purpose of Configuration Management is to establish and maintain the integrity of the products (components, data, and documentation) and the system artifacts, throughout the development and product life cycle.

Configuration management in Business Analysis

- In the context of Business Analysis, Configuration Management ensures that all work products (outcomes) of Business Analysis are :
  - Identified
  - Version controlled
  - Tracked for changes
  - Related to each other
  - Related to other items (e.g., development artifacts) so that traceability can be maintained throughout the realization or maintenance process.

Change Management

- Change Management can be considered as a sub-discipline of Configuration Management, and supports managing changes of the requirements in an effective way.
  - (1) A structured approach to transitioning individuals, teams, and organizations from a current state to a desired future state.
  - (2) A controlled way to effect a change, or a proposed change, to a product or service.

Change Management

- Changes can result from:
  - New or changing business requirements (resulting from new regulations, changes within the business domain, new capabilities requested by stakeholders, etc.)
  - Solution improvement efforts
  - Business process improvement initiatives
  - A defect found in the code, documentation or requirements
  - External changes (regulatory, legal, etc.)

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Change Management

The Change Management process typically includes the following elements:

- Identifying a need for a change
- Requesting modification (raising a Change Request)
- Analyzing the change request (including impact analysis)
- Evaluating and estimating the change
- Planning the change realization
- Realization of the change
- Reviewing and closing the Change Request

Assess requirements changes

- The purpose of Assess Requirements Changes is to evaluate the implications of proposed changes to requirements and designs
- The task is performed as new needs or possible solutions are identified
- Assessment must be performed to determine whether a proposed change will increase the value of the solution, and if so, what action should be taken

Assess requirements changes

- Define change assessment process formality
- Perform impact analysis
  - **Benefit** - the benefit that will be gained by accepting the change
  - **Cost** - the total cost to implement the change including the cost to make the change, the cost of associated rework, and the opportunity costs such as the number of other features that may need to be sacrificed or deferred if the change is approved
  - **Impact** - the number of customers or business processes affected if the change is accepted.
  - **Schedule** - the impact to the existing delivery commitments if the change is approved
  - **Urgency** - the level of importance including the factors which drive necessity such as regulator or safety issues

Approve requirements

The purpose of Approve Requirements is to obtain agreement on and approval of requirements and designs for business analysis work to continue and/or solution construction to proceed.

- Approval of requirements and designs may be formal or informal
- Business analysts work with key stakeholders to gain consensus on new and changed requirements, communicate the outcome of discussions, and track and manage the approval.

Conflict Management

- Collaborating: win/win
- Compromising: win some/lose some
- Accommodating: lose/win
- Competing: win/lose
- Avoiding: no winners/no losers

- A typical Conflict Management process includes the following activities:
  - Conflict identification
  - Conflict analysis
  - Conflict resolution

Prioritization

- Prioritization is a process used to determine the relative importance of business analysis information.
- The importance may be based on value, risk, difficulty of implementation, or other criteria
- Approaches for prioritization
  - Grouping
  - Ranking
  - Time boxing/Budgeting
  - Negotiation

Prioritize requirements

- The purpose of Prioritize Requirements is to rank requirements in the order of relative importance for the stakeholders.
- Priority can refer to the relative value of a requirement, or to the sequence in which it will be implemented
- Prioritization is an ongoing process, with priorities changing as the context changes
- Inter-dependencies between requirements are identified and may be used as the basis for prioritization

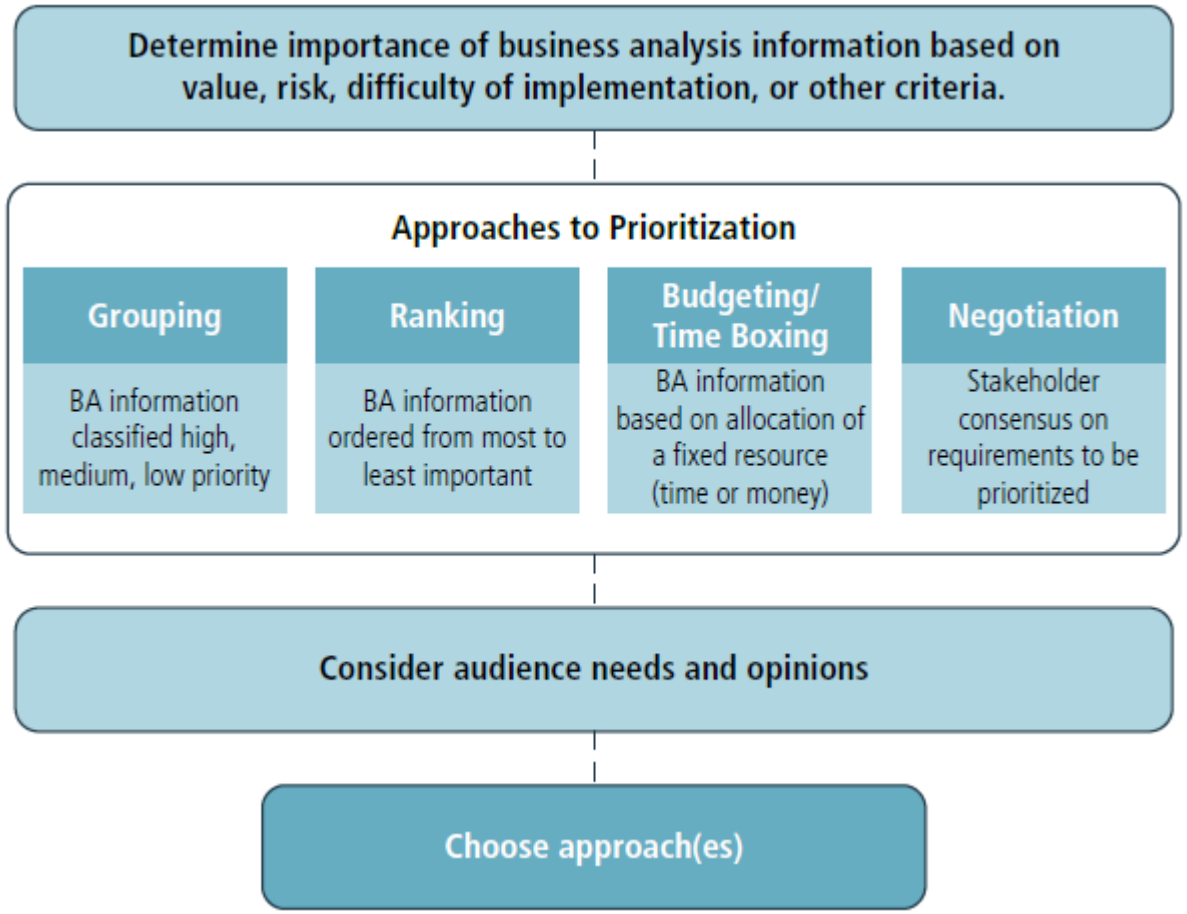
Prioritize requirements

- Provides a framework for business analysts to facilitate stakeholder decisions and to understand the relative importance of business analysis information.
- Risk factors:
  - Benefit
  - Penalty
  - Cost
  - Risk
  - Dependencies
  - Time Sensitivity
  - Stability
  - Regulatory or Policy Compliance

Prioritize requirements

Benefit	
Penalty	the consequences that result from not implementing a given requirement
Cost	the effort and resources needed to implement the requirement
Risk	the chance that the requirement cannot deliver the potential value, or cannot be met at all
Dependencies	relationships between requirements where one requirement cannot be fulfilled unless the other requirement is fulfilled
Time Sensitivity	the 'best before' date of the requirement, after which the implementation of the requirement loses significant value
Stability	the likelihood that the requirement will change, either because it requires further analysis or stakeholders have not reached a consensus
Regulatory or Policy Compliance	requirements that must be implemented in order to meet regulatory or policy demands imposed on the Organization

Prioritization



MoSCoW Prioritization

MoSCoW provides a way to reach a common understanding on relative importance of delivering a requirement or other piece of value in the product

- **M** – Must have. Mandatory, absolutely essential requirement
- **S** – Should have. Mandatory, but may be deferred for a short time
- **C** – Could have. Desirable but may not be implemented due to time and budget.
- **W** – Want to have but won't have this time.

Prioritization

T-shirt sizing

T-shirt sizing is a way to practice relative **sizing** in Agile. By comparing requirements, you can break them into buckets of extra-small (XS), small (S), medium (M), large (L), and extra-large (XL). Estimating in relative buckets is more important than estimating absolute time or effort

Prioritization

Strengths of Prioritization

- Facilitates consensus building and trade-offs and ensures that solution value is realized and initiative timelines are met

Limitations of Prioritization

- Some stakeholders may attempt to avoid difficult choices and fail to recognize the necessity for making trade-offs.
- The solution team may intentionally or unintentionally try to influence the result of the prioritization process by overestimating the difficulty or complexity of implementing certain requirements.
- Metrics and key performance indicators are often not available when prioritizing business analysis information; therefore, a stakeholder's perspective of the importance may be subjective.

Backlog Management

- The backlog is used to record, track, and prioritize remaining work items
- A backlog occurs when the volume of work items to be completed exceeds the capacity to complete them.
- Backlog management refers to the planned approach to determine:
  - what work items should be formally included in the backlog,
  - how to describe the work items,
  - how the work items should be tracked,
  - how the work items should be periodically reviewed and prioritized in relation to all other items in the backlog,
  - how the work items are eventually selected to be worked on, and
  - how the work items are eventually removed from the backlog.

Backlog Management

- **Prioritization** - Items in the backlog are prioritized relative to each other

- **Estimation** - The level of detail used to describe each backlog item may vary considerably. Items near the top of the backlog are usually described in more detail, with a correspondingly accurate estimate about their relative size and complexity that would help to determine the cost and effort to complete them

- **Managing Changes to the Backlog -** When new or changed requirements are identified, they are added to the backlog and ordered relative to the other items already there.

Backlog Management

Backlog items may be any kind of item which may have work associated with it. A backlog may contain, but is not limited to, any combination of the following

- items:
- use cases,
- user stories,
- functional requirements,
- non-functional requirements,
- designs,
- customer orders,
- risk items,
- change requests,
- defects,
- planned rework,
- maintenance,
- conducting a presentation, or
- completing a document.

Exam Questions

Question 1

Which of the following techniques is used for information elicitation?

- [A] UML
- [B] Interview
- [C] MoSCoW
- [D] Ishikawa diagram

Question 2

Which of the following statements about UML is **not** true?

- [A] UML contains structural diagrams to model dynamic aspects of system.
- [B] UML allows the user to model the solution from different perspectives.
- [C] UML is a unified notation for the analysis and design of systems.
- [D] UML contains behavior diagrams depicting behavioral features of a system or business process.

Question 3

Which of the following diagrams would be the best option to directly express functional requirements for a system?

- [A] UML activity diagram
- [B] UML class diagram
- [C] UML state machine
- [D] UML use case diagram

Question 4

- The following tables present the traceability between business needs, requirements and test cases. The mark “X” in the table means that a given need is covered by a given requirement and a given requirement is covered by a test case. Every change in any artifact A implies the analysis of all the artifacts that are traced back to A.

	Business need 1	Business need 2	Business need 3
Requirement 1	X		
Requirement 2		X	
Requirement 3		X	X
Requirement 4			X

	Req 1	Req 2	Req 3	Req 4
Test case 1	X			
Test case 2	X			
Test case 3		X		
Test case 4			X	
Test case 5			X	X
Test case 6			X	

The client decided to change the Business Need 3. How many test cases are needed to be analyzed in this situation?

- [A] 3
- [B] 4
- [C] 5
- [D] It is impossible to answer, because the test cases are not traced back to the business needs.

Question 5

Which of the following statements correctly defines the objective of configuration management?

- [A] Configuration management includes configuration identification, configuration change control, configuration status accounting, and configuration audit.
- [B] Configuration management aims to create and manage the association existing between artifacts on different abstraction levels
- [C] Configuration management aims to establish and maintain the integrity of the products and relevant artifacts, throughout the development and product life cycle.
- [D] Configuration management aims to manage versions of requirements artifacts that were already implemented and deployed into production.

Section Conclusion and Summary

The learning objectives for this section were:

- Learn how to create traceable requirements
- Maintain requirements
- Understand the importance of the requirements prioritization and learn how to prioritize them
- Assess requirements changes
- Manage conflicts between the stakeholders during the requirements approval

Module 6:

Solution Evaluation and Optimization

Section learning objectives

- Solution evaluation definition
- Assessing the solution options (proposals)
- Evaluating performance of the solution
- Solution/business process optimization
- Exam question

Solution evaluation

- **Evaluation** – systematic assessment of an organization, process, or solution to determine its status and/or performance in meeting objectives over time, and to identify ways to improve it to better meet objectives.

- IQBBA: Solution Evaluation covers a set of activities that are performed in order to ensure that the capabilities provided by the solution proposal fulfill the stated Business Need(s), and satisfy business, stakeholder and solution requirements.

- Describes the tasks that business analysts perform to assess the performance of and value delivered by a solution in use by the enterprise, and to recommend removal of barriers or constraints that prevent the full realization of the value.

Solution Evaluation

Solution Evaluation tasks can be performed on solution components in varying stages of development:

- **Prototypes or Proofs of Concept**: working but limited versions of a solution that demonstrate value
- **Pilot or Beta releases**: limited implementations or versions of a solution used in order to work through problems and understand how well it actually delivers value before fully releasing the solution.
- **Operational releases**: full versions of a partial or completed solution used to achieve business objectives, execute a process, or fulfill a desired outcome.

Tasks in Solution Evaluation

- Measure solution performance
- Analyse performance measures
- Assess solution limitations
- Assess enterprise limitations
- Recommend Actions to Increase Solution Value

Measure solution performance

- Performance measures determine the value of a newly deployed or existing solution.
- The measures used depend on the solution itself, the context, and how the organization defines value.
- Measure types
  - **Quantitative Measures**: are numerical, countable, or finite, usually involving amounts, quantities, or rates.
  - **Qualitative Measures**: are subjective and can include attitudes, perceptions, and any other subjective response. Customers, users, and others involved in the operation of a solution have perceptions of how well the solution is meeting the need.

Analyze performance measures

- In order to meaningfully analyze performance measures, business analysts require a thorough understanding of the potential value that stakeholders hope to achieve with the solution.
- To assist in the analysis, variables such as the goals and objectives of the enterprise, key performance indicators (KPIs), the level of risk of the solution, the risk tolerance of both stakeholders and the enterprise, and other stated targets are considered

Assess solution limitations

- Determine the factors internal to the solution that restrict the full realization of value
- Assessing solution limitations identifies the root causes for under-performing and ineffective solutions and solution components
- This assessment may be performed at any point during the solution life cycle. It may occur on a solution component during its development, on a completed solution prior to full implementation, or on an existing solution that is currently working within an organization.

Assess enterprise limitations

- Determine how factors external to the solution are restricting value realization
- Solutions may depend on environmental factors that are external to the enterprise.
- Enterprise limitations may include factors such as culture, operations, technical components, stakeholder interests, or reporting structures
- This assessment may be performed at any point during the solution life cycle. It may occur on a solution component during its development or on a completed solution prior to full implementation

Recommend Actions to Increase Solution Value

- Understand the factors that create differences between potential value and actual value, and to recommend a course of action to align them
- Recommendation types
  - Do nothing
  - Organizational change
  - Reduce complexity of interfaces
  - Avoid waste
  - Identify additional capabilities
  - Retire solution

Common methods for Solution Evaluation

- Common methods for evaluating a solution:
  - Reviews and inspection (often based on a Requirements Traceability Matrix (RTM) and/or requirements specification documents)
  - Demonstrating the solution proposal (prototype) to the stakeholders with the aim of explaining and confirming the appropriateness of the implemented requirements
  - Collecting stakeholder’s feedback regarding the solution proposal(s)

Common methods for Solution Evaluation

- Common methods for evaluating a released solution include:
  - Reviews against defined KPIs, or acceptance and evaluation criteria
  - Reviews against requirements stated in the Business Case
  - Root cause analysis (for problem analysis)
  - Usability evaluation

Exam Questions

Question 1

You are examining a solution deployed into the working environment against requirements defined in a Business Case. According to the Business Case, end users should be able to use the solution without a need for any additional training or instruction.

What solution evaluation activity will be needed to conduct the evaluation?

- [A] Usability evaluation
- [B] Reviews against performance metrics
- [C] Reviews against technical requirements
- [D] Feasibility analysis

Question 2

You would like to demonstrate the solution proposal to the stakeholders with the aim of explaining and confirming the appropriateness of the implementation of the requirements. The Business Case contains the following constraint:

“To demonstrate the proper implementation of each requirement, the statement coverage (achieved by the test cases) for each of the features related to this requirement must be 80% or higher”

You obtained the following report on features and coverage:

Based on the information covered by the above scenario, what should be the next step to be done?

Requirement	Feature	Statement coverage
Login	Correct login process when all data correct	100%
Login	Ability to re-enter the password if wrong	85%
Login	“Forgot password” reminding mechanism	80%
Registering	Correct registration if all data correct	90%
Registering	Report on mistakes if some data wrong	75%

- [A] One of the features should be tested more thoroughly.
- [B] The solution meets the Business Case constraints and it can be presented to the client.
- [C] “Login” requirement needs more testing.
- [D] One feature for the “Registering” requirement is missing.

Question 3

Which of the following is not a typical purpose of optimization?

- [A] Reducing operational cost
- [B] Improving quality
- [C] Facilitating communication with other solutions
- [D] Reducing the number of system functions

Section Learning Objectives Reflection

The learning objectives for this section are:

- Solution evaluation definition
- Assessing the solution options (proposals)
- Evaluating performance of the solution
- Solution/business process optimization
- Exam question