



PXL – IT

42TIN1280 Software Analysis

Introduction

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MET HET NETWERK**

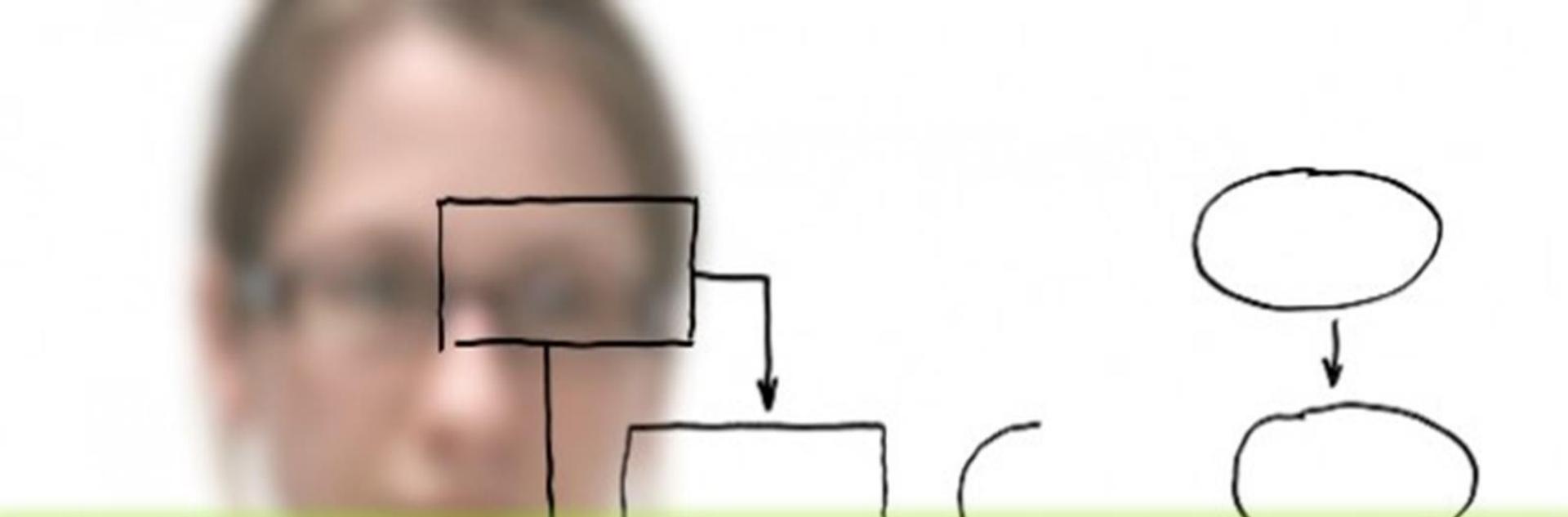
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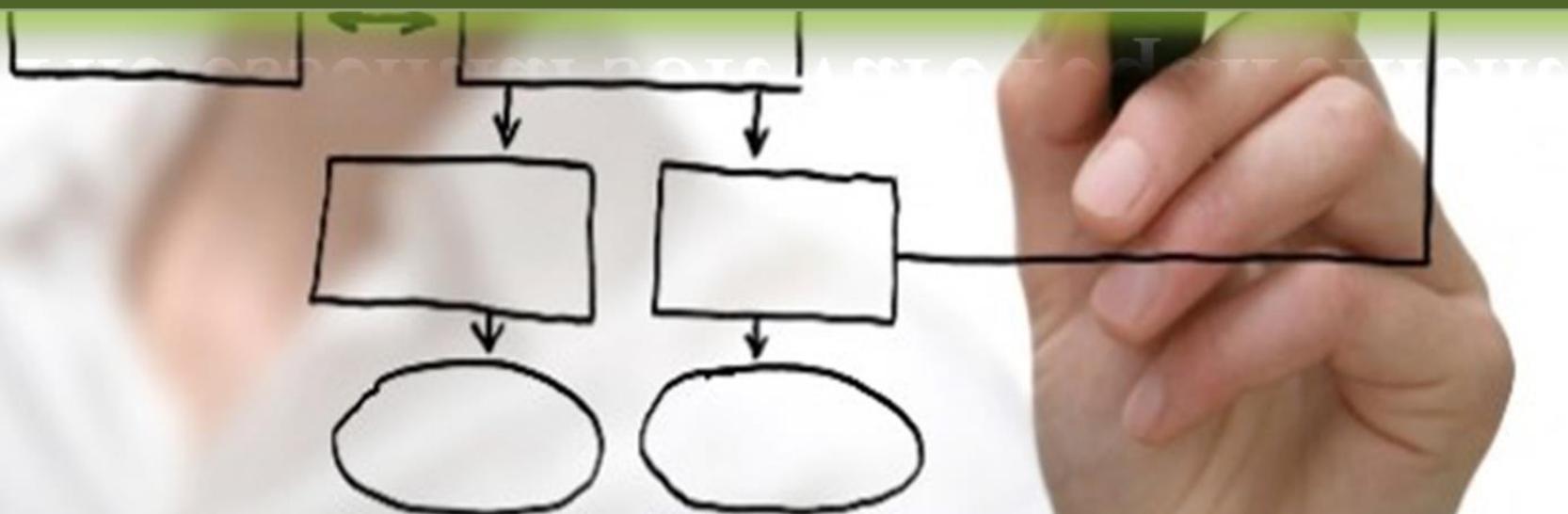
Content

- The essential software requirement
- What are requirements?
- Levels and types of requirements
- Requirements development and management
- Brief history of requirements methods & modeling
- The role of the analyst
- Questions & Answers





The essential software requirement

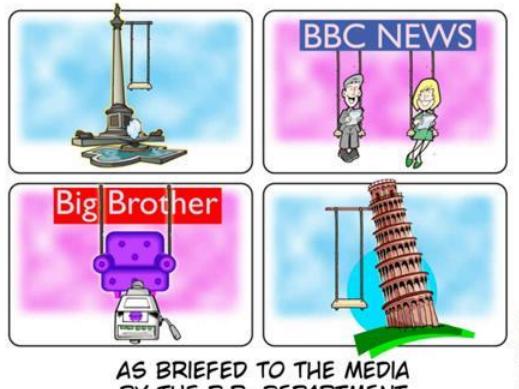
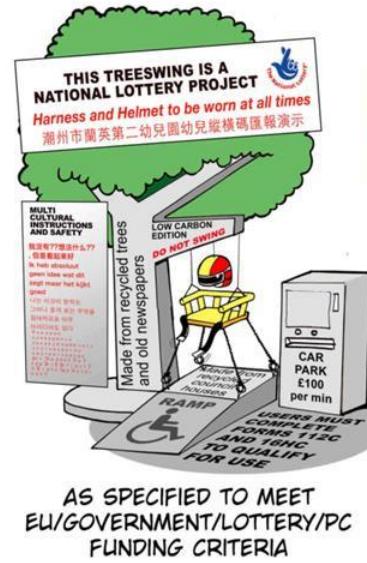
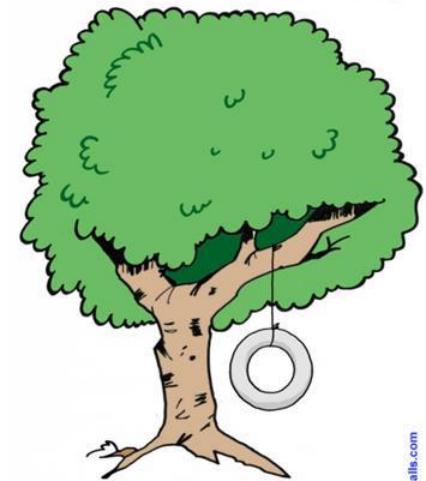


The essential software requirement

- Why do we need requirements?
 - As a group describe in one or two keywords the important requirements problems from your projects / organizations, what resulted from these problems (consequences) and any ideas for improvement you can think of (solutions).
 - Give examples, explain the examples
 - Discussion afterwards
 - *Cf. MS Word “WK01 - 02 - Assignment – Requirements Methods -1516.docx”*



The essential software requirement



WHAT THE DIGITAL
DEPARTMENT DEVELOPED



The essential software requirement

- To capture the need or problem completely and unambiguously without resorting to specialist jargon, thus understandable to our customer
- They form the basis for:
 - Project planning
 - Trade-off
 - Risk management
 - System & Acceptance testing
 - Change control



The essential software requirement

- Why? Facts and figures ...
 - Most significant contributors to project failure relate to requirements (Standish Group CHAOS report)

CHAOS 2004

SURVEY RESULTS

Resolution of Projects



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Project Challenged Factors	% of Responses
1. Lack of User Input	12.8%
2. Incomplete Requirements & Specifications	12.3%
3. Changing Requirements & Specifications	11.8%
4. Lack of Executive Support	7.5%
5. Technology Incompetence	7.0%
6. Lack of Resources	6.4%
7. Unrealistic Expectations	5.9%
8. Unclear Objectives	5.3%
9. Unrealistic Time Frames	4.3%
10. New Technology	3.7%
Other	23.0%



The essential software requirement

- Why? Facts and figures ...
 - Most frequently named cause of total project failure:
changing requirements (Study Computer Industry Daily of 500 IT managers USA &UK)
 - **Requirements Management** seen as biggest problem in software development processes (EU Survey)
 - Investing less than 5% in gathering and processing requirements will lead to **budget overruns** of approximately 80% - 200%
 - 50% of the **defects** reported during dynamic testing can be traced to requirements engineering and/or requirements management

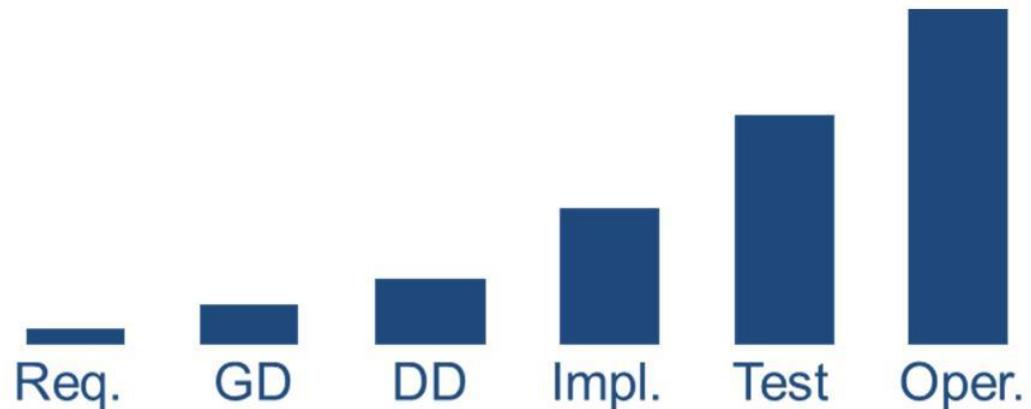


The essential software requirement

- Why? Facts and figures ...
 - Requirements defects are the most important
 - Defects have the characteristic to multiply themselves top-down
 - Costs of rework rise exponentially

Example (Intel):

Req.	\$200
Test	\$6,000
Field	\$18,000



The essential software requirement

- Who needs requirements - and why?

(Cf. MS Word "WK01 - 02 - Assignment - Requirements Methods -1516.docx" – exercise 02)

- User categories

-
-
-

- Requirements needs

- ...
...
...



The essential software requirement

- Who needs requirements - and why?
- **Conclusion**
 - Without this, how can we run a project?
Requirements have a direct influence on the success of the development project!!





What are requirements?

Requirement ID	Description	Status	Owner	Last Update
R-001	System must support user authentication.	Pending Review	John Doe	2023-06-15
R-002	System must allow users to create accounts.	In Progress	Jane Smith	2023-06-15
R-003	System must store user data securely.	Approved	John Doe	2023-06-15
R-004	System must provide user interface for account management.	Pending Review	Jane Smith	2023-06-15
R-005	System must handle multiple users simultaneously.	In Progress	John Doe	2023-06-15
R-006	System must generate reports on user activity.	Pending Review	Jane Smith	2023-06-15
R-007	System must integrate with external APIs.	In Progress	John Doe	2023-06-15
R-008	System must be accessible via mobile devices.	Pending Review	Jane Smith	2023-06-15
R-009	System must support multi-factor authentication.	In Progress	John Doe	2023-06-15
R-010	System must be compliant with data protection regulations.	Pending Review	Jane Smith	2023-06-15

What are requirements?

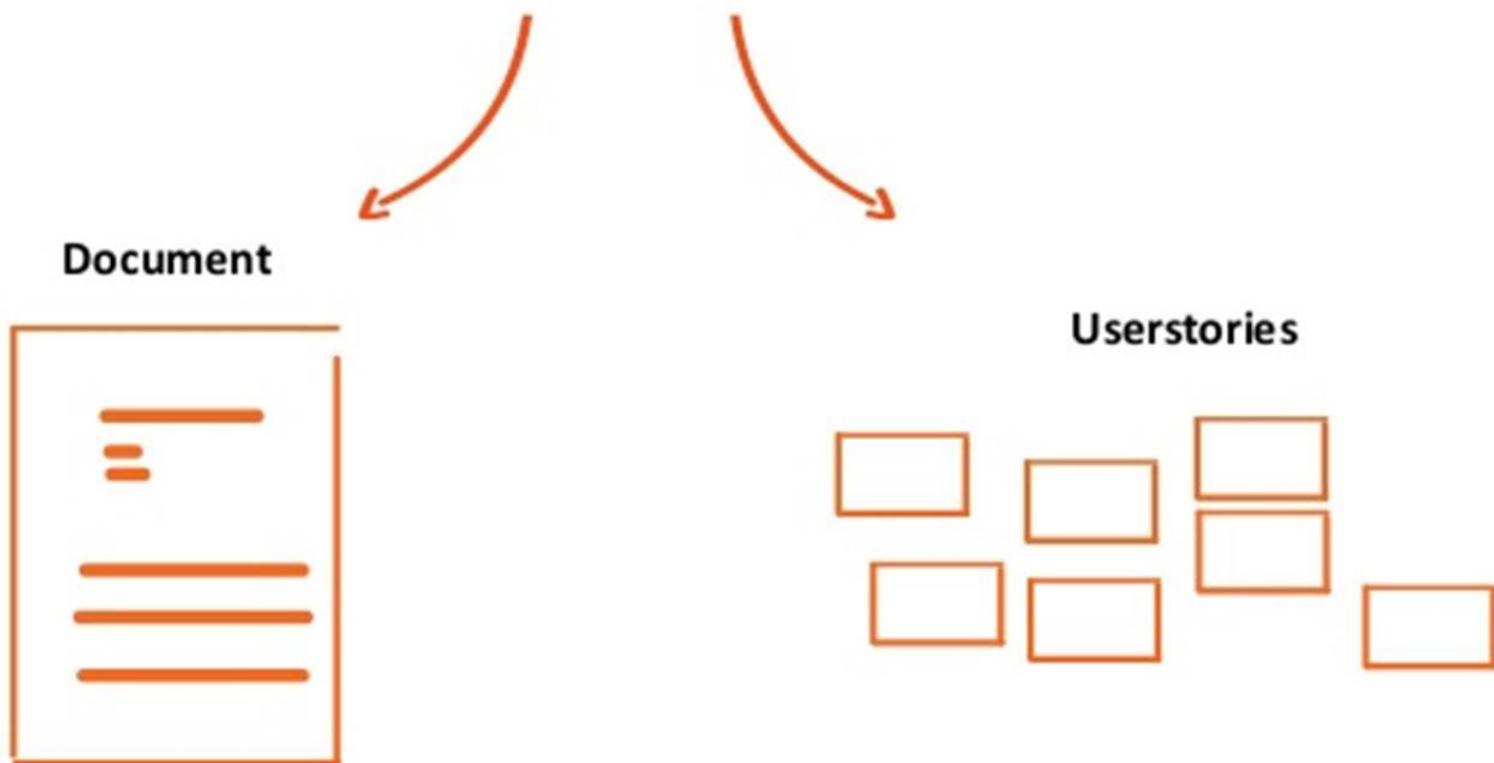
Requirements are a specification of what should be implemented. They are descriptions of how the system should behave, or of a system property or attribute. They may be a constraint on the development process of the system.

Don't assume that all your project stakeholders share a common notion of what requirements are. Establish definitions up front so that you're all talking about the same things.



What are requirements?

They are a little bit something like a contract
between the stakeholder and the project manager !



What are requirements?

**Conditions or capabilities needed by a user/stakeholder
to solve problem or achieve an objective**

Scope : the sum of the products, services and results
to be provided as a project

Project Scope :
the work that must be performed to deliver
a product, service or result with the
specified features and functions

Product Scope :
the features and functions that characterize
the product, service or result



What are requirements?



- According to IEEE a requirement is
 - A. a condition or capability needed by a user to solve a problem or achieve an objective
 - B. 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
 - C. a documented representation of a condition or capability as in (A) or (B)





Levels and types of requirements



Levels and types of requirements

- Three kinds of requirements
 - **Functional requirement:**
 - defines a function that has to be offered by the system to be created or one of its components
 - **Quality requirement:**
 - defines a qualitative property that the system to be created or one of its functions has to offer
 - **Constraint:**
 - A requirement that limits the solution space beyond what is necessary for meeting the given functional requirements and quality requirements.

Non-functional
requirements



Levels and types of requirements

Term	Description
???	A high-level business objective of the organization that builds a product or of a customer who procures it.
???	A policy, guideline, standard, or regulation that defines or constrains some aspect of the business. Not a software requirement in itself, but the origin of several types of software requirements
???	A restriction that is imposed on the choices available to the developer for the design and construction of a product
???	A description of a connection between a software system and a user, another software system, or a hardware device.
???	One or more logically related system capabilities that provide value to a user and are described by a set of functional requirements

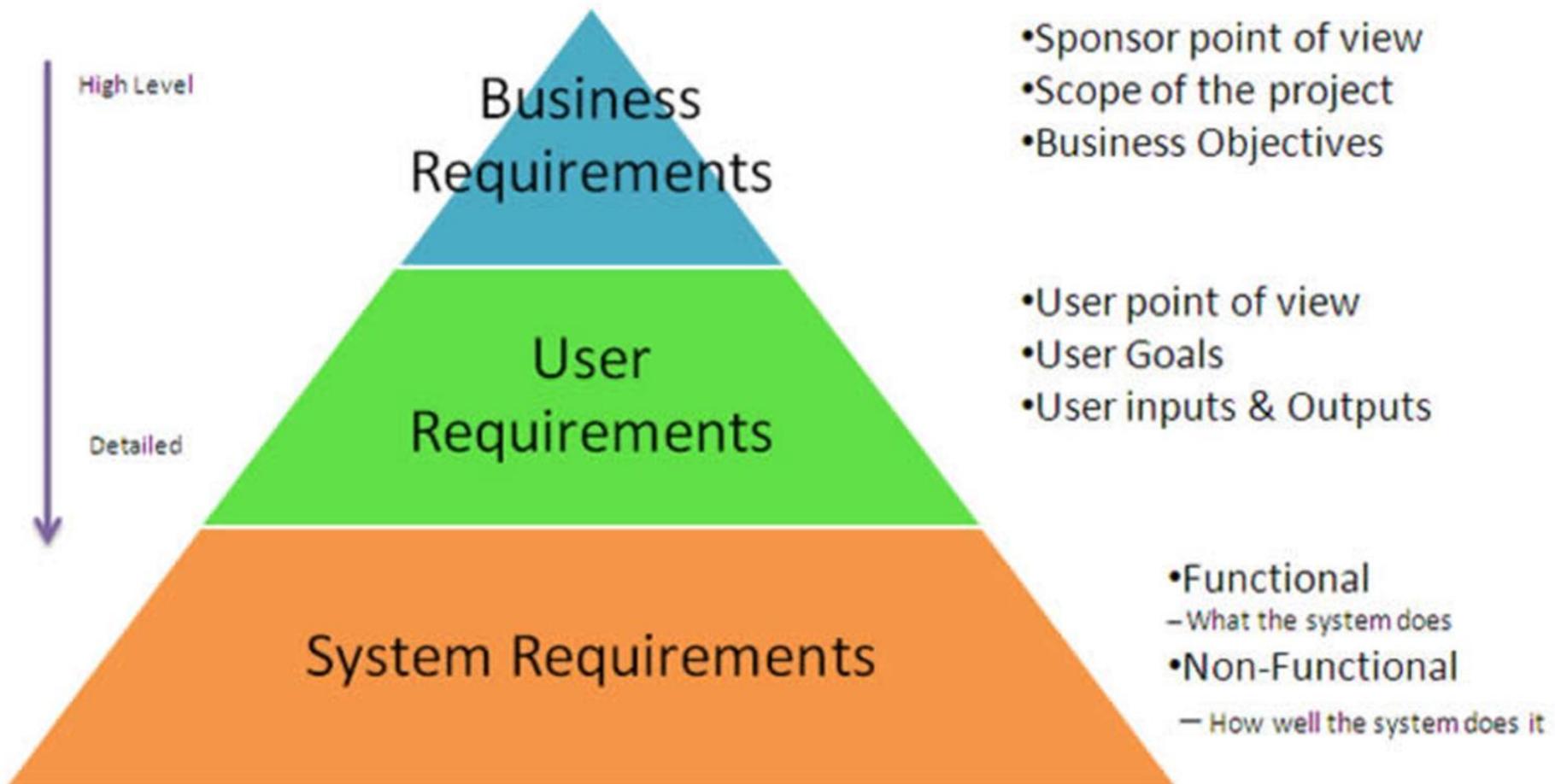


Levels and types of requirements

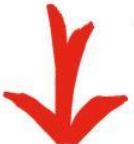
Term	Description
???	A description of a behavior that a system will exhibit under specific conditions.
???	A description of a property or characteristic that a system must exhibit or a constraint that it must respect.
???	A kind of nonfunctional requirement that describes a service or performance characteristic of a product
???	A top-level requirement for a product that contains multiple subsystems, which could be all software or software and hardware.
???	A goal or task that specific classes of users must be able to perform with a system, or a desired product attribute



Levels and types of requirements



Levels and types of requirements

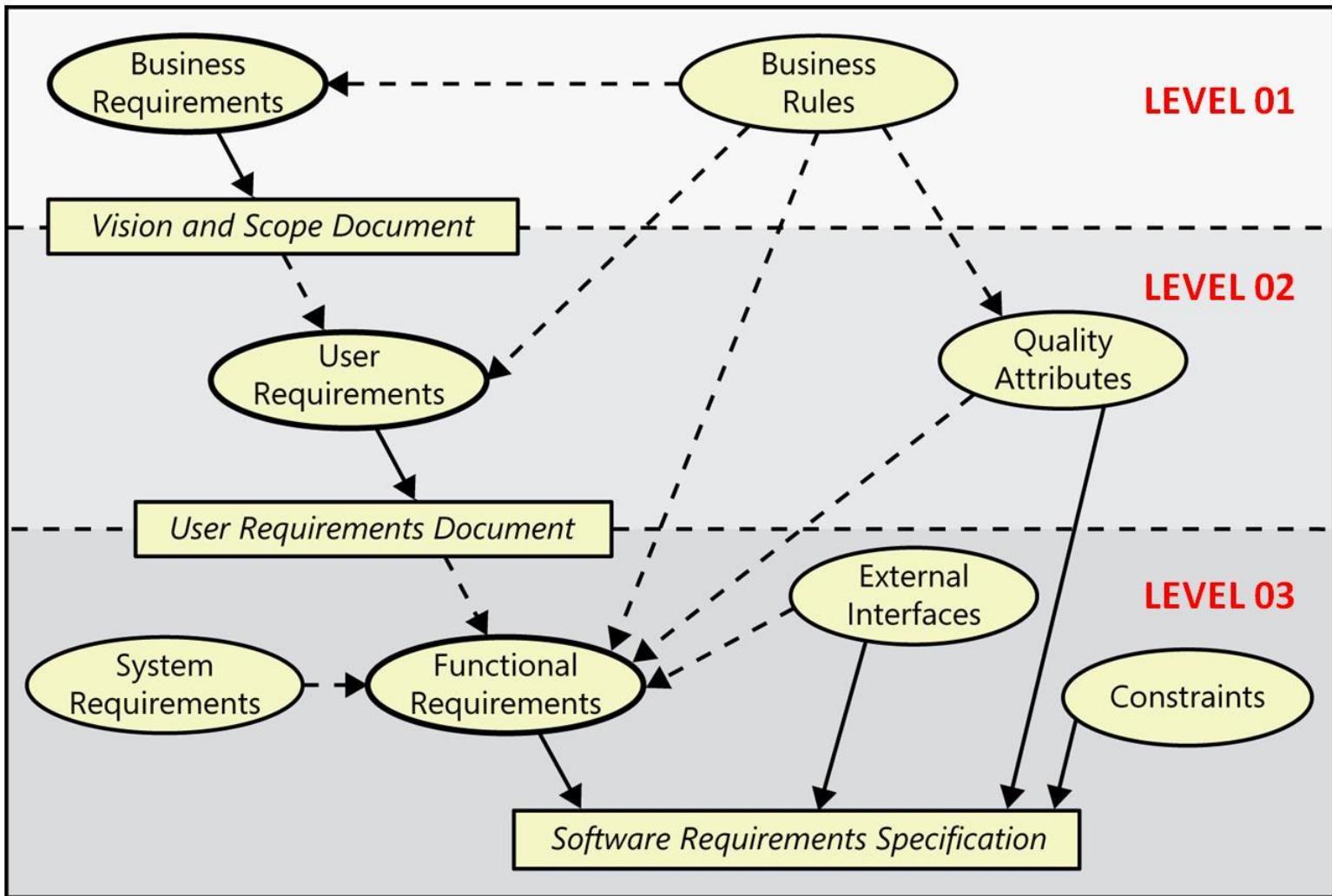
- Levels and types of requirements
 - User Requirements Specification The user shall be able to ...
 - System Requirements Specification The product shall ...
 - Detailed Requirements Specification
 - Are these still requirements ?
 - Many different supporting diagram and modeling techniques

Levels and types of requirements

- Typical levels
 - User requirements - problem domain
 - Stakeholder's view
 - State what the stakeholders want to achieve through use of the system.
 - Avoid reference to any particular solution.
 - System requirements - solution domain
 - Analyst's view
 - State abstractly how the system will meet the stakeholder requirements.
 - Avoid reference to any particular design.



Levels and types of requirements



Levels and types of requirements

- Bad/good requirements – why? (Cf. MS Word)
 1. We need to be able to respond to a code red incident anywhere on the planet within 24 hours.
 2. The system shall validate and accept credit cards and cashier's checks. High priority.
 3. The system shall process all mouse clicks very fast to ensure user's do not have to wait
 4. I want the system to automatically calculate sales taxes based on relevant sales tax laws.
 5. The website visitor won't need to click more than once to get to the order page from any other page on the site.



Levels and types of requirements

- Bad/good requirements – why?
 6. The user must have Adobe Acrobat installed.
 7. Sales needs to be able to see which contracts will be expiring within the upcoming 90 days.
 8. The clerk enters basic loss information specific to the claim line. The system confirms that there are no existing, possibly competing claims and assigns a claim number. The clerk confirms they are finished; the system saves and triggers acknowledgement to be sent to the agent.

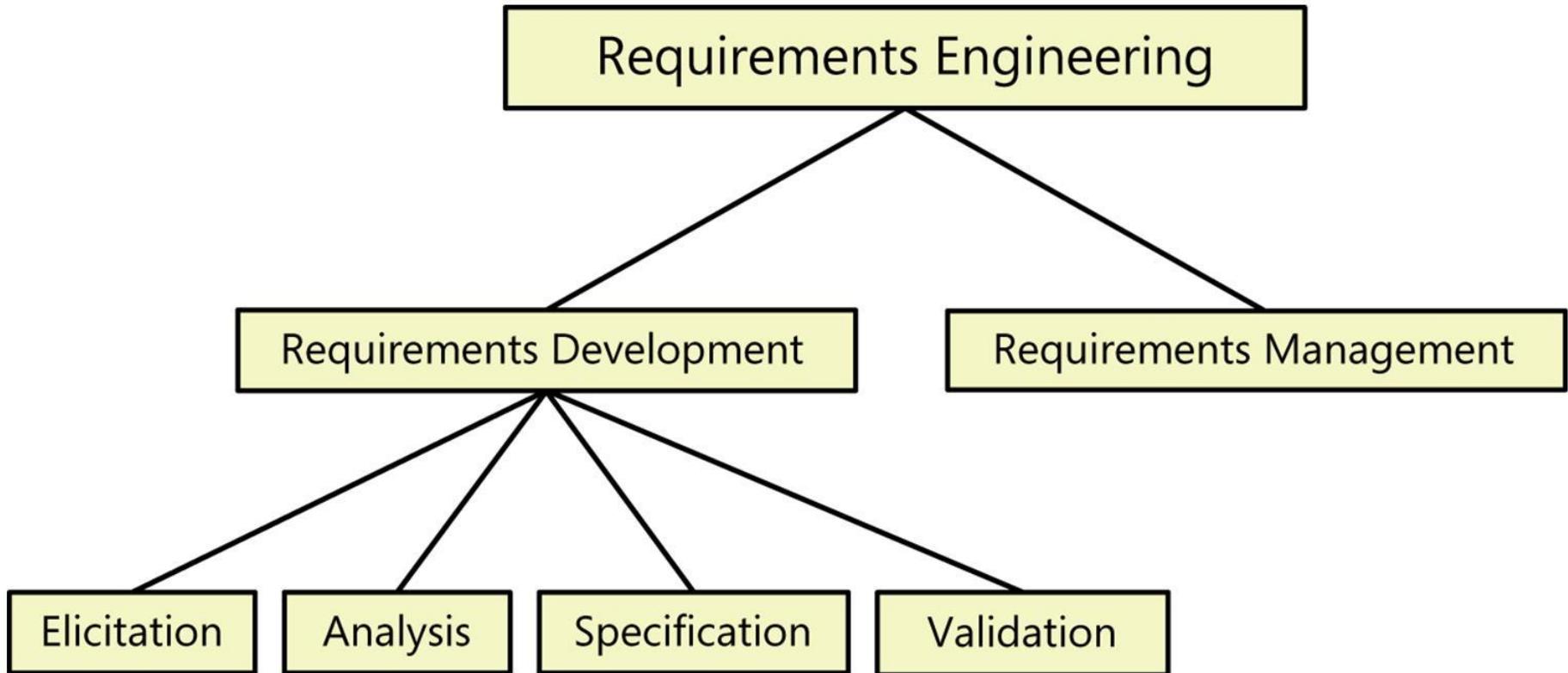




Requirements development & management (RE)



Requirements Engineering



Requirements Engineering

- A systematic and disciplined approach to the specification and management of requirements with the following goals:
 - Knowing the **relevant** requirements, achieving a **consensus** among the stakeholders about these requirements, **documenting** them according to the given standards, and managing them systematically,
 - Understanding and documenting the **stakeholders'** desires and needs,
 - Specifying and managing requirements to minimize the **risk** of delivering a system that does not meet the stakeholders' desires and needs.



Requirements Engineering

- 4 main activities
 - Elicitation
 - Documentation
 - Validation & Negotiation
 - Management of requirements



Requirements Management

- The process of managing existing requirements and requirements related artifacts.
- Includes particularly storing, changing and tracing of requirements.



Common Requirements problems

- Typical symptoms of inadequate RE:
 - Missing requirements
 - Unclear requirements
- Typical reasons for inadequate RE:
 - Wrong assumption stakeholders: ‘much is self-evident’
 - Communication problems
 - Experience
 - Knowledge
 - Project pressure from the client

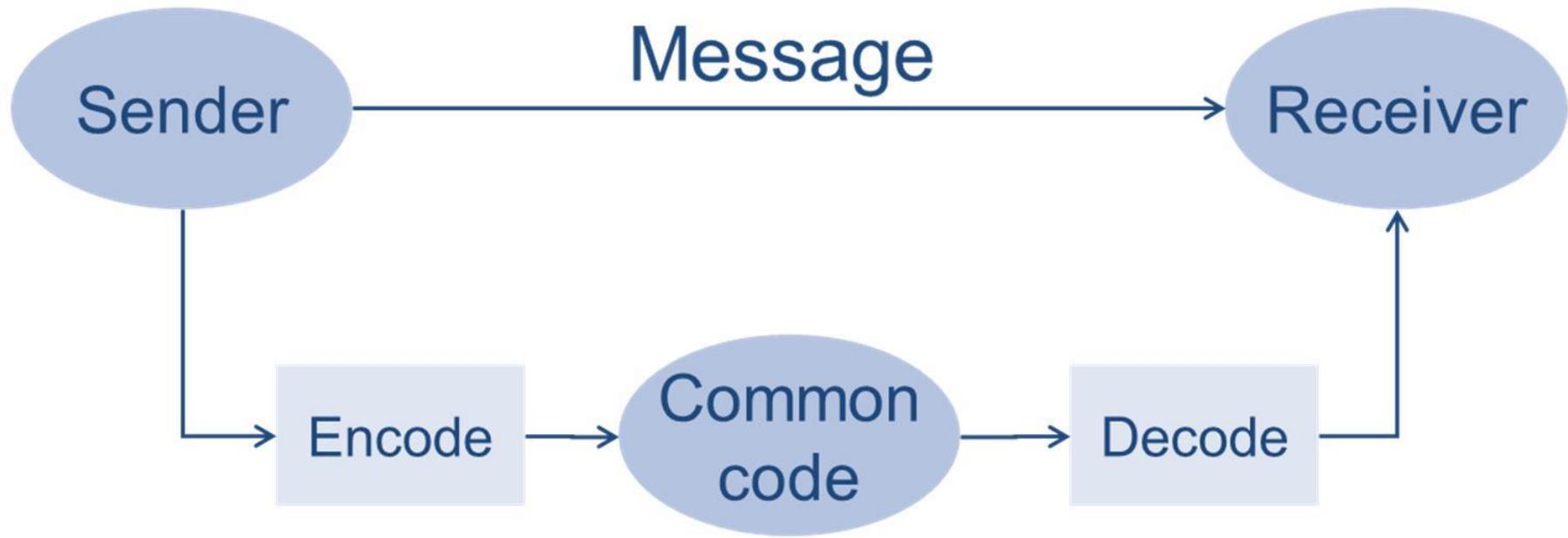


There is not one solution

- Influencing factors related to:
 - Business
 - Type of system, applicable standards, importance of quality requirements (RAMS: Reliability, Availability, Maintainability, Safety)
 - Project
 - Outsourcing, size, number and availability of stakeholders, customer involvement
 - Development process
 - Waterfall, V-Model, Iterative, Incremental, Agile
 - Human factors
 - Personal profiles, politics, cultural differences



Basic Communication Model



Informal vs. Formal Communication

- Informal descriptions (unstructured, no rules apply)
 - Subjective and thus misunderstood
 - No universal language
- Formal descriptions (defined rules)
 - No misunderstandings, re-usable
 - The description is appropriate to the matter at hand
- Cf. Requirements documentation: Requirements types, attributes rules and models will be introduced



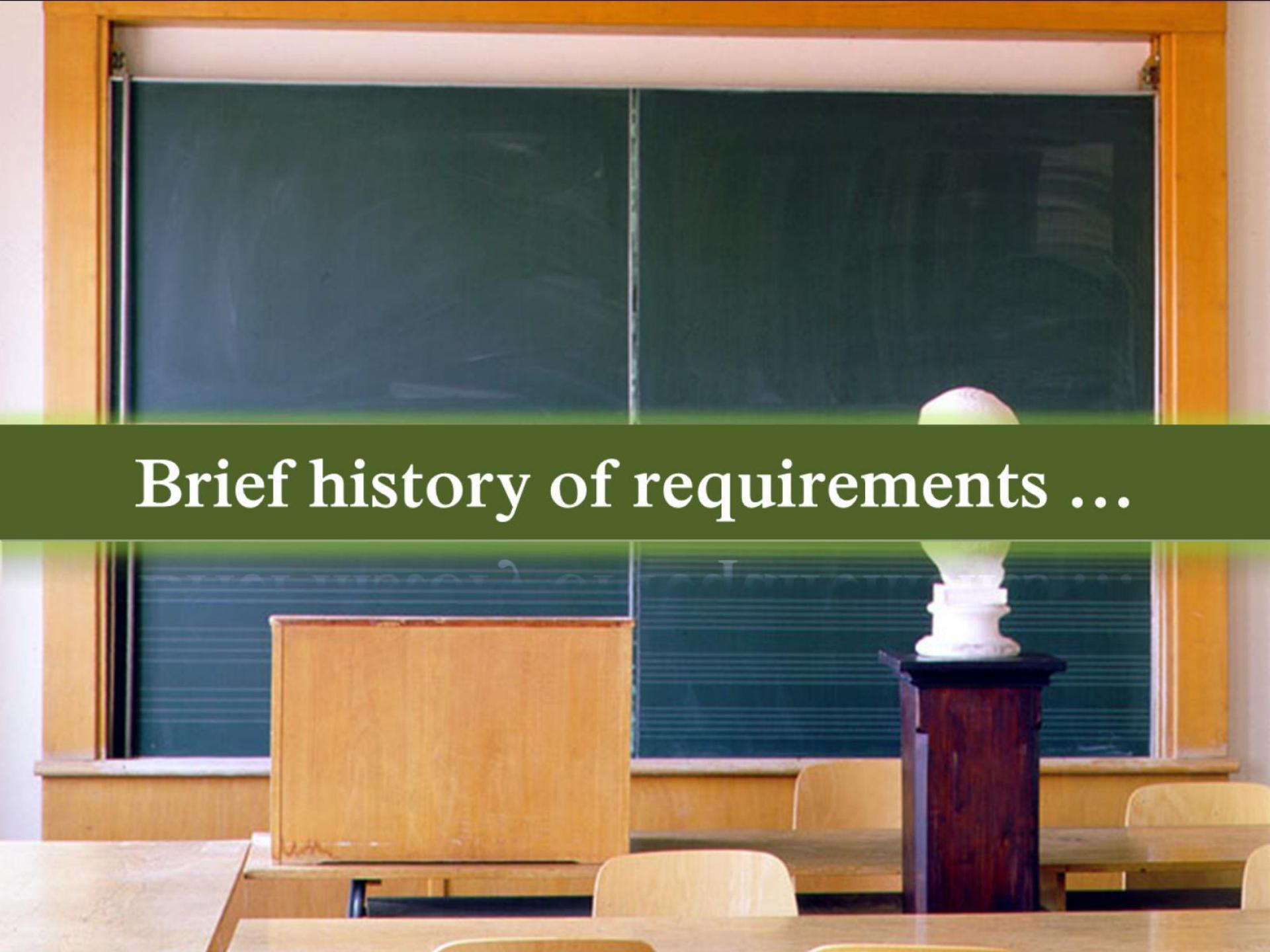
20 - 80 Rule in Communication

How a message is received is determined by:

- 20 % WHAT is said (words)
- 30 % on HOW it is said (tone used)
- 50 % by the EXPRESSION (face, attitude)

Explaining knowledge \Leftrightarrow Describing requirements
(Cf. behavior of business analyst, requirements engineer)



A photograph of a classroom interior. In the foreground, the backs of several light-colored wooden desks are visible. In the center background, there is a large, dark green chalkboard with some faint, illegible markings. To the right of the chalkboard stands a dark wooden pedestal on which sits a white, classical-style bust of a person's head. The walls of the room are a warm, yellowish-orange color.

Brief history of requirements ...

Brief history of requirements ...

Enterprise-Scale
Adaptive (Lean & Agile)
Processes



Adaptive
(Agile)
Processes

OpenUP
Crystal FDD
Scrum Lean Kanban
XP DSDM

Iterative
Processes

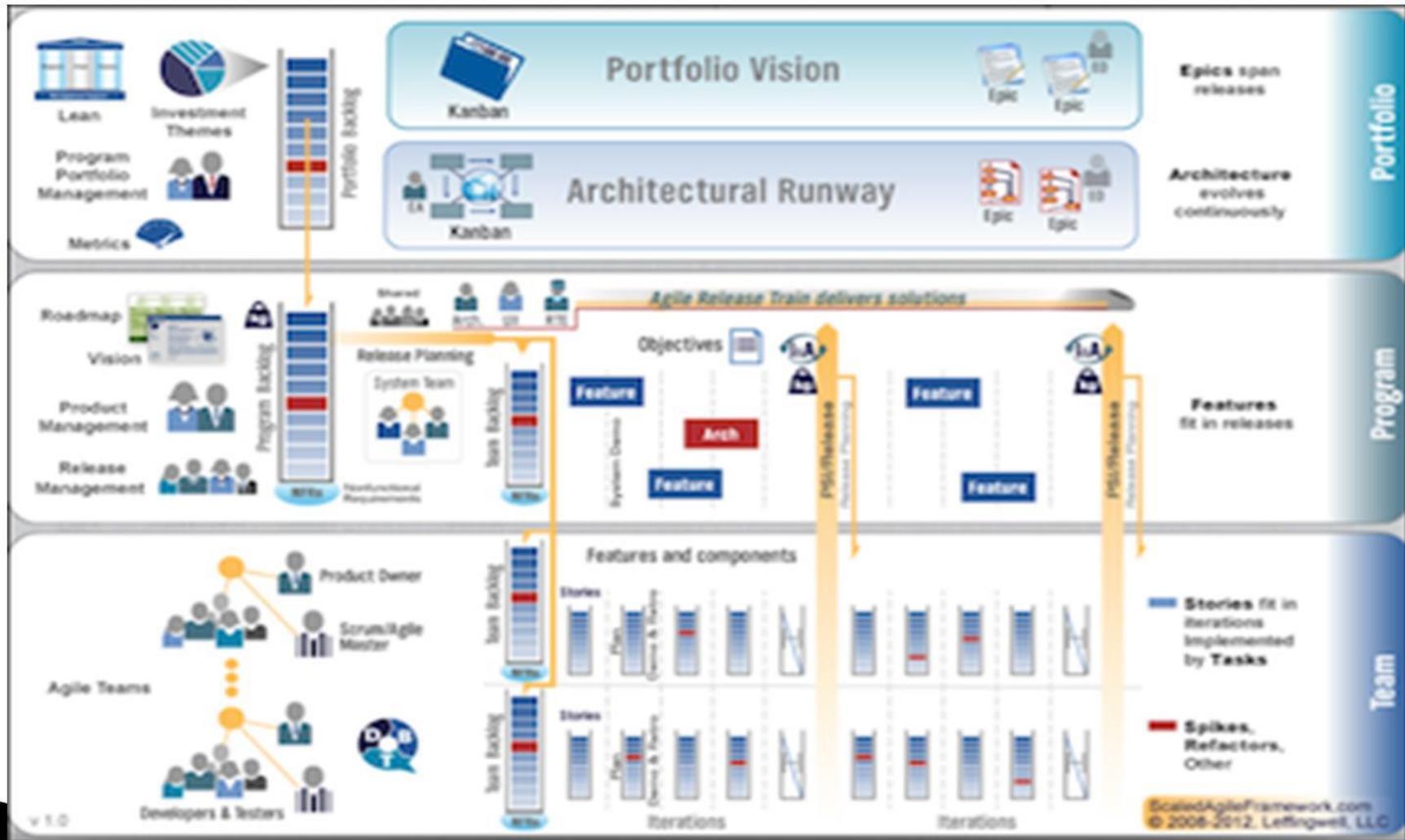
RAD Spiral
RUP

Predictive
Processes

Waterfall V-model
model



Brief history of requirements ...



Brief history of requirements ...

- Every group describes 1 model (Cf. MS Word)
- Next classes – to make good arrangements





The role of the analyst, requirements engineer

ENGI^NEER

What is Business Analysis?



Wikipedia Definition of Business Analysis

Business analysis is a research discipline of identifying business needs and determining solutions to business problems

<http://www.wikipedia.org>



IIBA Definition of Agile Business Analysis

Agile business analysis is about increasing the delivery of business value to the stakeholders of the project or product being developed.

<http://www.iiba.org/BABOK-Guide/Agile-Extension-to-the-BABOK-Guide-IIBA.aspx>
IIBA BABOK



IIBA

Business analysis is the set of skills and techniques used to facilitate communication among stakeholders in order to understand the needs and requirements of an organization, and to recommend solutions to achieve its goals.



AIBA Definition of Business Analysis

...effective Business Analysis capability will drive successful project execution and organisational performance improvement

<http://businessanalysis.com.au/>



The Business Analyst



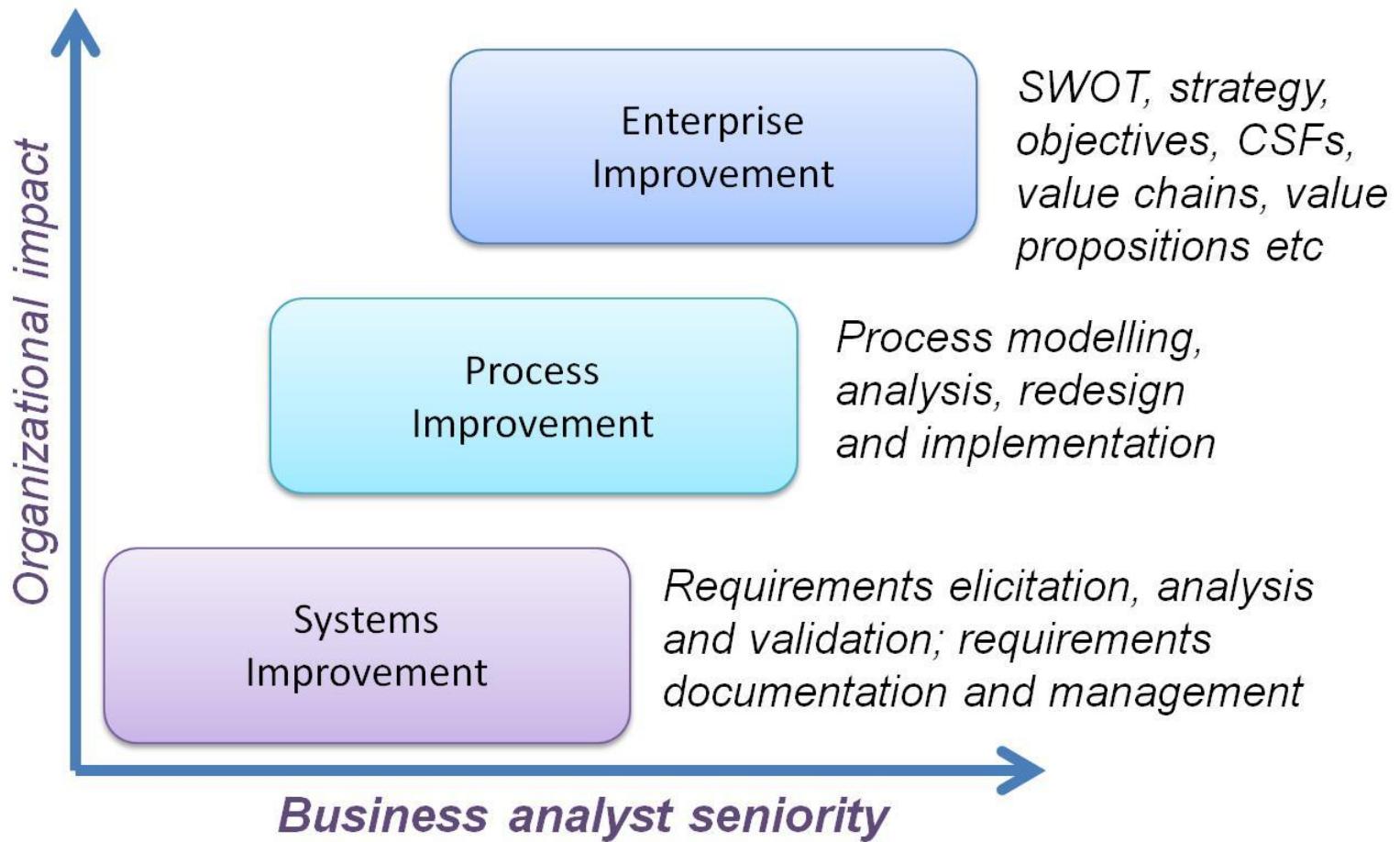
IIBA Definition of a Business Analyst

A business analyst is any person who performs business analysis activities, no matter what their job title or organizational role may be.

IIBA BABOK Guide Version 2.0



The scope of business analysis



Activities of the business analyst

- Analyze and synthesize information provided by a large number of people
 - Responsible for eliciting the actual needs of stakeholders, not simply their expressed desires
 - Facilitate communication between organizational units
 - Align the needs of business units with information technology
- May serve as a “translator” between business units



IIBA Underlying Competencies

- 1. Analytical Thinking and Problem Solving** – problem solving, creative thinking, systems thinking, learning and decision making
- 2. Behavioral Characteristics** – ethics, personal organization and trustworthiness
- 3. Business Knowledge** – business principles & practice, industry knowledge, organization knowledge and solution knowledge
- 4. Communication Skills** – oral communication, written communication and teaching
- 5. Interaction Skills** – facilitation & negotiation, leadership & influencing and teamwork
- 6. Software Applications** – general purpose applications and specialized applications



The Business Analyst – Req. Engineer

- Read all slides to the end of this presentation (Cf. MS Word)
- Execute a self-assessment
- Next classes – to make good arrangements



The Business Analyst – Req. Engineer



Business

Technology



The Business Analyst – Req. Engineer

- Misconceptions

I'm just a note taker.

I'm just the scribe.

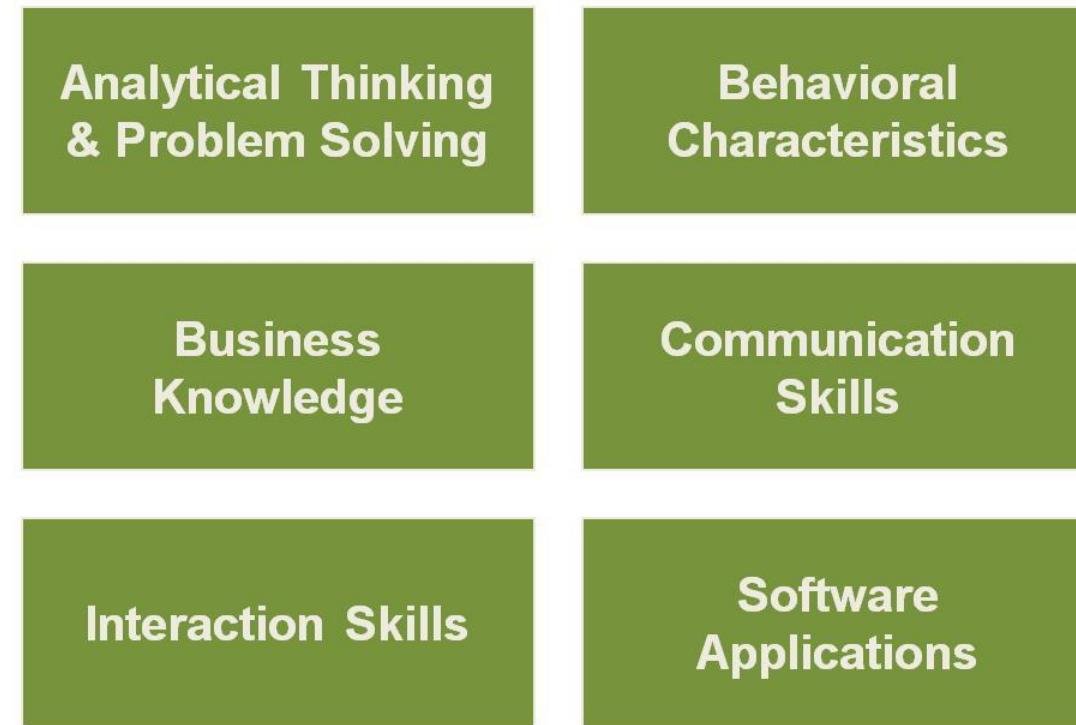
It's not my place to ask questions.

I don't want to slow things down.



The Business Analyst – Req. Engineer

- 6 key areas



* source IIBA BABOK 2.0



The Business Analyst – Req. Engineer

- Creative Thinking

Analytical Thinking & Problem Solving

"Business analysts must be effective in generating new ideas for approaches to problem solving and in generating alternative solutions."
[BABOK 2.0]

- Applying methodology to your project
- Approach for eliciting requirements from team members
- Finding alternative solutions
- Where else can you be creative on your projects?



The Business Analyst – Req. Engineer

- Decision making

Analytical Thinking & Problem Solving

“Business analysts must be effective in understanding the criteria involved in making a decision, in making decisions, and in assisting others to make better decisions.” [BABOK 2.0]

- Decisions you might be faced with:

- What kind of requirement is it?
- How much detail is enough?
- Is the information relevant?
- Does it meet the business objectives?
- Should I use a different elicitation technique?



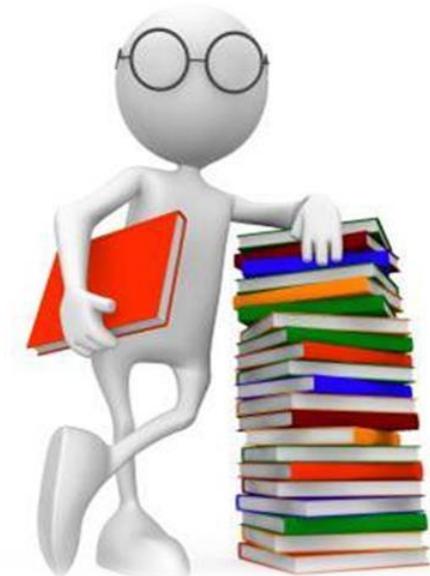
The Business Analyst – Req. Engineer

- Learning

Analytical Thinking
& Problem Solving

“Business analysts must be effective at learning about business domains and how they function, and then translate that learning into an understanding of how to benefit an organization.” [BABOK 2.0]

- How many different projects do you work on?
- Each new project is a potential learning experience
 - New people, new ideas, new solutions
- Be prepared for your project



The Business Analyst – Req. Engineer

- Problem solving

Analytical Thinking
& Problem Solving

"Business analysts must be effective at defining and solving problems in order to ensure that the real, underlying problem is understood and that solutions actually address that problem." [BABOK 2.0]

- What happens when requirements don't meet objectives?
- What do you do when it feels like no one is getting it?
- What happens when stakeholders don't agree?



The Business Analyst – Req. Engineer

- Systems thinking

Analytical Thinking
& Problem Solving

“Business analysts must be effective at understanding how the people, processes, and technology within an organization interact in relationships and patterns to create a system as a whole.” [BABOK 2.0]

- See the bigger picture!
- System, in this case, means more than an IT application
- What might happen to applications, processes, and people if a requirement changes?



The Business Analyst – Req. Engineer

- Ethics

Behavioral Characteristics

“A business analyst must be able to behave ethically in order to earn the trust and respect of stakeholders, and be able to recognize when a proposed solution or requirement may present ethical difficulties.” [BABOK 2.0]

- If you aren’t getting it, don’t hide it.
- Be upfront about your abilities?
- Can you think of other examples?



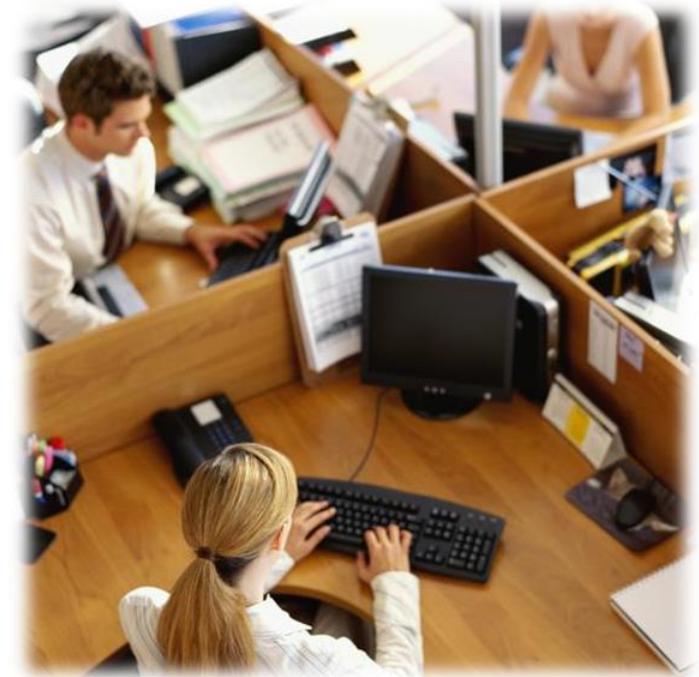
The Business Analyst – Req. Engineer

- Personal organization

Behavioral Characteristics

“Personal organization skills assist the business analyst in effectively managing tasks and information.”
[BABOK 2.0]

- Lots of information to manage
- Information comes at high velocity
- Most projects have many requirements and documents to manage
- If you aren’t organized you will struggle.



The Business Analyst – Req. Engineer

- Trustworthiness

Behavioral Characteristics

“Earning the trust of key stakeholders is necessary to ensure that the business analyst is able to elicit requirements around sensitive issues and to ensure that recommendations are evaluated properly.” [BABOK 2.0]

- Very important skill!
- If stakeholders don’t trust you they won’t tell you everything you need to know
- Work in the stakeholders best interest
- Honestly address issues



The Business Analyst – Req. Engineer

- Business Principles and Practices

Business Knowledge

"Business analysts require an understanding of fundamental business principles and best practices, in order to ensure that they are incorporated into and supported by solutions." [BABOK 2.0]

- Basic skill for most job types
- Professionalism
- Reporting practices
- Follow-up
- Timeliness



The Business Analyst – Req. Engineer

- Industry Knowledge

Business Knowledge

- Know your industry
- Know terminology and jargon
- In what other ways can industry knowledge help the BA?

“Business analysts should have an understanding of the industry that their organization is in so that they may understand new challenges that may be posed by competitive moves, and which solutions have proven effective elsewhere.” [BABOK 2.0]



The Business Analyst – Req. Engineer

- Organization Knowledge

Business Knowledge

“Business analysis is significantly assisted by an understanding of the organization for which it is being performed.” [BABOK 2.0]

- Understand
 - the hierarchy
 - the culture
 - products and services
- Find the right people
- Find help when you need it



The Business Analyst – Req. Engineer

- Solution Knowledge

**Business
Knowledge**

“Business analysts can use their understanding of existing solutions in order to identify the most effective means of implementing a change.”
[BABOK 2.0]

- Is a pro and can be a con
- Might know an easier way to get it done
- Might know past challenges and avoid them again
- Watch this one – sometimes when you are the subject matter expert your ability to write good requirements can be limited by your unconscious assumptions!



The Business Analyst – Req. Engineer

- Oral communication

Communication Skills

"Oral communication skills enable business analysts to effectively express ideas in ways that are appropriate to the target audience."
[BABOK 2.0]

- You have to ask questions!
 - Ask lots of why questions?
 - Ask lots of what questions too!
- Confirm what you thought you heard
- All requirements elicitation techniques depend on the BAs ability to communicate!



The Business Analyst – Req. Engineer

- Teaching

Communication Skills

"Teaching skills are required to ensure that business analysts can effectively communicate issues and requirements and to ensure that the information communicated is understood and retained." [BABOK 2.0]

- Know when your audience isn't following
- Change up your presentation approach
- Help stakeholders to understand the process you are using to elicit and document requirements



Tell me and I forget. Teach me and I remember. Involve me and I learn.

Benjamin Franklin



The Business Analyst – Req. Engineer

- Written communication

Communication Skills

"Written communication skills are necessary for business analysts to document elicitation results, requirements, and other information for which medium to long term records are required."
[BABOK 2.0]

- Note taking skills
- Clear, concise, simple sentences
- Use common language
- Use good grammar
- Organized documentation
- Don't over complicate your requirements documents



The Business Analyst – Req. Engineer

- Listening

Communication Skills

“Listening skills are critical to business analysts in eliciting, understanding, and documenting information.” [BABOK 2.0]

- Don’t try to write requirements when you are eliciting information
- Practice active listening – confirm what you thought you heard
- Pay attention

Don’t multitask



The Business Analyst – Req. Engineer

- Facilitation and Negotiation

Interaction Skills

"Business analysts facilitate interaction between stakeholders in order to help them resolve disagreements regarding the priority and nature of requirements." [BABOK 2.0]

- Disagreements?
 - That never happens, right?
- Sometimes no one talks; only one or two people talk
- Sometimes stakeholders don't agree
- What do you do when these happen?



The Business Analyst – Req. Engineer

- Leadership and Influencing

Interaction Skills

"Business analyst need to be able to be effective in formal and informal leadership roles, in order to guide others investigating requirements and to help encourage stakeholder support for a necessary change." [BABOK 2.0]

- Lead your requirements effort
- Motivate team members to work together
- Set vision for where you want the requirements effort to go
- Don't yield your responsibility
- Remember you're not just taking notes!



The Business Analyst – Req. Engineer

- Teamwork

Interaction Skills

“Business analysts must be able to work closely with other team members to effectively support their work so that solutions can be effectively implemented.” [BABOK 2.0]

- Team relationships are important for project success
- Handle emotional conflicts
 - Us vs. Them
- Handle cognitive conflicts
 - Conceptual differences
 - Some agree and don't realize it
- Everyone gets an opportunity to contribute



The Business Analyst – Req. Engineer

- General Purpose Applications

Software Applications

“Business analysts use office productivity applications to document and track requirements.” [BABOK 2.0]

- Know which tool is appropriate
- Basic, have to know, tools
 - Email
 - Word Processing
 - Spreadsheet
 - Presentation
 - Instant messaging
 - Collaboration / Screen-sharing
- Don’t let the tool get in your way!



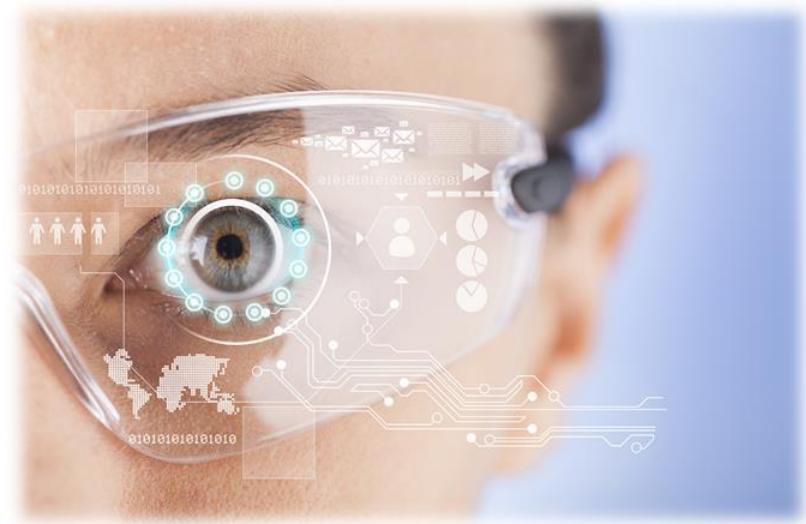
The Business Analyst – Req. Engineer

- Specialized Applications

Software Applications

“Business analysts use modeling tools to support development of formal models, and in some cases, their validation and implementation as well.” [BABOK 2.0]

- Apps/Tools for
 - General Diagramming
 - Requirement Elicitation
 - Requirements Management
 - Business Process Modeling



The Business Analyst – Req. Engineer

Requirements knowledge <ul style="list-style-type: none">• Requirements principles• Techniques & methods• Tools	IT knowledge <ul style="list-style-type: none">• Software engineering• Test engineering• Life cycle models• Architecture
Domain knowledge <ul style="list-style-type: none">• Business process• User characteristics	Soft skills <ul style="list-style-type: none">• Communication• Analytical• Change management

Technical know-how on its own won't suffice

Questions & answers

