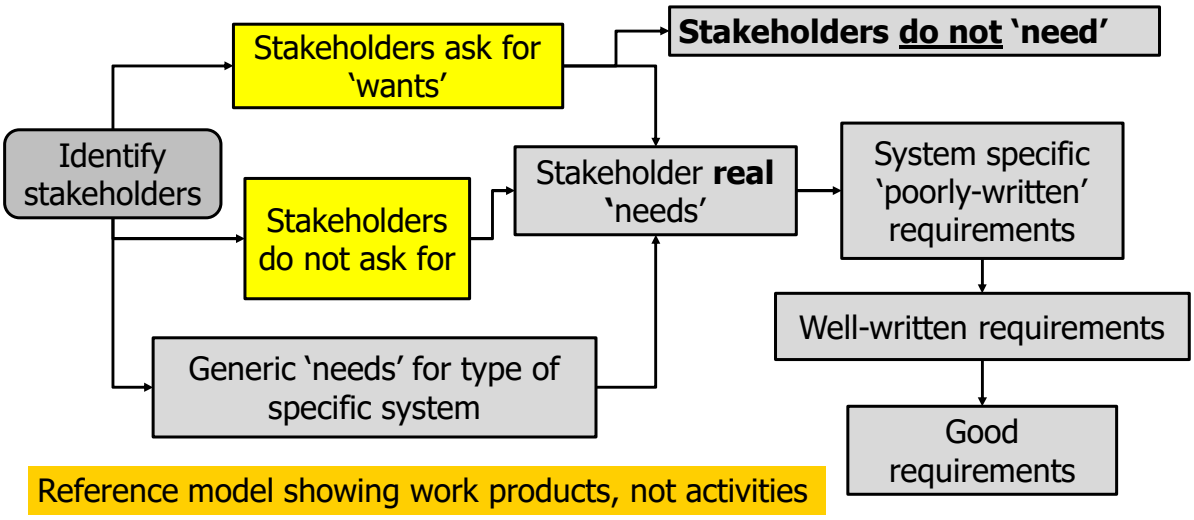
How to write good requirements
Module 3 of 10
Communicating with the stakeholders

Version 1.2.6

Course module topics

1. Introduction to requirements
2. Stakeholders and their importance
3. **Communicating with the stakeholders**
4. Converting stakeholder wants to needs
5. Documenting stakeholders' needs
6. Converting stakeholder needs to requirements
7. Converting requirements to well-written requirements
8. Converting well-written requirements to good requirements
9. The use of requirements in the rest of the system development process
10. Summary and closeout

Gap analysis for writing good requirements



Reference model showing work products, not activities

Objectives of module 3

1. To identify some barriers to communications
2. To explain more than eight tools to overcome the barriers
3. To explain how to extract "wants" from stakeholders
4. To explain how to discourage stakeholders from asking for something they don't need
5. To explain what to do before meeting the stakeholders
6. To explain what to do when meeting the stakeholders
7. To explain what to do after meeting with the stakeholder
8. To provide the opportunity to exercise the 5 levels of knowledge in the updated Blooms taxonomy

Knowledge components

- Lecture
  - Sets the context and provides overview
- Readings
  - 0302 Kasser, J. E., Four little known tools to jump start your systems thinking, The Systems Thinking Summit - May 2023, https://youtu.be/9LtaAoc-rB8
  - 0303 Kasser J.E., Shoshany S., Systems Engineers are from Mars, Software Engineers are from Venus, *proceedings of the 13th International Conference on Software & Systems Engineering and their Applications*, Paris, France, 2000.
- Exercises
  - 3-1 Operator question outcome
  - 3-2 Stakeholder questions and answers
  - 3-3 Knowledge reading 0302
  - 3-4 Knowledge reading 0303

Module topics

- **Communications**
- Barriers to communications
- Eight tools to overcome the barriers
- More tools for eliciting requirements
- What to do before meeting the stakeholders
- What to do when meeting the stakeholders
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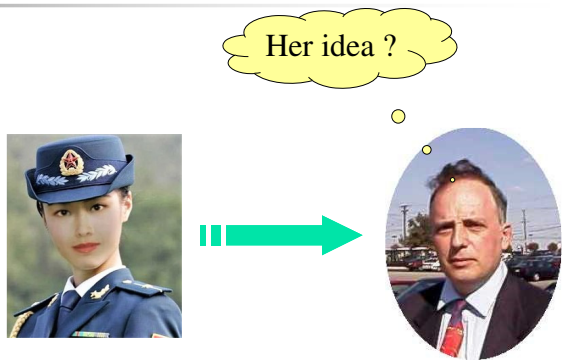
- Exercises

Communications

- Transferring information between two entities
  - Computer to computer
  - Radio transmitter to radio receiver
  - Person to person
    - Brain
    - Mouth and body language
    - Ear/Eyes
    - Brain
- Without degradation



Decide how to communicate with stakeholders

- One-on-one : One-on-many
- Verbal : Written
- Synchronous : Asynchronous
- Formal : informal
- Some or all of the above

- Meetings (in person and online)
- Public meetings
- Emails
- Letters
- Documents
- Surveys
- Telephone calls
- Etc.

Module topics

- Communications
- **Barriers to communications**
- Eight tools to overcome the barriers
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Some barriers to communications

- Cultural differences in perception
  - organisation
  - national
- Semantics
- Emotion
- Language
  - national
  - specialty disciplines
- Signal-to-noise ratio
  - information overload

Details in Reading 0303

Module topics

- Communications
- Barriers to communications
- **Eight tools to overcome the barriers**
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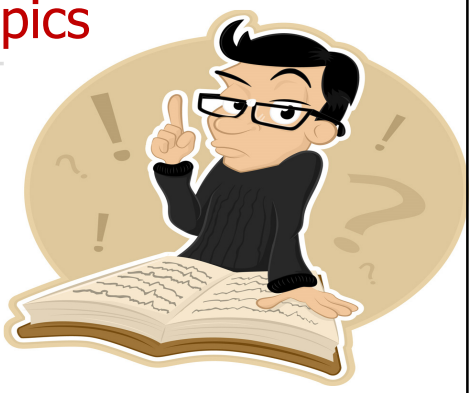

Eight tools to overcome the barriers

1. **Asking questions**
2. Holistic Thinking Perspectives
3. Active Brainstorming
4. Active listening
5. Pattern matching
6. STALL
7. Keep it Simple, Student (KISS)
8. The principle of hierarchies

Properties of a good question statement

- Answer implementation independent
  - Does not tell what the answer is
  - Not a leading question
- Quantitative
- Concise
- Pertinent
  - Boundaries (external and internal)
- Complete
- Stated as a function
- Unambiguous
- Insensitive to errors in interpretation

Notice similarity between questions and requirements?

Insensitive to errors in interpretation

- Ambiguity introduces errors in interpretation
- Remember for exercise

http://www.youtube.com/watch?v=By0oe7BUDWQ last accessed 10 September 2023

Aim of Question

- **What** do you want the answerer to do?
  - recall
  - apply information
  - analyse and use data or information
  - evaluate
- **How**
  - easy will it be to answer ?
  - difficult will it be to evaluate response?
  - easy will it be to communicate results to those that need to make use of the information?

Three attributes of questions

1. Validity
   - Results in a response containing the desired information
2. Difficulty
   - Degree of ease/difficulty of answering the question
   - How much thinking time and type of thinking (Blooms)
3. Reliability
   - Consistent responses between different responders

Tips for asking questions

- Be clear and concise
- Use only one main idea/concept
- Be as brief as possible
- Don't bias answers (see next slide)
- Use correct grammar
- Be consistent
- Clarify responses using
  - Active listening techniques (coming up)
  - Orthogonal questions
    - Second question from different perspective
- STALL (coming up)
- Give recipient adequate time to respond

Notice similarity between questions and requirements?

Biasing answers

- Example from *Yes, Prime Minister, Episode 2*, 1986
- England
- England does not have National Service, has all volunteer armed forces
- Discussion on reintroducing National Service
- Two different sample (stakeholder) survey questionnaires can achieve opposite answers from the same respondent

Biasing answers "for"

- Are you worried about the number of young people without jobs?
  - Yes
- Are you worried about the risk in crime among teenagers?
  - Yes
- Do you think there is lack of discipline in our comprehensive schools?
  - Yes
- Do you think young people would welcome some authority and leadership in their lives?
  - Yes
- Do you think they'd respond to a challenge?
  - Yes
- Would you be in favour of reintroducing national service?
  - I might be
  - Yes

Biasing answers "against"

- Are you worried about the danger of war?
  - Yes
- Are you worried about the growth of armaments?
  - Yes
- Do you think there is a danger in giving young people guns and teaching them how to kill?
  - Yes
- Do you think it is wrong to force people to take up arms against their will?
  - Yes
- Would you oppose the reintroduction of national service?
  - Yes

Standard answer to nearly every question

- "it depends"
  - Request of further information
  - Removes annoyance of not answering question immediately
  - Opens dialogue to explore situation
    - What it depends on

Eight tools to overcome the barriers

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   - Reading/video 0302
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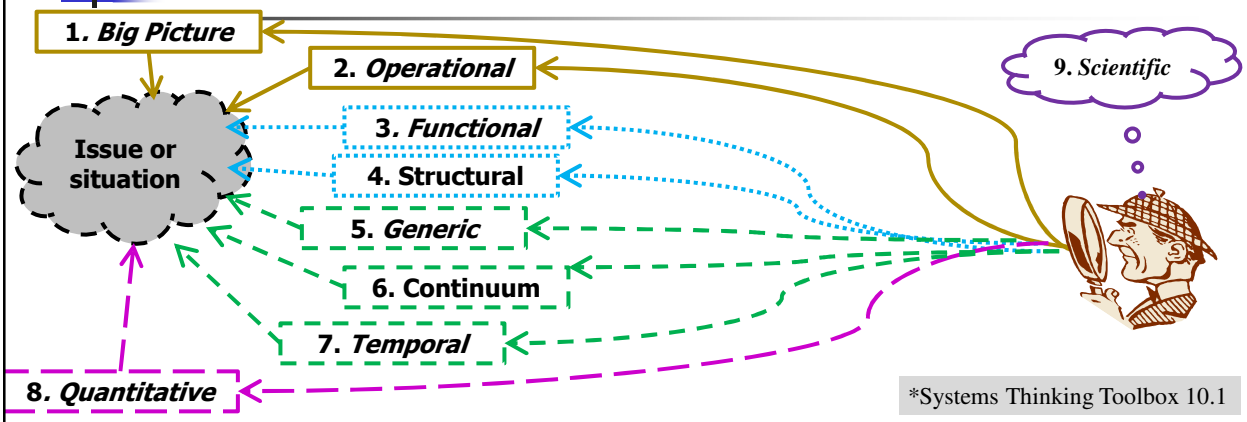
The Holistic Thinking Perspectives*



*Systems Thinking Toolbox 10.1

External	Internal	Progressive	Remaining
1. Big picture	3. Functional	5. Generic	8. Quantitative
2. Operational	4. Structural	6. Continuum	9. Scientific
		7. Temporal	

Eight tools to overcome the barriers

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Use Active Brainstorming **after** flow of initial set of ideas stops (updated)

- Start a brainstorming Module
- Don't interfere with initial free flow of ideas
- Capture ideas to whiteboard/software
- When initial idea flow stops, begin Active Brainstorming
- Don't tell people you are using Active Brainstorming to think up the questions
- Capture ideas to whiteboard/idea capture software
  - Don't force ideas into HTPs during active brainstorming
  - Do it later as appropriate

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Closing the loop (feedback)

statement

confirmation

Iterate until "sure" understanding has been reached

Active listening-1

- When the other person speaks give them your full attention and look them straight in the eyes
- Begin iteration loop
  - Listen to everything the other person says and try to understand it fully
  - **Ask questions** to clarify anything you don't understand and analyze the response
  - Rephrase what you have heard in your own words and ask the speaker if they meant what you are about to say
    - "if I understand you, then ……."
    - "Do you mean….."
    - **This is the principle of applying feedback**

Active listening-2

- If,
  - after you have rephrased what has been said
- and
  - the person says, "No that's not it!" or the equivalent,
- then
  - **go back to loop**
- You may need to invoke the STALL technique at this time
- Else
  - when the speaker finally agrees with you
- then
  - you have (most probably) actually communicated and shared meaning

Eight tools to overcome the barriers

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Pattern matching

- Modify active listening by the use of patterns (examples)
- Incorporate the pattern by adding words such as
  - "this reminds me of the [Type A Scenario]"
  - "isn't this similar to [Type B]"
- and explain why
- Use other's person's language or metaphor if you can.
  - Football, etc.

Eight tools to overcome the barriers

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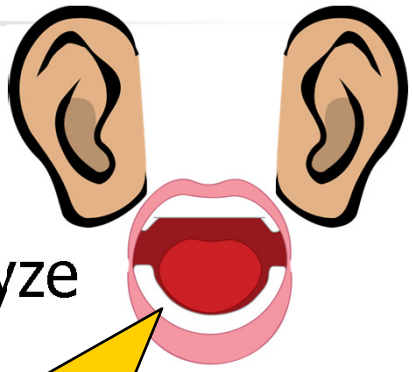
The "Stall" approach

- **S**tay calm
- **T**hink
- **A**sk questions and analyze
- **L**isten
- **L**isten



You also have 2 eyes, so Look and Listen

Eight tools to overcome the barriers

1. Asking questions
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Eight tools to overcome the barriers

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8. **The principle of hierarchies**
   - Reading/video 0302

Module topics

- Communications
- Barriers to communications
- Eight communications tools to overcome the barriers
- **More tools for eliciting requirements**
- What to do before meeting the stakeholders
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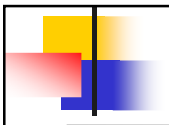
More tools for eliciting requirements

- Simulations
- Prototypes
- Models and mock-ups
- Computer software
- Charts
- Pencil and paper
- QFD/QRD
- Others

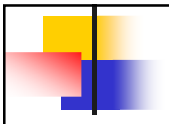
Simulations

- An operational/functional/structural model of a system to conduct experiments for the purpose of:
  - Understanding the behaviour of the system
  - Evaluating alternative strategies/system design configurations.
- Best used in early states of system development (HKM^{2}F Column A)
- Used as games and training



Rapid prototyping

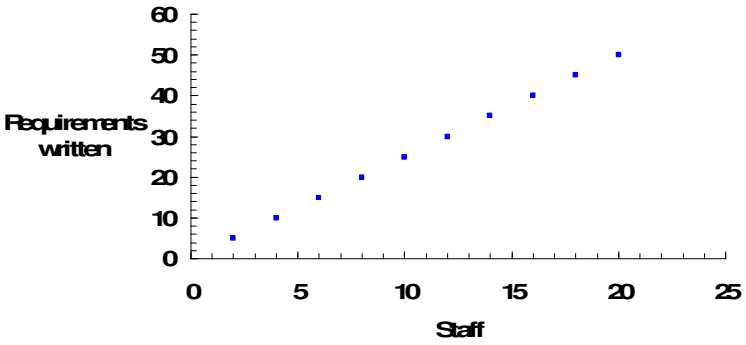
- A prototype is developed early in the design process
- The stakeholders are involved in the operation of the prototype
- Ideas are generated for the improvement of the program/system
- Those changes are evaluated for system impact and appropriate modifications are incorporated.



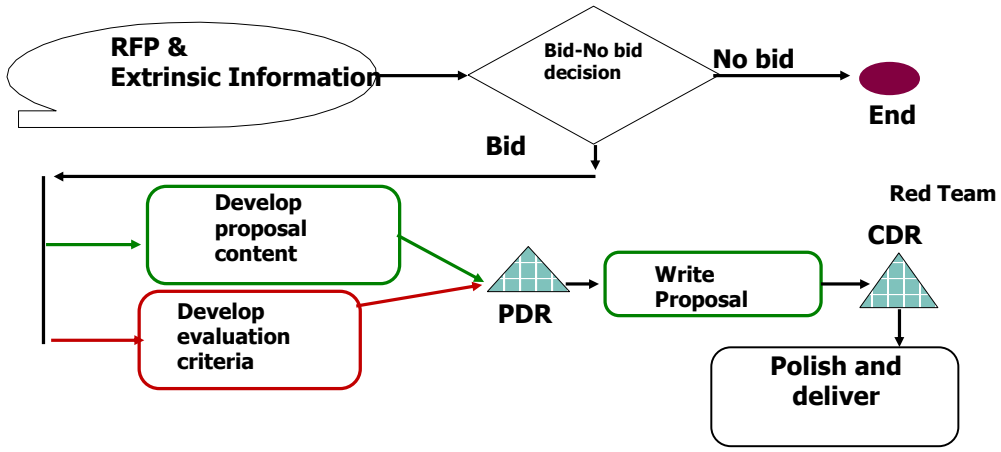
Mock-ups

- Use relatively inexpensive materials
- Physically resemble the real components (to various scales) to be procured
- Try out various spatial arrangements
- Perform maintainability analysis and training of maintenance and operating personnel
- Human factors studies
- Serve as an excellent marketing tool

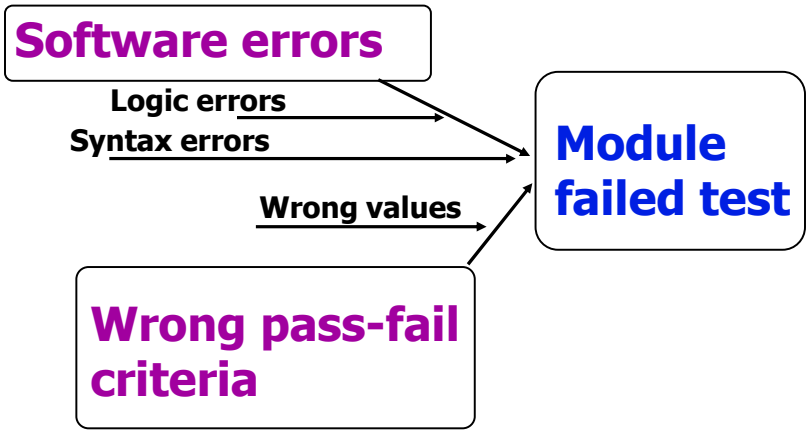
XY chart



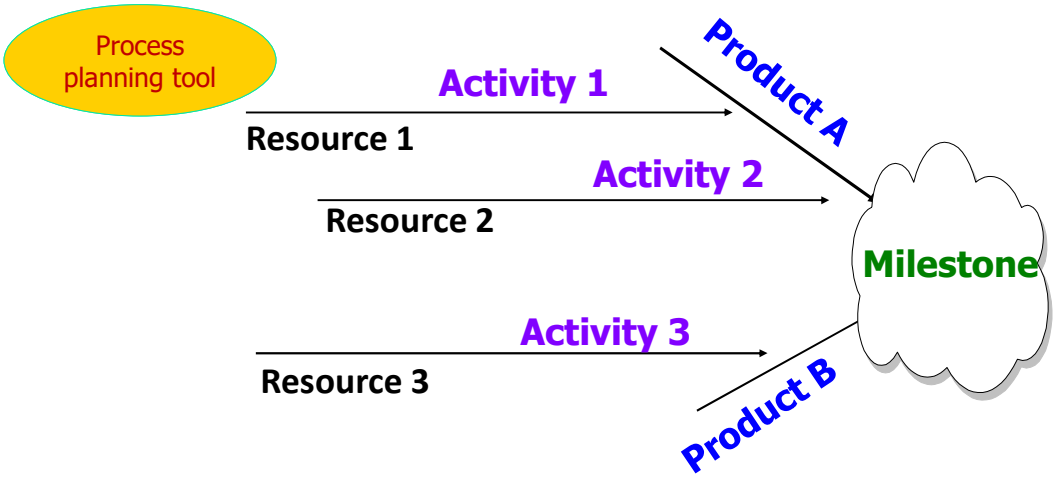
Flow chart



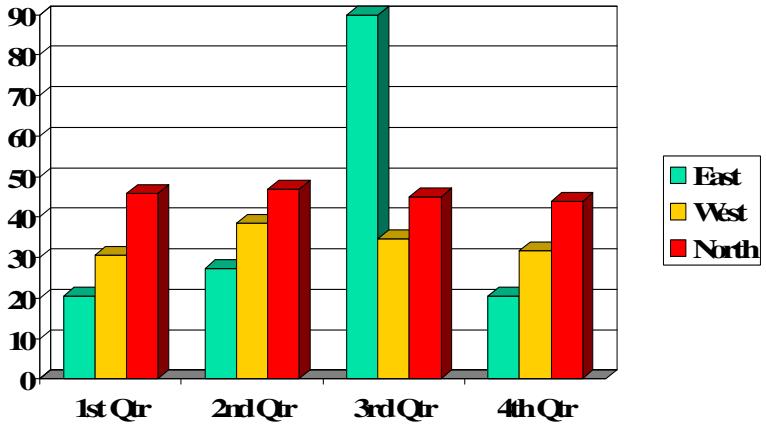
Cause and effect chart



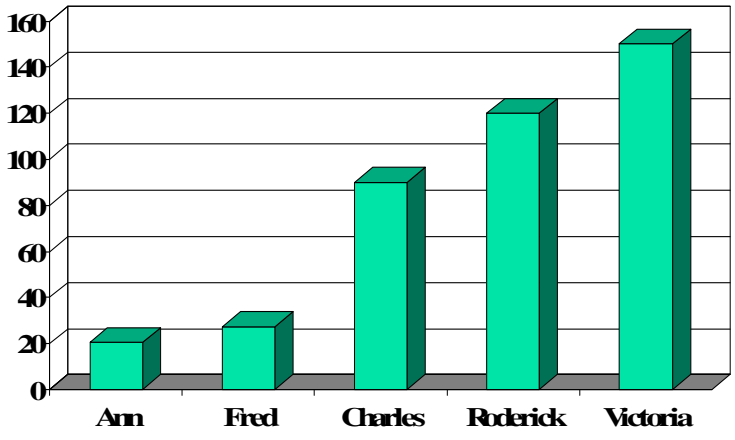
Product-Activity-Milestone (PAM) chart



Bar chart

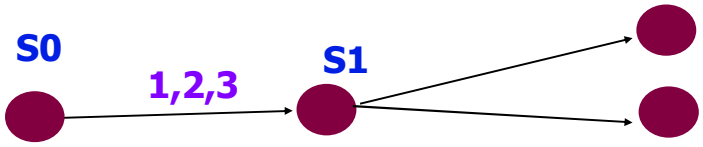


Pareto chart

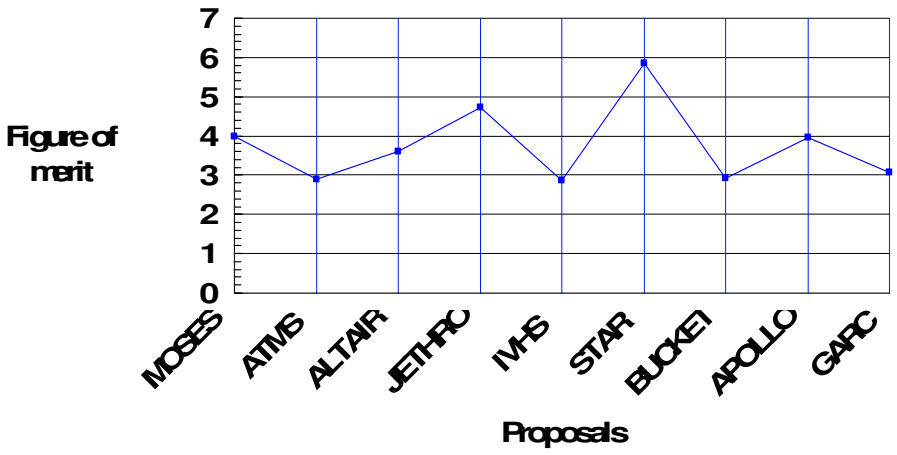


PERT chart

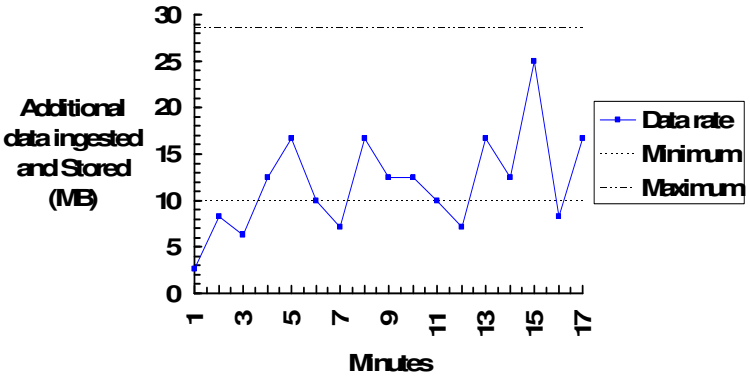
- Management tool
- Communications tool
  - how work elements relate to each other
  - where inputs come from
  - where outputs go (customers)
  - when products are needed
  - how much time is available to produce the product



Trend chart



Control chart



More charts

- UML
- SySML
- IDEF0
- Rich pictures
- Bubble charts
- PowerPoint graphics
- DoDAF, MoDAF drawings
- Others

Module topics

- Communications
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- **What to do before meeting the stakeholders**
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- Exercises

Before meeting the stakeholders

- Imagine the three functional conceptual generic representations (as-is, CONOPS (to-be) and transition)
  - Be aware you may not know it all
  - Document assumptions
- Arrange meetings
  - At stakeholders' location
  - Maximum time 60 minutes
- Prepare starter Active Brainstorming questions

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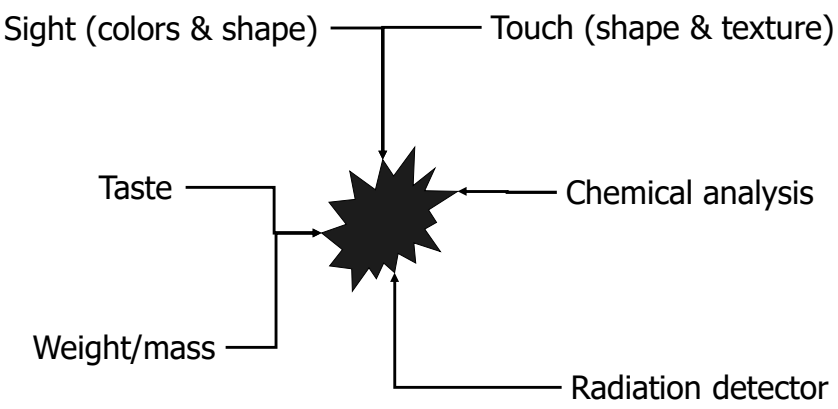
Stakeholders want a rock

Generic non-functional attributes of a rock



Needs, wants and problems

- Difference between
  1. What stakeholders want (ask for)
  2. What stakeholders need
  3. What stakeholders tell you

Stakeholders		Know what they need	
		Yes	No
Know what they want	Yes	Well-structured problem	Ill-structured problem
	No	Ill-structured problem	Well-structured problem'

One way to tackle the problem

- Know what they need
  - Document the need
- Know what they want
  - Use applicable generic functional model to make sure it is a need
  - Use applicable generic functional model to show that a want is not a need (if applicable)
- Don't know what they want
  - Try the rock approach based on the applicable generic functional model
- Don't know what they need
  - Help them work out what they need using
    - The applicable generic functional model
    - Benchmarking results of similar systems

When meeting the stakeholders

- Speak the customer's language
- Focus discussion on area of interest of stakeholder
- Discuss other areas if stakeholder mentions them
- Hold a conversation not an interrogation
- Use the more than eight tools to overcome barriers to communications
- Ask the stakeholders what they want (ask for)
- Ask the stakeholders what they would wish for
- Ask why they need it
- Ask how they will know when the need is met
- Compare what they ask for with the conceptual generic system
- Explain wants that do not show up in the conceptual generic system
- Clarify assumptions

Assumptions

https://www.youtube.com/watch?v=jsdlRiQM75s, 26/09/ 2006, last accessed 8/09/2023

When meeting the stakeholders

- Ask would happen if it (the want) wasn't in the system
  - Get details
  - Watch out for exaggeration
- Ask the applicable stakeholders what they would change in the current system (not what is wrong with the current system)
- Use the draft CONOPS to suggest needs the stakeholder does not ask for
- When conversation lags, use draft CONOPS to ask, the prepared Active Brainstorming questions
  - "would you like ….?"
  - "do you want …?"
  - "have you thought about …?"
- If a contradiction between a want and another stakeholder's want occurs, explore/explain the contradiction

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After the meeting

- For each want, document
  - An identification number for traceability
  - Who wants it and other information from Module 2
  - Why they want it (reason, rational)
  - What the benefit of having it is to other stakeholders (if any)
- Thank them for the meeting
  - Use the "thank you" tool
- Share the findings
- Ask for a second meeting if necessary to clarify
  - Unresolved issues
  - Remaining conflicts
  - Any other outstanding matter

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Exercise 3-1

1. Select one generic stakeholder from each of the three situations from Exercise 2-1.
2. Craft at least 5 questions for each stakeholder to be met
3. Assume you met the specific instance of the generic stakeholders
4. Document the information you recorded after meeting with each of the stakeholders and asking the questions (assume reasonable feasible answers)
5. Prepare a <5 minute presentation containing
    1. The generic stakeholders and why you selected them
    2. The questions you prepared for each of the three stakeholders
    3. The documented responses from one of the stakeholders
    4. A compliance matrix for the exercise
    5. Formulated problem per COPS problem formulation template
    6. Lessons learned from exercise
    7. This slide and the version of the session
6. Save as a PowerPoint file in format Exercise3.1-abcd.pptx
7. Post/email presentation as and where instructed

Exercise 3-2 (10-20 minutes)

- The unintended ambiguity in the question "make sure he's dead?" resulted in an unintended outcome

1. Prepare a <2 minute presentation containing
    1. What was the requirement she was complying with?
    2. What question should the operator have asked?
    3. Lessons learned from exercise
    4. This slide and the version of the session
2. Save as a PowerPoint file in format Exercise3.2-abcd.pptx
3. Post/email presentation as and where instructed

Exercise 3-3 knowledge reading

1. Prepare a brief on two main points in reading 0302 (< 5min)
2. Presentation to contain
    1. Formulated problem per COPS problem formulation template
    2. A summary of the content of the reading (<1 minute)
    3. The compliance matrix
    4. This slide and the version of the session
    5. The main points
    6. The two briefings
    7. Reflections and comments on reading (<2 minute)
    8. Comparisons of content with other readings and external knowledge
    9. Why you think the reading was assigned to the module
    10. Lessons learned from module and source of learning e.g. readings, exercise, experience, etc. (<2 minutes)
3. Save as a PowerPoint file as Exercise3.3-abcd.pptx
4. Post/email presentation as and where instructed
5. Brief on one main point

Exercise 3-4 knowledge reading

1. Prepare a brief on two main points in reading 0303 (< 5min)
2. Presentation to contain
    1. Formulated problem per COPS problem formulation template
    2. A summary of the content of the reading (<1 minute)
    3. The compliance matrix
    4. This slide and the version of the session
    5. The main points
    6. The two briefings
    7. Reflections and comments on reading (<2 minute)
    8. Comparisons of content with other readings and external knowledge
    9. Why you think the reading was assigned to the module
    10. Lessons learned from module and source of learning e.g. readings, exercise, experience, etc. (<2 minutes)
3. Save as a PowerPoint file as Exercise3.4-abcd.pptx
4. Post/email presentation as and where instructed
5. Brief on one main point

Meeting the objectives

#	Objective	Met
1	Identified some barriers to communications	21, R 0303
2	Explained more than eight tools to overcome the barriers	23-46, R 0302
3	Explained how to extract "wants" from stakeholders	48, 50-54
4	Explained how to discourage stakeholders from asking for not needed	53,54
5	Explained what to do before meeting the stakeholders	48
6	Explained what to do when meeting the stakeholders	50-55
7	Explained what to do after meeting with the stakeholders	57
8	Provided the opportunity to exercise the 5 levels of knowledge	59-62

Any questions ?

1. Best
2. Worst
3. Missing

Email: beyondsystemsthinking@yahoo.com
Subject: <class title> BWM Module #