INST0031
Systems Management

Lecture 3

System Specification and Selection

What we will cover today

- A bit about Systems Analysis
  - Working out what is needed
- System specification
  - Feasibility studies
  - Operational requirements
- System selection
  - Criteria for evaluation
  - Approaches, tips and hints

- Practical session - reviewing Network Analysis!

Systems Analysis

- A computer-science-based (programming-based) discipline
- Allows/helps us to:
  - identify systems
  - break them down
  - make them work
- Systems Analysis is the first stage in computer program design, but is useful in other contexts

The design & development process

- In Systems Analysis we need to identify & develop different views:
  - Processes
  - Data
  - Interactions
- Importance of Conceptual Modelling

What is a system specification?

- The basis for every project
  - Define the need for a potential new system
  - Stakeholders expectations
  - What system must do to meet that need/expectations
- A well structured document, communicated and agreed, without too many specialist jargon or conventions to be well understood and used by everyone.

What is a system specification?

- States in a very precise and explicit manner, what are the functions and capabilities that system must provide as well as constraints by which the system must abide while completing a project with as little cost growth as possible.

Basic principle

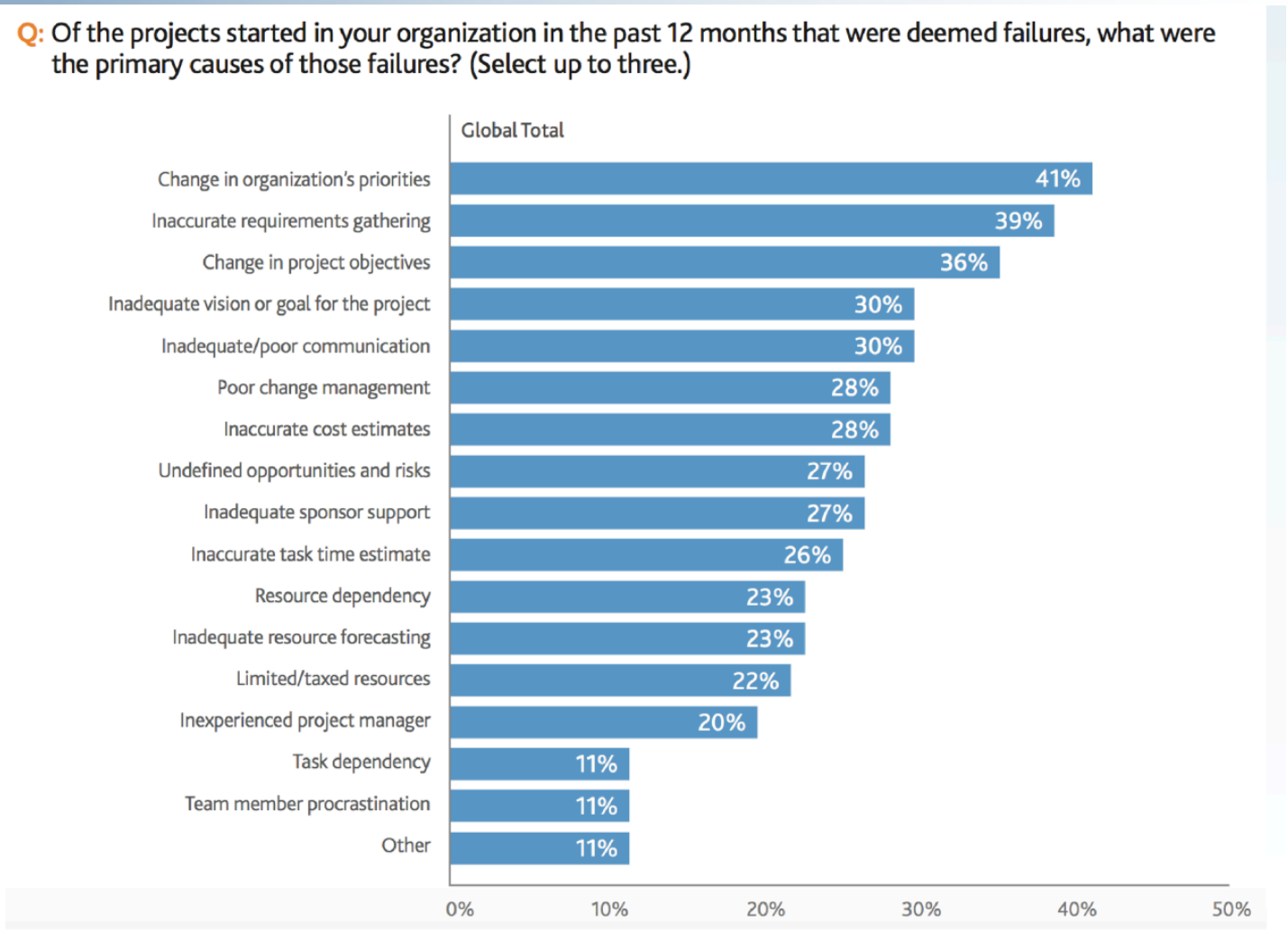
- Gain a full understanding of the REAL NEEDS OF THE USERS OF THE SYSTEM

- Don't be technology led - do you need automation to meet this need?

Why system specification is important?

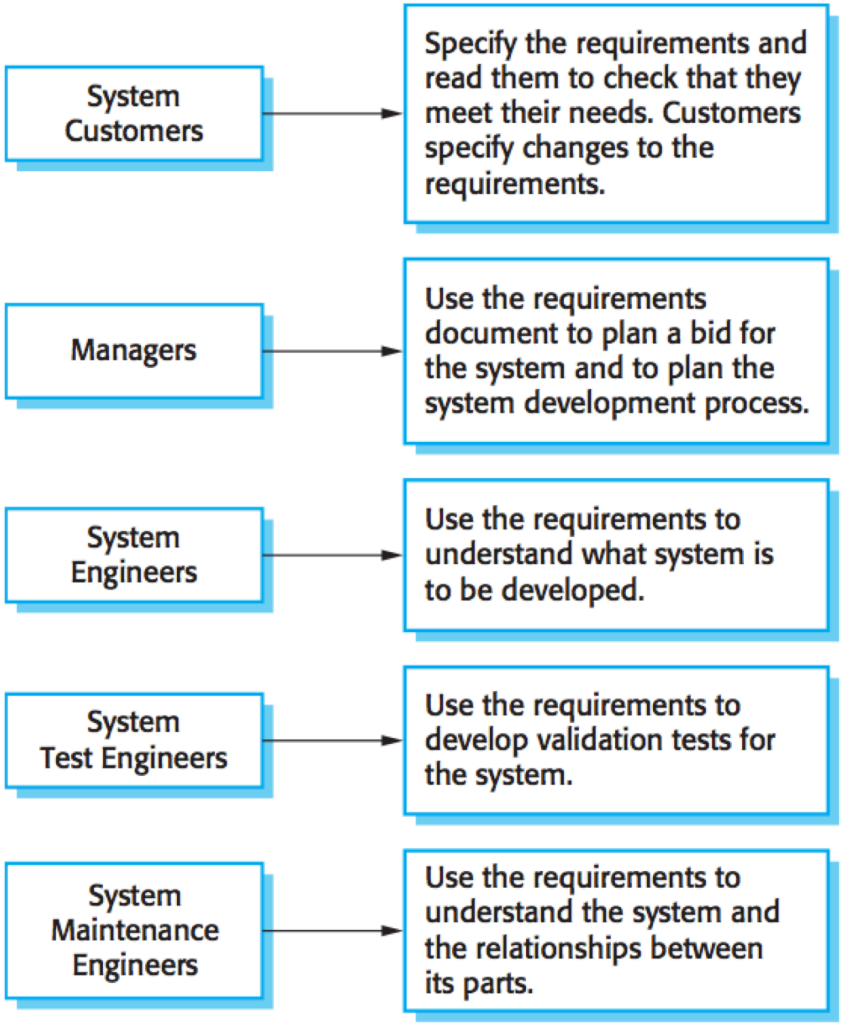
- Reveals omissions misunderstandings and inconsistencies early in the development cycle
- Provides a basis for estimating costs and planning
- Provides a basis for validation and verification
- Provides a basic document compliance with requirements that can be measured

Why system specification is important?



- Source: PMI's Pulse of the Profession Survey, 2017.

Who uses system specification?



Sommerville, I., 2011. Software engineering. Boston: Pearson,. Page 92

System specification activities

- • Identify the stakeholders , Understand the "user's needs"
- Analyse, clarify and restate the requirements
- Define and specify the requirements
- Prioritise the requirements
- Track requirements
- Manage requirements
- Test and verify requirements
- Validate requirements

Essential requirements gathering techniques(1)

- **Document Analysis:** Evaluating the documentation of a present system can assist when documenting a potential new system
- **Reverse Engineering:** Reverse engineering consist in "taking apart" a system to see how it works
- **Observation:** Conducting an observation means studying the users in their natural habitat
- **Brainstorming:** This is used to collect as many ideas as possible from a group of people in order to identify many different possibilities

Essential requirements gathering techniques(2)

- **Focus Groups:** A focus group is actually gathering of people who are representative of the users or customers, in order to gain their feedback
- **Requirements Workshop:** This is also known as joint application design or be part of an hackathon where a problem is given to gain the participants ideas and solutions
- **Interviewing:** Interviews of users and stakeholders are important when specific questions need to be addressed

Essential requirements gathering techniques(3)

- **Survey:** Surveys ask specific questions to a wider audience than interviews
- **Interface Analysis :** Interface analysis considers the touch points with another external system
- **Prototyping:** A prototype is a basic working model, mock-up or a simple simulation of the product which provides practical feedback

Establishing needs and objectives

- **ASK THE USERS!!!**
- Methods:
  - Questionnaires
  - Interviews
  - Documentation
  - Observation
- Important to identify VIEWS and OPINIONS as well as FACTS

Problem Analysis & Fact Collection

- Difficulties:
  - Locality of view
  - Inconsistency of view
  - Incompleteness of view
  - Perceived threat
- Establishing the real problems
- Symptoms and causes

Detailed Specification

- Identify & describe key personnel & processes
- Identify & describe key items of data
- Details of access to data
- Policies and practices
- Exceptions

Types of system requirements

- User requirements: the high-level abstract requirements.
  - Natural language plus diagrams
  - Expected services
  - Constraints
- System requirements: the detailed description of what the system should do.
  - Detailed descriptions of the software functions
  - What and how to be implemented
  - Operational constraints

Types of software requirements

- **Functional requirements:** functionalities and services, what the system should do. Depends on:
  - Type of software
  - Target users
  - Organisation general approach
- **Non-functional requirements:** properties and constraints.
  - Reliability, performance, security, or availability,

Characteristics of a good specification document

- Concise
- Traceable
- Modifiable
- Well structured
- Verifiable

Designing & replacing systems

- Needs planning - lots of it!
- Very important decision:
  - Mission-critical
  - High-impact
  - High profile
  - High cost?
- Also true for small-scale projects

The basic steps

- Specify requirements
  - WHAT not HOW
  - Feasibility studies
  - The Operational Requirement
- Gather information on possibles
- Shortlist
- Select
- KEEP THE DOCUMENTATION!

The feasibility study

- A study to ascertain the feasibility of a new system (!)
- A study to justify the NEED for a new system
- General terms of reference: DEFINITION
  - What do we need?
  - What might work?
  - What will it cost?

Approaches

- Formal vs informal
- Objective vs subjective
- Logical vs intuitive
- Must include cost estimate, therefore
  - Need to contact suppliers
  - Can DIY be considered?

Report to management

- Short description of present system
- Problems with present system
- Possible solutions
- Outline costs of solutions
- Likely benefits
- Work required to identify solution
- Implementation information
- Implications

The Operational Requirement

- Builds on the FS
- FULL systems specification
- Major basis for selection

The Operational Requirement

"The statement issued to the supplier giving details of a project against which they are invited to submit proposals. It is an important document which must enable the supplier to determine whether or not he should invest effort in competing for business". (CCTA)

IMPORTANT CONCEPT!

Of use to the supplier as well as to you!

What's in it?

- A description of FUNCTIONS
- WHAT is to be done
- Levels of need
  - Mandatory
  - Desireable
  - Optional

What functions?

- Operational requirements
- Technical requirements
- Key factors/constraints:
  - links to existing systems
  - data conversion
  - timetables
  - cost limits

System evaluation

- Using the OR
  - Subjective vs Objective
  - Qualitative vs Quantitative
- Multiplicity of viewpoint

Criteria for evaluation

- Functionality
- Performance
- Hardware requirements
- Integration & modularity
- Customisation/parameterisation
- Upgrading and development
- Support and training
- Price

Why do things go wrong?

- Technical failure
- Use/user failure
- Real needs not met
- Oversimplification
- Optimism
- Inflexibility

Evaluation at a supplier demonstration

- Be a skeptic, have a checklist, and remember:
  - Salespeople are there to sell
  - Competence and willingness – interruptions?
  - See what you want – and see, don't hear
  - Operational conditions?
  - Functional blindness…
  - Interface and integration – origins?
  - Configurability/parameterisation

Onsite visits & demonstrations

- Supplier selection and representation
- Double up!
- Match your needs if possible
- The embarrasment factor
- Who's at fault?
- Follow the workflow
- Keep an open mind
- Use the user groups

Questions?

OK...

Take a break!