Projects of Information Technologies

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EU digital policies and implementation

- The Digital Agenda for Europe provides part of the policy background. The Digital Decade Policy Programme sets directions for digital transformation towards 2030.
- Its main areas are digital skills, digital infrastructure, digitalisation of businesses and digital public services.
- Relate an IT project to an identified policy priority and a documented need at national, regional or local level.
- Discuss subsidiarity: which decisions and responsibilities belong at each level?
- Digitalisation does not automatically deliver sustainable development. Explain the expected benefit and how it will be assessed.

European Commission: Digital Decade Policy Programme https://digital-strategy.ec.europa.eu/en/policies/digital-decade-policy-programme

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Case study: Coca-Cola: “Opening Happiness” with a New Project Management System

- Problem: ?

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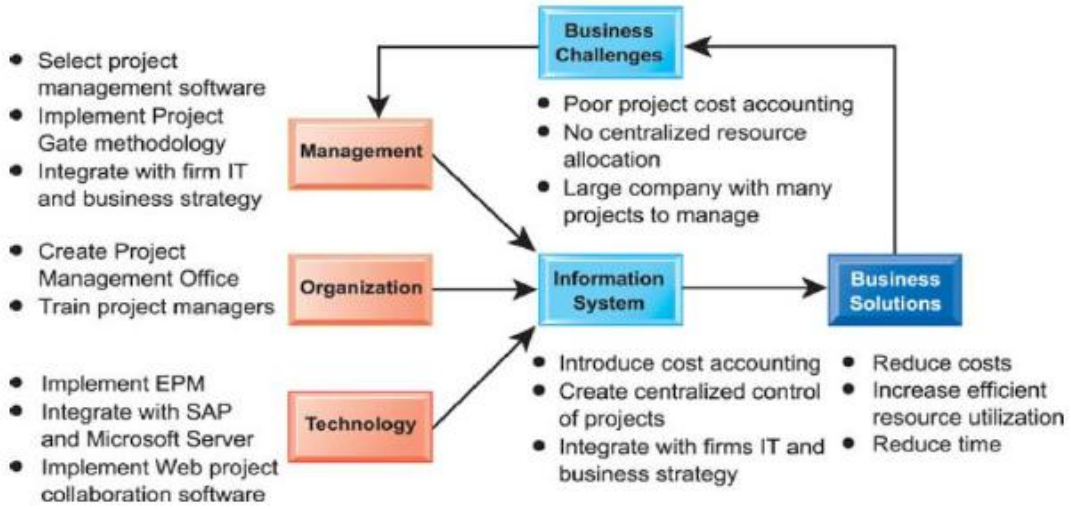
Case study: Coca-Cola: “Opening Happiness” with a New Project Management System

- Problem: Coke Bottling’s existing project management software did not provide:
  - The required regulatory reports
  - Projects exceeded the available resources
  - Projects did not stay within their time frames

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Case study – solution: Coca-Cola: “Opening Happiness” with a New Project Management System

- Microsoft Office Enterprise Project Management (EPM) enables centralised project management.
- Shows the use of information systems and the need for quality data to manage projects effectively
- Shows the need for organisational and management changes to ensure the success of new technology



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Introduction to project management

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What is a project?

- A temporary* undertaking that creates a new product, service or other result.
- Temporary means that the project has a defined period of implementation, with a beginning and an end.

- *Temporary does not necessarily mean that the project is short.

Source: PMBOK_Guide_5th Edition

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What is a project?

- A project is a sequence of tasks with a defined beginning and an expected end
  - constrained by time, resources and the desired results.
- It can, and often does, involve several organisational units and functions.
- The end is reached when the objectives are achieved, when the project is terminated because its objectives will not or cannot be achieved, or when the need for the project no longer exists (it takes too long).

Source: PMBOK_Guide_5th Edition

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Definition of a project

- Purpose / Objectives / Results
  - (defined scope / success criteria)
- Time limits
  - (defined beginning and end)
- Limited resources
  - (people / materials / machines / money)

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Examples: what is a project?

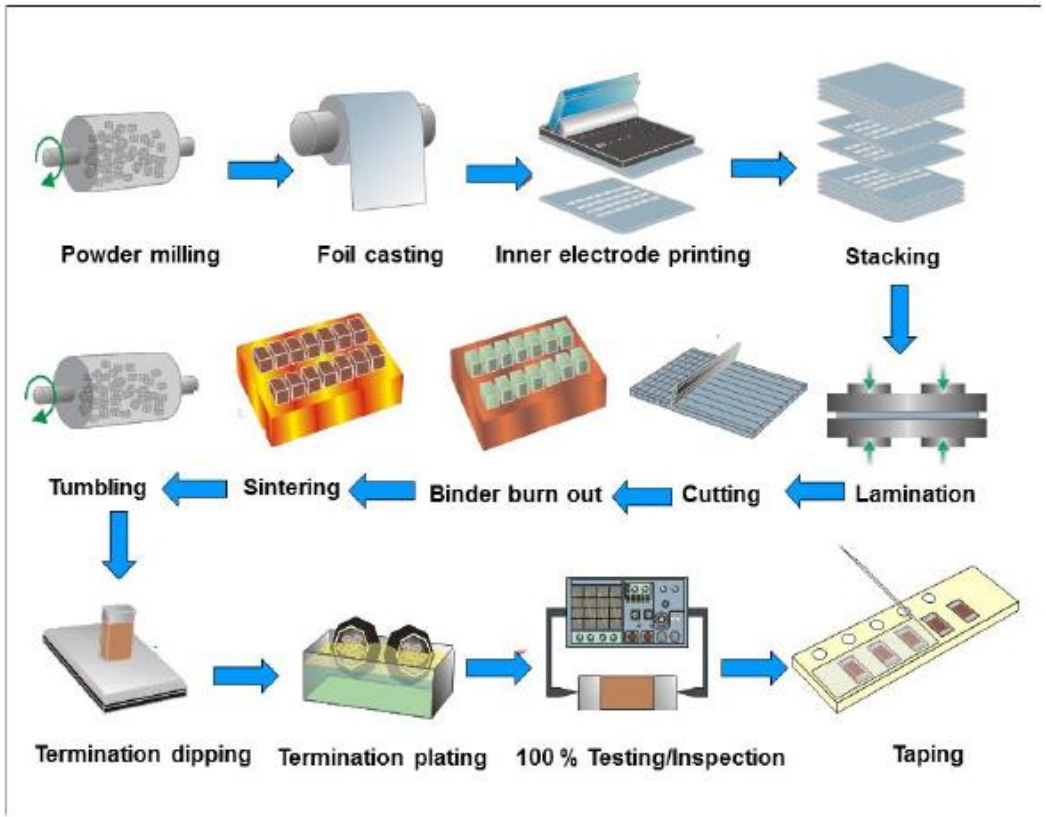
- Building a garage?
- Developing a new course
- A holiday in a new location
- Repairing a TV
- Making a film
- Preparing a business plan

- Yes
- Yes
- Yes
- Yes
- No
- Yes
- Yes

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Terms often confused with “project”

- Process:
  - A series of routinely performed steps
  - A method of doing work



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Terms often confused with “project”



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Terms often confused with “project”

- Programme:
  - Centralised and coordinated management of projects to achieve strategic objectives (e.g. e-commerce).
  - Managing related or interdependent projects as a group to achieve the best possible results.
  - Optimising resources across projects and reducing implementation problems

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Terms often confused with “project”

- Portfolio
  - A collection of related or unrelated projects or programmes.
  - Comprises several programmes or projects that are not part of a programme.
  - Usually belongs to one business unit (e.g. R&D)
  - Shares the same (human) resources
  - Has its own budget
- Examples:
  - New product development projects
  - Research and development (R&D) projects
  - Maintenance projects
  - Business process improvement (BPM) projects

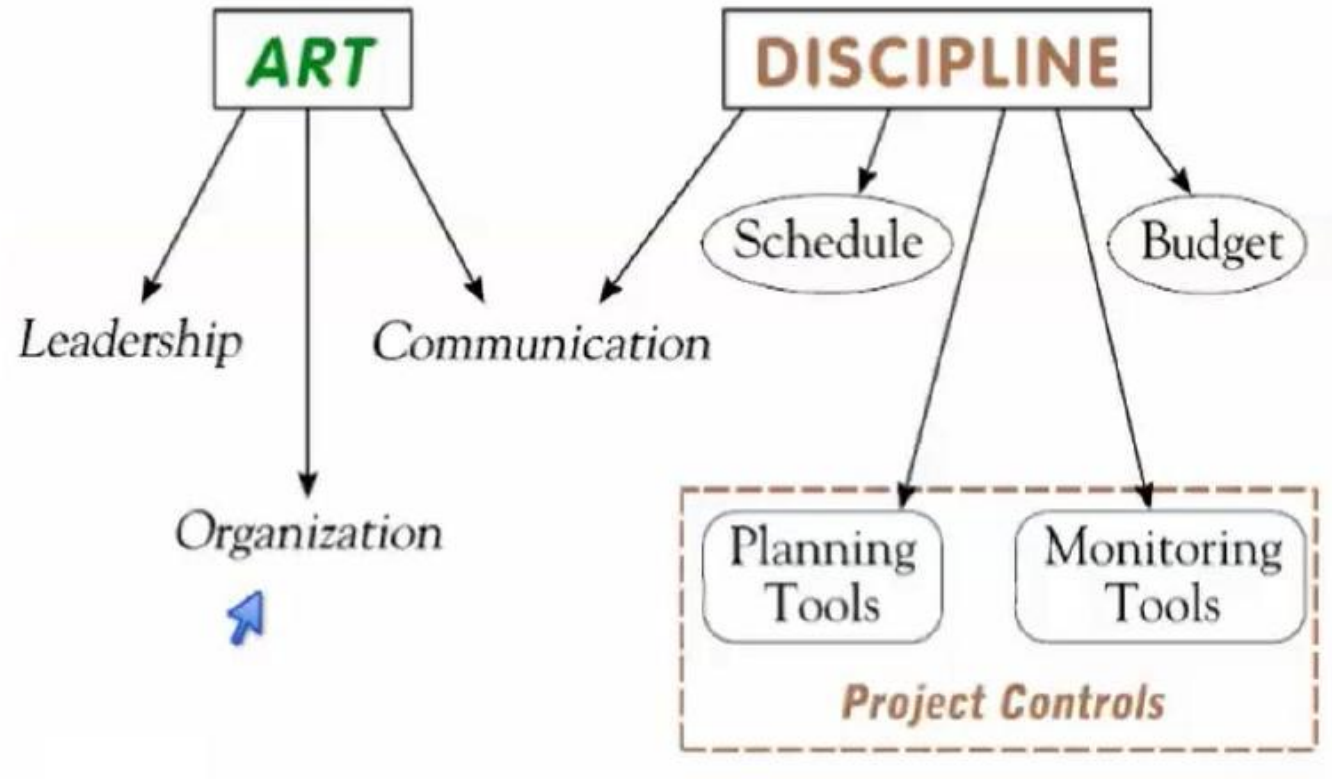
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Case study:

- What challenges does Motorola face? Why is project management so important in this company?
- Which HP PPM features were most useful to Motorola?
- Which management, organisational and technological factors had to be addressed before Motorola could implement and successfully use HP PPM?
- Assess the business impact of implementing HP PPM at Motorola.

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Project management



Source: EM464 WU

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Project management

Provides a systematic and organised way of working!

- Activities
  - Identifying requirements
  - Planning the work
  - Assessing risks
  - Estimating resource needs
  - Organising the work
  - Assigning tasks and optimising resources
  - Monitoring project implementation
  - Reporting progress
  - Analysing results

- Activities
  - Improves communication with stakeholders
  - Provides tools to manage project changes
  - Manages cash flow
  - Provides guidance for project closure
  - Offers an opportunity to record lessons learned during the project and apply them to subsequent projects

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How to manage a project?

- Work with stakeholders to achieve the project objectives
- Balance:
  - Scope
  - Time
  - Cost
  - Quality
  - Risks

Source: PMBOK_Guide_5th Edition

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Project example – a trip from Ljubljana to Hannover

- Project objective
  - A trip from Ljubljana to Hannover, Germany
  - Transport: car
  - Arrive safely in Hannover at the specified time
  - Number of passengers: 4
  - Each passenger contributes €100 towards the trip

- Questions:
  - Is this a project?
  - What resources does it involve?
  - What is the success criterion?

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Trip plan

- Distance from Ljubljana to Hannover: 1,000 km
- Average travelling speed: 100 km/h

- Journey time: 10 h (assumption)
- Three available routes



Are the assumptions valid?

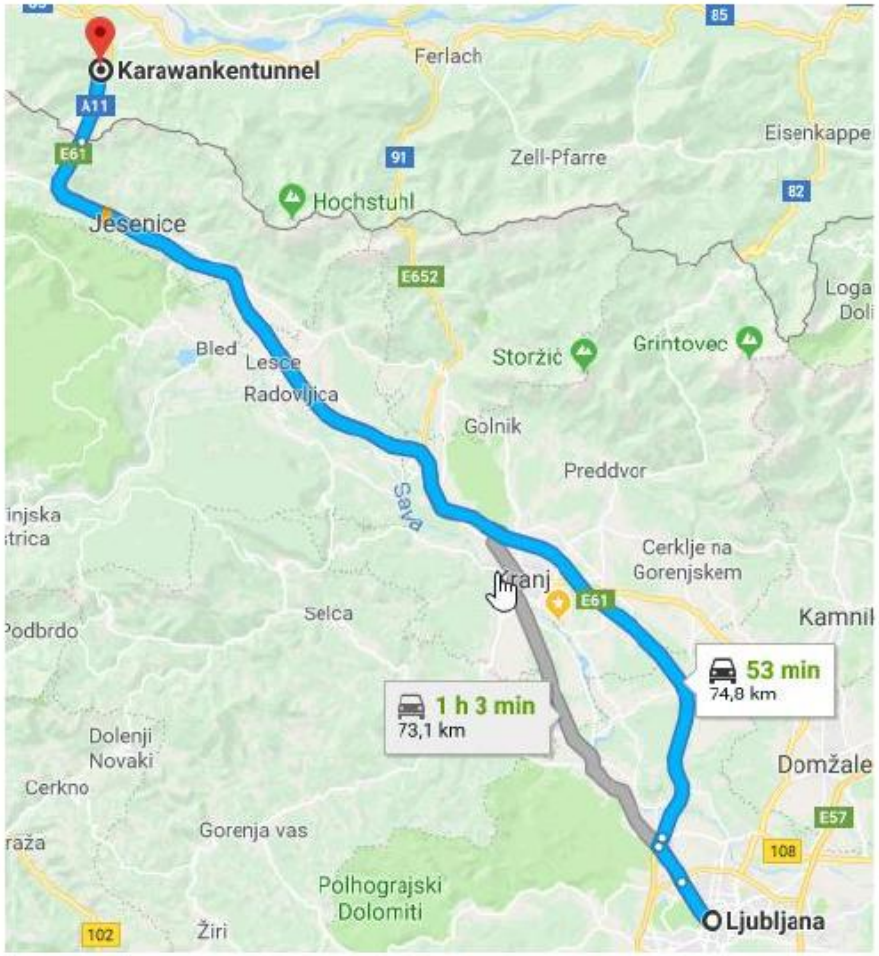
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Progress of the trip

- Departure from central Ljubljana
- Heavy motorway traffic before the Karawanks Tunnel
- We have travelled only 75 km in 2 h

How will we measure our progress?

- 2 h / 10 h = 20%
- 75 km / 1,000 km = 7.5%



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Resources / Budget

- We need money for fuel, food, vignettes and tolls
- Everyone pays the same amount

How will we pay?

- The bus approach: €400 in advance
- The taxi approach: €400 on arrival
- Payment in stages: we pay along the way according to progress
  - How often?
  - How will we measure progress?
  - Will we retain any money?

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Changes during the trip

- Almost halfway through the journey (in kilometres), just before Munich, the passengers request a change
- They want to visit Munich Zoo
- They want to spend at least 2 h at the zoo (opening hours?)



- What should we do?
  - Accept the change during the trip?
  - Change the plan? Make a new plan?
  - Change the payment method?

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Communication

- Prepare for possible roadside assistance (emergency numbers?)

- Plan ahead for traffic congestion
- Road maps / GPS navigation
- Who should be contacted if the arrival time changes?

- What needs to be done?
  - What is our communication plan?
  - Which tools will we use?

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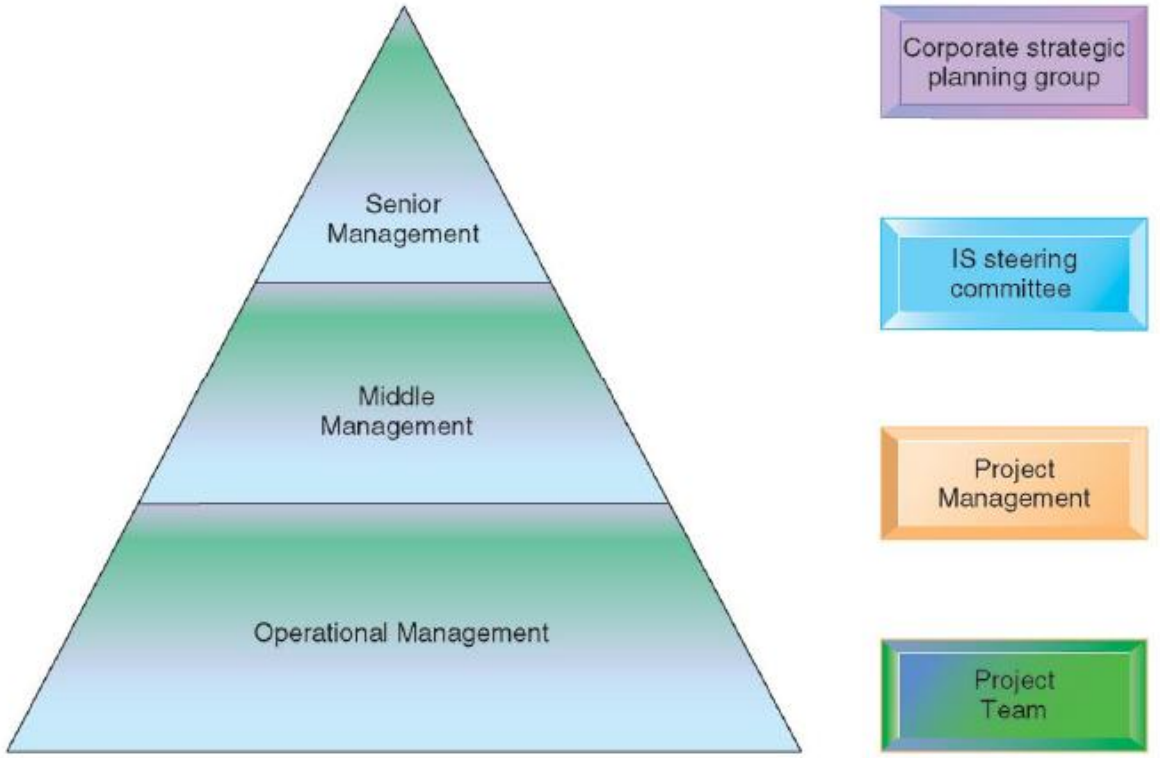
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Project management in a company

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Organisational structure for IT projects in larger companies

- Corporate strategic planning group
  - Responsible for the company's strategic plan
- Information systems steering committee
  - Reviews and approves projects
- Project management group
  - Responsible for overseeing individual / specific projects
- Project team
  - Responsible for an individual project



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Project development roadmap – project selection

- Identifies projects that will deliver the greatest business value
  - Links development to the business plan
- The development roadmap sets the direction for the information system:
  - Purpose of the roadmap, key business processes, management strategy
  - Alignment with the strategic business plan (business / strategic plan, organisational structure, market changes, etc.)
  - Current state of the information system (hardware / software, databases, networks, cloud, etc.)
  - New developments to consider (new business models, strategy)
  - Management strategy (acquisitions, milestones, training, human resources, etc.)
  - Implementation plan (identify potential implementation problems)
  - Budget

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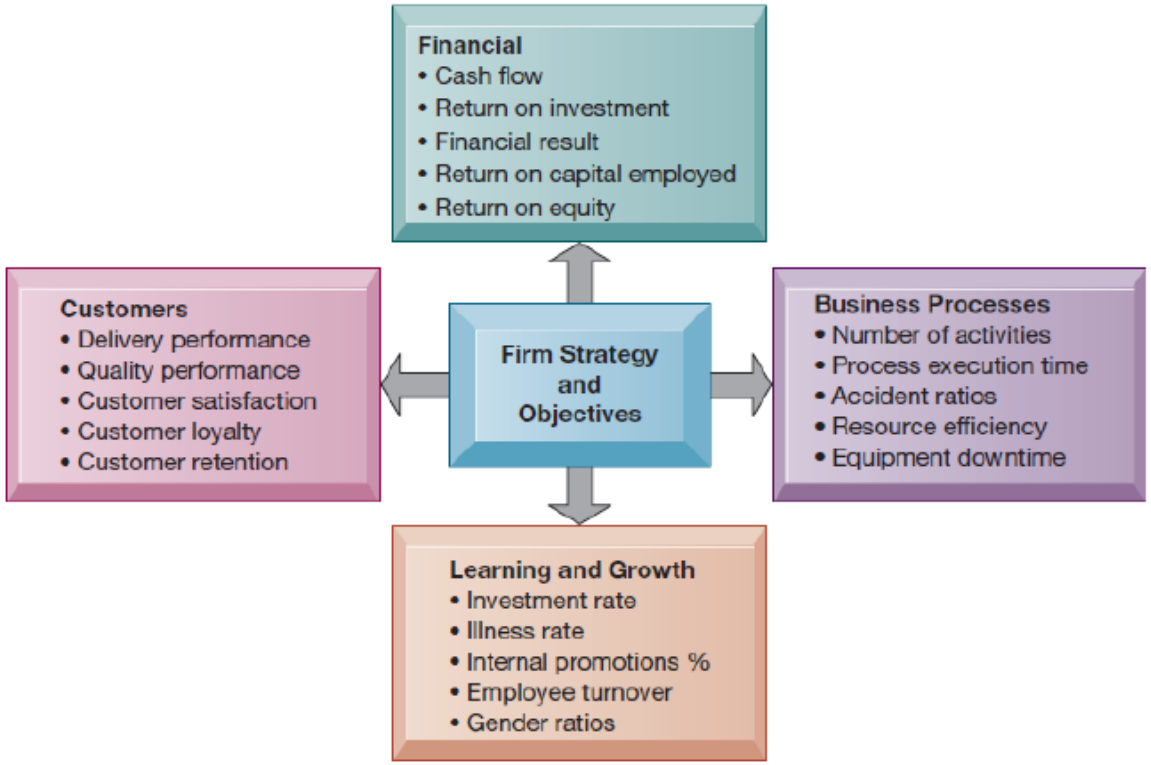
Project selection

- To plan and select projects effectively, companies must inventory and document their existing:
  - Software and hardware
  - Databases
  - Information and communication technology
  - Cloud services
- To prepare an effective project roadmap, the organisation must clearly understand its long-term and short-term requirements
- Using indicators for project selection
  - A pragmatic choice of indicators to avoid “gut feeling” decisions
  - For example, the Balanced Scorecard (BSC) framework
  - Using a benefit–risk matrix
  - A scoring model (also to compare solutions from two or more suppliers)

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Project selection – BSC indicators

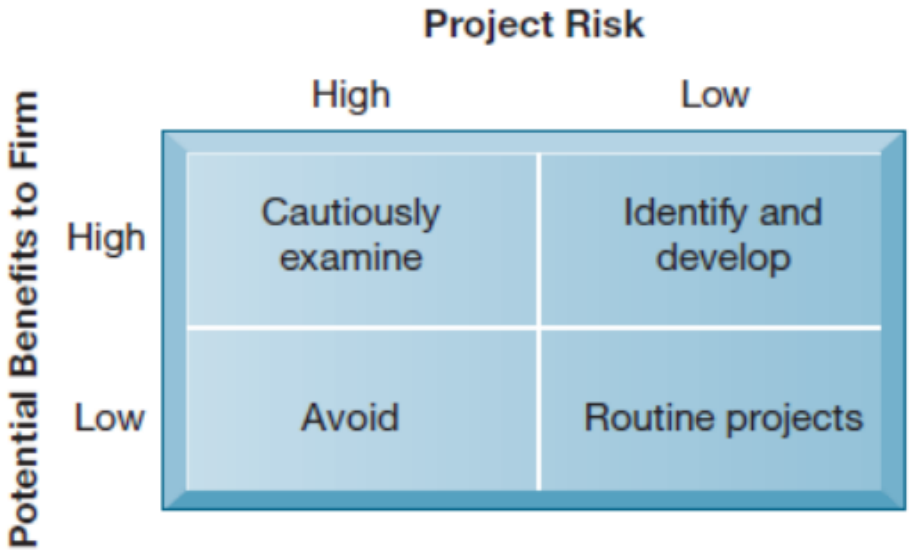
- The Balanced Scorecard (BSC) defines the company's strategic objectives in four areas:
  - Financial
  - Business processes
  - Customers
  - Learning and growth



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Project selection – risks

- Once the direction of information system development is set, analysis of the project portfolio can begin
- Lists all alternative projects and assets associated with the information system
  - Infrastructure, outsourcing contracts and licences
- Each project has its own risks and benefits
  - High benefit, low risk
  - High benefit, high risk
  - Low benefit, low risk
  - Low benefit, high risk
- To improve portfolio returns, project selection must balance risks and benefits



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Scoring model for comparable solutions

- Can be used to assess and compare (project) solutions

- Weights are assigned to different solution features and weighted totals are calculated

Criterion	Weight	Solution A	Score A	Solution B	Score B
Online ordering	4	67	268	73	292
Inventory review and management	3	66	198	59	177
ERP integration	4	72	288	81	324
Warehouse integration	2	71	142	75	150
…					
Total			3128		3300

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Assessing the business value of a solution

- Tangible benefits:
  - Can be quantified and assigned a monetary value
    - E.g. higher productivity, lower operating costs, fewer staff, lower computer equipment costs, etc.
  - Systems that reduce work activities (workload) and save space / materials:
    - Transaction processing and office systems
- Intangible benefits:
  - Cannot be quantified immediately but may lead to measurable benefits in the long term
    - E.g. more effective customer service, better decisions / planning, greater employee satisfaction, a better company image among customers, etc.
  - Systems that influence decision-making:
    - Executive Support Systems (ESS)
    - Decision Support Systems (DSS)
    - Collaboration tools

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Assessing the business value of a solution

- Various models assess IT projects and their financial returns (ROI, NPV, etc.)

- Main parameters
  - Expenditure – investment
    - Hardware / software, development labour costs
  - Operating costs
    - Licences, electricity, consumables
  - Revenue / benefits
    - Increased sales in €
    - Cost reductions in €
- Limitations of financial models
  - They do not account for social and organisational dimensions that may affect costs and benefits

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Finding EU funding opportunities

- EU-level opportunities: use the EU Funding & Tenders Portal and the relevant programme documentation.
- Transnational and macroregional cooperation: examine Interreg programmes, such as the Danube Region Programme.
- National and regional opportunities: consult the responsible authorities and official portals, such as Slovenia's Evropska sredstva.
- These are search routes. Eligibility, funding conditions and application procedures depend on the specific call.

EU Funding & Tenders Portal

Interreg Danube Region

Evropska sredstva

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Project scope

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Case study: Berlin's Brandenburg Willy Brandt International Airport



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Project scope management

- Project scope refers to all the work needed to complete the project successfully
- A deliverable is a product resulting from a project, such as hardware / software, documentation, etc.
- Project scope management includes processes that control what is and is not included in the project.

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Project scope management process

- Scope planning:
  - Determining how the project scope and requirements will be managed
- Collecting requirements:
  - Defining the features and characteristics of the project / product
  - Defining the procedures used to implement them
- Defining scope:
  - Reviewing the project charter, requirements documents and organisational factors
- Creating the WBS:
  - Breaking major project deliverables into smaller, more manageable activities
- Validating scope:
  - Formally accepting project deliverables
- Controlling scope:
  - Controlling changes to the project scope throughout the project

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Scope planning

- Using expert judgement and various meetings, the project team prepares two important outputs:
  - Requirements collection and management
  - Scope management and monitoring

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Collecting requirements

- For some IT projects, it is useful to divide requirements development into categories:
  - Requirements analysis
  - (Functional) requirements specification
  - Requirements validation
- An iterative approach to defining requirements is important
  - Requirements are often unclear at the start of a project

Sustainable development in project requirements

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Methods for collecting requirements

- Interviews
- Group work, workshops, focus groups
- Questionnaires and surveys
- Observation
- Prototyping
- Defining typical users (personas)
- Requirements can also be collected through benchmarking or by generating ideas from comparisons of project practices or product features with other projects or products inside or outside the company

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Personas

- Personas are fictional, generalised representations of your ideal customers / buyers / users.
- They help you understand your customers (and potential customers) and tailor content to the specific needs, behaviour and problems of different groups.
- The strongest buyer personas draw on market research and insights from actual customers (surveys, interviews, etc.).

- Depending on your business, you may have just one or two personas, or as many as 10 or 20.

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Requirements traceability matrix

- A table listing requirements, their attributes and status
- Sample RTM (Requirements Traceability Matrix)

Requirement No.	Name	Category	Source	Status
R32	Laptop memory	Hardware	Project charter and corporate laptop specifications	Complete. Laptops ordered meet requirement by having 4GB of memory.

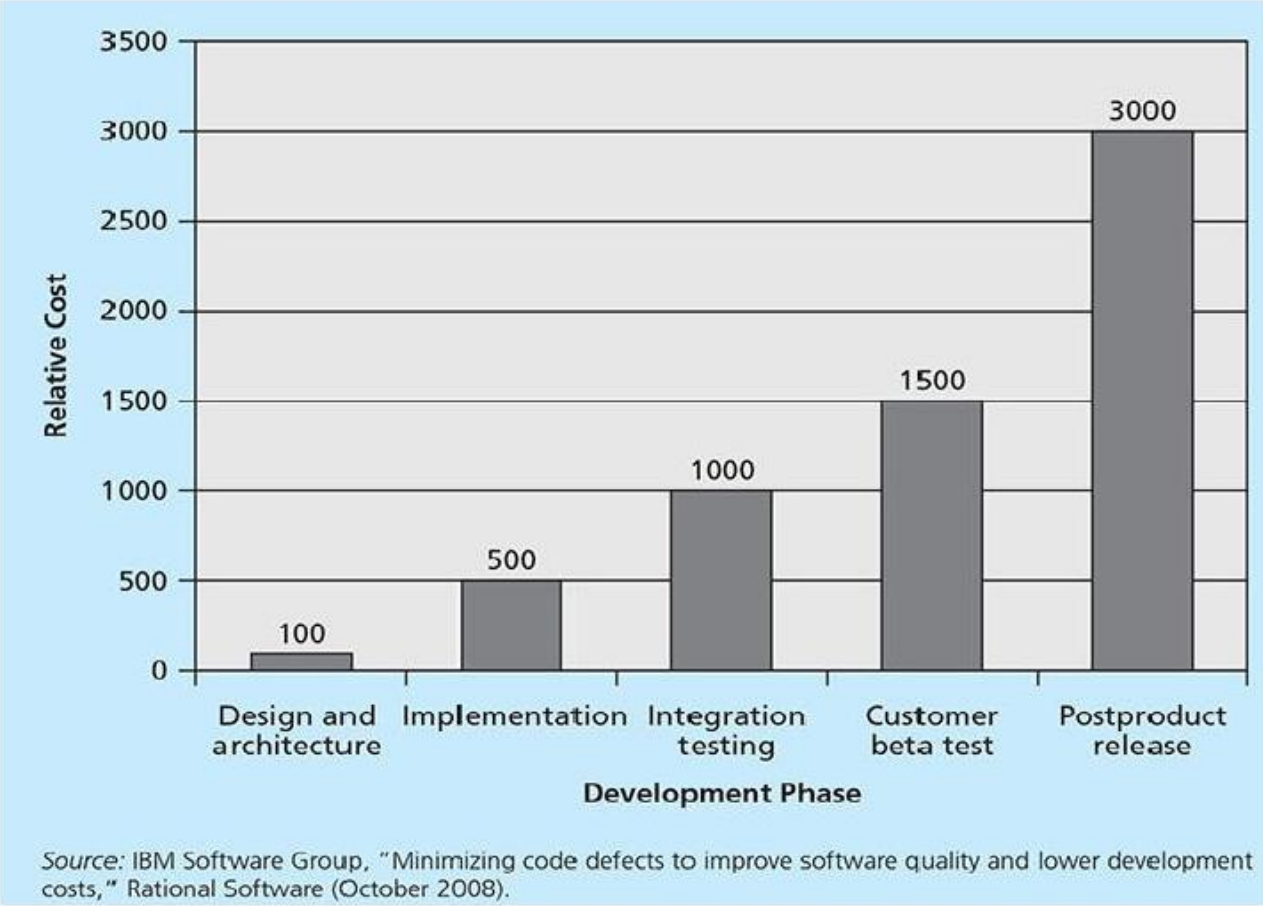
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Defining project scope

- The project scope statement should contain at least:
  - A description of the product
  - User acceptance criteria
  - More detailed information about all project deliverables
- It is also useful to document other scope information:
  - What is within and outside the project scope
  - Constraints
  - Assumptions
- The scope statement should also refer to supporting documents, such as product specifications
- As implementation progresses, the project scope becomes clearer and more specific.

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Relative cost of correcting software defects



Source: IBM Software Group, "Minimizing code defects to improve software quality and lower development costs," Rational Software (October 2008).

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Example project charter (extract)

Project Title: Information Technology (IT) Upgrade project

Project Start Date: March 4
Project Finish Date: December 4

Key Schedule Milestones:

- Inventory update completed April 15
- Hardware and software acquired August 1
- Installation complete October 1
- Testing complete November 15

Budget information: Budgeted $1,000,000 for hardware and software costs and $500,000 for labor costs.

Manager: Kim Nguyen, (310) 555- 2784, knguyen@course.com

Project objectives: Upgrade hardware and software for all employees (approximately 2,000) within nine months based on new corporate standards. See attached sheet describing the new standards. Upgrades may affect servers as well as associated network hardware and software.

Main Project Success Criteria: The hardware, software, and network upgrades must meet all written specifications, be thoroughly tested, and be completed in nine months. Employee work disruptions will be minimal.

Approach:

- Update the IT inventory database to determine upgrade needs.
- Develop detailed cost estimate for project and report to CIO
- Issue a request for quote to obtain hardware and software
- Use internal staff as much as possible for planning, analysis, and installation

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Project risks and change management

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The importance of risk management

- The art and science of identifying, analysing and responding to risks throughout a project
- Risk management is often overlooked in projects
- Risk management contributes to project success
  - Helps with project selection
  - Defining project scope / features
  - Preparing realistic estimates (cost, scope, time)

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Project risks

- Depend on:
  - Project size
    - Cost, time, number of organisational units involved
    - Organisational complexity can also create risk
  - Project structure
    - Structured, clearly defined requirements represent lower risk
    - Undefined requirements and constant changes represent higher risk
  - Experience with the technology used
    - Risk increases if the project team lacks the necessary technical knowledge and experience
  - Team stability
    - Try to keep the team(s) as stable as possible

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Case study: Stephan FP&R

- Why was the project successful?
- Why was continuous monitoring of the project scope important?

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Project risk management

- Identifying risks
  - Identifying and describing all potential project risks
- Qualitative risk analysis:
  - Ranking risks according to their likelihood of occurring
- Quantitative risk analysis:
  - Numerically assessing the effects of risks on project objectives
- Planning risk responses:
  - Taking action to reduce risks (responses if the risk occurs, a fallback plan if the primary action fails, management reserves)
- Controlling risks:
  - Monitoring identified risks
  - Identifying new risks
  - Implementing actions for recorded risks
  - Assessing the effectiveness of risk reduction actions

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Examples of risks

Knowledge Area	Risk Conditions
Integration	Inadequate planning; poor resource allocation; poor integration management; lack of post-project review
Scope	Poor definition of scope or work packages; incomplete definitions
Time	Errors in estimating time or resource availability; errors in determining the critical path; poor allocations and management of float; early release of competitive products
Cost	Estimating errors; inadequate productivity, cost, change, or contingency
Quality	Poor attitude towards quality; substandard design, materials, and workmanship; inadequate quality assurance program
Human resource	Poor conflict management; poor project organization and definition of responsibilities; absence of leadership
Communications	Carelessness in planning or communicating
Risk	Ignoring risk; unclear analysis of risk; poor insurance management
Procurement	Unenforceable conditions or contract clauses; adversarial relations
Stakeholders	Lack of consultation with key stakeholder

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Project risk management

- The first step in risk management is to identify the nature or type of risk (scope, technical, organisational, financial) and its probability of occurring
- Methods for identifying risks
  - Brainstorming (individually or in a group)
  - SWOT analysis
  - Interviews
  - …

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Project risk management

- Technically complex projects require a strong technical team
- Managing technical complexity
  - Project managers with technical and administrative expertise
  - A highly experienced technical team
  - Frequent team meetings
  - Obtaining specialist / scarce expertise outside the company (outsourcing), if needed
  - A stable project team

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Example risk register

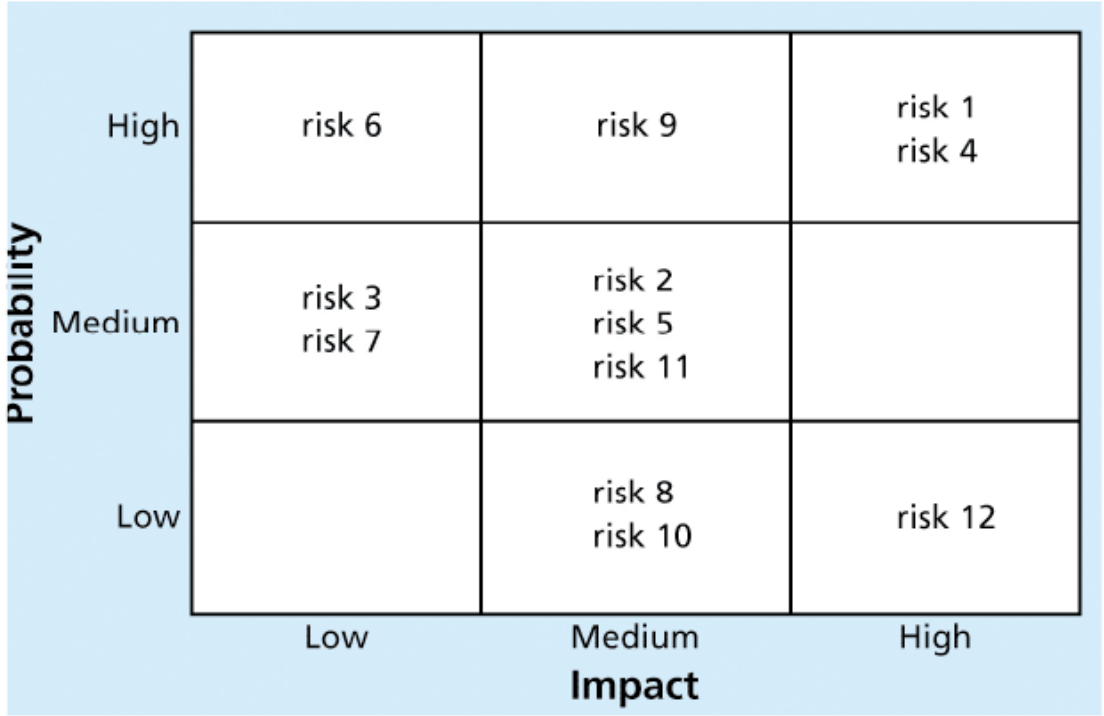
No.	Rank	Risk	Description	Category	Root Cause	Potential Responses	Risk owner	Probability	Impacts	Status
R44	1									
R21	2									
R7	3									

- Number: R44
- Rank: 1
- Risk: New customer
- Description: We have never carried out a project for this company and know little about it. One of our company's strengths is building good customer relationships, which often lead to further projects. Working with this customer may be difficult because the relationship is new.
- Category: People
- …

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Qualitative risk analysis

- Assesses risk probability and impact to determine the level of risk and response priority.
- Tools
  - Probability / impact matrices
  - Expert judgement
  - …



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Quantitative risk analysis

- Often follows qualitative risk analysis, although both can be performed together.
- Large, complex projects involving advanced technologies often require extensive quantitative risk analysis.
- Tools:
  - Decision trees and Expected Monetary Value (EMV)
  - Simulation (e.g. Monte Carlo)
  - Sensitivity analysis

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Risk responses

- Once individual risks have been identified and quantified, we need to decide how to respond.
- Four main options:
  - Avoid the risk
  - Accept the risk
  - Transfer the risk (e.g. through insurance)
  - Mitigate the risk
- It is also important to define the risks that remain (addressing all risks is very difficult).
  - Residual risks remain after the risk response plan, including those we have chosen not to address
  - Secondary risks arise directly from the actions taken

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Risk control

- Includes monitoring implementation of the defined risk response plan
- An ongoing part of project activities
- Workarounds are unplanned risk reduction actions needed when unforeseen events occur
- Main outputs of risk control:
  - Information on the progress of risk responses
  - Requests to change the project scope (change requests)
  - Updates to the project plan (schedule, budget, scope)
  - Updates / changes to technical or business processes
  - Updates to other project documents
  - …

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Software for risk management

- A risk register can easily be created using standard MS Office tools (Word or Excel)
- Advanced tools are available for risk monitoring and simulation (quantitative analysis)

Risk analysis and planning							
Risks		Risk analysis	Risk treatment				
Risk	Impact	Probability	Responses	Owner	Activities	Deadline	Costs
Risk description	Effect on the project	1 Unlikely <34% 3 Moderately likely 35%-80% 5 Almost certain >81%	Risk elimination Risk mitigation Risk transfer Risk acceptance				
	Assets	Unlikely	Risk mitigation				
	Cash flow	Very likely	Risk transfer				
	Profitability	Moderately likely	Risk acceptance				
	Reputation	Unlikely	Risk acceptance				
	Business continuity	Unlikely	Risk elimination				

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Results of good risk management

- Good project risk management often goes unnoticed.
- Well-managed projects may seem almost “easy”, but managing a project well requires substantial work.
- Project managers should aim to make their work look straightforward, reflecting the results of well-managed projects

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Risks to the intended project benefits

- Project risks affect scope, time and cost, as well as the intended contribution to sustainable development.
- Common risks include low user adoption, exclusion of some users, unreliable data and insufficient resources for continued operation.
- A risk register records each risk’s likelihood, potential impact, responsible owner, planned response and review date.
- Risk responses aim to protect the expected benefits by reducing the likelihood or impact of threats.
- Risk assessments are updated when requirements or implementation conditions change.

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Case study: Samsung battery problem

- What were the project risks?
- Which management, organisational and technological factors caused these problems?
- What could have been done to reduce the risks?

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Project scope control

- Includes controlling changes to the project scope.
- Objectives of scope control:
  - Influence the factors that cause scope changes
  - Ensure changes follow agreed procedures as part of integrated change control
  - Manage changes as they arise

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Scope increase

- Project scope may increase because of:
  - Unrealistic requirements
  - Poor control of scope changes
  - Poor communication between executive sponsors and the project team
  - Inadequate needs definition and documentation at the start of the project
  - A weak project manager or executive sponsor
  - Poor planning
  - Project duration
  - Project complexity

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Scope increase

- The following approaches can help reduce these problems:
  - Prioritising requirements using MoSCoW
    - Must Have: essential requirements
    - Should Have: important requirements, but another way of meeting the need exists
    - Could Have: desirable but not essential, and could improve the user experience or customer satisfaction at some development cost
    - Won’t Have this time: the least critical, least beneficial or unsuitable items, deferred to future versions or deliveries
  - Define project expectations
  - Agree and document the deliverables
  - Document and review business requirements

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How to avoid project scope problems?

- Keep the project scope realistic.
  - Projects should not be so large that they cannot be completed.
- Involve users in defining the project scope.
- Where possible, use the existing information system, including available hardware and software.
- Follow good project management procedures.

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Suggestions for improving user involvement

- Project sponsors should come from the same organisational unit as the users.
- Users should hold important roles within the project team.
- Hold regular meetings to share information openly and formally record approval of results, including tests.
- Providing interim results to users and sponsors increases motivation and trust.
- Do not promise what you cannot deliver.
- Where possible, locate the users and development team together.

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Suggestions for reducing incomplete and changing requirements

- Agree and then follow a requirements management process
- Involve users as much as possible in development through prototyping, use-case modelling, etc.
- Record requirements in writing and keep them updated (wiki, SharePoint, etc.)
- Create and document a requirements repository (wiki, SharePoint, etc.) to make requirements easier to control
- Test continuously throughout the project life cycle
- Review requirement changes from both a functional and a system perspective
- Emphasise completion dates to focus on the most important requirements / changes
- Assign the most experienced people to review change / improvement requests – this takes time!

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Software support for project scope management

- Word / wiki tools make it easy to document requirements

- Spreadsheets support financial calculations and scoring models, and the creation of tables and charts.
- Email and online wiki tools help clarify and communicate the application area and project scope

- Project management software supports WBS creation (e.g. MS Project), CCPM (e.g. the ProChain plug-in for MS Project) and agile methods (e.g. Jira / Confluence)

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Changes resulting from a project
(beyond the technical perspective)

- Necessary for successful completion and introduction of an information system project
- New information systems have substantial human and organisational effects
  - Changes in system use often lead to a new distribution of responsibilities and roles
  - Internal organisational changes create resistance and opposition
- Implementation
  - Changes to configurations, tasks, roles and cooperation require close involvement of users
- Activities needed to introduce the new solution and use it in daily work

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The role of end users

- The problem – a communication gap between users and the technical team:
  - Different backgrounds, interests and priorities
  - Different managers, priorities and terminology
  - Different concerns about the new information system

- Involving users in development and implementation (testing):
  - The system is more likely to meet the requirements
  - The user interface is more likely to meet their needs
  - Users are more likely to accept the new system as “their own”
  - Users learn about the system and become advocates for the new solution
  - Fewer problems concerning organisational matters and new roles

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Management support

- Has a positive influence on the project
  - Also positively influences users and technical staff
- Provides sufficient funding and the necessary resources
- Encourages and motivates the required organisational changes
  - Reduces the influence of managers who oppose change
  - Reduces employees' concerns

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Changes to project requirements

- We distinguish between:
  - Changes within the project scope:
    - Minor changes with minimal impact on cost and resources
  - Changes outside the existing project scope:
    - A formal document is needed describing the change and its impact on cost, time and resources
- A change request is a formal proposal to modify the project scope, cost or time frame

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Different project management methods

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The importance of project schedules

- Project managers often identify timely delivery as one of their greatest challenges.
- Time is the least flexible constraint. Scope and money are easier to adjust ☺
- Deadline problems, especially in the second half of a project, are a main source of project conflict

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Working styles and cultural differences can affect schedules

- Some people prefer to follow defined plans and meet deadlines, while others do not.
- Different cultures, and even entire countries, have different attitudes towards deadlines.

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Project planning

- The project plan must reflect:
  - What? – project scope
  - How? – project delivery and the tasks to perform
  - Who? – project organisation and roles
  - When? – project plan and schedule
- The project manager is responsible for answering these questions
  - Other team members usually provide the details

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Project planning

- What is the project objective? What problem does it solve?
- What are the project deliverables?
  - How many different deliverables are there?
  - What are the deadlines?
  - In what form or format?
- What resources are available?
- Which resources are needed?
  - Types of resources (human, equipment, financial, natural)
  - What expertise?
  - What quantity?
  - Where are they located?
  - Do we need to obtain external expertise?
- Who are the stakeholders / customers?
  - Who wants what?

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Simple project plan example – seminar assignment with presentation

- The simplest way to monitor project implementation
  - Define the necessary steps – an activity list (e.g. a to-do list in Excel)
  - Assign the people responsible for delivery
  - Identify resources that support / contribute to each activity
  - Set the activity dates (from / to)
  - Define milestones – important events
  - Supporting “traffic light” indicators

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Process of preparing a project plan (1/2)

- Project management:
  - Define the policies, procedures and documentation used to plan, implement and control the project
- Defining activities:
  - Identify the tasks that team members and stakeholders must perform to achieve the project objectives
- Define dependencies between project activities

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Process of preparing a project plan (2/2)

- Determine the resources needed for project activities
- Determine activity durations based on the assigned resources

- Develop the project schedule:
  - Analyse activity sequences, required resources and activity durations

- Control the project schedule:
  - Monitor and manage project activities, including changes and associated resources

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Preparing the project plan – getting started

- The project team uses expert knowledge, analytical techniques, meetings and workshops to prepare the plan.
- The project plan includes:
  - Project management methodology (more later)
  - Planning precision (tasks at daily, weekly or monthly level)
  - Control points (milestones)
  - Rules for measuring performance
  - Reporting formats
  - …

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Defining activities

- An activity or task is usually found in the work breakdown structure (WBS)
  - It has a defined duration, cost and resource requirements.
- Preparing a project plan requires a detailed, but not excessively detailed, WBS with associated activities, so that project cost and duration can be estimated.
  - The project is expected to last 12 months.
  - Should I schedule a meeting on 10 October from 10:00 to 10:45?

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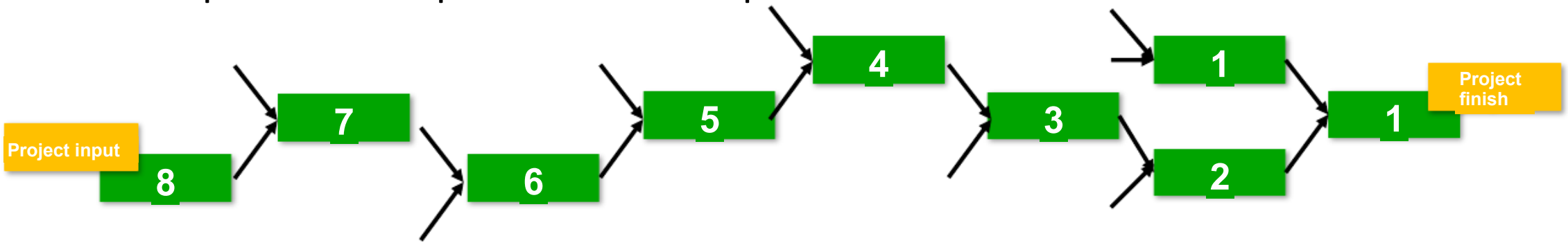
Work Breakdown Structure (WBS)

- Defines the approved tasks that make up the full project scope
- Provides the foundation for planning and managing project schedules, costs, resources and changes
- Decomposition breaks project deliverables into smaller parts
- A work package is the lowest-level task in the WBS

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Project planning – how?

- Project network diagram – only the project work
  - Start with the tasks or deliverables at the end
  - Work backwards towards the beginning
    - Identify what must be completed before a task can start (one or more tasks)
  - Begin with one path from the end to the beginning
  - When the first path is complete, plan the next path furthest to the right, again working backwards
  - Repeat until all paths have been planned



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Project planning – what?

- Project network diagram – only the project work
  - Check the task sequence from beginning to end
    - Check task dependencies
    - Every task needs defined start conditions and completion conditions (how do we know it is finished?)
  - Do NOT assign the required resources yet!

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Project planning – who?

- Assigning people to project tasks
  - How many people are available?
  - What is the skill level of the available people?
  - Work from left to right and define the minimum resource requirements for completing each task (type, skill level, number)

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Project planning – how long?

- Estimate the duration of each task
  - Understand the task objectives
  - Consider the skills and number of people assigned
  - This is not easy, especially for new work that we have not done before

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Project planning – validating the plan

- Obtain expert views from each relevant field
  - Review individual tasks and their objectives
  - Check task dependencies, assigned people and work estimates (duration)

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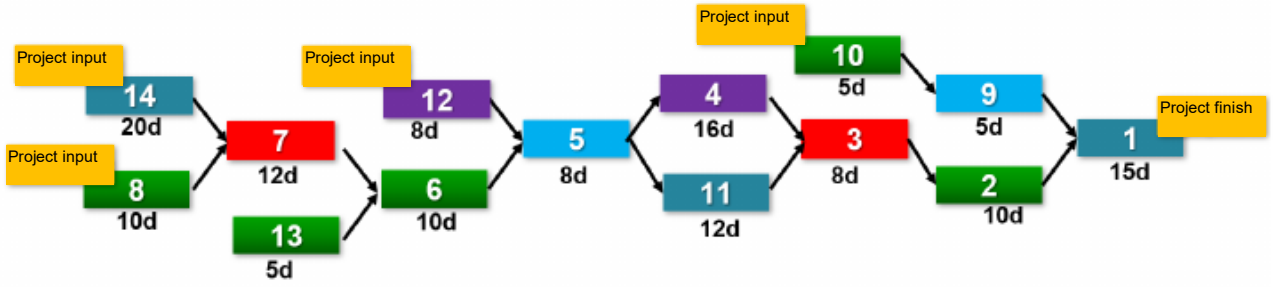
Project planning

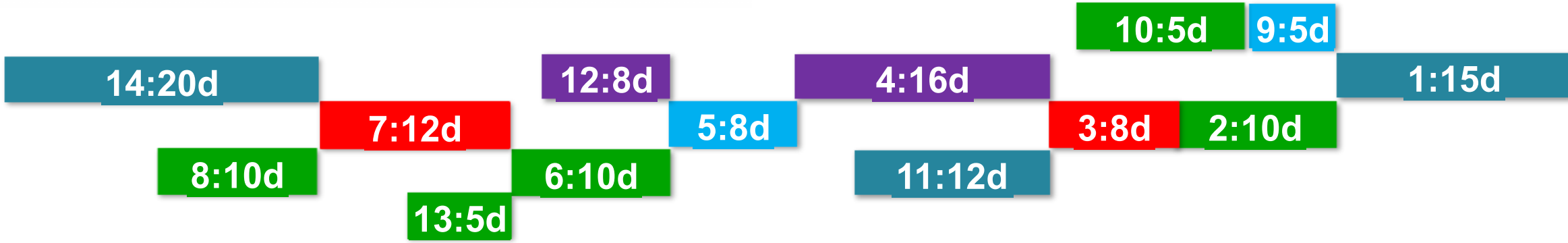
- Establish the project timeline
- Resolve resource conflicts
- Identify the project's critical path
  - For CCPM, identify the critical chain and all buffers (FB, PB)
- Identify risks and actions to reduce them

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Project planning

- Place tasks on the timeline
  - Where possible, schedule tasks feeding into the critical path (critical chain) As Late As Possible (ALAP)

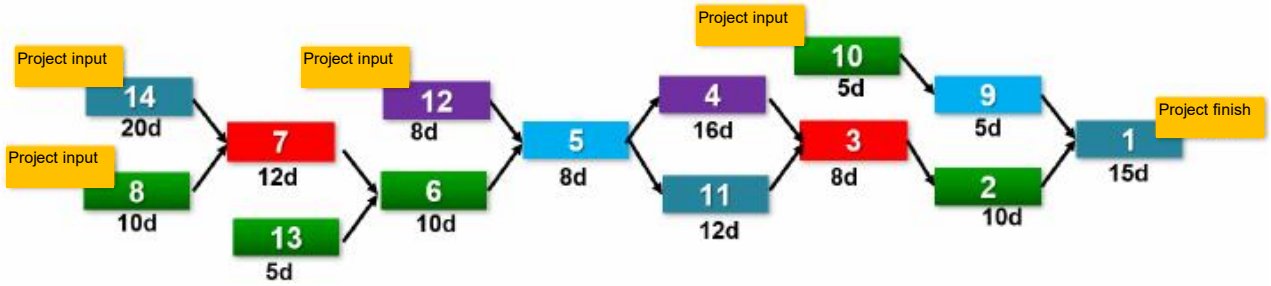




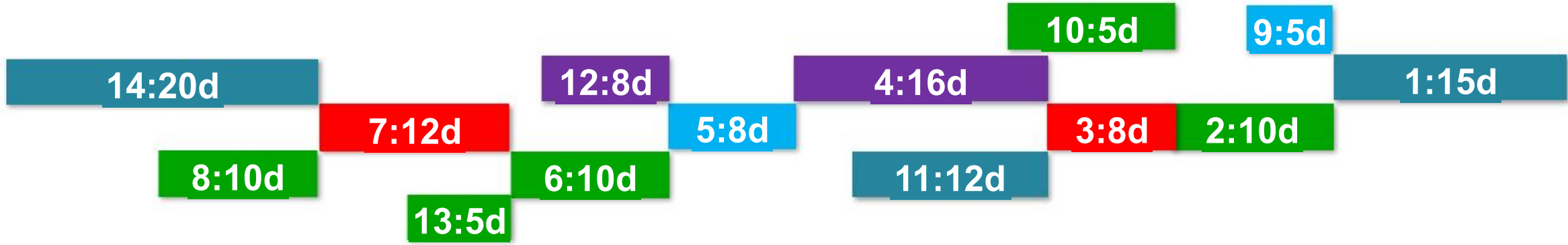
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Project planning – resolving resource conflicts

- Work from right to left and resolve any resource conflicts
  - Move the shorter task sequences to the left



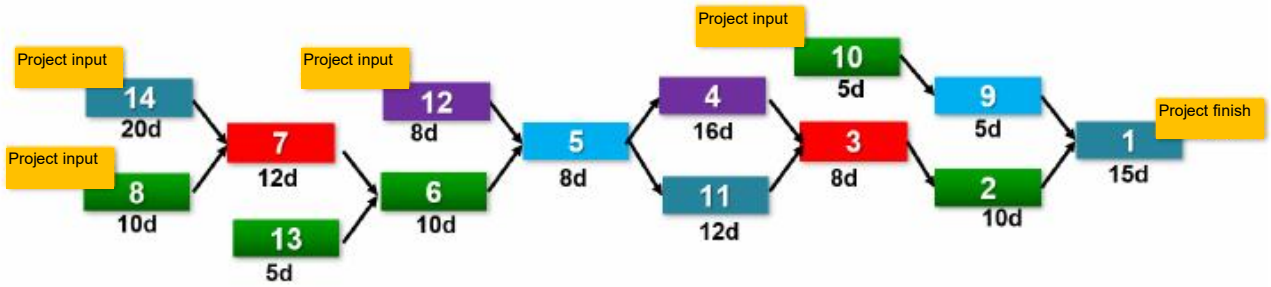
Only one person is available for the task

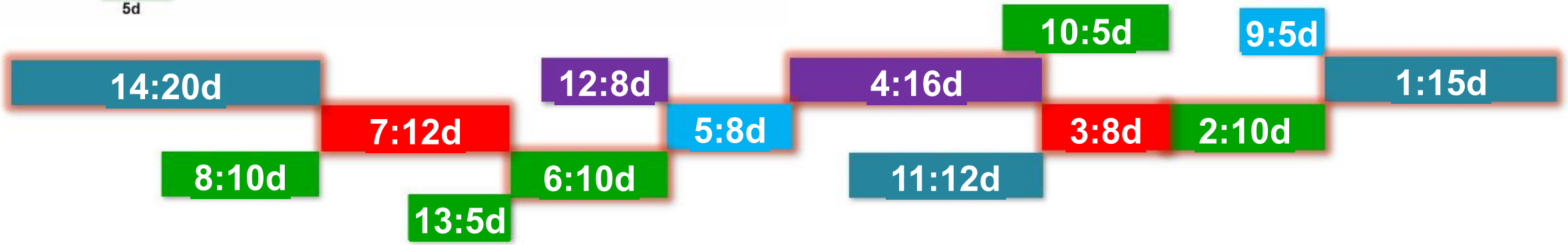


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Project planning – identifying the critical path

- Identify the longest task sequence, considering task order, task dependencies and resource dependencies

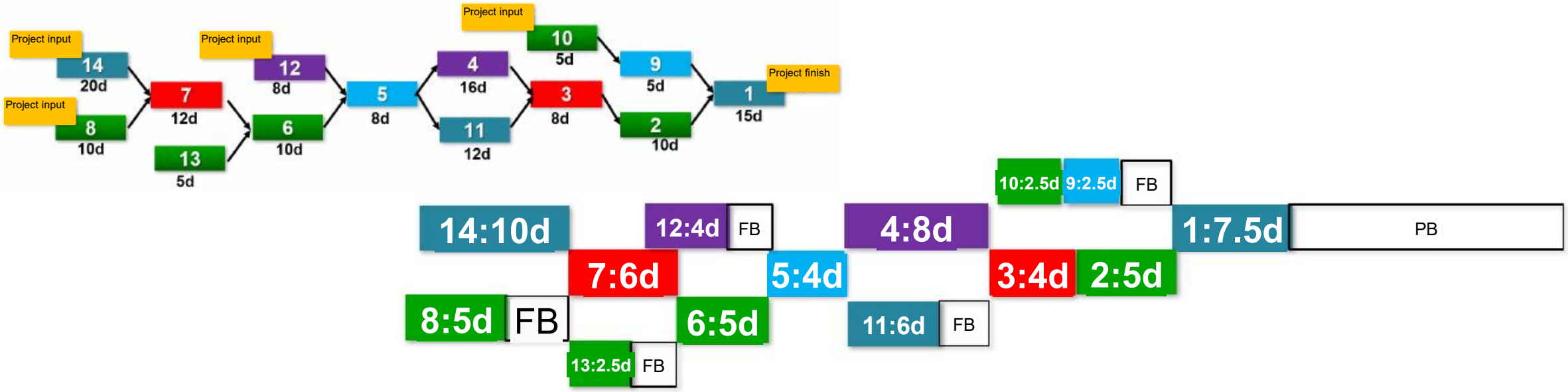




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Project planning – CCPM

- Halve task durations
- Define FB and PB (half of the safety allowance goes into buffers)



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Project planning – risks

- Have known risks been defined, and how will we address them?
- Are there other risks whose timing is unknown?

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Tips for creating a WBS

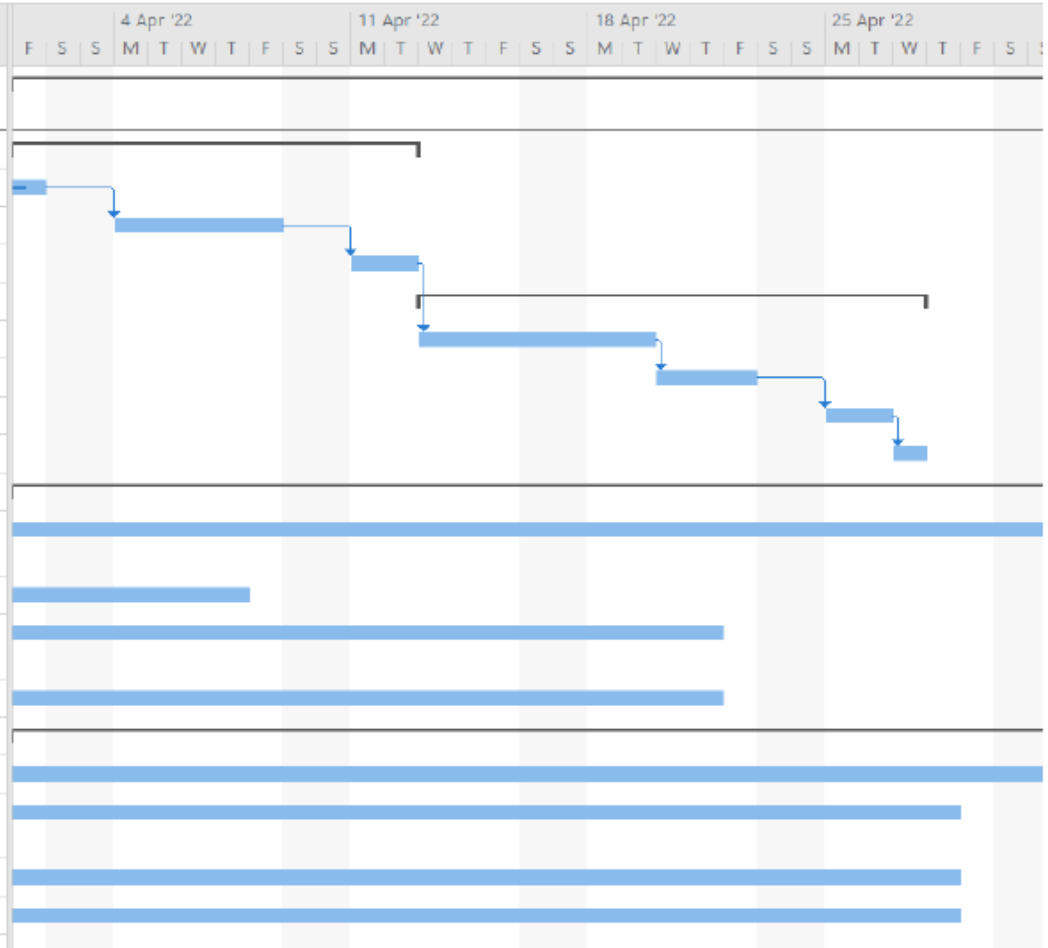
- A unit of work can appear in the WBS only once.
- The work in a WBS item equals the sum of the items beneath it.

- Each WBS item should have one accountable person, even if several people work on it.
- The whole project team should help define the WBS.

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A simple WBS example – using MS Project

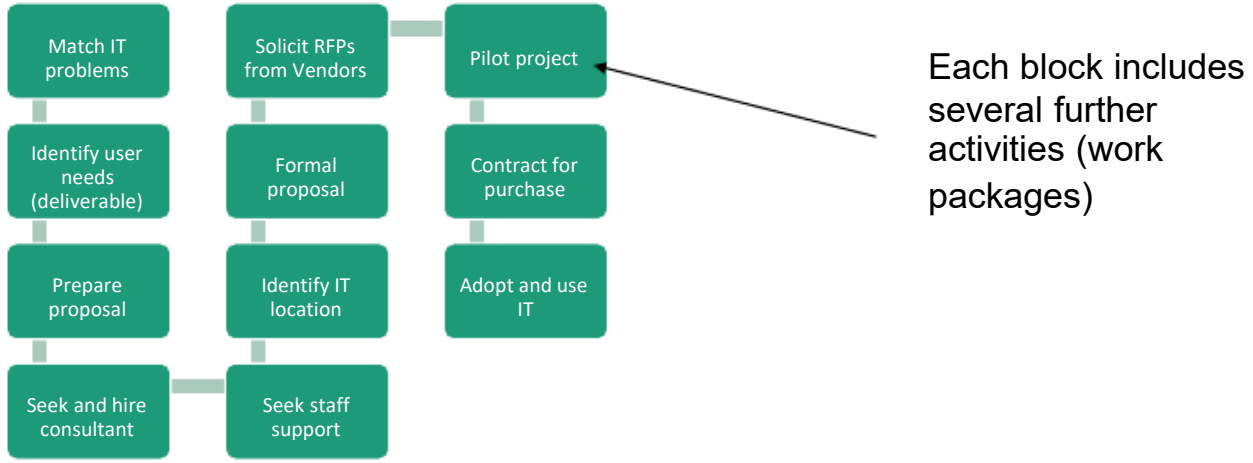
	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource
1		Project Seminar paper with presentation	80 days	Fri 1.04.22	Thu 21.07.22		
2		Identify topic	8 days	Fri 1.04.22	Tue 12.04.22		
3		Brainstorming with collegues	1 day	Fri 1.04.22	Fri 1.04.22		
4		Google search	5 days	Mon 4.04.22	Fri 8.04.22	3	
5		Personal interest area	2 days	Mon 11.04.22	Tue 12.04.22	4	
6		Research topic	11 days	Wed 13.04.22	Wed 27.04.22		
7		Academic Literature review	5 days	Wed 13.04.22	Tue 19.04.22	5	
8		Survey	3 days	Wed 20.04.22	Fri 22.04.22	7	
9		Review analitic reports (Gartner, ...)	2 days	Mon 25.04.22	Tue 26.04.22	8	
10		Audit comapnies (E&Y, ...)	1 day	Wed 27.04.22	Wed 27.04.22	9	
11		Paper draft	48 days	Fri 1.04.22	Tue 7.06.22		
12		Magazine research - which magazine to publish - template	48 days	Fri 1.04.22	Tue 7.06.22		
13		Writing	5 days	Fri 1.04.22	Thu 7.04.22		
14		Simulations, programing, HW, mathematical discussion, etc.	15 days	Fri 1.04.22	Thu 21.04.22		
15		Paper submition for review	15 days	Fri 1.04.22	Thu 21.04.22		
16		Edit paper	80 days	Fri 1.04.22	Thu 21.07.22		
17		Review comments from Reviewers	80 days	Fri 1.04.22	Thu 21.07.22		
18		Update results based on reviewer comments	20 days	Fri 1.04.22	Thu 28.04.22		
19		Submit paper	20 days	Fri 1.04.22	Thu 28.04.22		
20		Prepare presentation	20 days	Fri 1.04.22	Thu 28.04.22		



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A simple WBS example

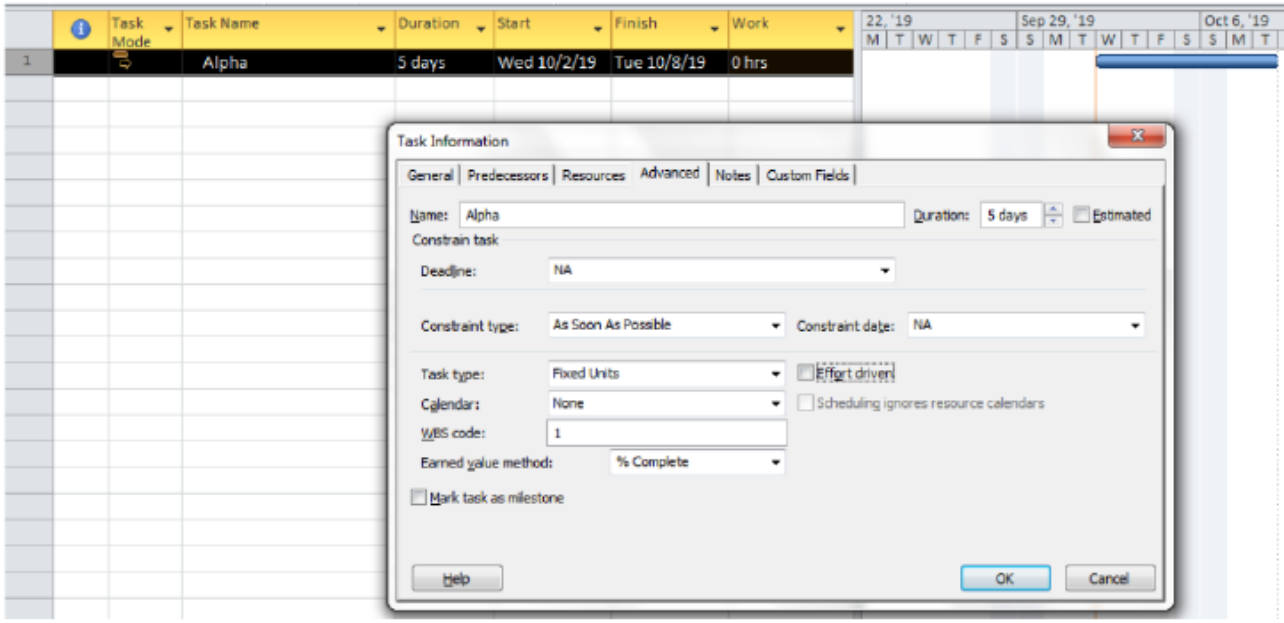
- An organisation-wide IT system is introduced, covering billing, accounts receivable, patient records, staff supervision and medical process control.
- The first step in launching this extensive installation project is to identify the key elements of introducing the technology.



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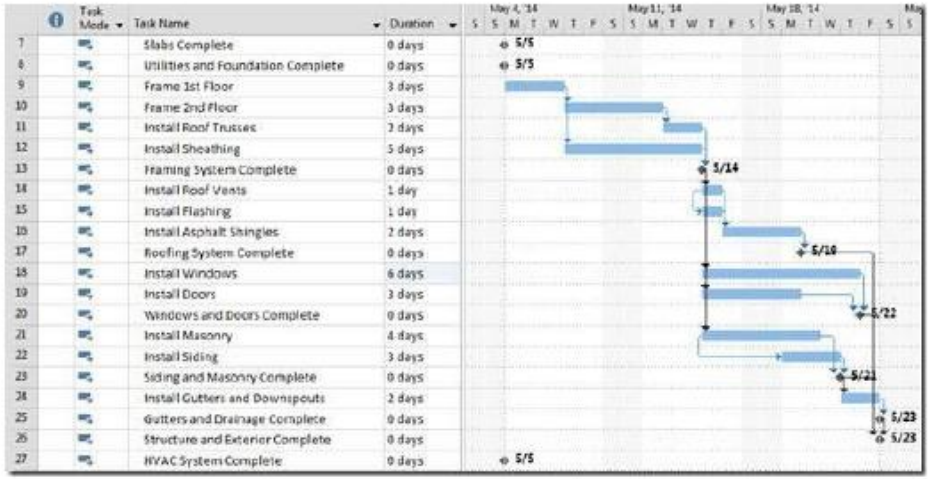
Activity list and details

- An activity list in the project plan contains:
  - Activity name
  - Activity identifier or number
  - Brief activity description
- Additional information:
  - Dependencies: predecessors, successors
  - Logical relationships, etc.
  - Resource requirements
  - Constraints
  - Required delivery dates
  - Assumptions
  - …



https://www.mpug.com/a-new-look-at-ms-project-task-types-fixed-duration-and-effort-driven/

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Milestones

- A milestone is an important event in the project plan
  - Usually has no duration (0 days)
- Used to set interim project objectives and monitor progress
  - Very common in large projects
- Examples
  - Customer signature on a key project document
  - Completion of a prototype
  - Completion of …
- Follows SMART objectives – we must answer “Has the milestone been reached?”
  - Specific
  - Measurable
  - Achievable
  - Realistic
  - Time-bound

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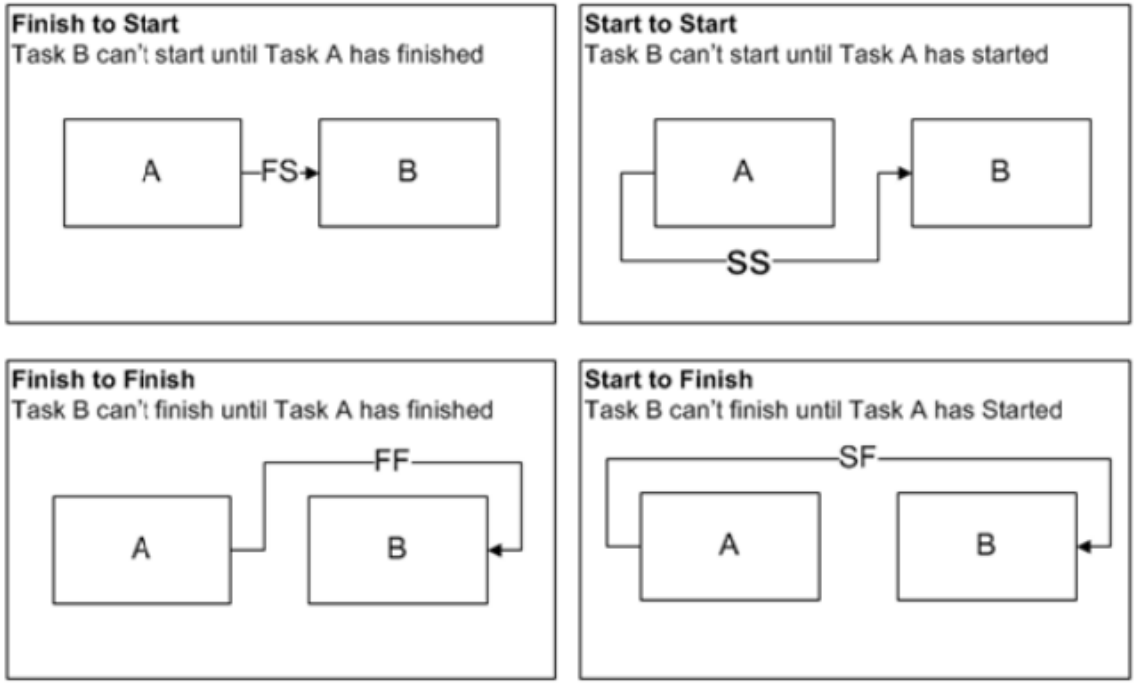
Sequencing activities

- Understand the prerequisites for performing each activity.
- Activities can be sequential, parallel or a combination of both (the most realistic form).
- Dependencies must be known to identify the project's critical path.

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Dependencies between activities

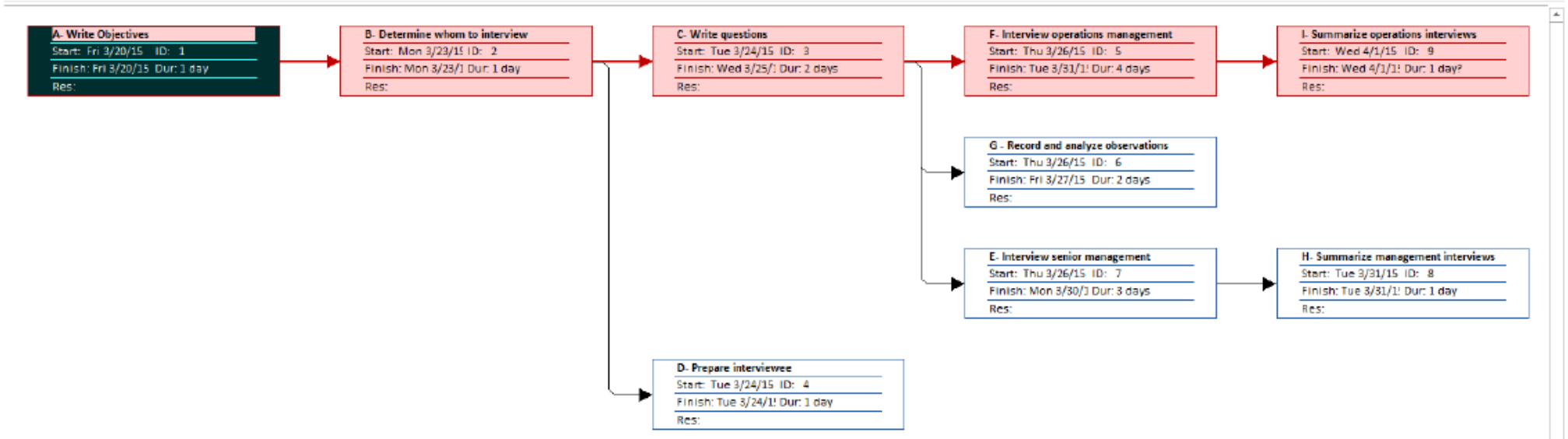
- Mandatory dependencies:
  - The next activity cannot proceed until the preceding one is complete – “hard logic”.
- Discretionary dependencies:
  - Use carefully, as they can restrict scheduling options.
- External dependencies:
  - Relationships between project and non-project activities



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Network diagrams

- Used to show the sequence of activities
- A schematic representation of logical relationships and dependencies between project activities
- The two main forms are arrow and precedence diagrams

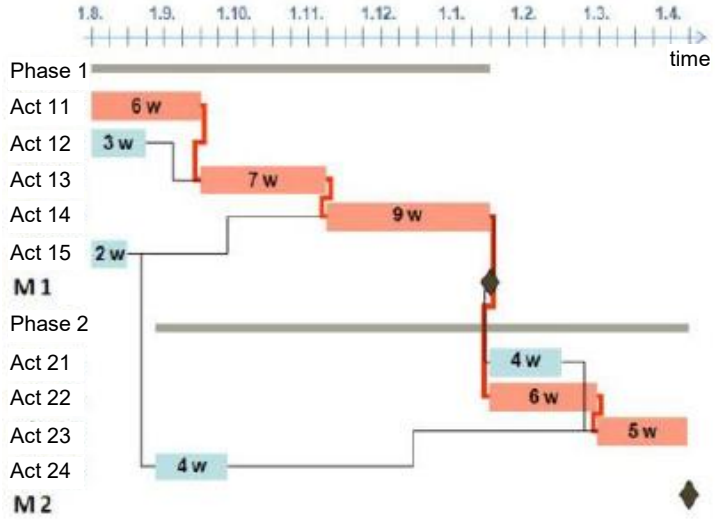


http://sadam15utm.blogspot.com/2015/05/network-diagram-and-critical-path-answer.html

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Network diagram

- How are the activities organised in relation to each other?
- How long does each task take?
  - This depends on assigned resources (more later)



Source: https://projektni-management.si/2011/02/10/clenitev-projekta-in-izdelava-seznama-aktivnosti-%E2%80%93-wbs/

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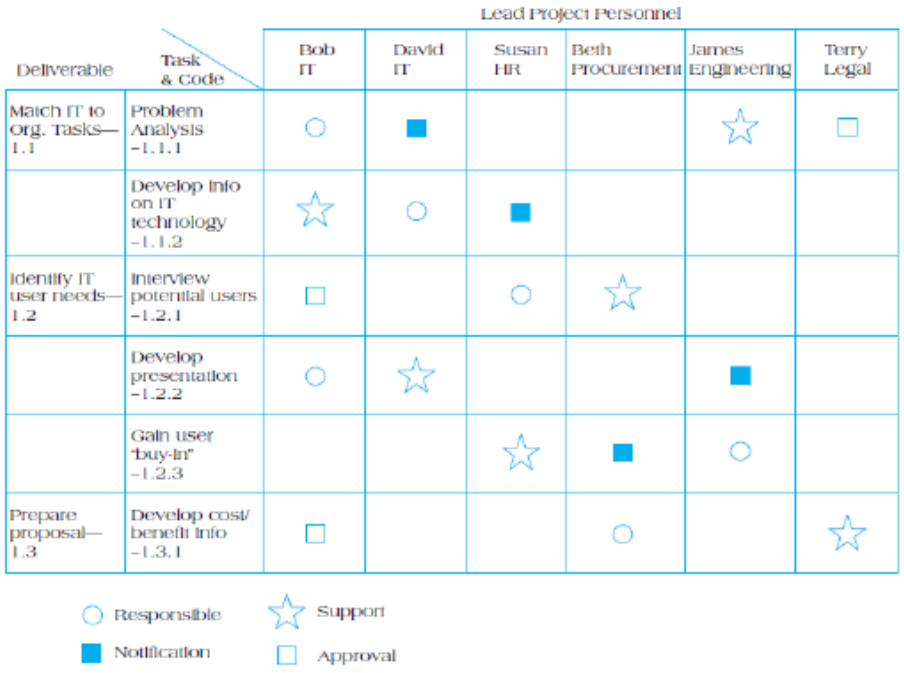
Assigning resources to activities

- Before estimating duration, we need to know the quantity and types of resources required
- Resources include:
  - People, equipment and materials
- When estimating work, consider:
  - How difficult is it?
  - What experience does the company have in this area?
  - Are the desired resources available during the project?
  - For example, developers work at different speeds. A realistic estimate requires knowing who will perform the work

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Responsibility matrix

- Each WBS item needs a task owner or a person assigned to perform it
- A complete RACI matrix is useful for more complex projects



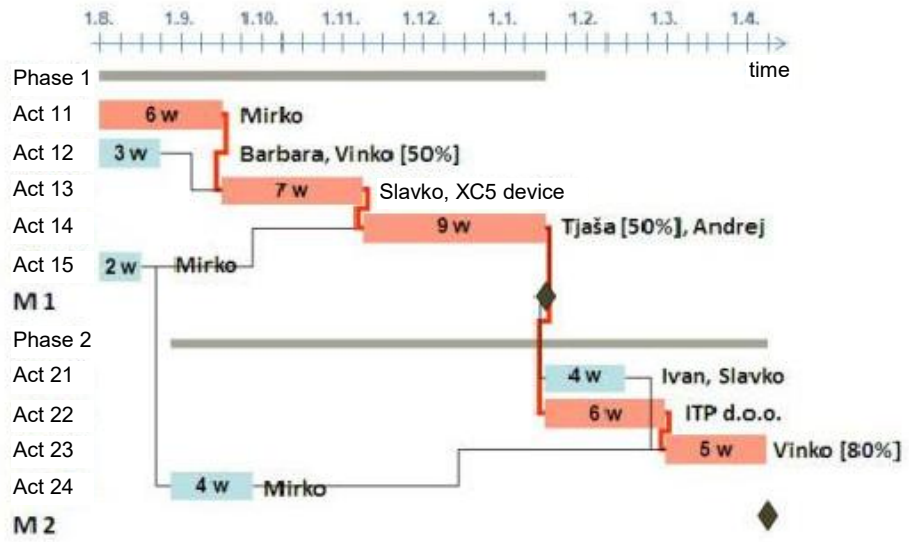
RACI matrix

- Responsible (R) – the person assigned to carry out the task
- Accountable (A) – the person who makes decisions and takes ownership
- Consulted (C) – those consulted about decisions
- Informed (I) – those informed about project decisions and actions

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Assigning resources to activities

- Who will work on the activities?
- How much capacity do we need?



Source: https://projektni-management.si/2011/02/10/clenitev-projekta-in-izdelava-seznama-aktivnosti-%E2%80%93-wbs/

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Estimating activity duration

- Duration includes the actual time spent working on an activity.
- Effort is the number of working days or working hours needed to complete an activity
- Effort is usually not the same as duration
- Those assigned to the activity should help prepare the estimates, and experts should review / approve them.

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Duration and effort: a clarification

- Duration is the time between an activity's start and finish, according to the applicable calendar.
- Effort is the amount of work required, measured in person-hours or person-days.
- An activity requiring eight hours of effort may take more than one day if the person is available only part of the day or must wait for input.
- Record resource availability and dependencies when estimating duration. Do not treat effort and duration as interchangeable.

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Traditional approaches to estimating work and resource needs

Prepared activity list





The project manager asks: "How long will each activity take?"



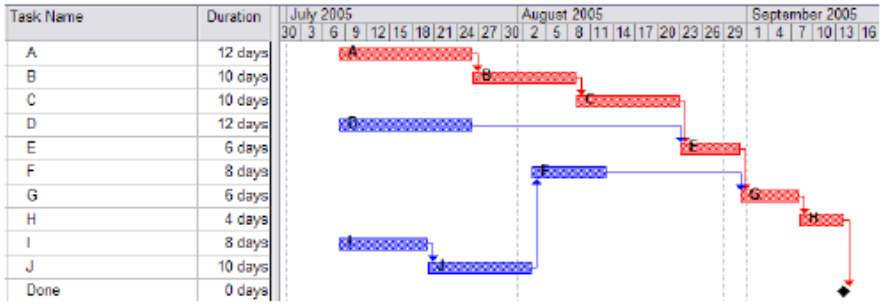
Hmm, … about 5 days

+ I also work on other projects

+ My work is constantly interrupted

+ Sometimes things go wrong

So … 10 days!

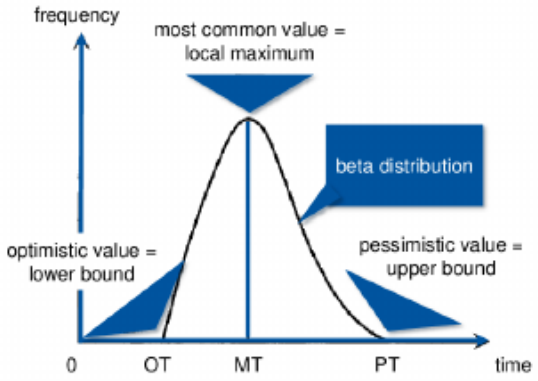


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Estimating work

- Rather than giving a single estimate, such as four weeks, it is often useful to estimate using:
  - An optimistic estimate (3 weeks)
  - A most likely estimate (4 weeks)
  - A pessimistic estimate (5 weeks)
- Agile project management uses story points (more later)
  - T-shirt sizes
  - Fibonacci sequence

https://www.susannemadsen.co.uk/blog/10-guidelines-for-estimating-project-effort



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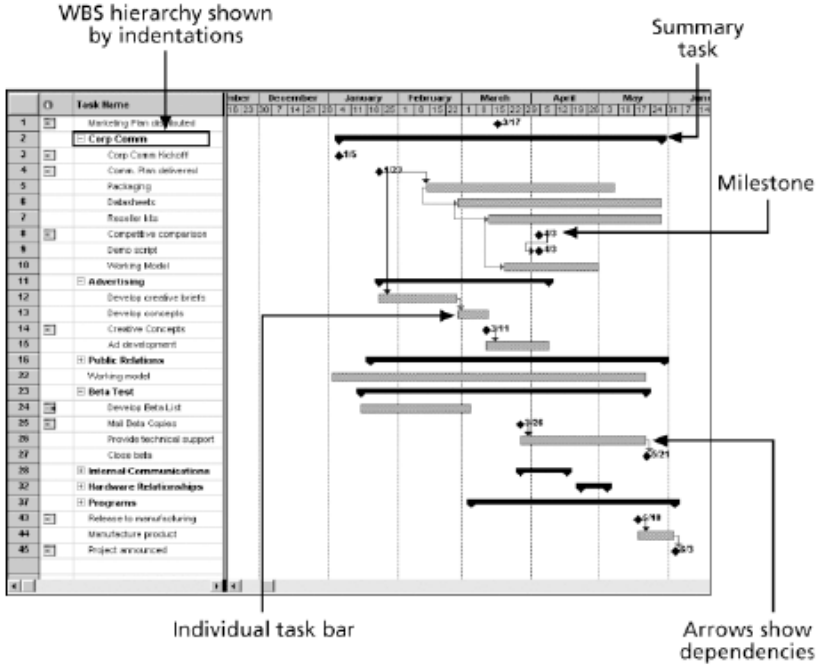
Preparing the project plan

- The aim is a realistic project schedule
- Use the project network diagram with all activities, dependencies and assigned resources
- Key tools and techniques include:
  - Gantt charts and critical path analysis (traditional approaches)
  - Critical Chain Project Management
  - Sprint Planning
  - …
- Limit the number of activities to approximately 100–150

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Gantt chart

- A Gantt chart is a standard way to present a project schedule
  - It lists project activities and their timing in a calendar format
- Symbols include:
  - Black diamonds: milestones
  - Thick black lines: summary tasks
  - Lighter horizontal bars: task durations
  - Arrows: task dependencies

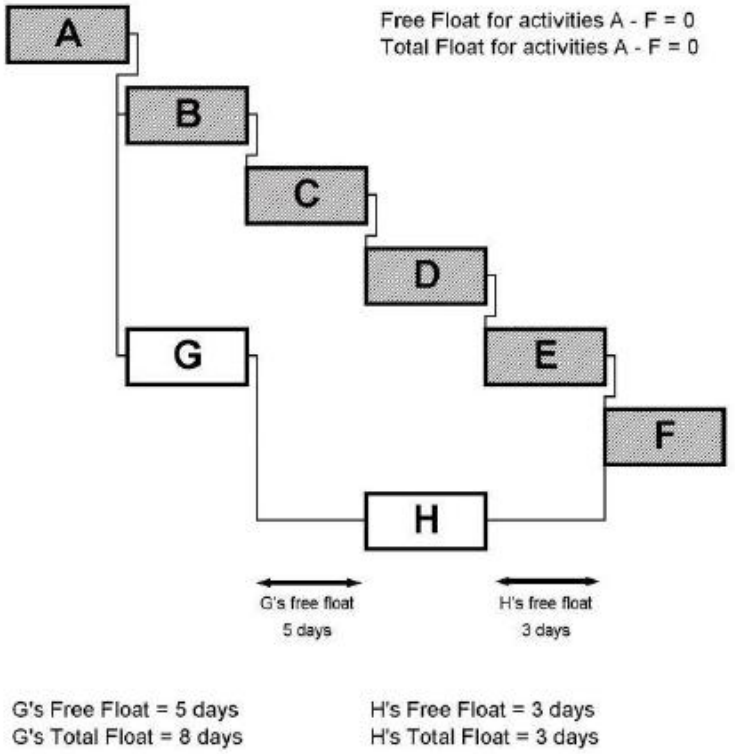


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Critical Path Method (CPM)

- CPM is a scheduling technique used to predict project duration.
  - The critical path determines the shortest possible project duration for the defined activities and dependencies.
  - Critical-path activities have the least float. Delays to these activities delay the final deadline unless corrective action is taken.

- Float is the time an activity can be delayed without delaying a subsequent activity or the project completion date.



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Calculating the critical path

- First prepare a sound network diagram with project activities and dependencies
- Add duration estimates for all activities
- The longest path is the critical path
- If one or more critical-path activities take longer than planned, the project schedule will slip unless the project manager or team takes corrective action



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Changes to the critical path

- Approaches to shortening the project schedule
  - Crashing activities: adding resources at additional cost
  - Fast-tracking activities: performing work in parallel or partly in parallel (e.g. coding before all specifications are known). This may add cost and risk if work begins too early.

- Updating the critical path
  - Continuously update activity progress
  - The critical path can change when actual start and finish dates are entered
  - Always coordinate project-level changes with the project sponsor

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Schedule management

- The aim is to know the project's status at all times
  - Where are we compared with the plan?
  - Understand and influence factors that could change the schedule
  - Identify when the schedule has changed
  - Manage changes as they arise
- Tools and techniques include:
  - Updating activities (Excel, MS Project, PBI, etc.)
  - Allow for unforeseen events
  - Do not plan for 100% resource availability
  - Progress reports
- Hold meetings with all stakeholders and report project status transparently

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Monitoring delivery and results

- Monitor scope, time, cost, quality and risks against the approved plan.
- Distinguish the delivered solution from the change experienced by its users.
- Define each indicator’s baseline, target, data source, measurement frequency and responsible person.
- Example: the number of people trained is different from their demonstrated ability to use the service.

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Working with the project team

- Good project management contributes to project success

  (more than detailed project network plans)
- Project managers must:
  - Enable delivery (what does the team need to do the work?)
  - Encourage individuals / the team
  - Be disciplined
  - Be able to negotiate

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Examples of project management methodologies

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Different types of methodologies for managing projects

- Traditional
  - Waterfall, V-model (PMI, ITIL)
- Theory of constraints
  - Critical Chain Project Management (CCPM)
- Agile
  - Scrum
- Mixed
  - *„Rolling Wave“*

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PM² project management

- PM² is the European Commission's project management methodology, with governance roles, a life cycle, management activities and supporting templates.
- Its phases are Initiating, Planning, Executing and Closing.
- Monitoring and control take place throughout the project.
- Phase gates review progress and readiness before the project proceeds.
- Tailor the methodology to the project while retaining clear responsibilities and documented decisions.

Applying PM² to an IT project

European Commission: PM² Project Management

https://pm2.europa.eu/pm2-methodologies/pm2-project-management_en

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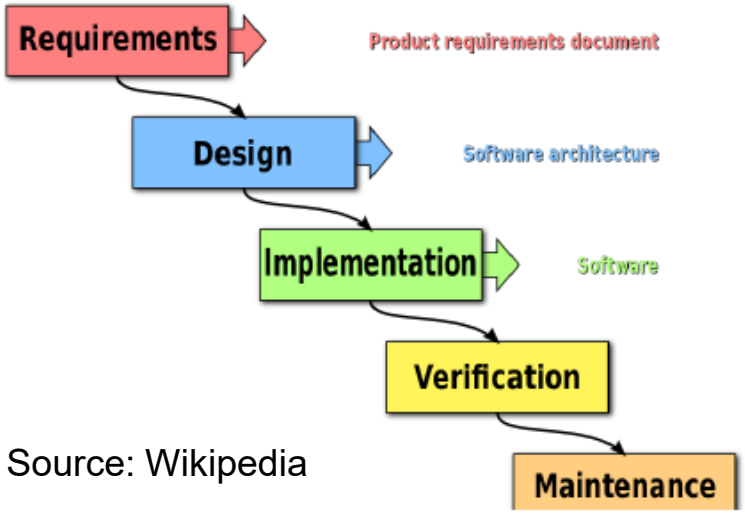
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Traditional project management approaches

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Waterfall / V-model

- The waterfall model is a sequential, non-iterative process for planning project tasks.
- Progress follows a steady downward flow of activities, like a waterfall.
- Still the dominant project management model

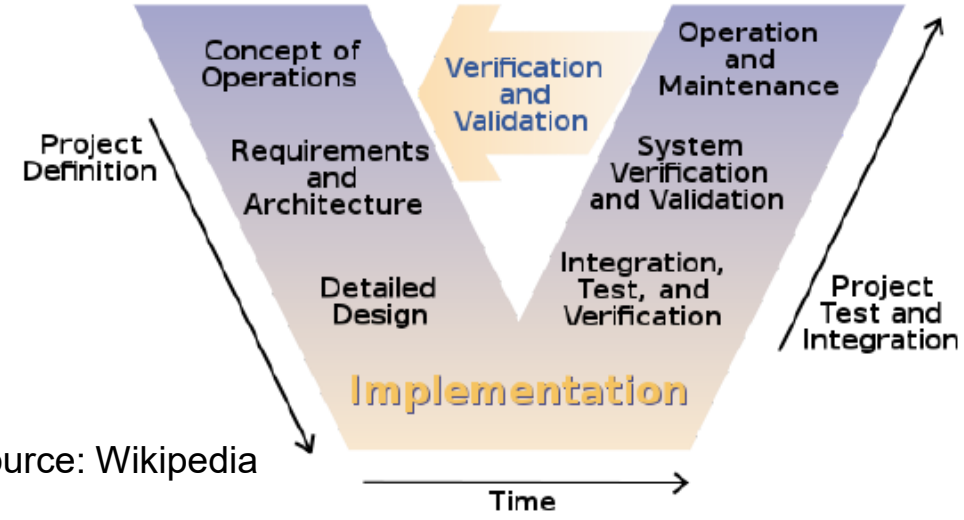


Source: Wikipedia

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V-model

- Can be viewed as an extension of the waterfall model
- Instead of progressing linearly downwards, it follows a V shape



Source: Wikipedia

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Critical Chain Project Management

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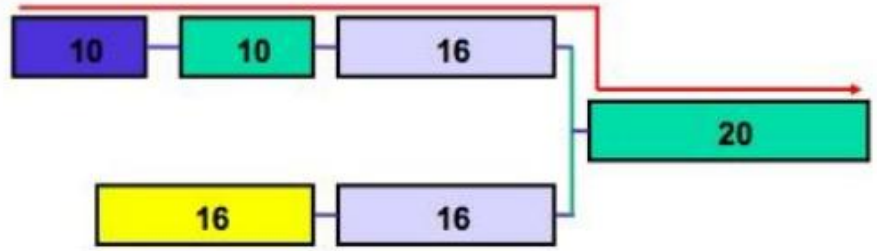
Critical Chain Project Management (CCPM)

- Definition (Wikipedia)
  - Critical Chain Project Management (CCPM) is a method for planning and managing projects that emphasises the resources needed to perform project tasks.
  - A critical-chain schedule aims to maintain an even workload for key resources. Other resources must be flexible about start times and switch quickly between tasks to keep the overall project on schedule.
- Uses approaches from the Theory of Constraints (Uses the Theory of Constraints - TOC)
  - A management approach developed by Eliyahu M. Goldratt and described in “The Goal”.
- Seeks to reduce the impact of human behaviour on project delivery
  - Reducing multitasking when resources are shared between projects
  - Student syndrome: “Put off until tomorrow whatever you can”
  - Parkinson’s law: people use all the time allocated to them and do not report early completion

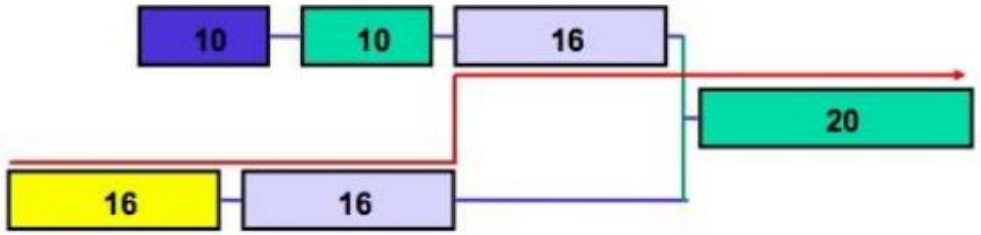
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Critical path vs. critical chain

- Critical path:
  - The longest sequence of project tasks, without considering resource constraints. Assumes no resource conflicts, so several activities can run simultaneously.



- Critical chain:
  - The longest sequence of dependent tasks, considering both tasks and resources.



Source: http://alexrogoventures.wordpress.com/2011/06/06/project-management-transitioning-from-critical-path-to-critical-chain/

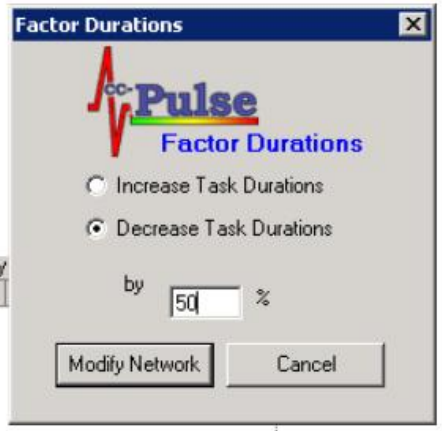
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Buffers and the critical chain

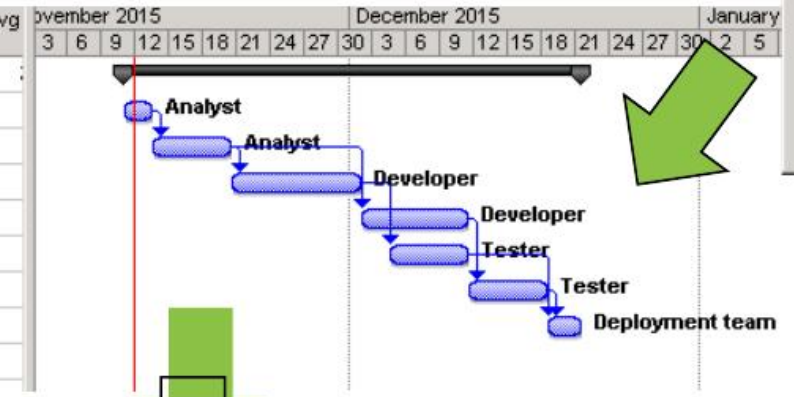
- A buffer is additional time allocated to activity completion
- Murphy's law: if something can go wrong, it will
- Parkinson's law: work expands to fill the time available
- In traditional settings, estimates contain safety allowances (buffers), which are used whether needed or not
- The critical-chain approach removes safety allowances from individual activities and adds:
  - Project buffer: time added at the end of all activities and treated as part of the project duration. The completion date includes this buffer.
  - Feeding buffers: time added to activities that feed into the critical chain, protecting it from delays in these activities

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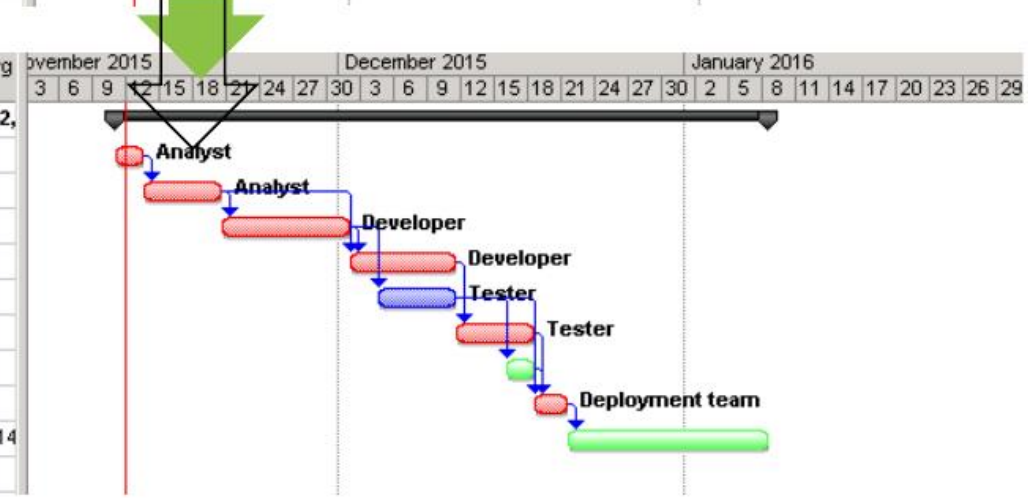
Using MS Project and cc(m)Pulse



ID	Task Name	Safe Duration	Avg
1	**Project1**	**0 days**	
2	Conduct needs analysis	0 days	
3	Develop functional specific	0 days	
4	Develop code - Feature1	0 days	
5	Develop code - Feature2	0 days	
6	Test Feature 1	0 days	
7	Test Feature 2	0 days	
8	Redy to deploy	0 days	

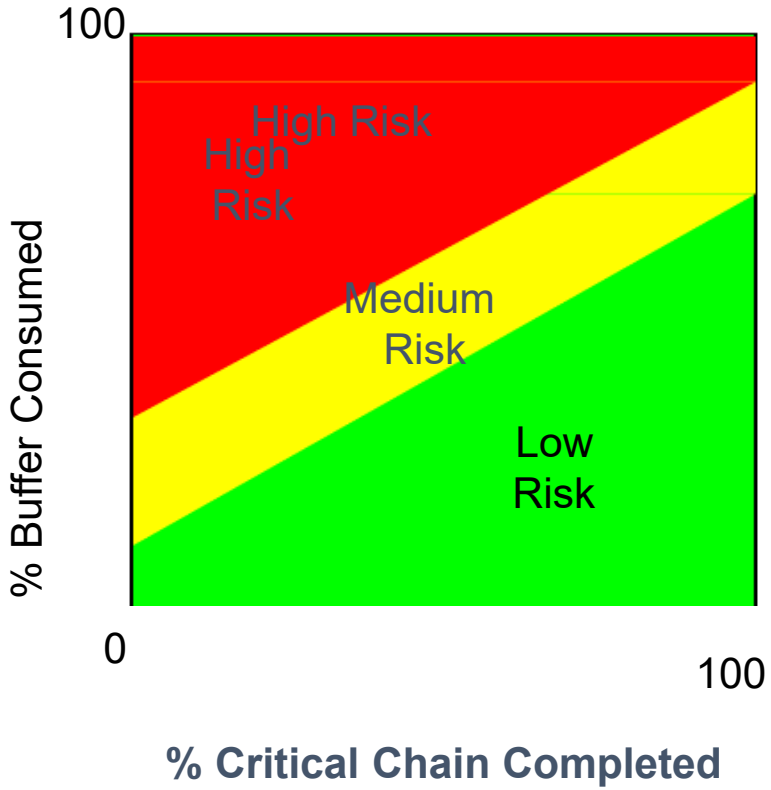


ID	Task Name	Safe Duration	Avg
1	**Project1**	**0 days**	42,
2	Conduct needs analysis	5 days	
3	Develop functional specific	10 days	
4	Develop code - Feature1	15 days	
5	Develop code - Feature2	15 days	
6	Test Feature 1	10 days	
8	Test Feature 2	10 days	
7	FB Protecting Redy to depl	0 days	
9	Redy to deploy	2 days	
10	PB Protecting Redy to depl	0 days	14



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Critical Chain and Risk Management



- Using buffers to reduce risk
- Use the relationship between completed work and buffer consumption to measure project risk.
- Use buffer management to identify and resolve problems
- Use the findings to plan and implement appropriate actions / support

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Case study: constraints management

- Applying Goldratt's theory of critical resources, who or what is the system constraint causing project delays?
- How does multitasking affect delays?

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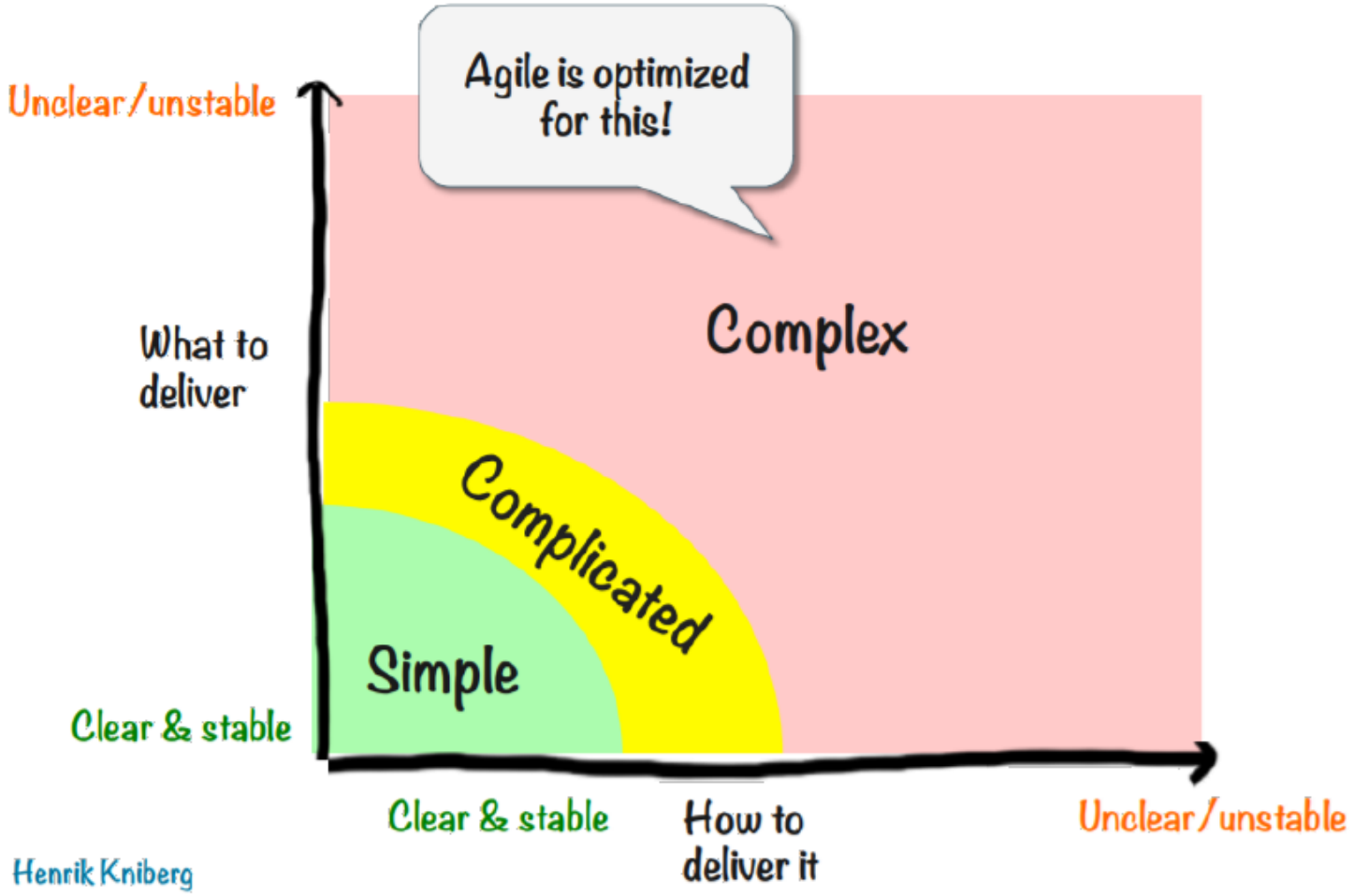
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Projects of Information Technologies

Agile project management methods – Scrum

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Different approaches



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Agile methods

- Agile software development is a group of methods based on iterative and incremental development

  - A group of software development methods
  - An iterative approach
  - Incremental: software is delivered to customers every 2–4 weeks
  - Self-organising, cross-functional teams
  - Refactoring

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Agile methods

- Scrum
- eXtreme Programming / pair programming
- Kanban
- …

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What is NOT agile?

- Some believe that being agile means not writing project specifications.

- Some believe that being agile means not doing design work (e.g. not modelling data when developing a database application).

- Some believe that being agile means skipping any software development phase they dislike.

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SCRUM

- Scrum is one of the agile approaches to (software) development.
- Also used in other complex and innovative areas of work.

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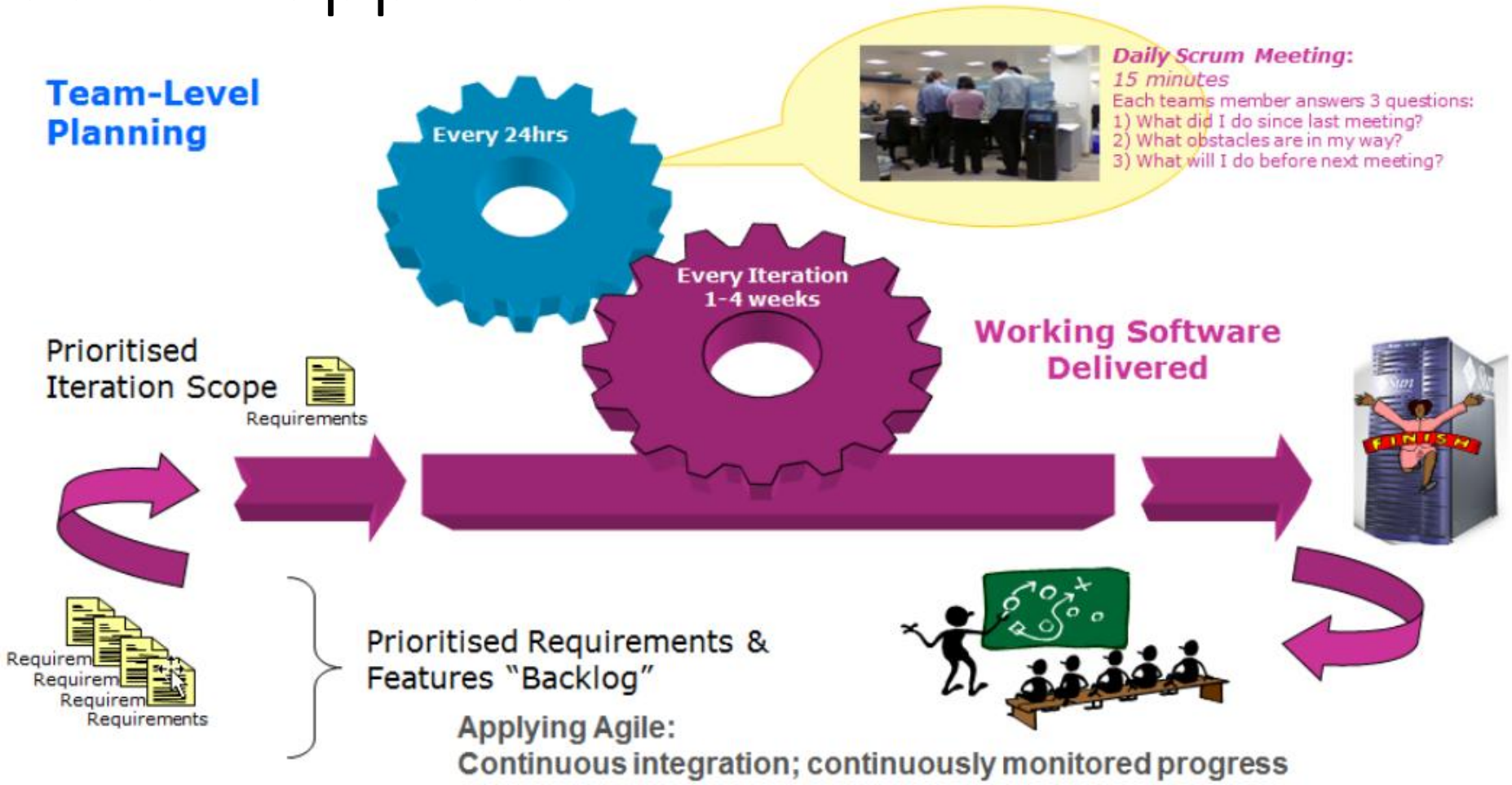
What is Scrum?

- Self-organising teams
- Development takes place in cycles called Sprints (lasting 1–4 weeks)
- Requirements are collected as tasks in a Product Backlog and prioritised by the Product Owner
- The most important requirements are known in greater detail than others
- Close cooperation with users / customers
- No prescribed technical practices
- One of the “agile processes”

https://www.mountaingoatsoftware.com/uploads/presentations/Getting-Agile-With-Scrum-Norwegian-Developers-Conference-2014.pdf

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The Scrum approach



https://www.mountaingoatsoftware.com/uploads/presentations/Getting-Agile-With-Scrum-Norwegian-Developers-Conference-2014.pdf

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Pair programming

- Two people work at the same computer
- Built-in backup and better code review

- Collaboration improves code quality
- Working process
  - One drives, the other talks
  - They exchange control of the keyboard
- Mental model
  - One takes a more tactical view, the other a strategic view
  - Both consider the full range of possible solutions, from different perspectives

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Refactoring

- Each iteration adds only the necessary / agreed features
- If only new features are added, the code often becomes difficult to understand
- Refactoring is, or should be, part of each iteration – “cleaning up” the code
- Essential for maintaining code quality
  - Also applies to software design

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The Rules of Extreme Programming

Planning

- User stories are written.
- Release planning creates the release schedule.
- Make frequent small releases.
- The project is divided into iterations.
- Iteration planning starts each iteration.

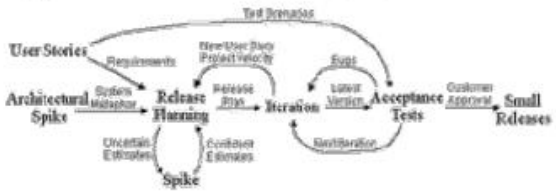
Managing

- Give the team a dedicated open work space.
- Set a sustainable pace.
- A stand up meeting starts each day.
- The Project Velocity is measured.
- Move people around.
- Fix XP when it breaks.

Designing

- Simplicity.
- Choose a system metaphor.
- Use CRC cards for design sessions.
- Create spike solutions to reduce risk.
- No functionality is added early.
- Refactor whenever and wherever possible.

Full Size Extreme Programming Project



Coding

- The customer is always available.
- Code must be written to agreed standards.
- Code the unit test first.
- All production code is pair programmed.
- Only one pair integrates code at a time.
- Integrate often.
- Set up a dedicated integration computer.
- Use collective ownership.

Testing

- All code must have unit tests.
- All code must pass all unit tests before it can be released.
- When a bug is found tests are created.
- Acceptance tests are run often and the score is published.

Source: http://www.extremeprogramming.org/rules.html

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When to use XP

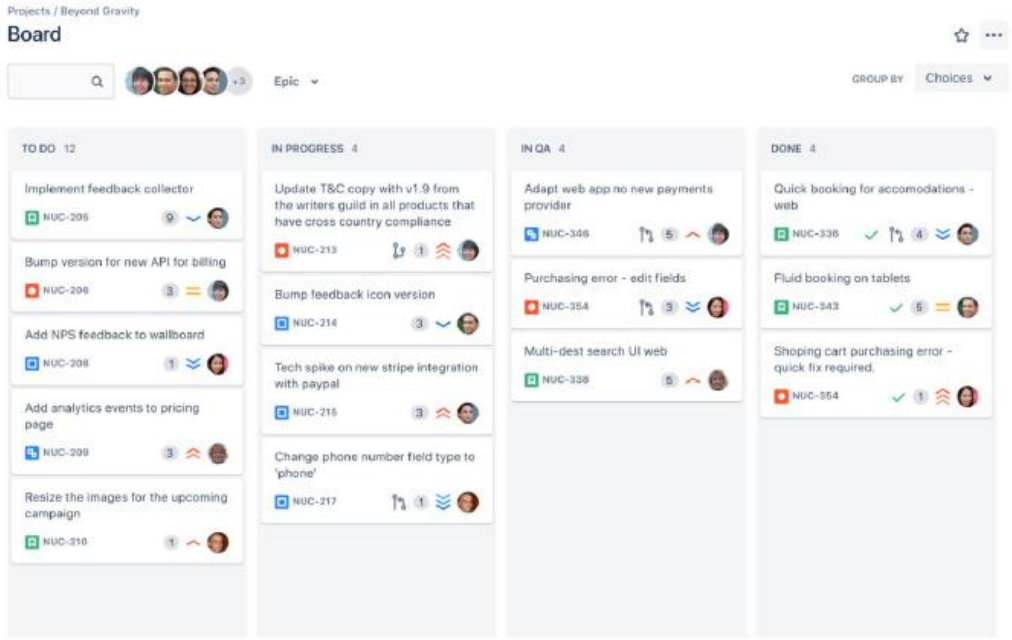
- What types of projects?
  - High risk
  - Poorly defined requirements and substantial uncertainty
- Team
  - Small, from 2 to 12 people
  - Users / customers must be involved
- Automated testing
  - Time required

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Kanban

- Kanban is based on Lean, the Toyota Production System and Just-in-Time (JIT) principles.
- Kanban has fewer “rules” than Scrum. Kanban is based on flow, while Scrum uses time-boxed iterations (Sprints).

- Kanban focuses on limiting Work in Progress (WIP). Scrum focuses on estimates and what the Scrum Team can complete in a given iteration



https://www.atlassian.com/de/software/jira/features/kanban-boards

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看板 – Kanban cards limit work in progress

- 看板 – Kanban literally means “card”, “noticeboard” or “signboard”
- Toyota originally used Kanban cards to limit inventory tied up in work in progress on the factory floor
- Excess inventory wastes resources and the time spent producing it, which could be used elsewhere.
- Kanban cards act as a form of “currency”, representing how much work in progress is permitted in the system.



https://kanbanzone.com/resources/lean/toyota-production-system/

Source: http://www.agileproductdesign.com/downloads/patton_kanban.ppt

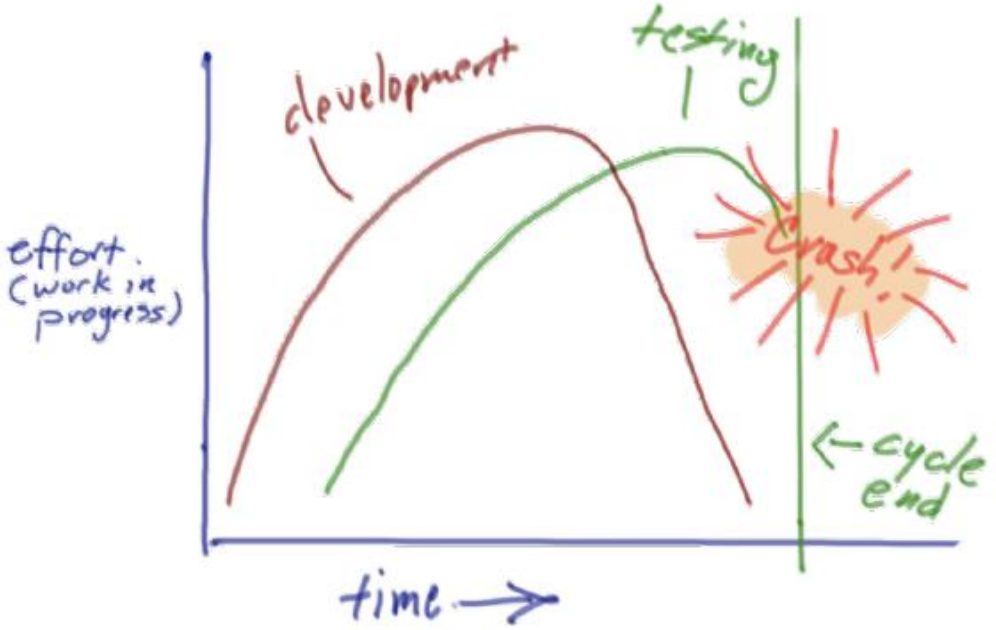
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Limitations of time-boxed iterations

- Short iterations allow more frequent progress measurement and software review, but development tasks become smaller
- Smaller tasks may be too small to show visible value, making benefits difficult to recognise

- Requirements may be superficial because preparation for the next iteration is rushed
- Development quality depends heavily on business analyst availability
  - Questions during development and testing
  - Testing where automated tests are unavailable

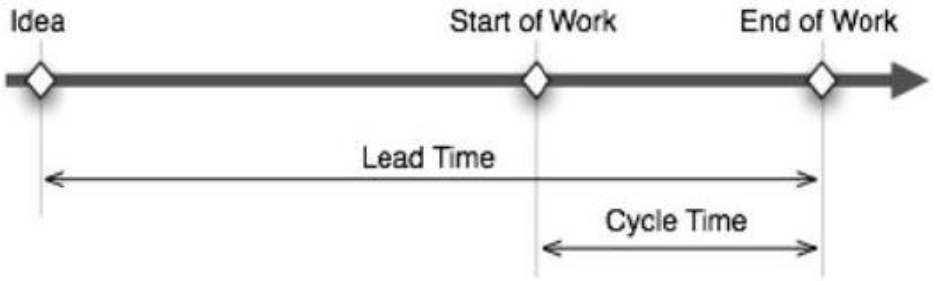
- Quality can suffer when testers become involved very late in an iteration



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Display and manage cycle times

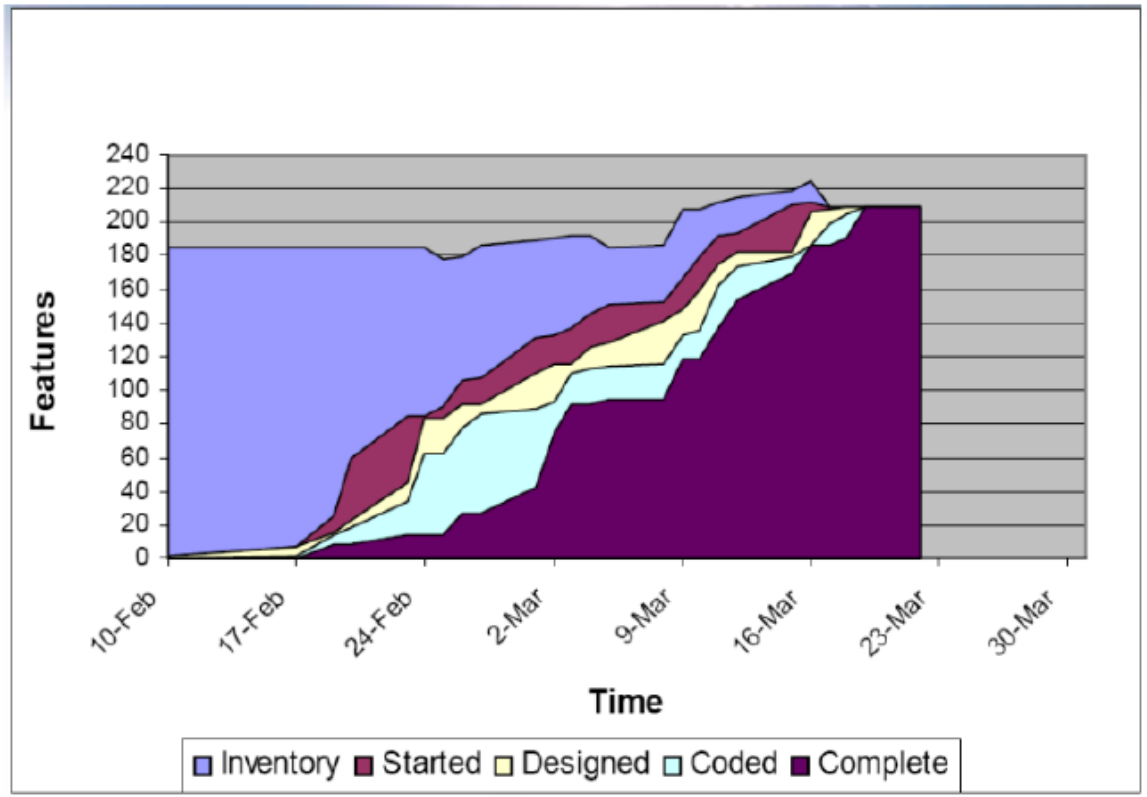
- Reduce the number of Kanban cards allowed at each stage until cycle time changes
- Reduce the size of development tasks
- Work in Progress (WIP) represents the number of cards × average processing time per card
- Identify bottlenecks and act accordingly – delivery speed is limited by the bottleneck
- Resolve recurring bottlenecks by
  adjusting staffing and skills for each role and providing the necessary training



https://youtu.be/c4A06KkGxa0?t=64

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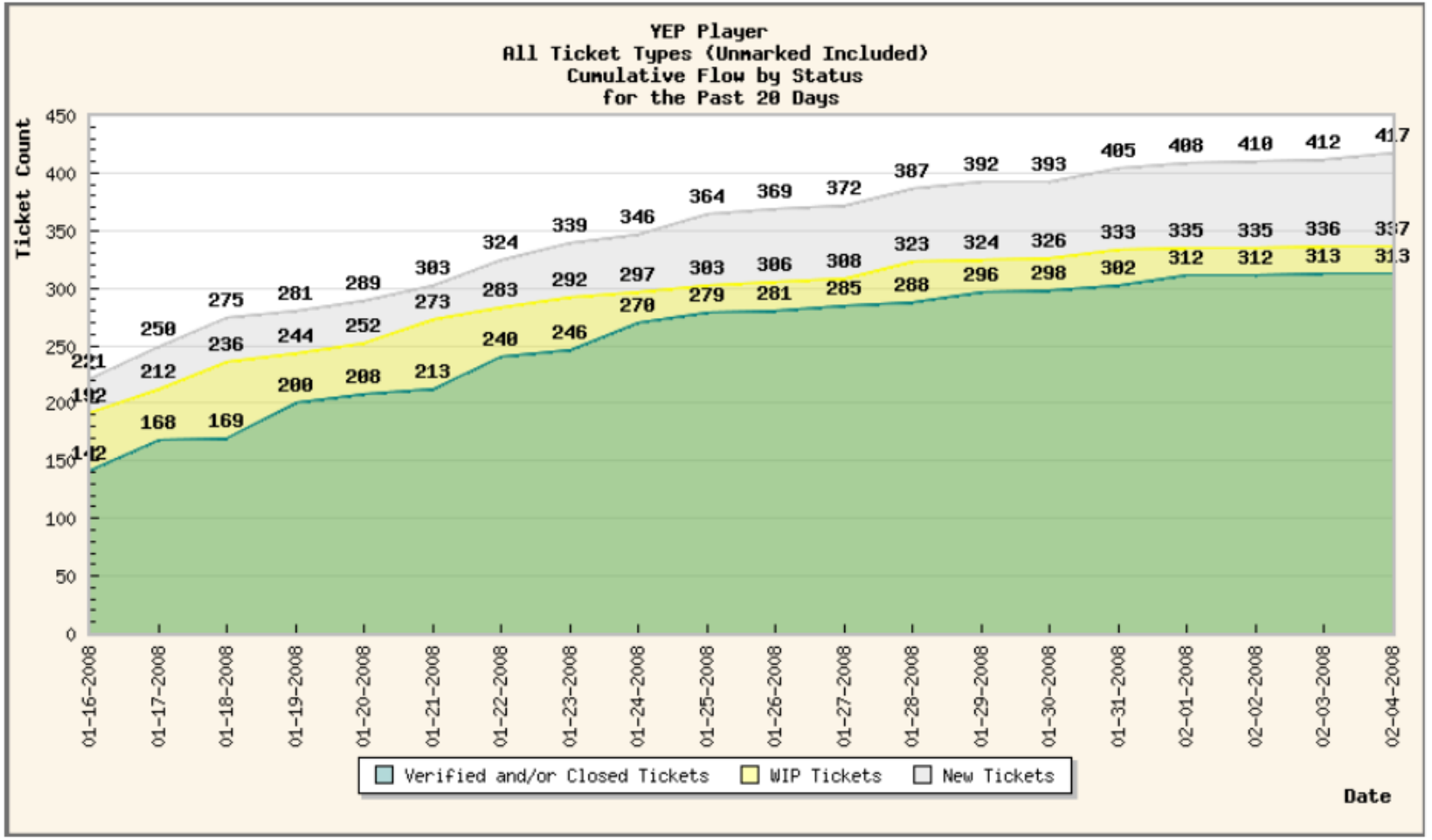
Using cumulative flow diagrams to visualise work in progress



www.agilemanagement.net/Articles/Papers/BorConManagingwithCumulat.html

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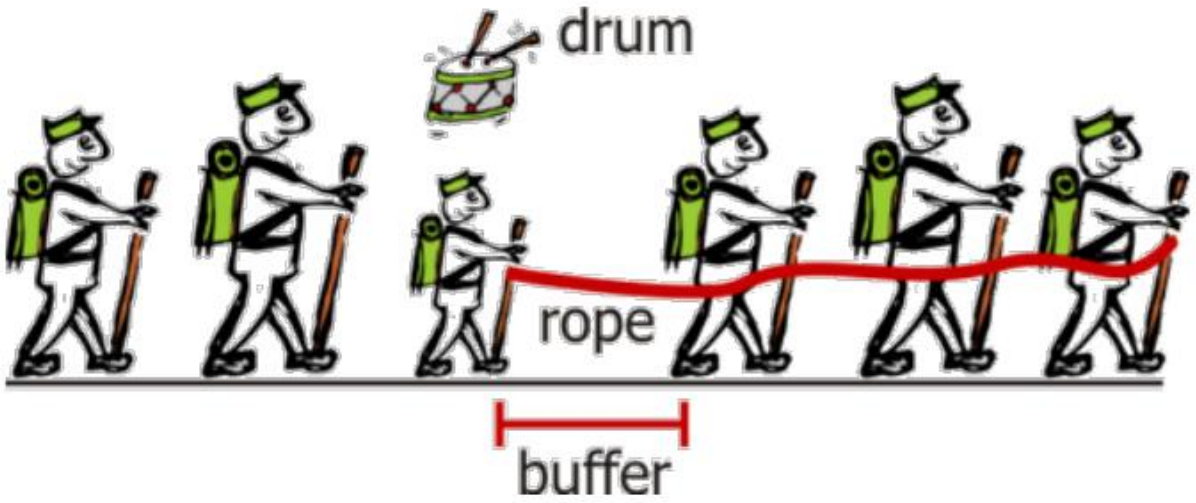
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Maintain a regular cadence and monitor processes

- Review your process regularly
- Assess the evolving product's quality in terms of functionality, engineering and user experience
- Assess development speed:
  - Number of development tasks completed against the final goal
  - Average task cycle time
  - Calculate the relationship between time spent per task and the remaining tasks. Use it to estimate when unfinished items will be completed.
  - Adjust the development plan as needed

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Drum-Buffer-Rope (DBR)

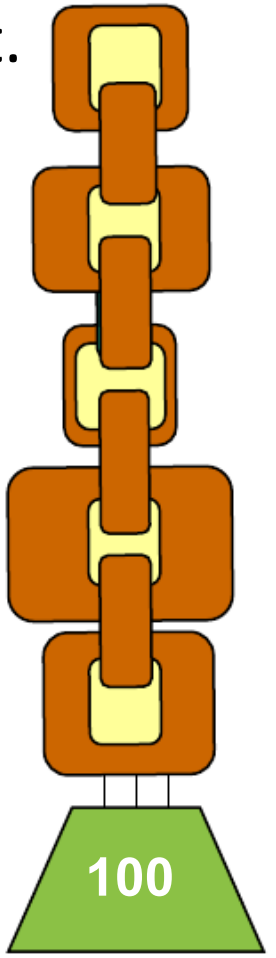


https://www.youtube.com/watch?v=oemeSg3CEV0

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Towards better “flow” and “focus”

- The concept was introduced by Dr Eliyahu M. Goldratt.
- It compares organisational performance to a chain’s strength, which is limited by its weakest link.
- Organisational results improve by focusing on the weakest link. Otherwise, the desired results are not achieved.



Throughput is limited by the weakest link … the constraint (bottleneck)!

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Addressing constraints using TOC

- The Five Focusing Steps aim to get the most from a system's current resource capacity and work capability, while focusing on greater capacity and predictability:
    - Reduce variability and increase output from constrained and unconstrained resources with minimal investment

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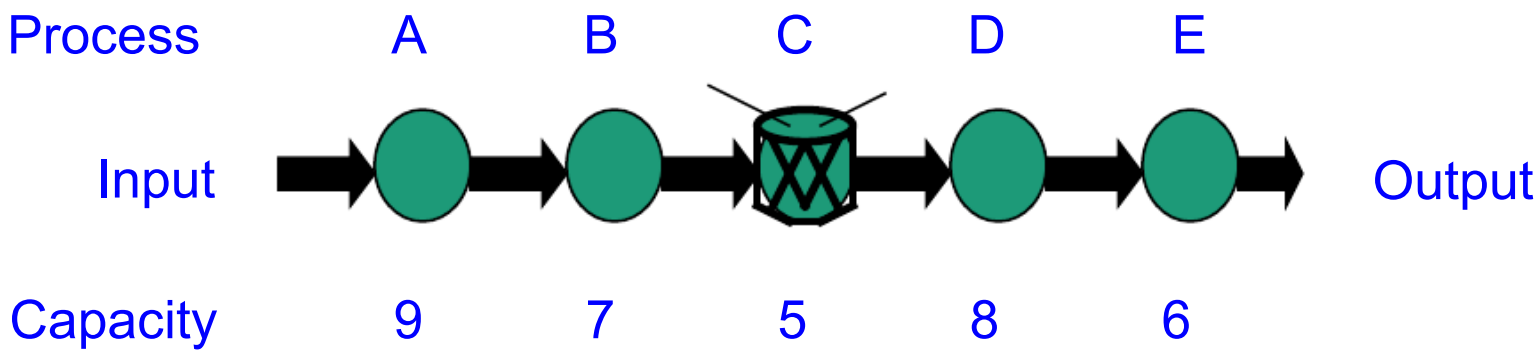
The Five Focusing Steps

- Steps:
  - Step 1: Identify the weakest link
  - Step 2: Decide how to use the weakest link
  - Step 3: Subordinate other work so that the weakest link always has work
  - Step 4: Improve the weakest link
  - Step 5: Warning! If the weakest link moves, return to Step 1

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Step 1. Identify the weakest link

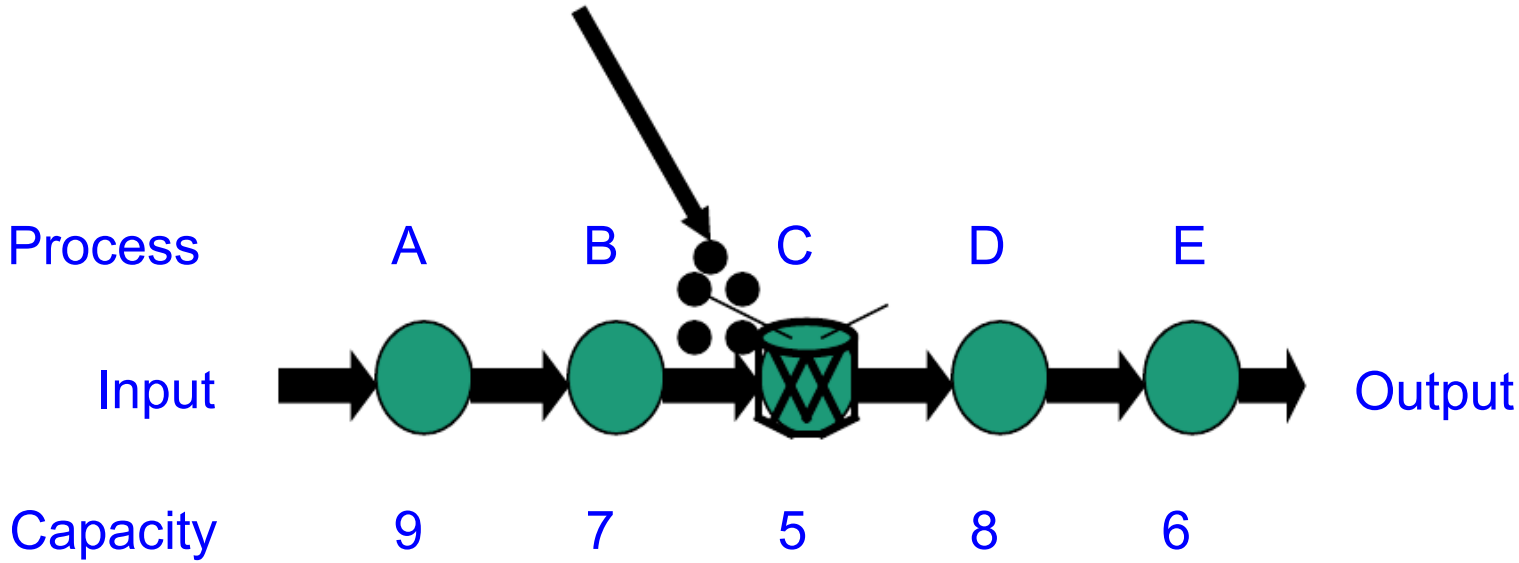
- The weakest link acts as the “drum” for the whole development / production process
- Identify also means “choose”



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Step 2. Decide how to use the weakest link

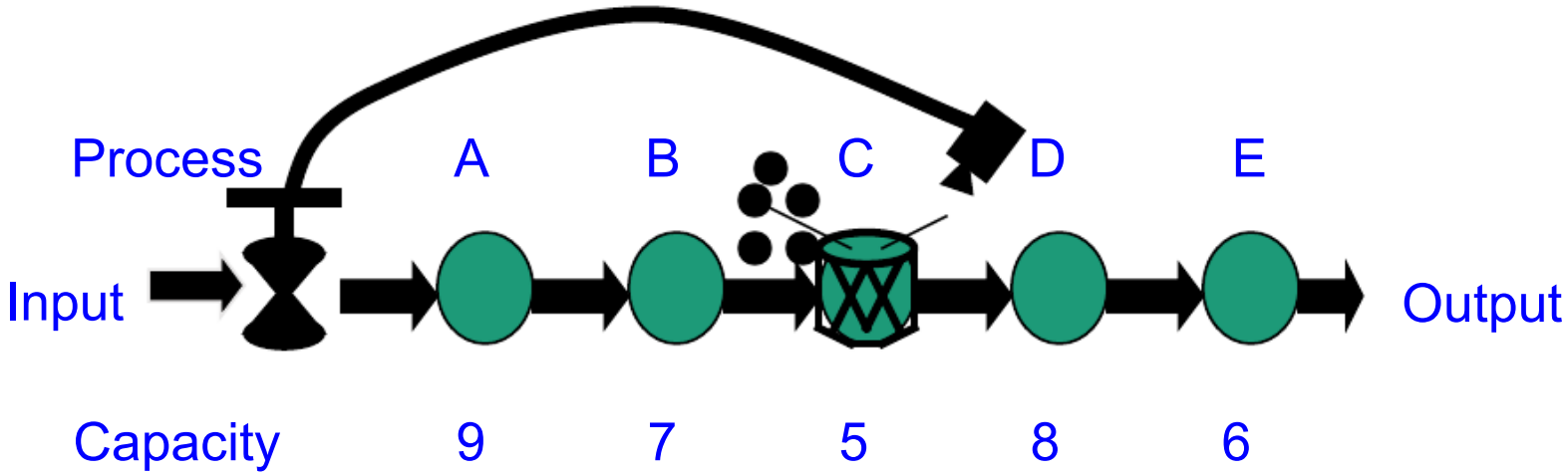
Always ensure work is available for the weakest link – a buffer protects against unforeseen events and Murphy's law



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Step 3. Subordinate the other work

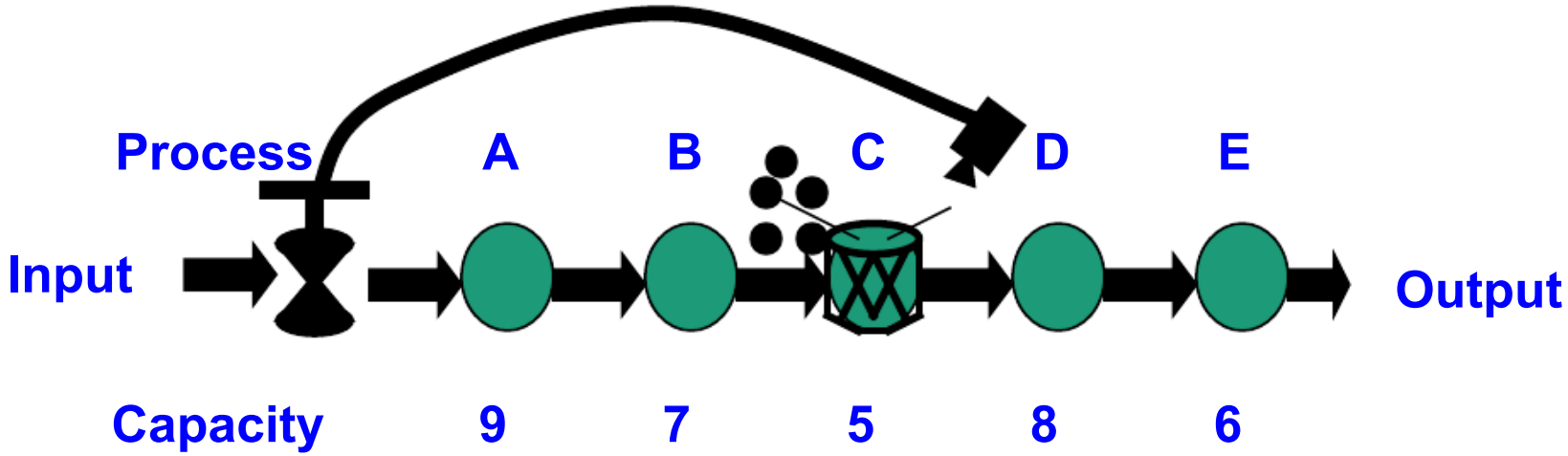
Each part of the process should work at its best capacity, using the relay-baton principle



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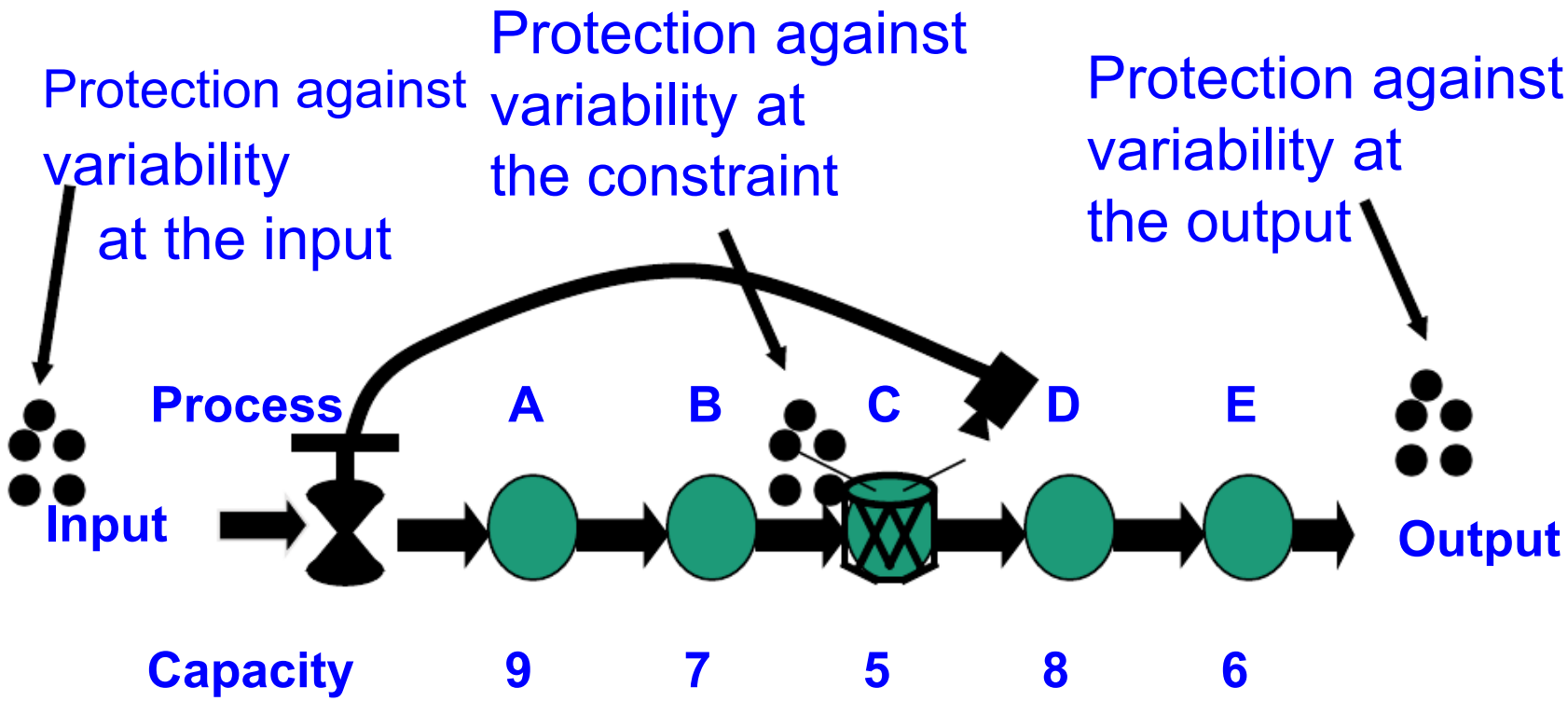
Prevent excess work

Control the release of tasks (user stories, bugs) according to the constraint's speed (the rope). The value of subordination!



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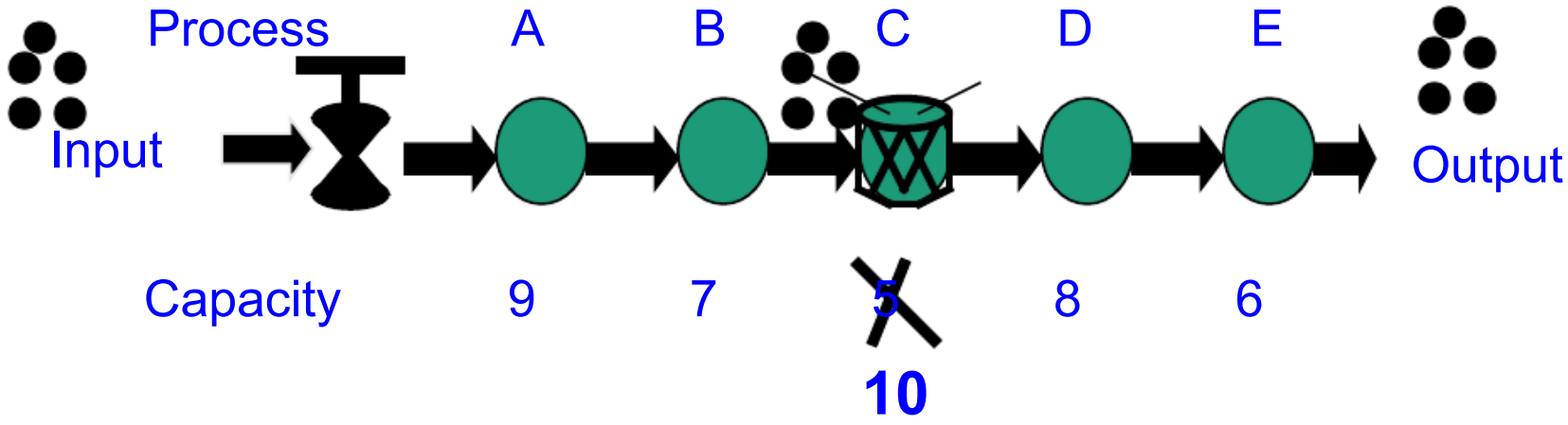
Ensuring predictability



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Step 4. Improve the weakest link

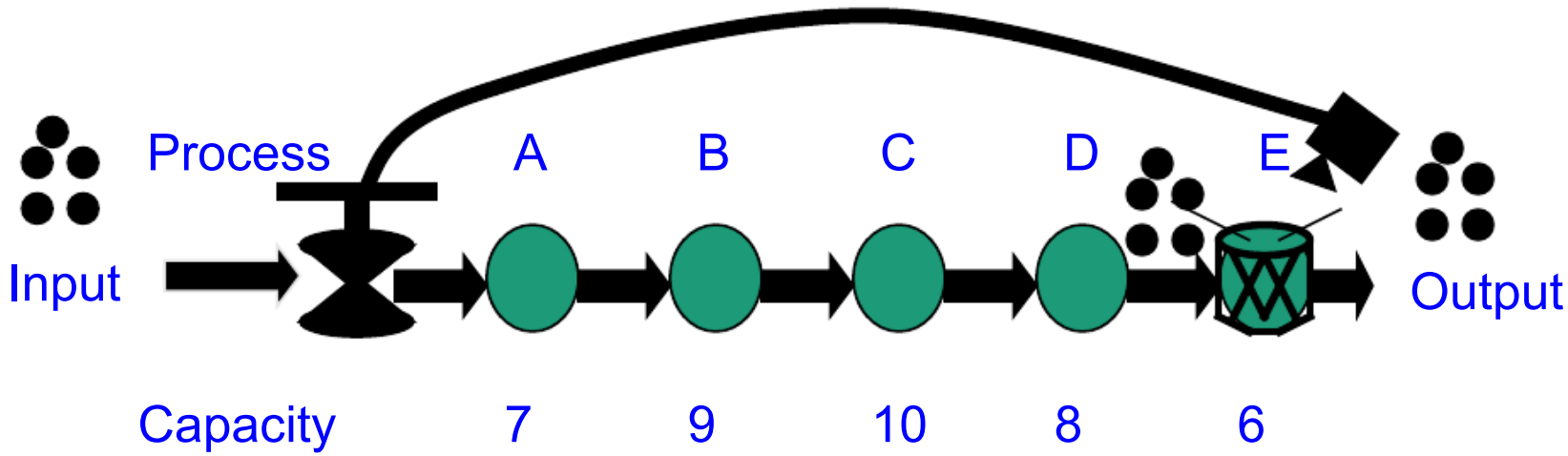
When more capacity is needed than the weakest link can provide, that link usually needs strengthening.



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Step 5. Update internal rules

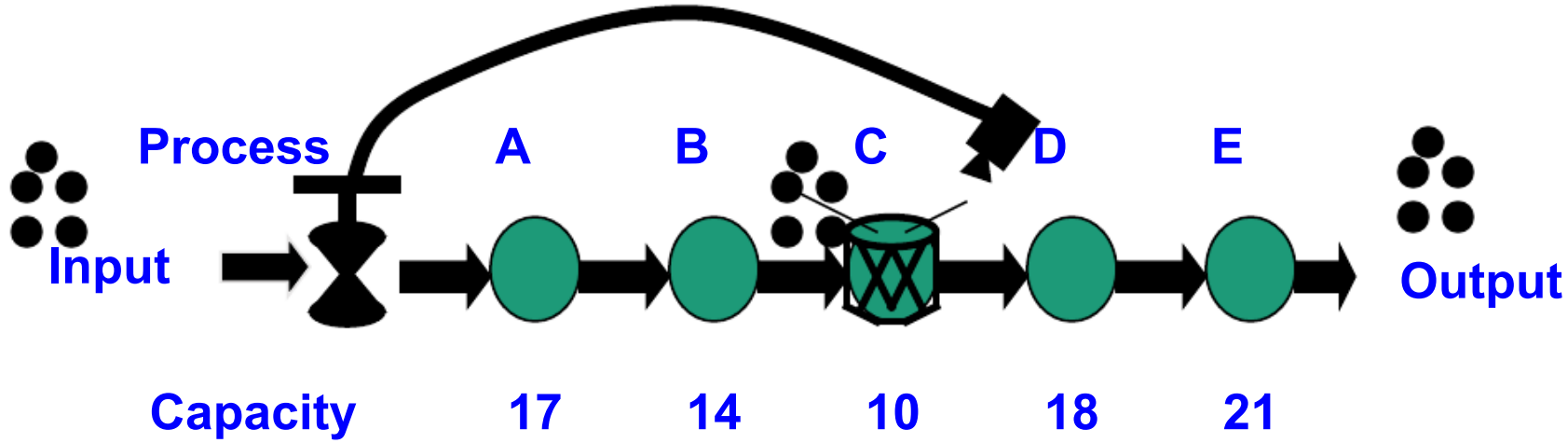
When the weakest link “moves”, change the working rules and controls.



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Or another option …

To avoid problems caused by the constraint moving and the associated cultural change, another option is to strengthen the whole chain rather than only the constraint (McDonald's).

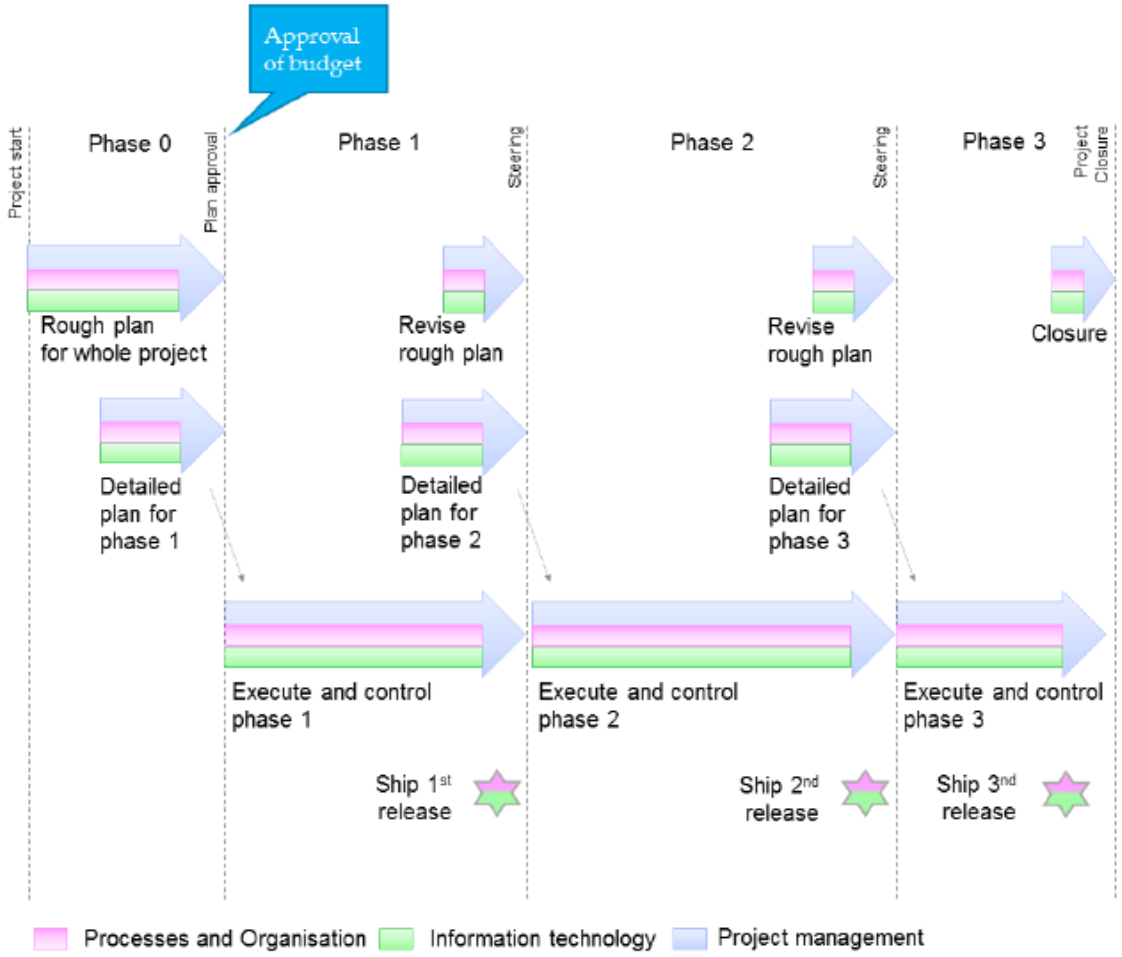


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A phased or incremental approach

- Can be combined with Scrum
- Phased market introduction
- Earlier revenue
- Reduced risks
- Reduced peaks in workload

- Existing reporting arrangements can be retained



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Project management tools

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Project management tools

- Can automate many project management tasks
- Support:
  - Defining, scheduling and organising project tasks
  - Assigning resources to individual tasks
  - Monitoring project progress
- Tools
  - Microsoft Project for traditional project management
    - The most widely used project management software
    - PERT, Gantt charts, critical path analysis
  - Jira / Confluence for agile project management
  - ….
- A growing number of SaaS and open-source project management applications

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Care when using project management software

- Many people use project management software incorrectly
    - They lack an understanding of key concepts and have not received training
- Enter dependencies so that dates adjust automatically and the critical path can be identified
- Enter actual progress information
    - Enable comparison between the plan and the actual position

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Case study: Arup Group moving to the cloud

- How do information technology and project management relate to Arup's business model and objectives?
- How does MS Project Online support Arup's business strategy? How has it changed working practices?
- Which management, organisational and technological issues did Arup need to consider when choosing MS Project Online for global project portfolio management?

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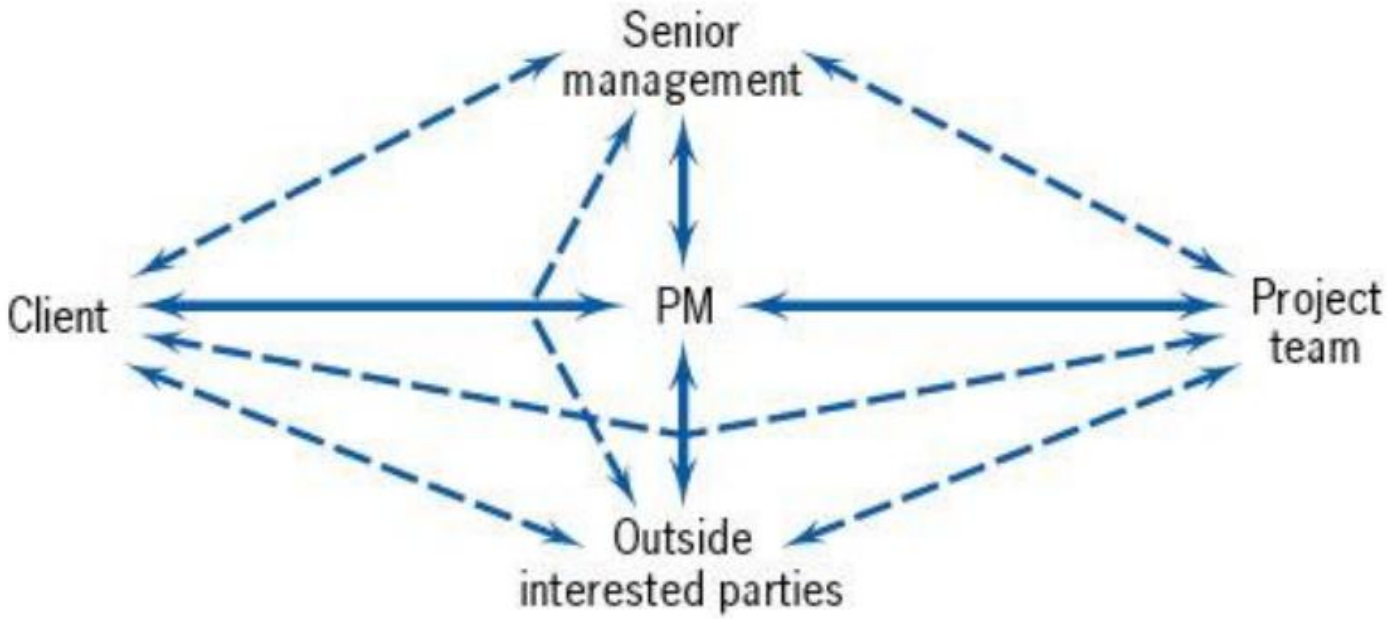
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Project communication

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The importance of good communication

- Project communication paths



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The importance of good communication

- A major danger in many projects is ineffective communication within the team and with external parties
- The communication skills of IT professionals are often questioned
- Today's complex solutions require effective communication from IT professionals too, with training where needed
- Verbal and non-technical skills are key factors in IT professionals' career development

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Project communication process

- Planning communications management:
  - Meeting stakeholders' information and communication needs
- Managing communications:
  - Providing information, adding / removing participants
  - One-off, periodic or event-specific communication
  - Methods: written, spoken, email, project site, Viber, etc.
  - Content: deadlines / delays, open issues, notices, project events, scope changes, etc.
- Controlling communications:
  - Monitoring and controlling project communication to ensure stakeholder needs are met

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Key points for good communication

- Project managers report spending as much as 90% of their time communicating
- Focus on the communication needs of both the group and the individual
- Use formal and informal communication methods
- Share important information effectively and promptly
- Prepare the ground for communicating bad news
- Determine the number of communication channels

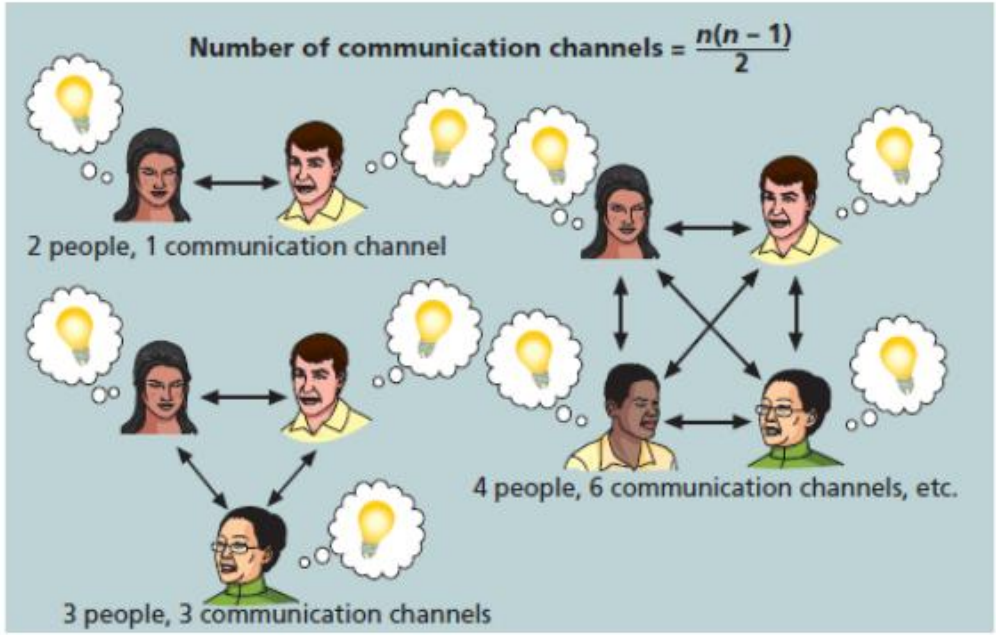
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Communication channels

- Communication becomes more complex as more people are involved
  - The number of communication channels increases
- Number of communication channels

$$n(n-1)/2$$

where n is the number of people involved



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Project communication plan

- Every project should include a communication plan to guide project communications.

- The plan varies according to project needs and should be put in writing.

    - In small projects, it forms part of daily work and is agreed with the team.

    - Large projects require a separate document.

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Contents of the communication plan

- Stakeholders' communication requirements
- Information to be communicated
  - Format, content and level of detail
- Who receives the information and who prepares it
- Proposed methods or technologies for communicating information
- Frequency of communication / updates
- Escalation procedures for resolving major problems
- Procedures for updating / changing communication arrangements
- Glossary of shared terminology

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Interdisciplinary cooperation and shared priorities

- Connect technical expertise with user needs, organisational processes and relevant EU policies.
- Involve the authorities, businesses, researchers or civil society organisations relevant to the project.
- Include sustainable development priorities in requirements and project decisions.
- Adapt communication to different levels of technical knowledge and create opportunities for feedback.
- Record disagreements, agreed actions and responsibilities.

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Managing communications

- Managing communication accounts for a large part of a project manager’s work.
- Getting project information to the right people at the right time and in the appropriate format is equally important.
- Use technology that makes project information easy to send, receive and use.

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Using technology to prepare and distribute information

- Used appropriately, technology can make preparing and distributing information easier.
- Choose the appropriate communication method and medium.
- Factors affecting the choice of communication technology:
  - Availability
  - Project environment
  - Project duration
  - Urgency
  - Level of readiness

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The importance of personal communication

- Adapt communication to the channel being used
- Short, frequent meetings are often highly effective in IT projects
- Stand-up meetings encourage people to focus on what they really need to communicate
- Some companies restrict email use during certain hours or days of the week

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Personal preferences affect communication

- Introverts prefer more private communication, while extroverts prefer public discussion.
- Intuitive people prefer the big picture, while sensing types need step-by-step detail.
- Thinking types want the logic behind decisions, while feeling types want to know how something affects them personally.
- Judging types focus on deadlines, while perceiving types need more help creating and following plans.

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Other aspects of communication

- A recipient rarely interprets a message exactly as the sender intended.

- Participants' geographical location and cultural background affect project communication
  - Different working hours
  - Language barriers
  - Different cultural norms

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How we distribute information

- Distribution methods
- Distribution tools
- Information distribution

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Types of communication methods

- Interactive communication: two or more people exchange information in a meeting, phone call or video conference. The most effective method for establishing a shared understanding.
- Push communication: information is sent without a request, using email, messaging, fax, voicemail and other channels. This ensures distribution, but not receipt or understanding.
- Pull communication: recipients obtain information on request through websites, noticeboards, e-learning, knowledge repositories such as blogs, and other channels.

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Effective and timely information distribution

- Do not withhold key information
- Do not be afraid to report bad news
- Spoken communication in meetings and informal discussions helps uncover important information, both good and bad.

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Effective and timely information distribution

- Collaboration is a key factor in organisational success
- Examples of good practice:
  - Web conferences
  - Conference calls
  - Meeting scheduling technologies
- Preferred communication methods differ between countries

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Reporting

- Reporting informs stakeholders about how project resources are being used.
- Status reports describe the project at a particular point in time.
- Progress reports describe what the team has achieved during a specified period.
- Forecasts predict project progress using past information and trends.

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Controlling communications

- The main objective is to ensure an effective flow of information throughout the project life cycle.
  - The project manager and team must continually check how well communication with all stakeholders is working.
  - Where problems arise, previously agreed communication arrangements need to change.
  - An assessment by someone outside the project team is often useful.

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Suggestions for better project communication

- Develop communication skills
- Run effective meetings
- Use email and other technologies effectively
- Use project communication templates

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Developing communication skills

- Many companies spend heavily on technical training, although communication training may be more beneficial.

- Employees are often more motivated to attend courses on new technologies than courses developing soft skills.
- As organisations become more global, they recognise the need to improve communication with people from different countries and cultures.
- Improving communication requires management support!

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Effective meetings

- Consider whether the meeting can be avoided
- Define its purpose and intended outcomes
- Decide who should attend
- Send participants an agenda beforehand
- Prepare materials and visual aids, and arrange logistics in advance

- Chair the meeting professionally
- Establish ground rules
- Build relationships

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Six rules of productivity (Musk)

- Avoid large meetings
  - Large meetings waste valuable time and energy.
  - They discourage debate
  - People are more guarded than open
  - There's not enough time for everyone to contribute
  - Don't schedule large meetings unless you're certain they provide value to everyone.
- Leave a meeting if you're not contributing
  - If a meeting doesn't require your:
    - Input
    - Value
    - Decisions
  - Your presence is useless.
  - It's not rude to leave a meeting.
  - But it's rude to waste people's time.

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Six rules of productivity (Musk)

- Forget the chain of command
  - Communicate with colleagues directly.
  - Not through supervisors or managers.
  - Fast communicators make fast decisions.
  - Fast decisions = competitive advantage.
- Be clear, not clever
  - Avoid nonsense words and technical jargon.
  - It slows down communication.
  - Choose words that are:
  - Concise
  - To the point
  - Easy to understand
- Don’t sound smart. Be efficient.

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Six rules of productivity (Musk)

- Ditch frequent meetings

There's no better way to waste everyone's time.

- Use meetings to:
  - Collaborate
  - Attack issues head-on
  - Solve urgent problems
- But once you resolve the issue, frequent meetings are no longer necessary.
- You can resolve most issues without a meeting. Instead of meetings:
  - Send a text
  - Send an email
  - Communicate on a discord or slack channel
- Don't interrupt your team's workflow if it's unnecessary.

- Use common sense, If a company rule doesn't:
  - Make sense
  - Contribute to progress
  - Apply to your specific situation
- Avoid following the rule with your eyes closed.
- Don't follow rules. Follow principles.

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Effective use of IT tools

- Check that email, instant messaging, text messages or collaboration tools suit what you want to communicate and achieve.

- Make sure the information reaches the right people.
- Use meaningful subject lines, keep each email to one main topic, and write clearly and concisely.
- Check access permissions for shared folders / documents
    - Who may edit?
    - Who may read?
    - Who has no access?

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Examples of IT collaboration tools

- SharePoint lets users create customised sites to access documents and applications from different devices.
- Google Docs lets users create, share and edit documents, spreadsheets and presentations online.
- Confluence (wiki) is a website where users with access can contribute to or edit content.
- Kanban boards visually display tasks to do, in progress and completed.

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Using project communication templates

- Many technical staff are reluctant to ask for help
- Examples and templates save time and money

- Organisations can:
  - Develop their own templates
  - Use templates provided by external organisations
  - Use examples from books
- Research suggests that organisations with strong project management make effective use of established templates

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Lessons learned reports

- The project manager and team members should prepare lessons learned reports.
- Record important lessons learned by individuals or the team while working on the project
- The project manager often combines the individual reports into a consolidated project report

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Project archives

- Project archives are very important
- Provide an organised view of completed projects
  - Include all project records (documents, minutes, etc.)
  - Can provide important information for future projects
  - Digitise paper documents and store them in the archive
- Typical activities:
  - Identify all documents to archive
  - Choose the IT tool to use
  - Link documents to the project and project phase
  - Enable navigation and searching across folders and content
  - Assign responsibility for archiving
  - Set different permission levels to allow or restrict access to documents

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Project websites

- Many teams create an online project folder for important documents and other information.
- Various software tools can be used, such as SharePoint.

- Access should be possible from different devices (computer / laptop, tablet, smartphone).

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Using IT tools to improve communication

- Many software tools support project communication.
- Many people now work remotely, at least part of the time.
- Project management software offers new ways to improve virtual communication.
- Technology can help, but it is not the most important factor. Improving the organisation's communication capability matters more and often requires cultural change.

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Special situations – escalation

- A proactive way of communicating critical project issues
  - Formally initiated by the project manager and referred to the next organisational level
  - A good project manager escalates whenever and wherever necessary
- Escalation is a formal procedure for raising critical issues, potentially through several management levels, following the project's escalation process.
  - For example, a stakeholder is unable or unwilling to perform an assigned activity, and the delay significantly affects project time, cost or scope.
- Examples:
  - Disagreement about objectives or scope, conflict between teams, third-party dependencies, unclear responsibilities and roles, etc.

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Why do project managers dislike escalation?

- Escalation can create conflict because it may be seen as a complaint against someone involved in project activities.

- It can provoke counterattacks or retaliation when people take it personally rather than professionally.
- Many hesitate to escalate for fear of a negative response or anger from those involved.
- Some project managers' pride prevents them from escalating or reporting risks because they regard themselves as highly capable.
- Some delay escalation too long because they believe they can resolve the issue within the project.

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Why do project managers dislike escalation?

- Junior or new project managers may hesitate to escalate issues involving experienced team members, senior management or customers.
- Escalation can create the impression that the project is out of control and the manager cannot manage it.
- Some project managers do not know how to use escalation to resolve an issue.
- The PMO has no defined escalation process, or none has been agreed for the project.

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When is the right time to escalate?

- When should a project manager escalate? There is no simple answer.
    - Escalating minor issues may reduce the attention given when something truly important arises.
    - Failing to escalate, or doing so too late, leaves less time and fewer options for resolving the issue.
        - Resolution will involve additional, unforeseen project costs.
- Consult colleagues or managers who have relevant experience or have handled similar escalations.
    - They can provide practical advice on how to proceed.

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How to escalate effectively in a project?

- Prerequisites
  - Define an escalation matrix and responsible people
  - If necessary, define escalation paths for different areas (see example)
- Ensure all team members understand the escalation procedure
  - Define which issues go to whom and the required response time
- Before escalation, the project manager must assemble the necessary information and analyses
  - Know whose involvement is needed for each open issue
- Avoid frequent, unnecessary escalation

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How to escalate effectively in a project?

- If an Operational Level Agreement (OLA) with another department or a Service Level Agreement (SLA) with another company applies, observe the agreed response times:
  - If the SLA allows three days to respond, do not escalate before that period expires
  - If no response is received within the agreed time, first send a formal reminder
- Explain the issue, analyses and data, its severity (high / medium / low) and proposed solutions
- Involve management two levels higher, depending on severity

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How to escalate effectively in a project?

- Arrange a separate meeting, call or email:
  - Focus on one specific issue at a time. Address issues separately to avoid diluting the escalation.
  - Involve only those needed to resolve the issue, rather than adding people merely for information or as optional attendees.
  - Keep the discussion focused on the issue. Personal or unrelated remarks about individuals do not help resolve it.
  - Document the required actions and responsible people. In email, put those responsible for actions in the “To” field.

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How to escalate effectively in a project?

- If the first escalation fails, move to the next level so that senior management is informed and can provide support
- If vertical escalation fails, use horizontal, indirect or other approaches until the issue receives the attention needed for resolution

- If escalation does not succeed, the project manager can take further action:
  - For example, propose suspending or terminating the project or meeting senior management in person

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Project escalation – a risk?

- Escalating a project issue requires both judgement and skill
- It also carries risks, including personal conflict and negative reactions.

- Recognising the need to escalate requires courage and commitment to completing the project successfully.

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Conflict resolution

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Identifying conflict

- Conflict exists when …
- Something is troubling or bothering me. I want something different and am unsure what to do or choose.
- I am under pressure to do one thing but cannot because the opposite is required.

- I seem physically unable to do one thing and its opposite at the same time.
- I cannot do both. I must choose one of several good options.

- I am stuck! I often start one thing, leave it half-finished, then start another and also leave it half-finished to reach a compromise.
- Neither side is satisfied. The compromise is only so-so …

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Conflicts and how to resolve them

- Focuses on preventing, managing or resolving conflicts.

- Identify potential conflicts as early as possible so they can be addressed.
- Conflict can be positive and generate new ideas. Unresolved negative conflict, however, can damage relationships and trust, leave issues unresolved, create ongoing stress and dysfunctional behaviour, and reduce productivity and morale.

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Approaches to conflict resolution

- Avoiding
  - Withdrawing from or ignoring the conflict
- Accommodating
  - Reassuring the conflicting parties
- Using positional authority
  - A higher authority (manager) resolves the conflict
- Compromising
  - Negotiating
- Collaborating
  - Confronting the problem and seeking a solution by integrating different ideas, views and perspectives

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Approaches to conflict resolution

- Every conflict is unique. The approach depends on:
  - The type of conflict and its importance to the project
  - Time pressure for resolving it
  - The power or authority of the parties involved
  - Whether the priority is maintaining project objectives or preserving relationships

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Towards a solution

- Finding a solution to a conflict is not easy
- Obtaining rational, impartial information about the conflict can help greatly
- This does not usually happen. Too often we enter “negotiations”, fighting our corner to reach a solution.
    - In negotiation, “the better speaker wins”. The other person therefore loses: winner–loser.

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Finding a breakthrough solution (the next step)

- Breakthrough solutions are called silver bullets, or at least silver fragments strong enough to make a crack or hole in the wall and let us move forward.
- How do we find them?
  - Observation
  - Testing the boundaries
  - A reference environment
- The best solutions often seem impossible (more on this later)

- If you cannot find a breakthrough solution, try the opposite of what others do

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Observing the environment for breakthrough solutions

- Review all assumptions (25 if you write five for each of the five arrows)

- Look for obvious assumptions arising from management objectives
  - This is not always possible, but it can open our eyes and help secure management support
- Are any assumptions not necessarily valid? Looking from another perspective can reveal this.

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Fakulteta za informacijske študije
Faculty of information studies

TIA2030
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Projects of Information Technologies

Project roles and responsibilities

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Roles and responsibilities

- Clearly defined and agreed roles and responsibilities ensure accountability
- and contribute to an effective and efficient project.
- RACI matrix*
  - Responsible: The person who does the work to achieve the task
  - Accountable: The person who is accountable for the correct and thorough completion of the task
  - Consulted: The people who provide information for the project and with whom there is two-way communication.
  - Informed: The people kept informed of progress and with whom there is one-way communication.

*https://en.wikipedia.org/wiki/Responsibility_assignment_matrix

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