Digital Technology

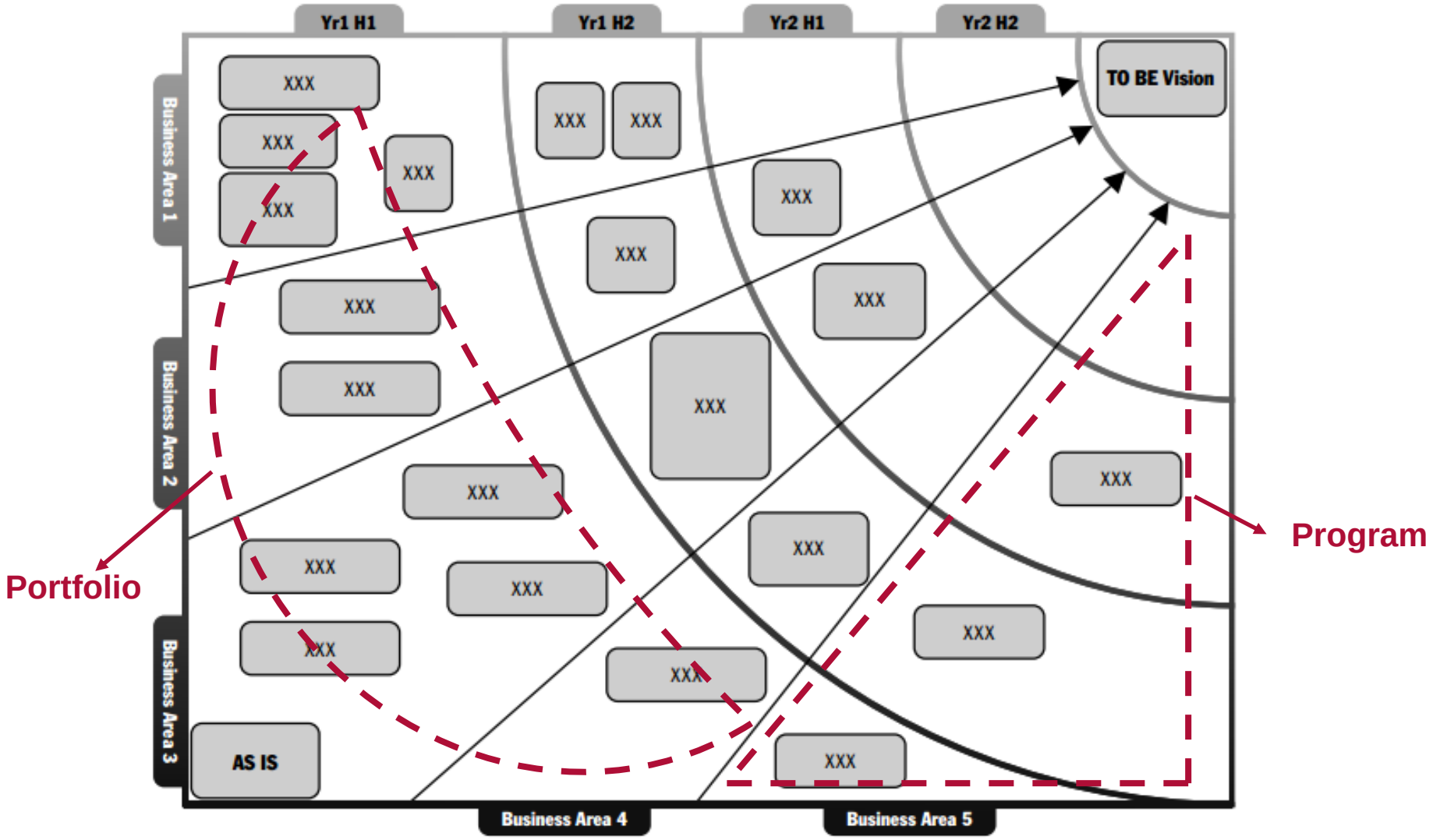
Project Management and IT projects

Giulio Nicelli

giulio.nicelli@polimi.it

Projects in an organization

General view chart



IT Projects: some examples

Software Development Projects: These projects involve creating new software applications or enhancing existing ones, including web applications, mobile apps, desktop software, and enterprise solutions.

Software Selection Projects: These projects involve evaluating and choosing software solutions that best meet the organization's needs. This includes defining requirements, researching available options, conducting vendor assessments, and coordinating trials or proof of concept activities.

Data Governance Projects: These projects establish policies, procedures, and standards for managing an organization's data assets to ensure data quality, integrity, security, and compliance with regulatory requirements.

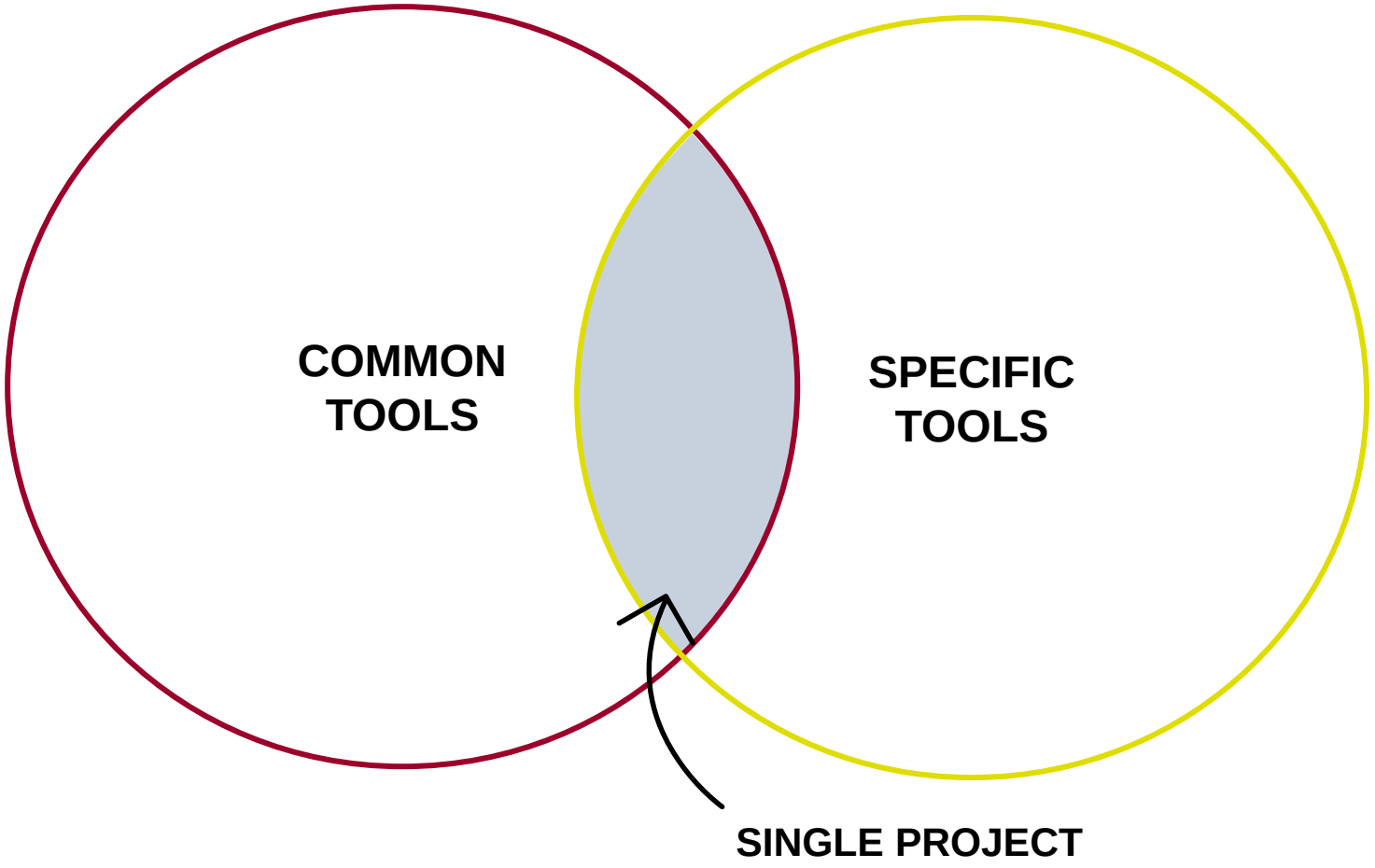
Infrastructure Upgrade Projects: These projects focus on updating or expanding IT infrastructure such as servers, network equipment, and data centers to improve performance, increase capacity, or enhance security.

Cybersecurity Projects: These projects aim to protect the organization's digital assets from cyber threats by implementing firewalls, intrusion detection systems, encryption protocols, and conducting security audits and vulnerability assessments.

Cloud Migration Projects: These projects involve moving applications, data, and services from on-premises infrastructure to cloud-based platforms to leverage scalability, flexibility, and cost-efficiency.

Business Intelligence (BI) and Data Analytics Projects: These projects aim to gather, process, and analyze data to provide actionable insights for decision-making by setting up data warehouses, creating dashboards, and developing data models.

A mix of different sets of tools



Reference Framework for the common tools

- Reference Framework Project Management Body of Knowledge (PMBOK)
- The PMBOK identifies 42 processes that sum the best practices of the project management, creating what is generally considered the de facto standard "of project management

- Objectives of the PMBOK
  - Identify and describe the common practices (It is PM's responsibility to determine what is appropriate to the project)
  - Provide a common vocabulary and basic references
  - Consolidate, deepen and systematize the lessons learned

But what is a project?

- *A set of **coordinated efforts** in time (Kerzner, 1995)*

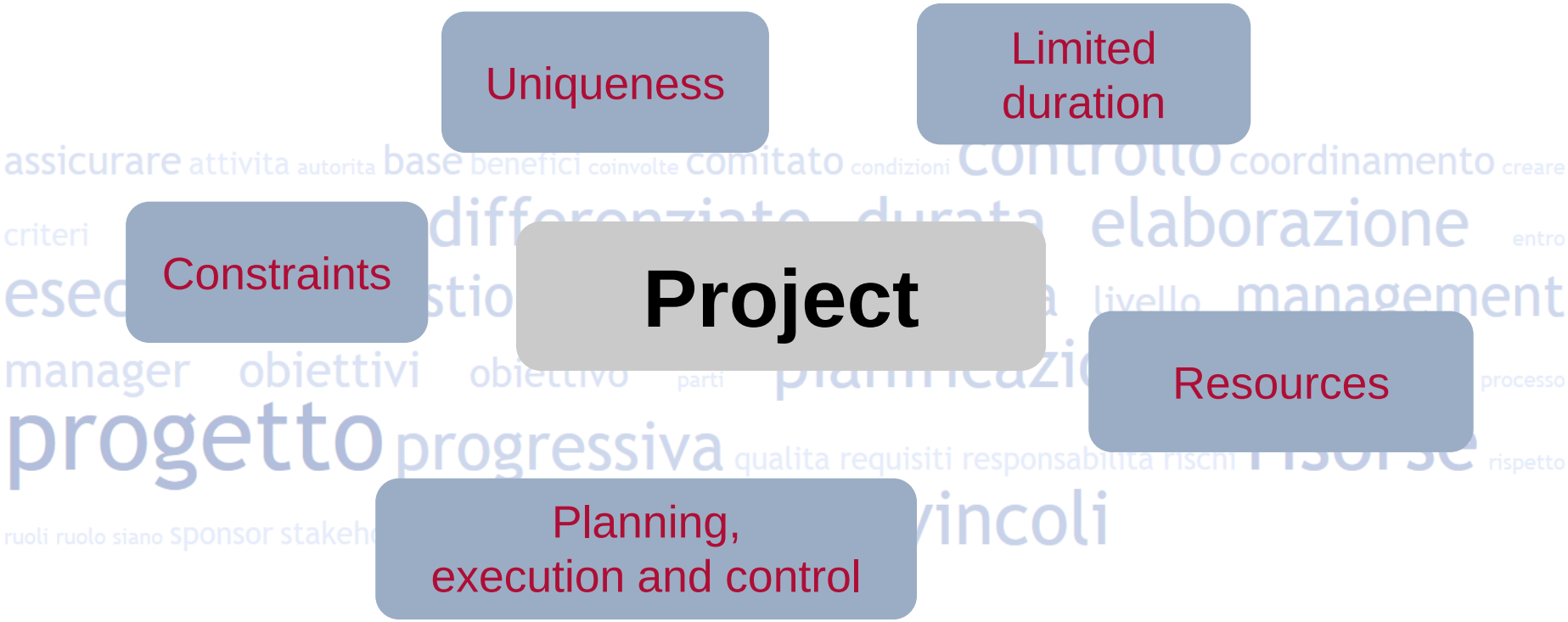
- *A set of people and other resources temporarly assembled to reach a specific objective, normally with a fixed budget and with a fixed time period. Projects are generally associated with products or procedures that are being done for the first sime or with procedures that are being altered (Graham, 1990)*

A project can be defined as a **temporary endeavor**

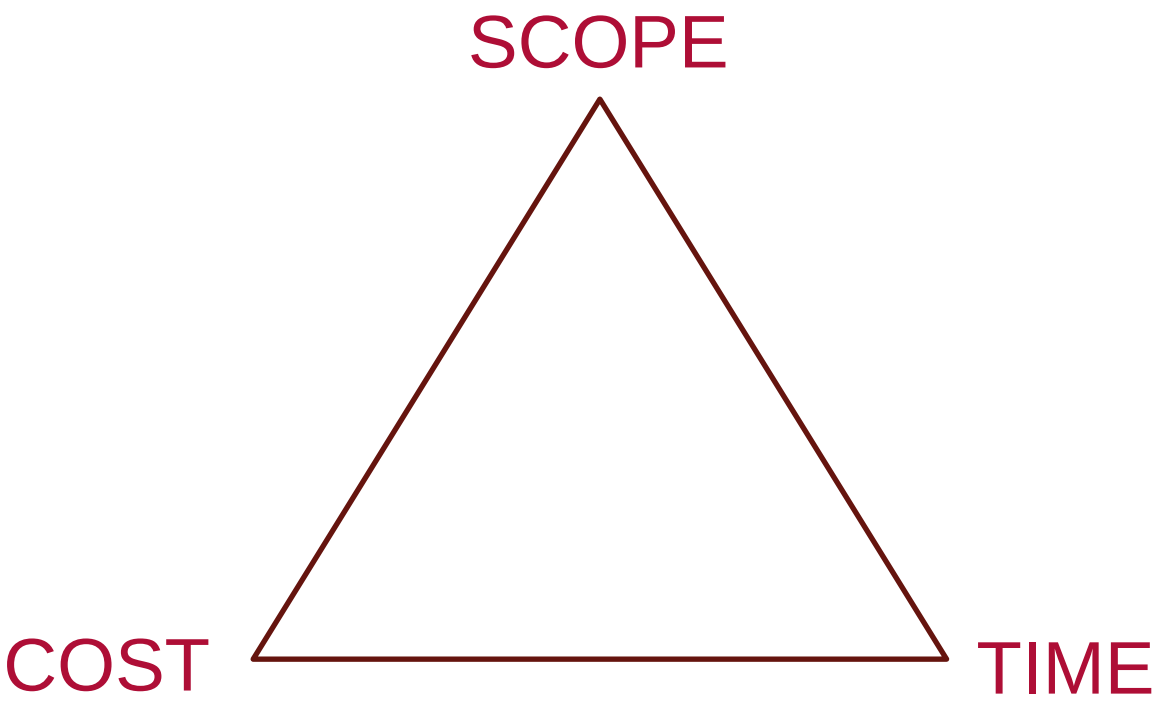
undertaken to create a **unique product or service**

(Project Management Institute, A guide to the Project Management Body of Knowledge - PMBOK Guide)

Some keywords



Project drivers



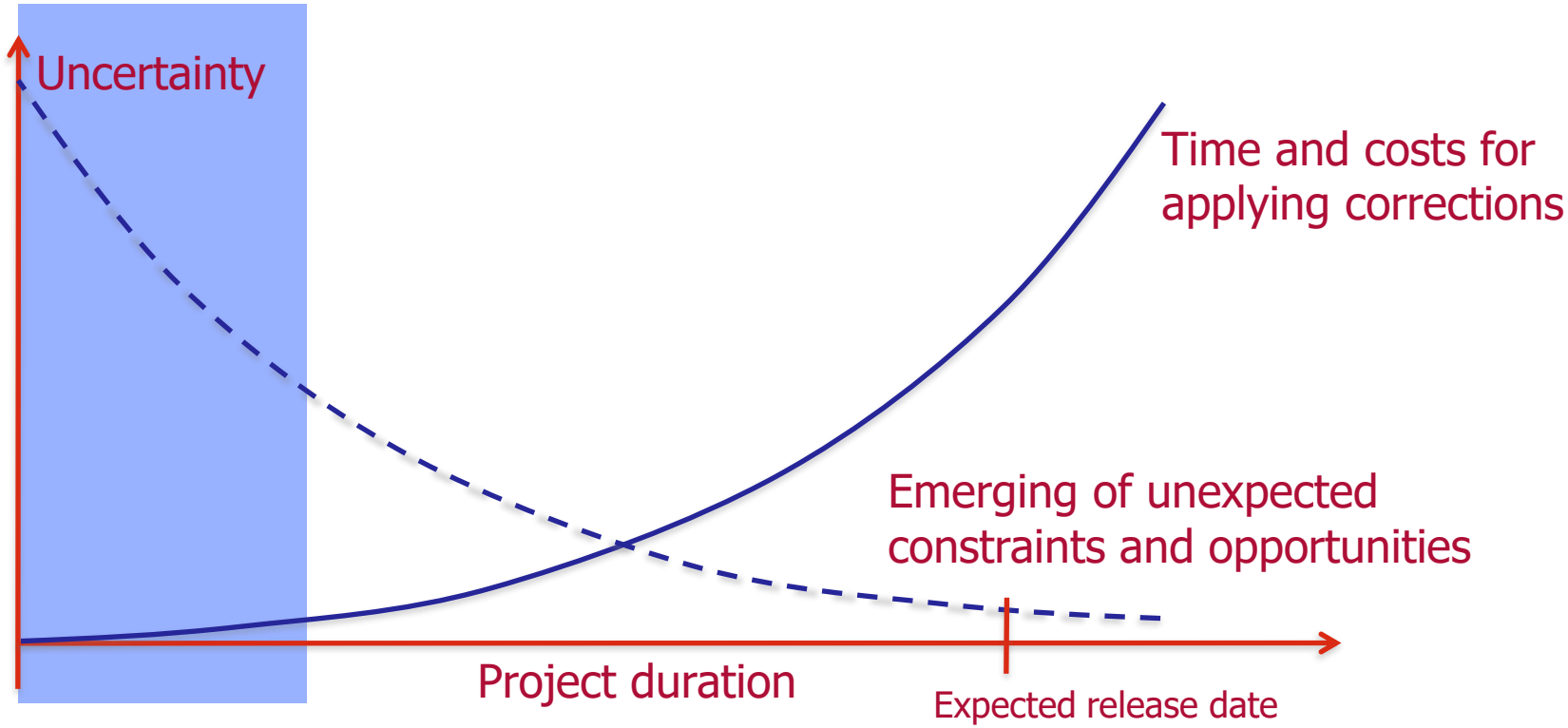
Continuous trade off

Project management

Project Management: application of knowledge, skill, techniques and instruments to satisfy project requirements

- Highlight critical situations and provide alternatives timely
- Empowering all stakeholders on specific objectives
- Provide realistic view of the project during its lifecycle
- Draw a future evolution forecasting framework of the project

Project Uncertainty



Uncertainty

- Ability to predict outcome of parameters or foresee events that may impact the **project**
  - It may have internal organizational origin or result from external conditions
  - It can result from technological, skills and organizational factors or from the project objective itself
- How to act?
  - In the planning phase, the setting of set a "contingency»
    - Ex. 10% of additional development efforts planned in the budget
  - During implementation, create pilot projects or incremental prototypes
  - In general it is a good idea to formalize and always share the requirements or an high level description of them

Technology - Innovation

- News and complexity of the technology involved
  - It is mainly technological
  - Internally it depends on the expertise of IT specialists
  - Externally iIt depends on the technology maturity
  - It depends on the technological complexity of the IT solution adopted
  - It is related to a natural phenomenon of technological obsolescence
- How to act?
  - Understanding the mandatory know how and acquire it in time
  - Making use of experimental / pilot projects
  - Beware of standard policy on ICT companies
  - A good rule is to resort to reference visit(eg. Forum, site visits to companies that have had similar experiences)

Technology - Size

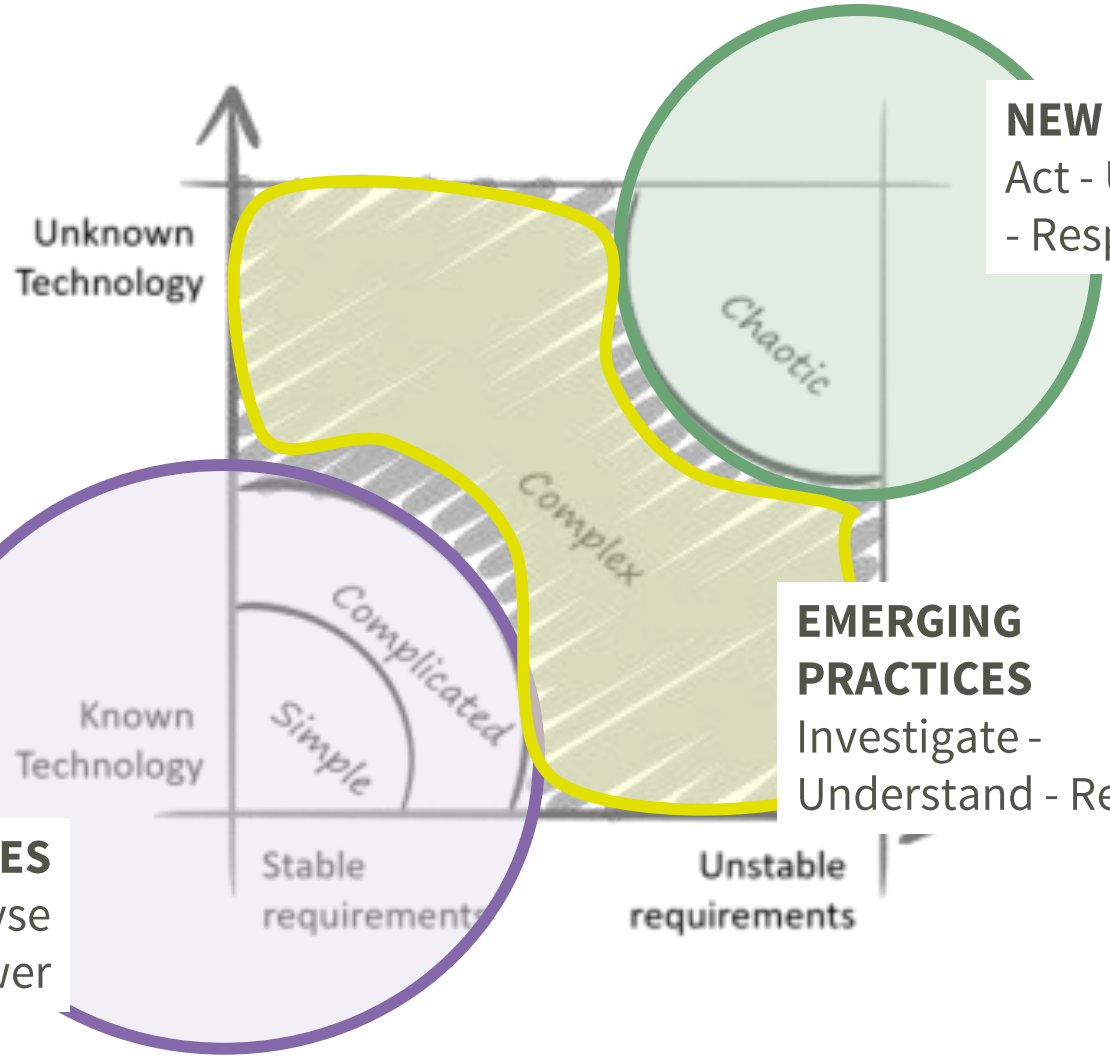
- Number the components in the new system (functional diversity, functional modules), LOC or FP, number of end-users of the system
  - It's origin is both technical (Eg. Number of modules) and organizational (number of end-users)
  - It acts as a multiplier to the other risk dimensions (indeterminacy and innovation)
  - You can reduce it by splitting a project in sub-projects (For a subset of modules or users)
- How to act? Break down as much as possible the project components (output, per phase, etc.), Giving:
  - clear responsibilities
  - measurable results
  - Add coordination and moments integration

    … "Divide et impera"

There is no single approach

"Cynefin Framework "

Stacy Landscape Diagram



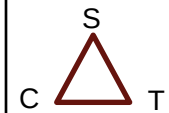
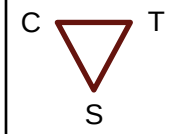
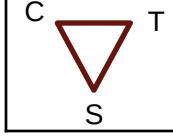
NEW PRACTICES
Act - Understand - Respond

EMERGING PRACTICES
Investigate - Understand - Respond

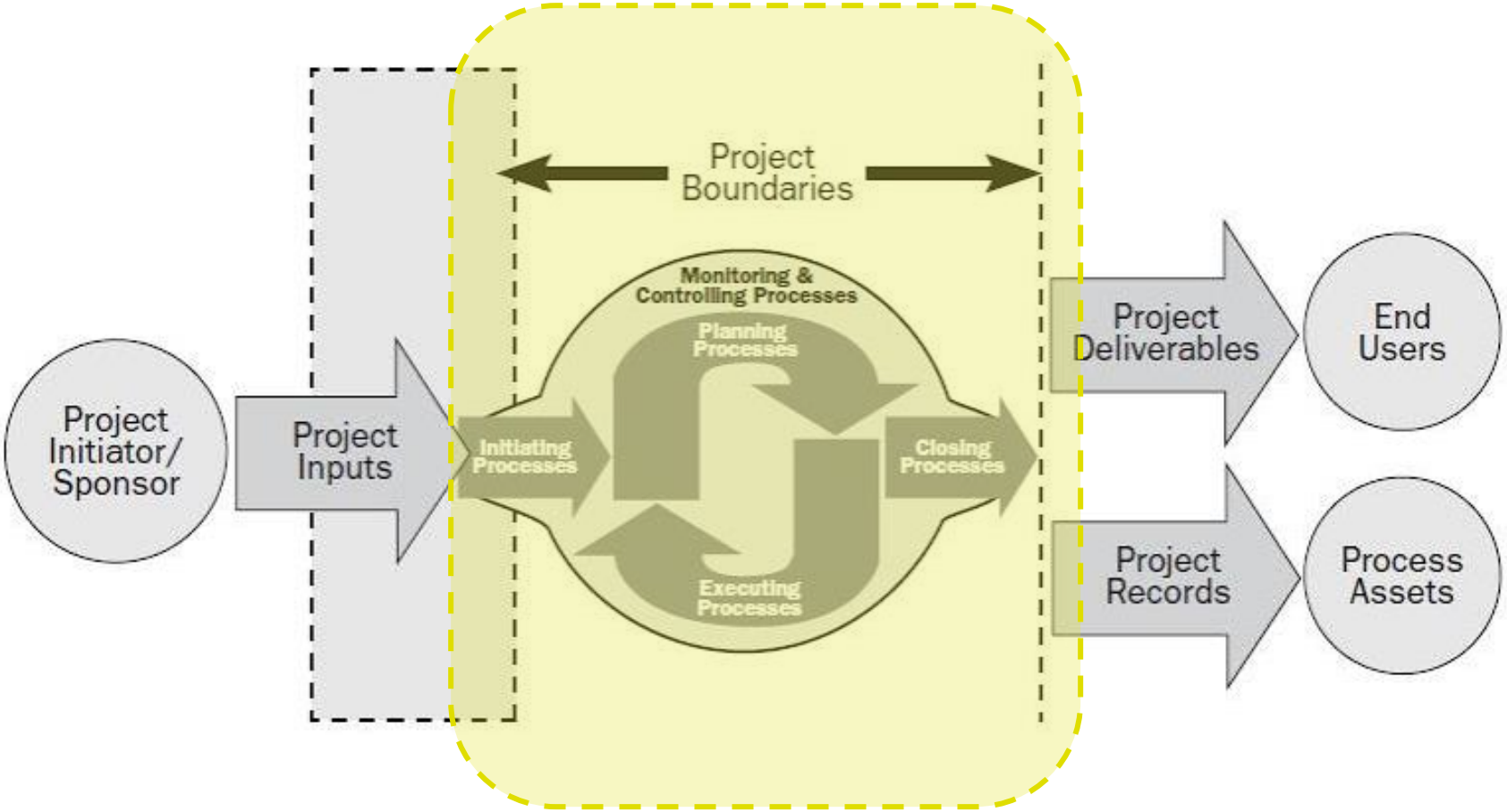
GOOD PRACTICES
Understand - Analyse or Categorise - Answer

Project Management Types

- **Traditional** (TPM): objectives and solutions are clear and known since the beginning of the project
- **Adaptive/Agile** (APM): clear objectives, but no clear solutions. The approach is iterative / incremental.
- **Extreme** (xpm): Typical of research and development projects, with vague objectives and solutions to develop/understand

		SCOPE	TIME	COSTS
	TPM	FIXED	FIXED	FIXED
	APM	VARIABLE	POSSIBLY FIXED	POSSIBLY FIXED
	XPM	NOT WELL DEFINED	RE-PLANNABLE	RE-FINANCEABLE

Project lifecycle phases



(Rework PMBOK®Guides)

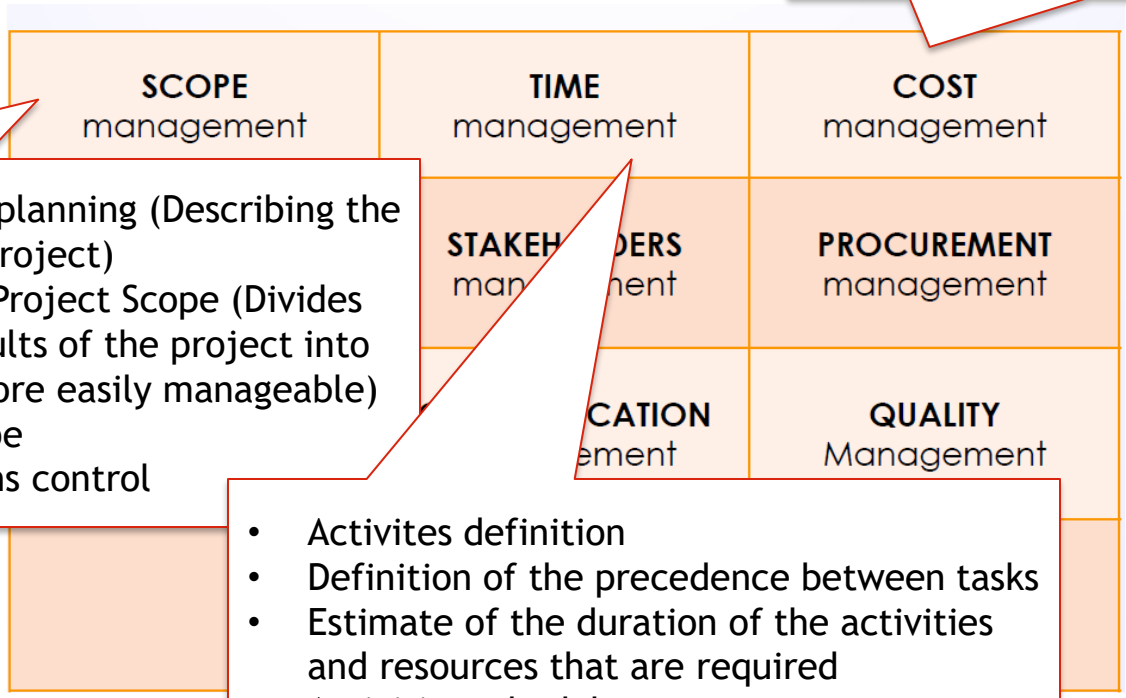
The 10 "souls" of a project

SCOPE management	**TIME** management	**COST** management
HUMAN RESOURCE management	**STAKEHOLDERS** management	**PROCUREMENT** management
RISK management	**COMMUNICATION** management	**QUALITY** Management
INTEGRATION management		

(Rework PMBOK®Guides)

The 10 "souls" of a project

- Resource planning (people and equipment)
- Costs estimation
- Budgeting (budget allocation for each activity)
- Costs contol



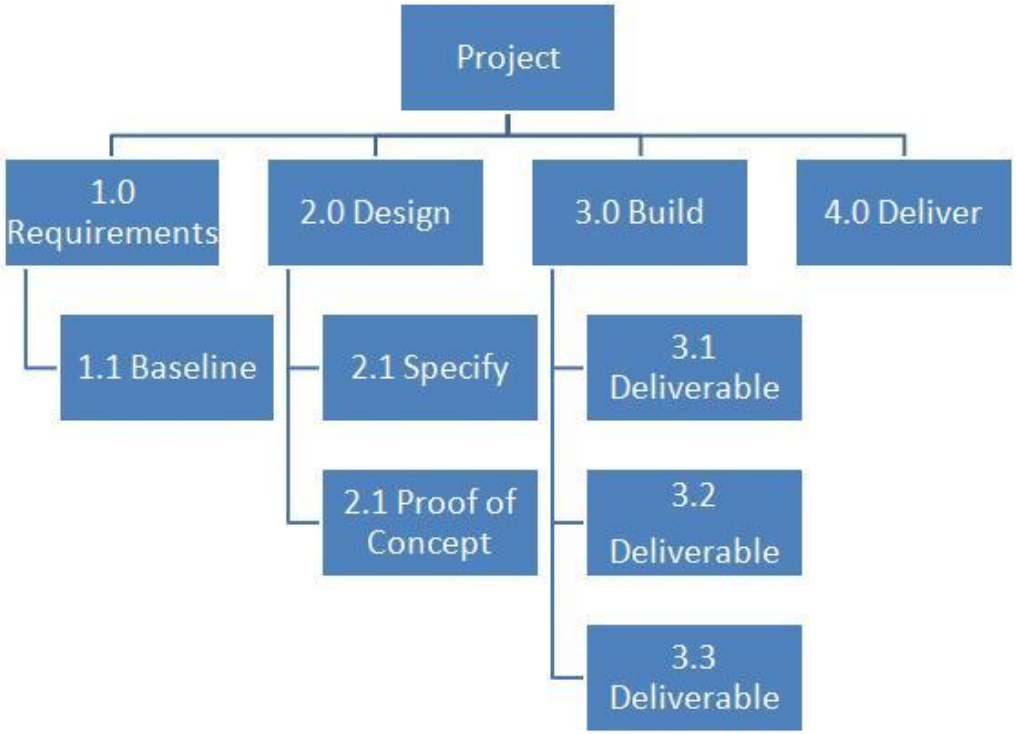
- Product Scope planning (Describing the object of the project)
- Definition the Project Scope (Divides the partial results of the project into components more easily manageable)
- Check the Scope
- Scope Variations control

- Activites definition
- Definition of the precedence between tasks
- Estimate of the duration of the activities and resources that are required
- Activities schedule

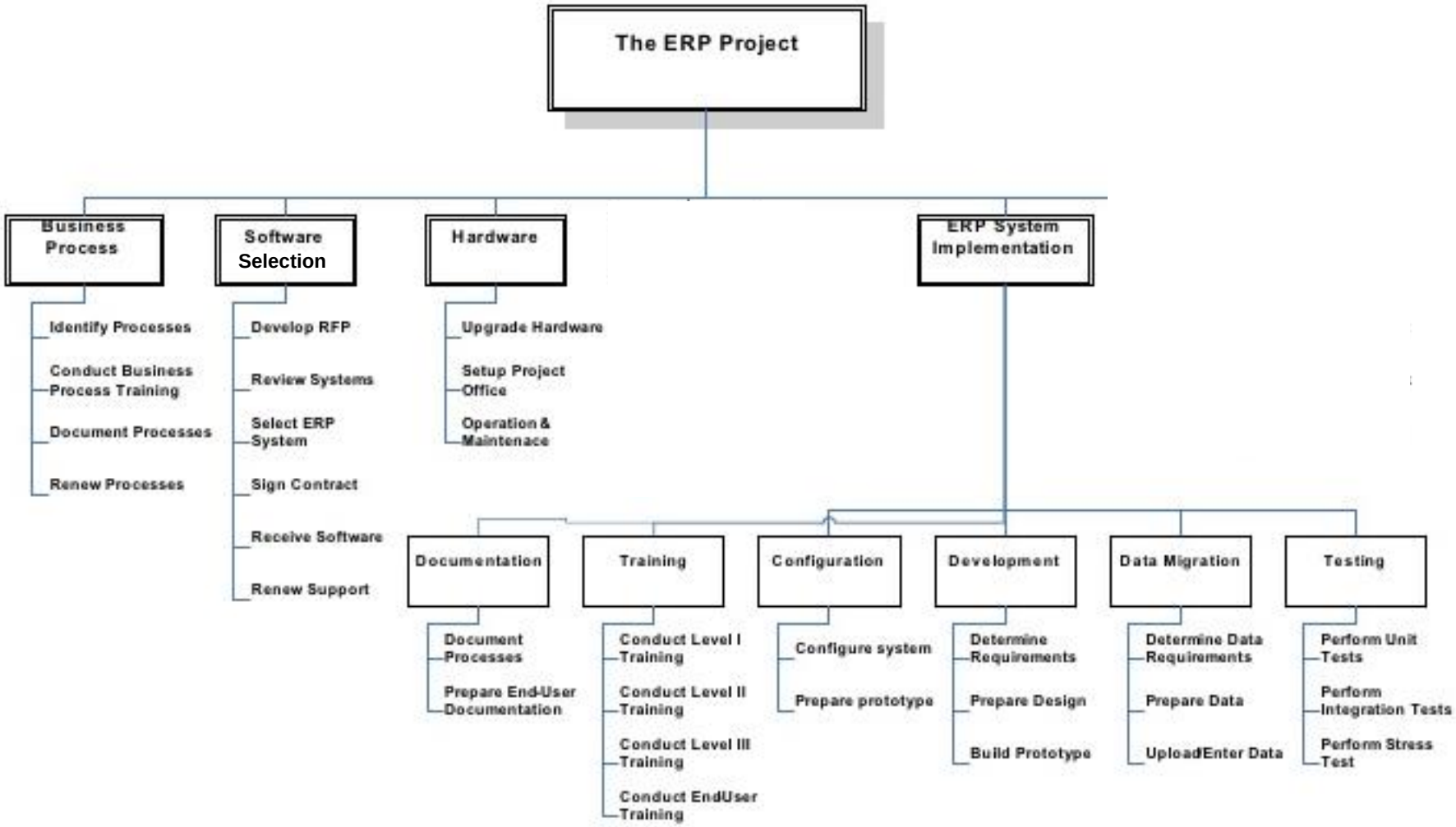
(Rework PMBOK®Guides)

WBS

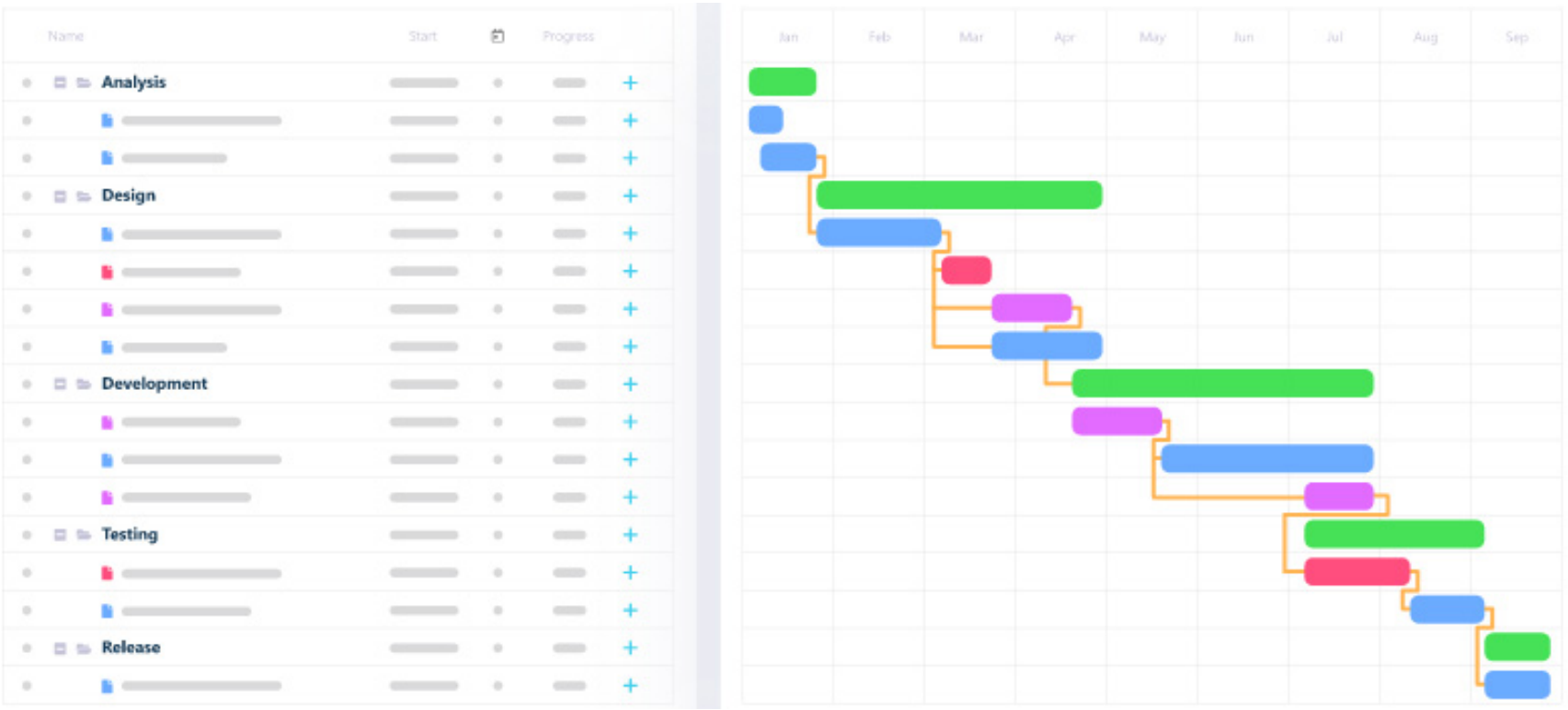
- Structured organization of project activities
- Project management tool to support the project managers in the organization of the activities of which it is responsible (by providing a logical structure and arrangement of various activities that must be completed in order to achieve the project objectives)
- Different approaches in the construction of the WBS (objectives, users, technology, ...)



Example of WBS

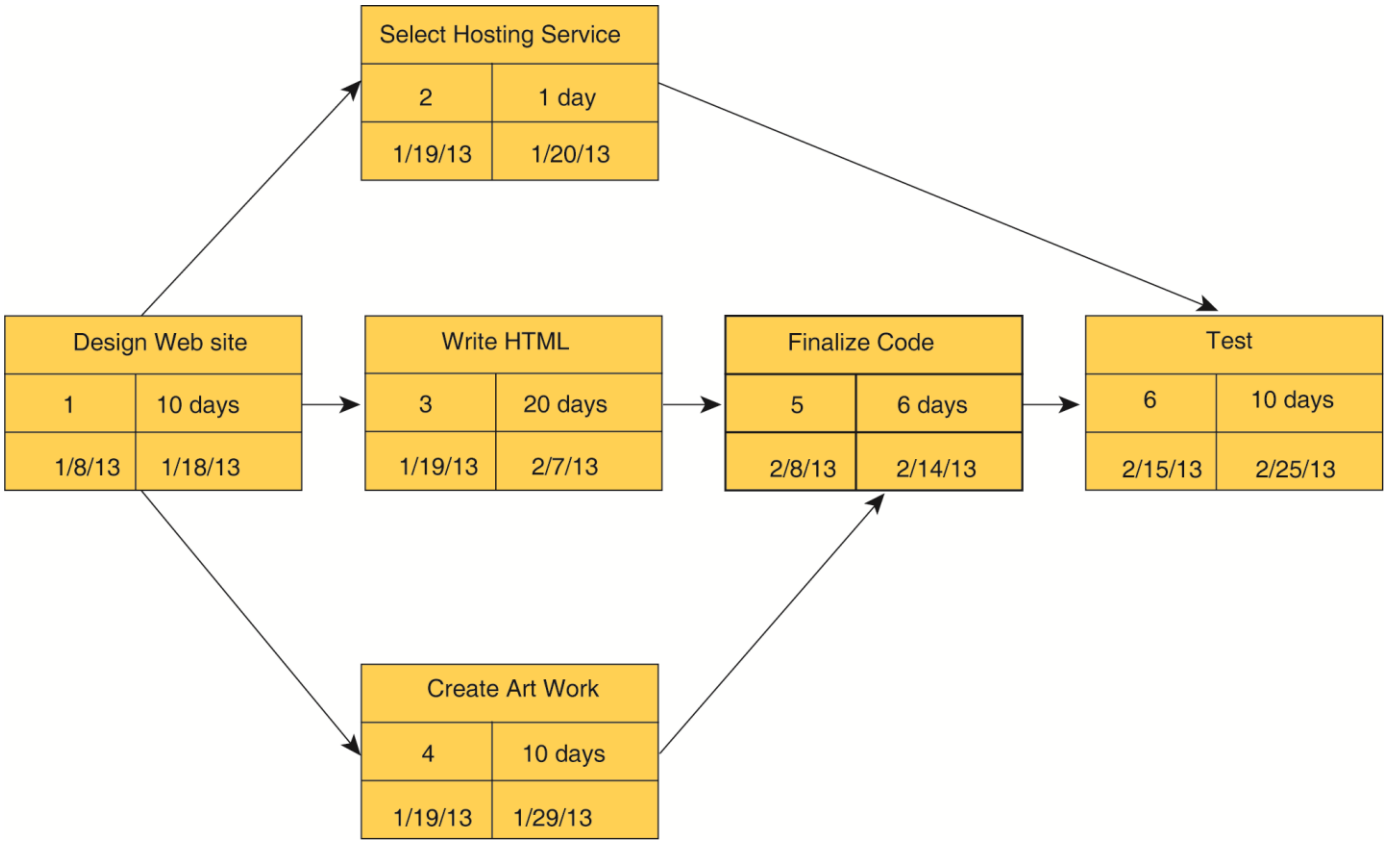


Gantt Chart



- Provides an overview of the activities of project and the sequence of activities and milestones
- can be integrated with information related to the resources needed, the progress of the project itself and of each activity

CPM – Critical Path Method



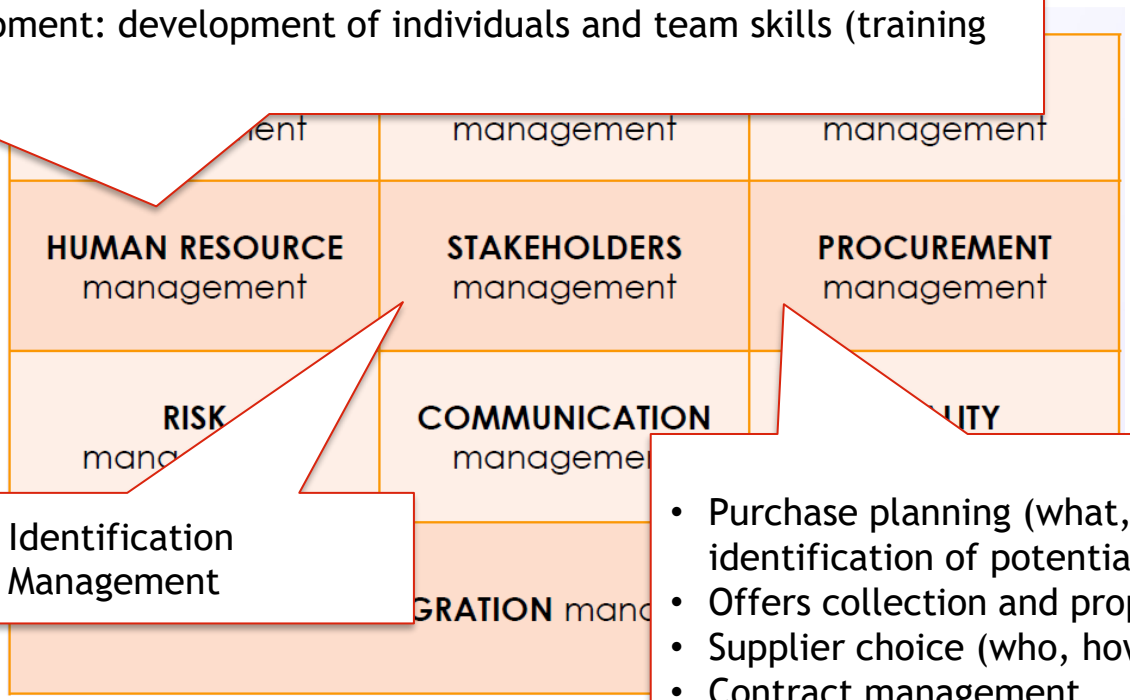
- It allows you to identify the critical activities (or resources) to monitor constantly
- It allows you to identify the critical path according to task priorities

Cost estimation tecniques

- Three main techniques:
  - **Top-down** (Or by analogy): use of the actual cost of a project analogous as the baseline to estimate the new project
  - **Bottom-up:** Estimation of individual tasks composing the project and relative amount for determine the total estimation
  - **Parametric**: Estimate based on indicators (eg. number of users, number of licenses, analogies with similar projects)
- Distinguish always internal and external costs
- Beware of "hidden costs"
- Attention to the financial aspects (if the PM competence):

The 10 "souls" of a project

- Project Organization Planning (identification, documentation and assignment of responsibility)
- Acquisition of human resources
- Team Development: development of individuals and team skills (training plans)

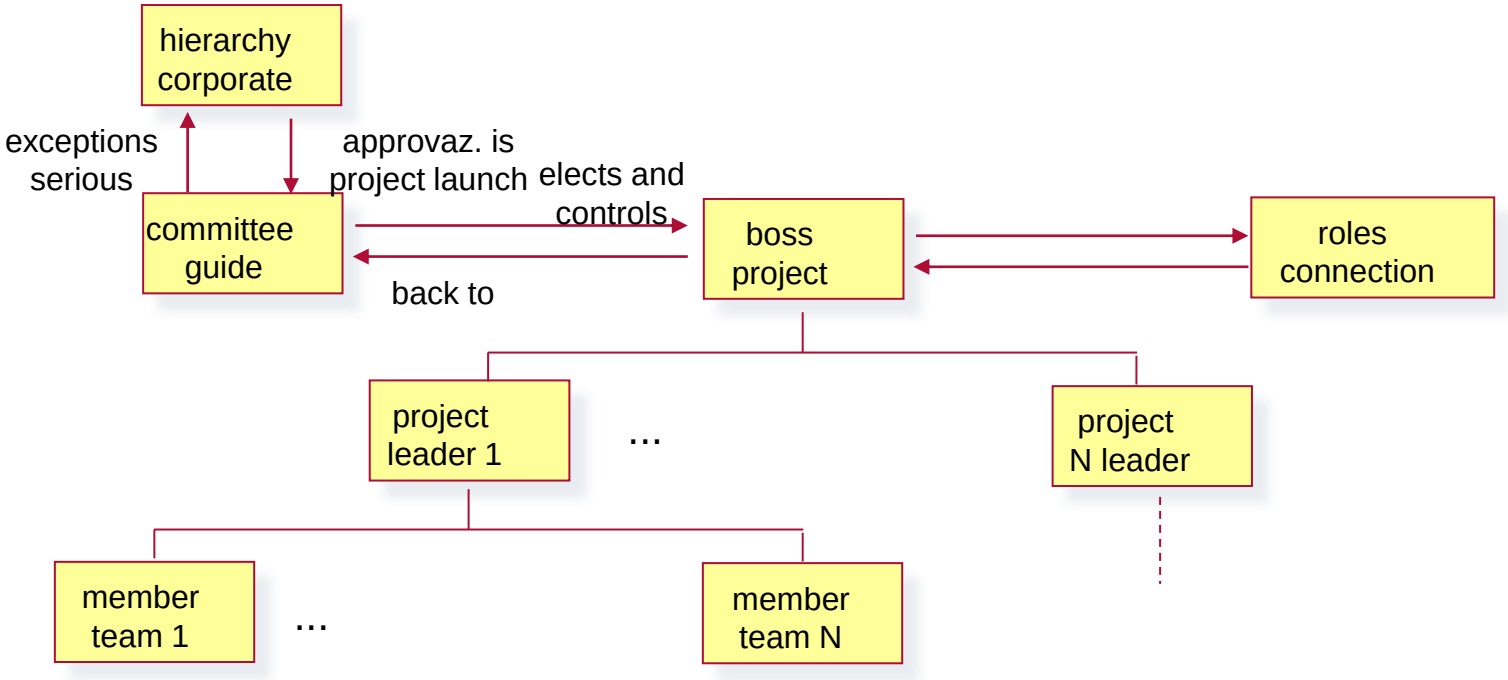


- Stakeholders Identification
- Stakeholders Management

- Purchase planning (what, how, when), identification of potential suppliers
- Offers collection and proposals
- Supplier choice (who, how)
- Contract management
- Contract closing

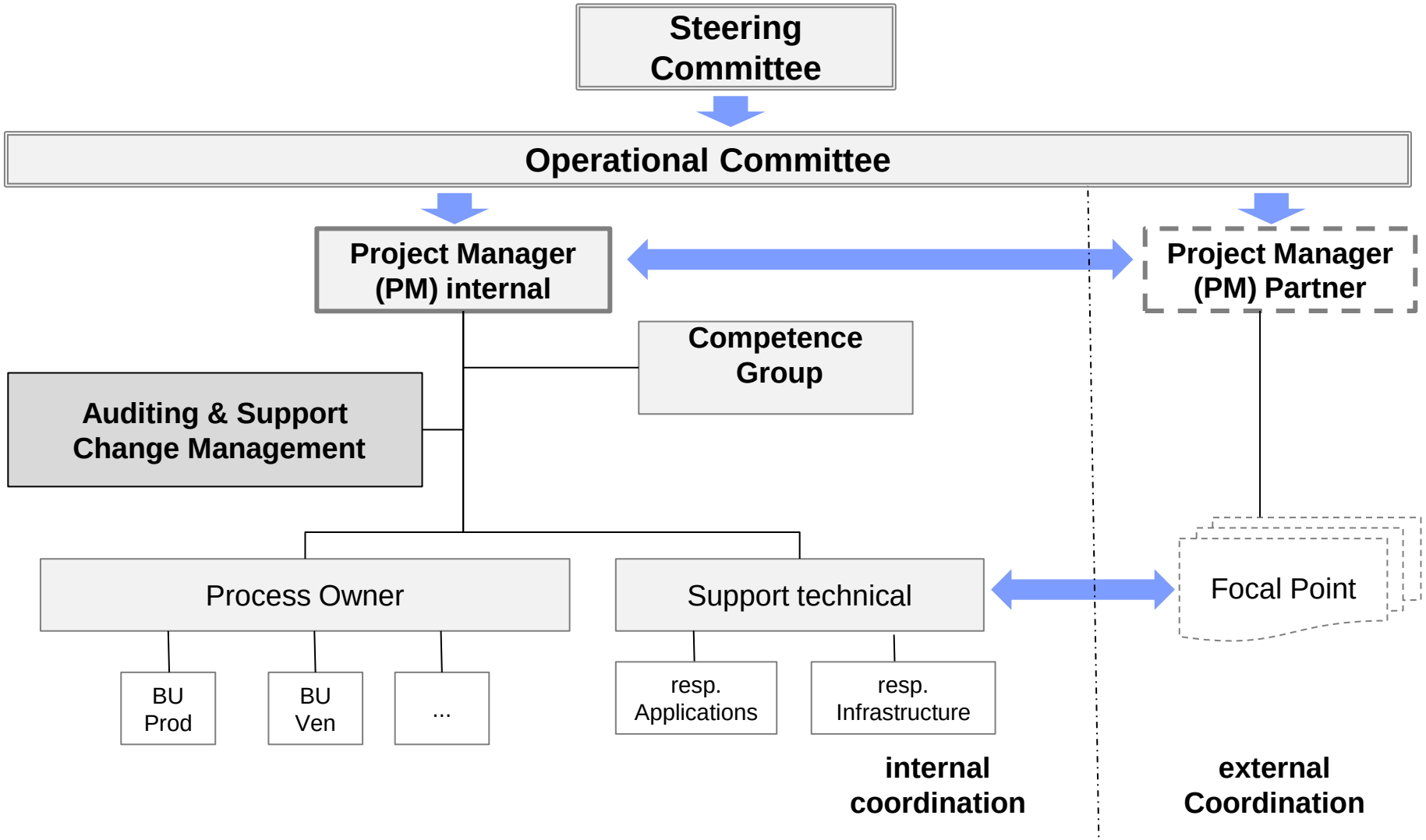
(Rework PMBOK®Guides)

OBS type



- It doesn't exists an organization valid for all the projects
- You have to choose the right organization depending on objectives, complexity, skills, interdependencies of the activities

OBS: eg. from ERP implementation project



RACI matrix

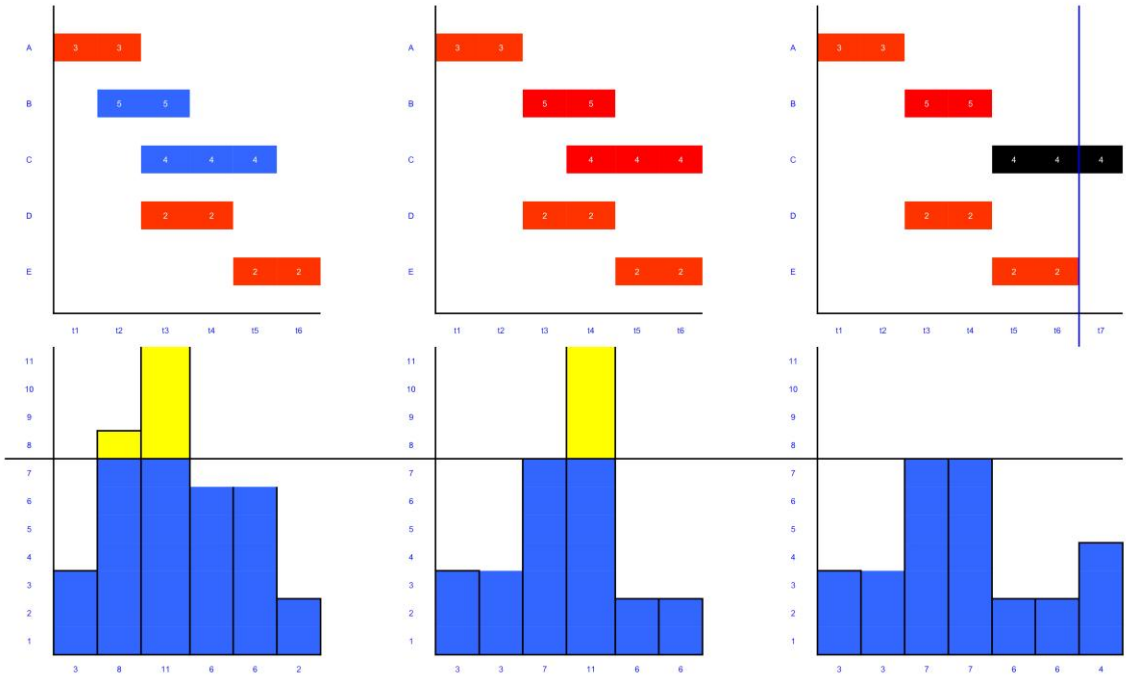
ACTIVITY/ WP

RESOURCES

	A1	A2	…	…
P1	R	RA		
P2	I			
P3	A	C		
…				

- The RACI matrix can be useful to define / assign task-level or single work package responsibilities of the various actors involved:
  - R = Responsible He who performs the activity / WP
  - A = accountable He who has the responsibility for the outcome
  - C = Consulted It helps and works with the Responsible
  - I = informed : One who must be informed at the time of the task execution

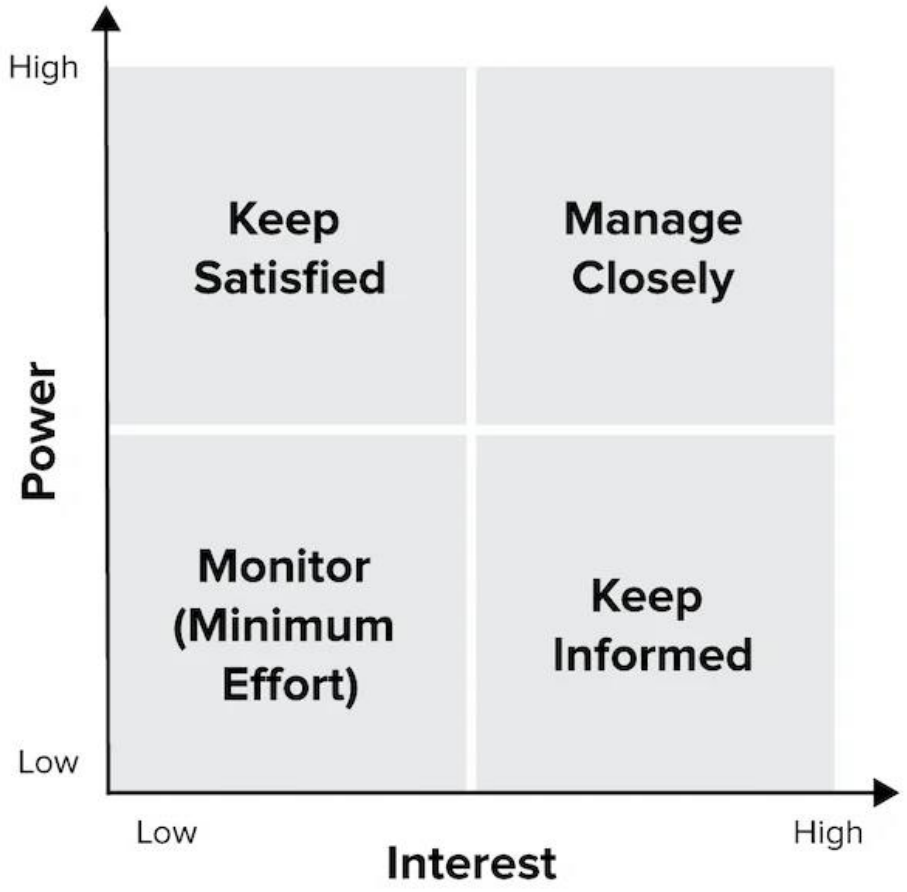
Resource histogram



- Allows to evaluate if, according to activity provided, there are overallocation issues
- In case of overallocation is possible:
  - reschedule considering **the time fixed** (fixed deadline, use the float margins of the non critical activities)
  - reschedule considering **the time fixed** (fixed deadline, overbudget related to overtime and / or additional resources)
  - reschedule considering **limited resources** (possibility of to vary the deadline)
  - **De-scoping**

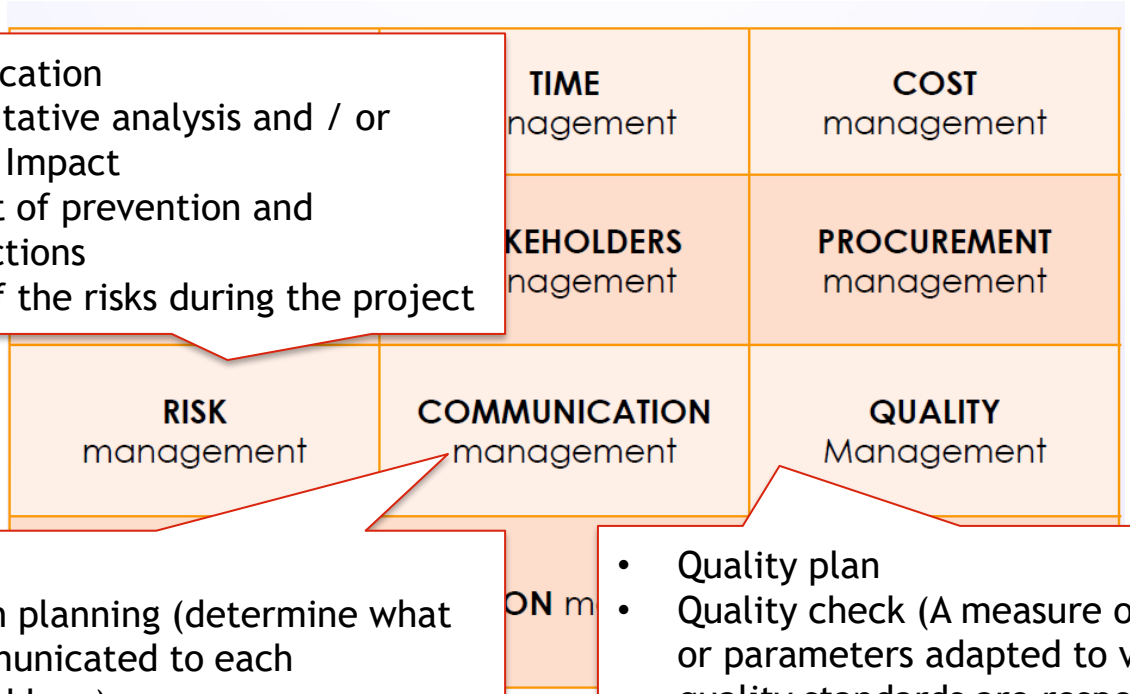
Mendelow‘s Matrix

Project Stakeholders



(Rework PMBOK®Guides)

The 10 "souls" of a project



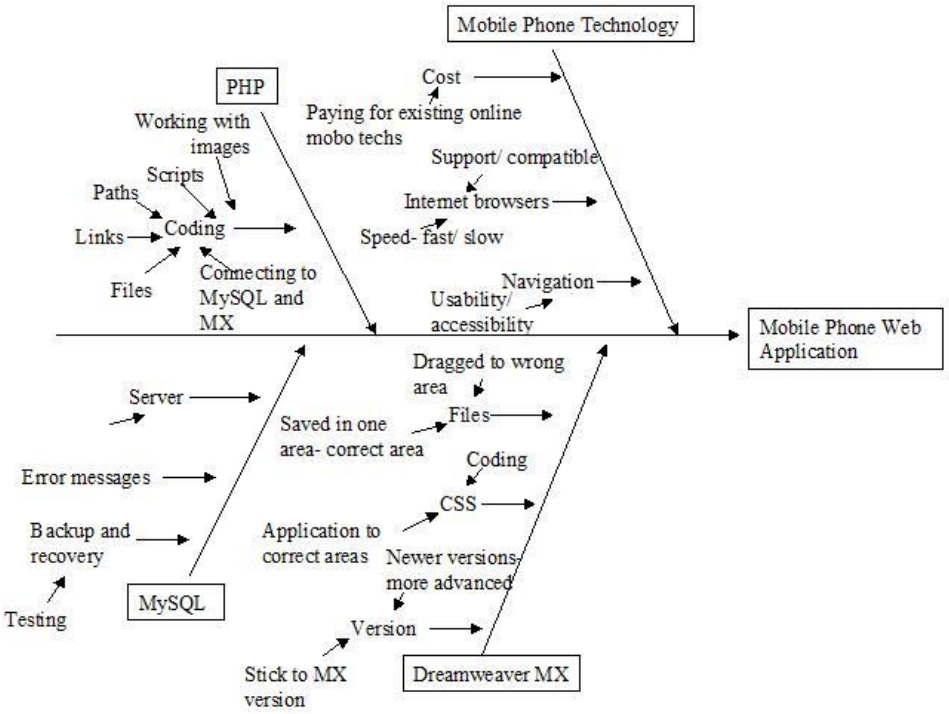
- Risks identification
- Rating: Qualitative analysis and / or Quantitative Impact
- Development of prevention and mitigation actions
- Monitoring of the risks during the project

- Communication planning (determine what has to be communicated to each stakeholder and how)
- Reporting on the results and performance (status, progress, forecasts)
- Closing procedures and final report

- Quality plan
- Quality check (A measure of specific results or parameters adapted to verify that the quality standards are respected and elimination of possible causes of the unsatisfactory performances)

(Rework PMBOK®Guides)

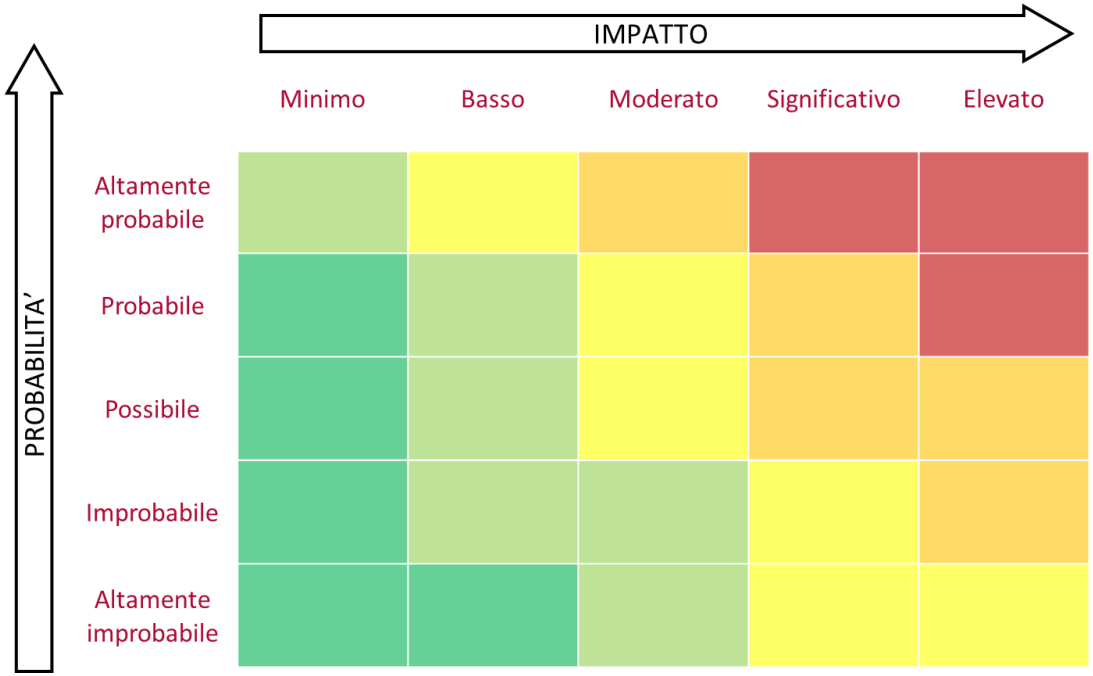
Risk Identification



for risk identification mode

- Brainstorming
- Subject Matter Expert (SME) and authoritative data sources
- Reading Close Out of similar projects
- Simulation
- Testing of prototypes
- Mock-up
- Site inspection
- Ishikawa

Risk assessment: Risk Quantification



- Probability indicates the likelihood of an event occurrency
- Impact: indicates the magnitude of the impact of a specific event

Responding to risks: Example Risk Plan

CAUSE	EFFECT	PROBABILITY '(START)	IMPACT (START)	RISK LEVEL (START)	COUNTERMEASURE	COST (€)	OWNER	PROBABILITY '(END)	IMPACT (END)	RISK LEVEL (END)	NOTES
Technolog provider Failure	Stop of production systems	5	5	25	Change technology platform	€ 400k	Board	5	0	0	
Bugs development	application Crash	4	3	12	Increase test coverage	€ 20k	Dir. IT	2	3	6	
...	...	2	5	10		-					
...	...	2	4	8		-					
...	...	1	4	4		-					

Response strategies to the risks (negative)

- Mitigate: prevention (reduces the likelihood) and protection (reduces the impact)
- Transfer
- Avoid
- Accept: actively (using contingency) Or passively

Close Out

- **Capitalize the experience on the project**, especially in relation to the problems encountered and the solutions adopted

- To introduce a virtuous circle of continuous improvement by identifying areas of improvement (both technological and methodological) that will be introduced in the management of future projects, for each of which will be defined an action plan with relative owner and deadline

- There are experiences that are useful share? (Positive and negative)
- Is useful to document the project performance