Project Management

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Project Management Professional, PMP®

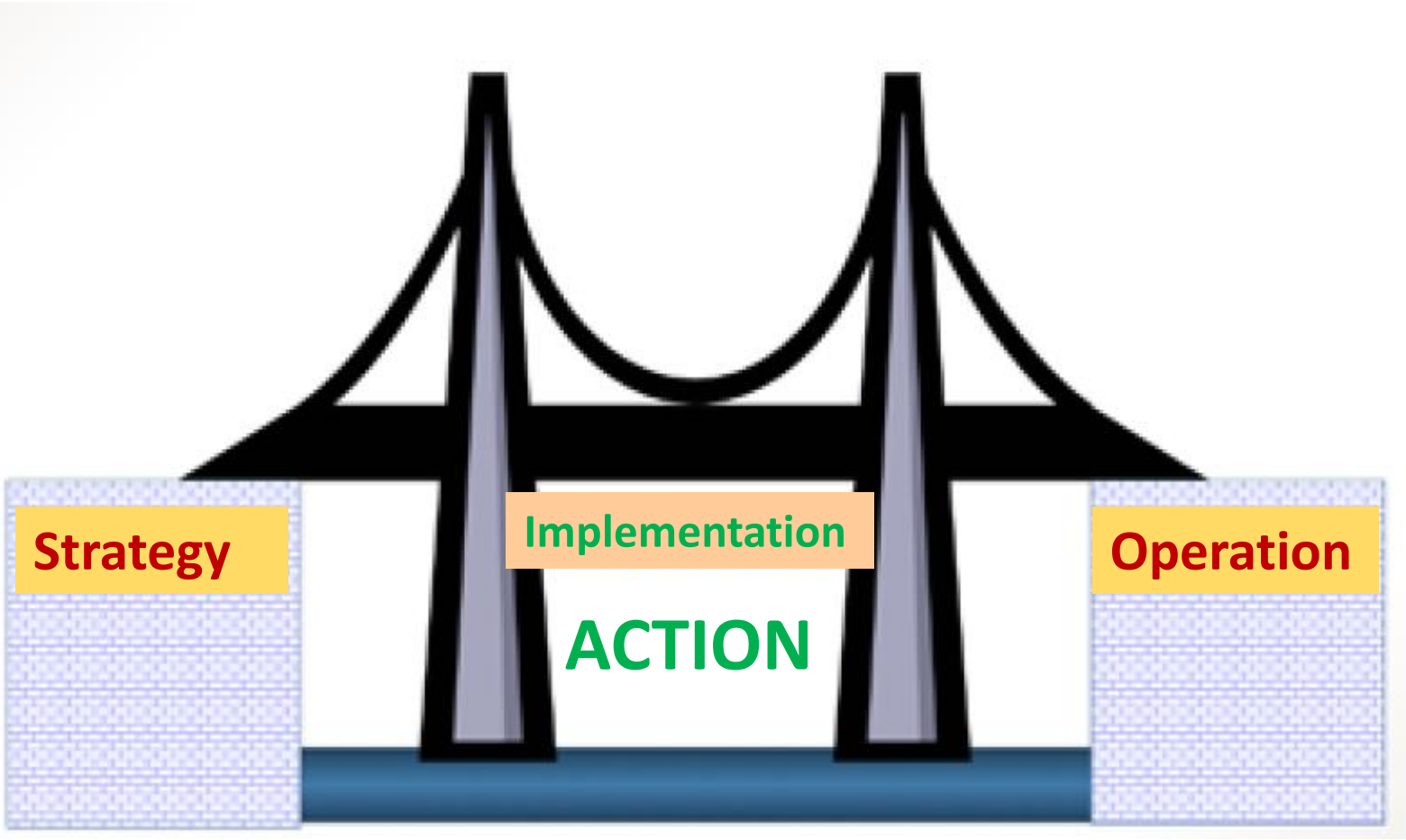
About me …

- ✓ Senior Consultant in Accenture
- ✓ Business Owner
- ✓ Director of IT Services Center
- ✓ Lecturer in Master Programs
- ✓ PhD in Computer Science
- ✓ MBA
- ✓ EFREI Engineer !!!

Objetives

- ✓ Acquire deep knowledge in **Project Management**.
- ✓ Based on **PMBOK** (Project Management Body of Knowledge) **5th Ed** published by the **PMI** (Project Management Institute).
- ✓ Initial preparation for **PMP** (Project Management Professional) and **CAPM** (Certified Associate in Project Managemnt) certifications.

Why ?



Why ?

Alice: Would you tell me, please, which way I ought to go from here?
The Cheshire Cat: That depends a good deal on where you want to get to.
Alice: I don't much care where.
The Cheshire Cat: Then it doesn't much matter which way you go.

What is Project Management?

Project management is the application of skills, tools, and techniques to project activities to meet the project requirements

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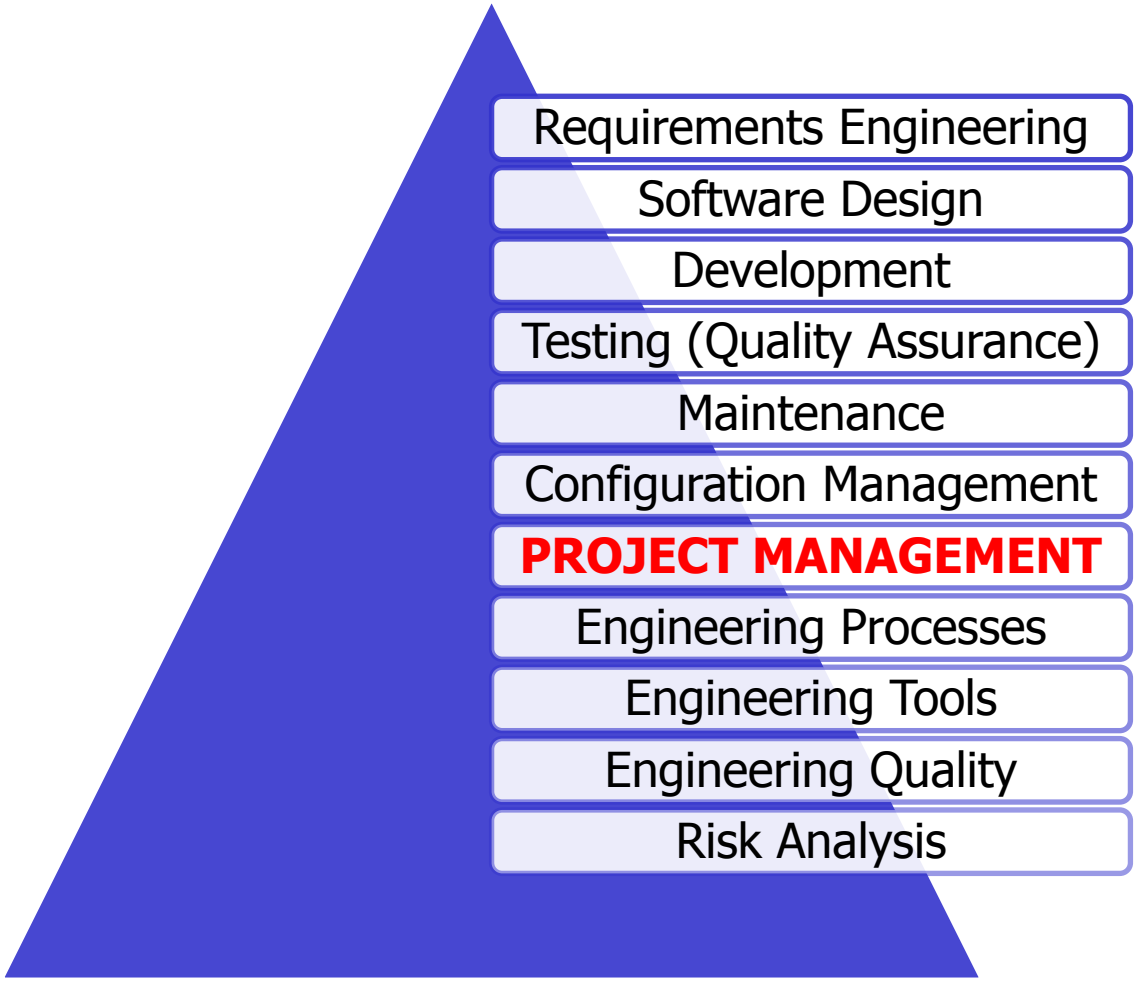
Software Engineering vs Software Project Management



Software Engineering is a broad discipline

Challenges ?

- Unclear objectives
- Unrealistic schedules
- Over-committed resources
- Unclear or changing priorities
- Poor communication
- Unclear organizational relationships

Content

- ✓ Framework & General Concepts
- ✓ Processes
- ✓ Integration
- ✓ Scope
- ✓ Time
- ✓ Cost
- ✓ Quality
- ✓ Human Resources
- ✓ Communication
- ✓ Risk
- ✓ Procurement
- ✓ Stakeholders
- ✓ Professional Conduct

Project Management Institute

- 1969, Philadelphia
- Leading not-for-profit professional membership association for the project management profession
- + 200 countries; + 650.000 Certified PMs
- **Standards** for projects
- **PMBOK® Guide** – Project Management Body of Knowledge
- **PMP®** – Project Management Professional
  - 4.500 h experience + 35hs education + exam 200 questions
- **CAPM®** – Certified Associate in Project Management
  - 24h education en PM + exam 150 questions

FRAMEWORK

Difference between project and operation

Project management context

Project Management Office (PMO)

Organizational systems

Stakeholders

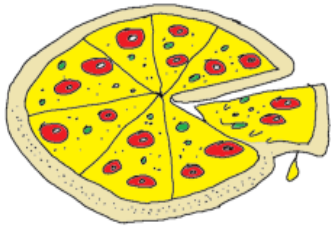
The triple constraint

Project life cycle

Project management knowledge areas

Project vs Operation

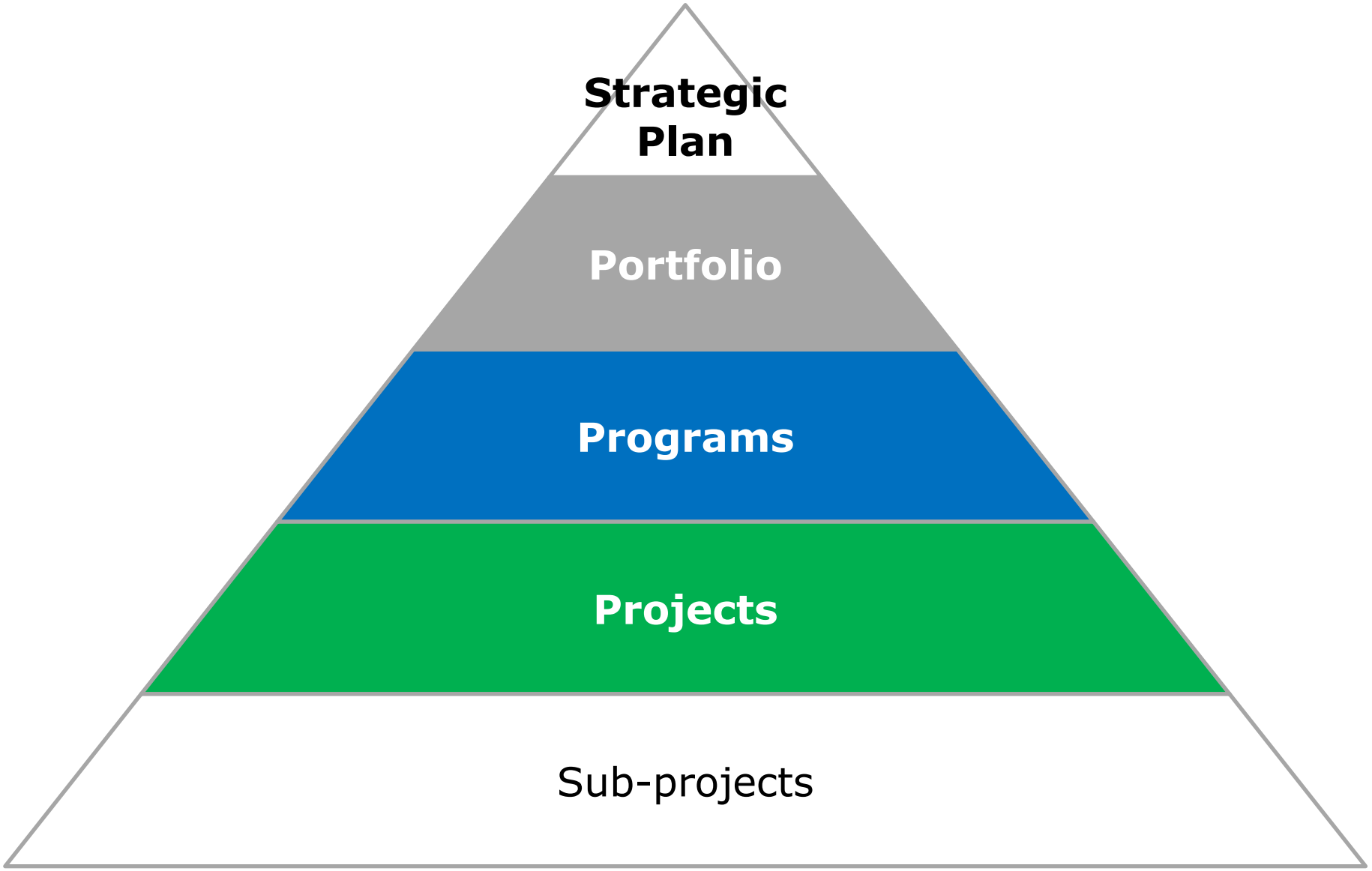
- **PROJECT**: temporary endeavour undertaken to create a unique product, service, or result
  - Desired Deadline
  - Budget



≠ **OPERATIONS**: repetitive activity maintained in time.

An organizational function performing the ongoing execution of activities that produce the same product or provide a repetitive service

PM Context



Stakeholders

- **STAKEHOLDERS**
  - People or organizations that will affect or might be affected by the project
  - User, owners, PM, clients, employees, government, etc.

- **Conflict of interest:**
  - Owners: $$
  - Researchers: High tech
  - Government: environment
  - etc., etc., etc.

Trying to satisfy every stakeholder
=> project failure

Stakeholder management

1. **Identify all of them**

   If stakeholder appears once the project is in execution, they may request changes = $$$. (e.g.: environmentalists).

2. Determine their **requirements** and **expectations**, and include these into project requirements.

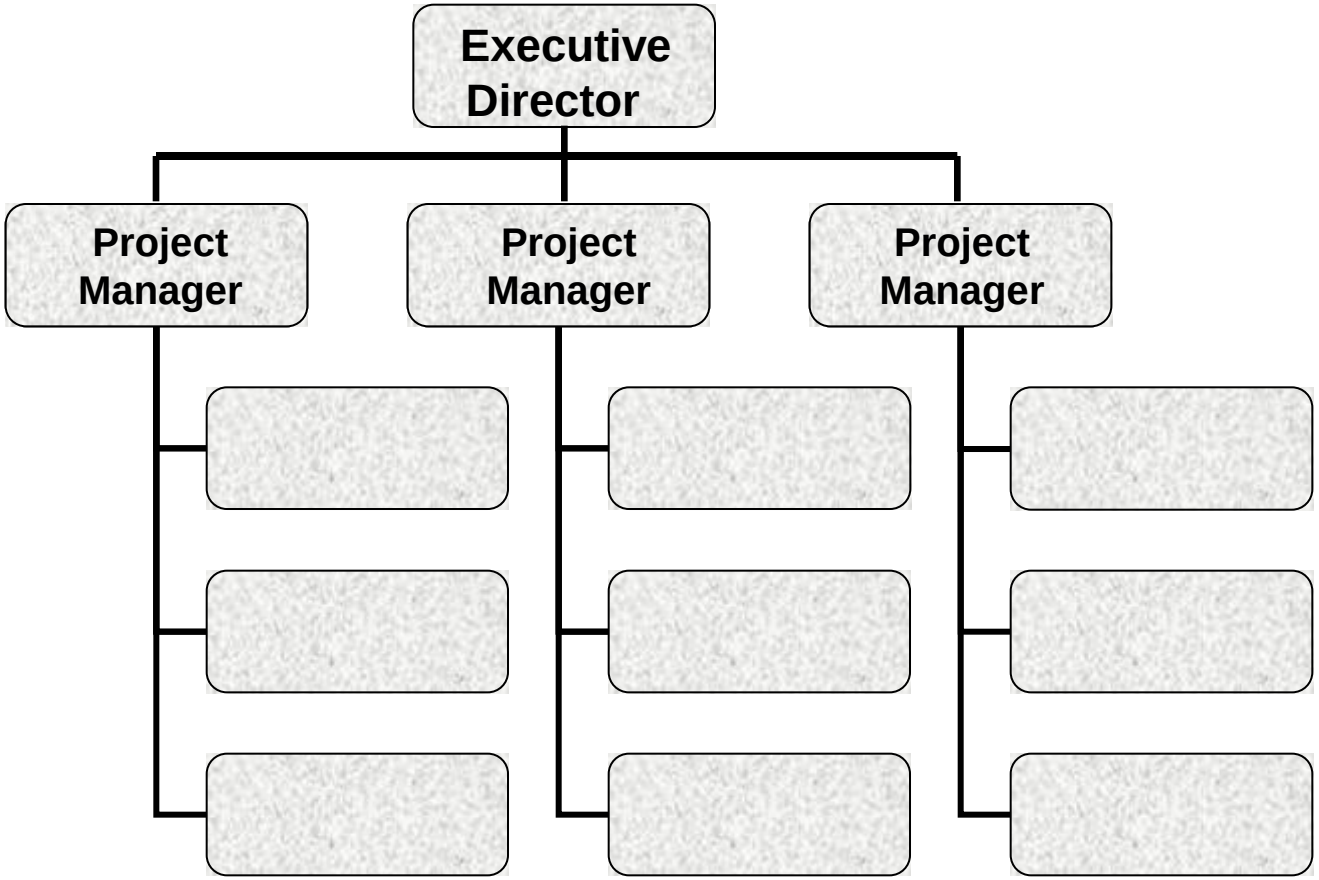
3. **Communicate** with them.

4. Whenever possible, **manage their influence**, in relation to their requirements, in order to have a successful project.

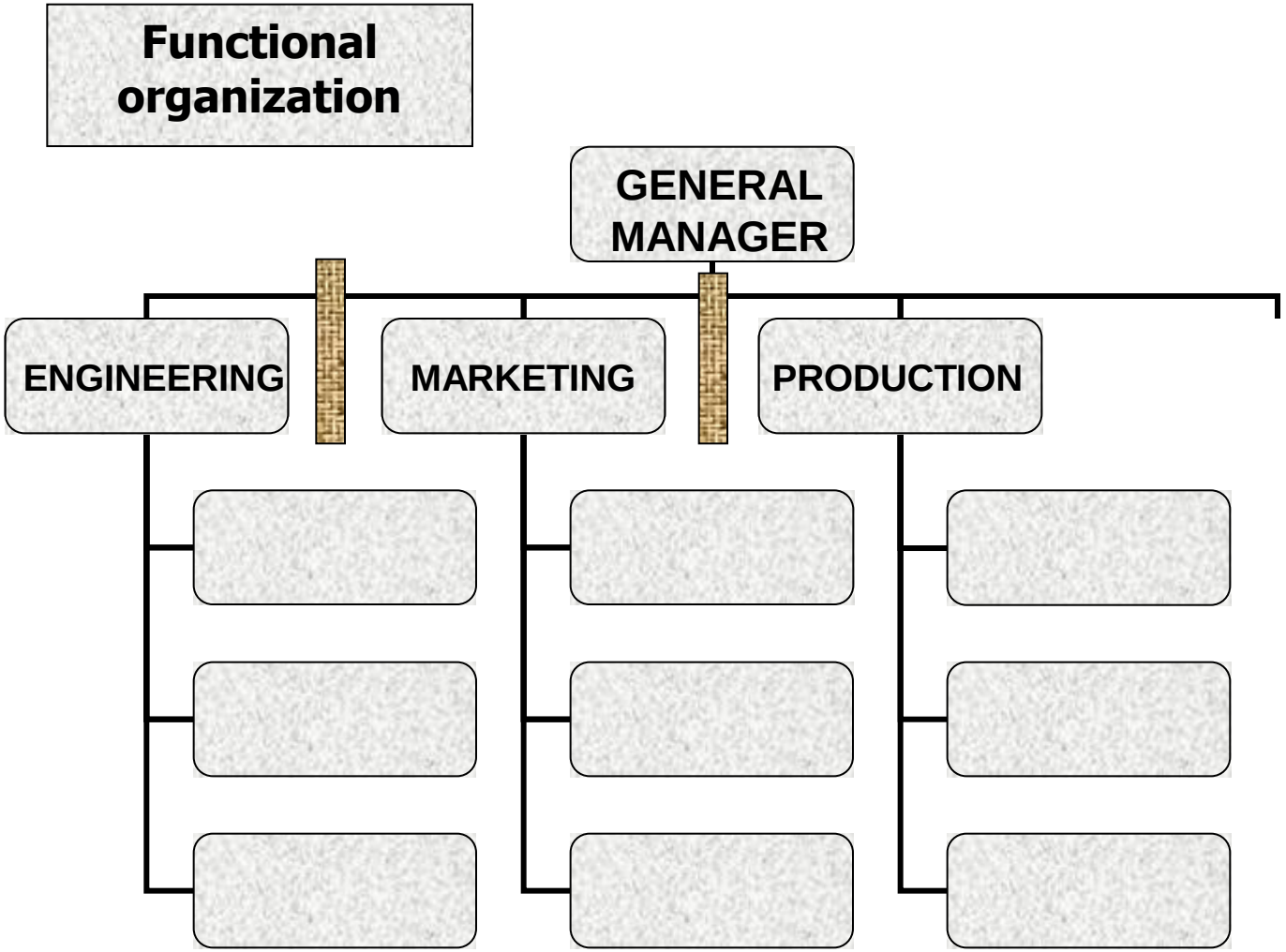
The stakeholder's identification occurs across the complete project life cycle, but especially on the initiation phases.

Organizational structure

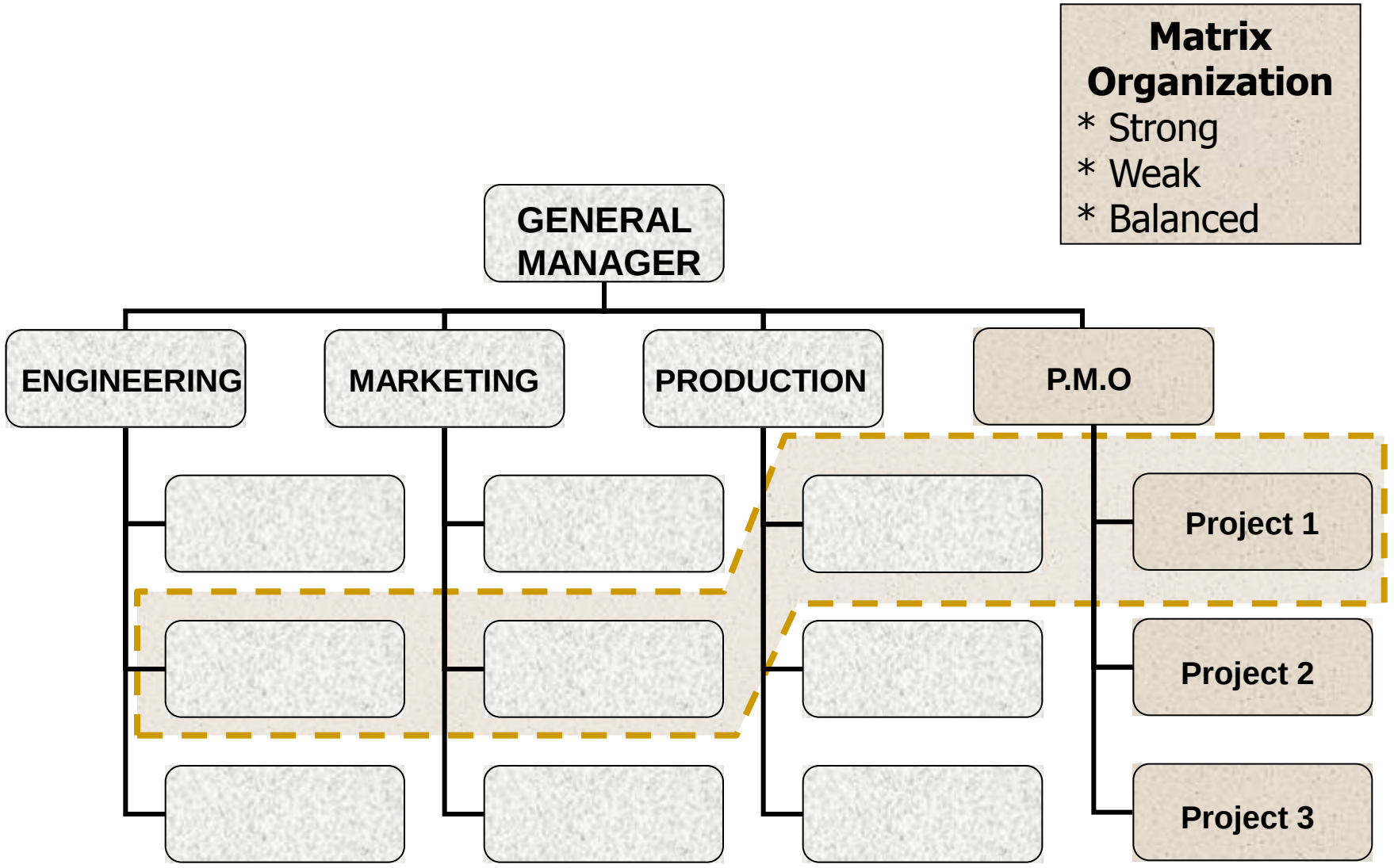
Projectized organization



Organizational structure



Organizational structure



PMO – Project Management Office

Roles – Some of the main roles of the PMO are:

1. Provide project management **methodologies**
2. Provide **support** for project management (e.g. training)
3. Assign **PM** and be accountable for project's successes or failures

Some of the functions:

- ✓ Manage project **interrelationships**
- ✓ Provide **lessons learned** for new projects
- ✓ Collaborate on the assignment of **shared resources**
- ✓ Get involved in the **project initiation** processes

Organizational structure

Functional: "Independent silos"

Projectized : "Nowhere to go when completed"

Matrix: "2 bosses"

Strong=> PM has power

Balanced => Shared power

Weak => Functional manager has power. PM is:

- Project **Coordinator**: little authority to make decisions
- Project **Expeditor**: no authority to make decisions

Organizational structure

Organization Structure / Project Characteristics	Functional	Matrix			Projectized
		Weak Matrix	Balanced Matrix	Strong Matrix	
Project Manager's Authority	Little or None	Low	Low to Moderate	Moderate to High	High to Almost Total
Resource Availability	Little or None	Low	Low to Moderate	Moderate to High	High to Almost Total
Who manages the project budget	Functional Manager	Functional Manager	Mixed	Project Manager	Project Manager
Project Manager's Role	Part-time	Part-time	Full-time	Full-time	Full-time
Project Management Administrative Staff	Part-time	Part-time	Part-time	Full-time	Full-time

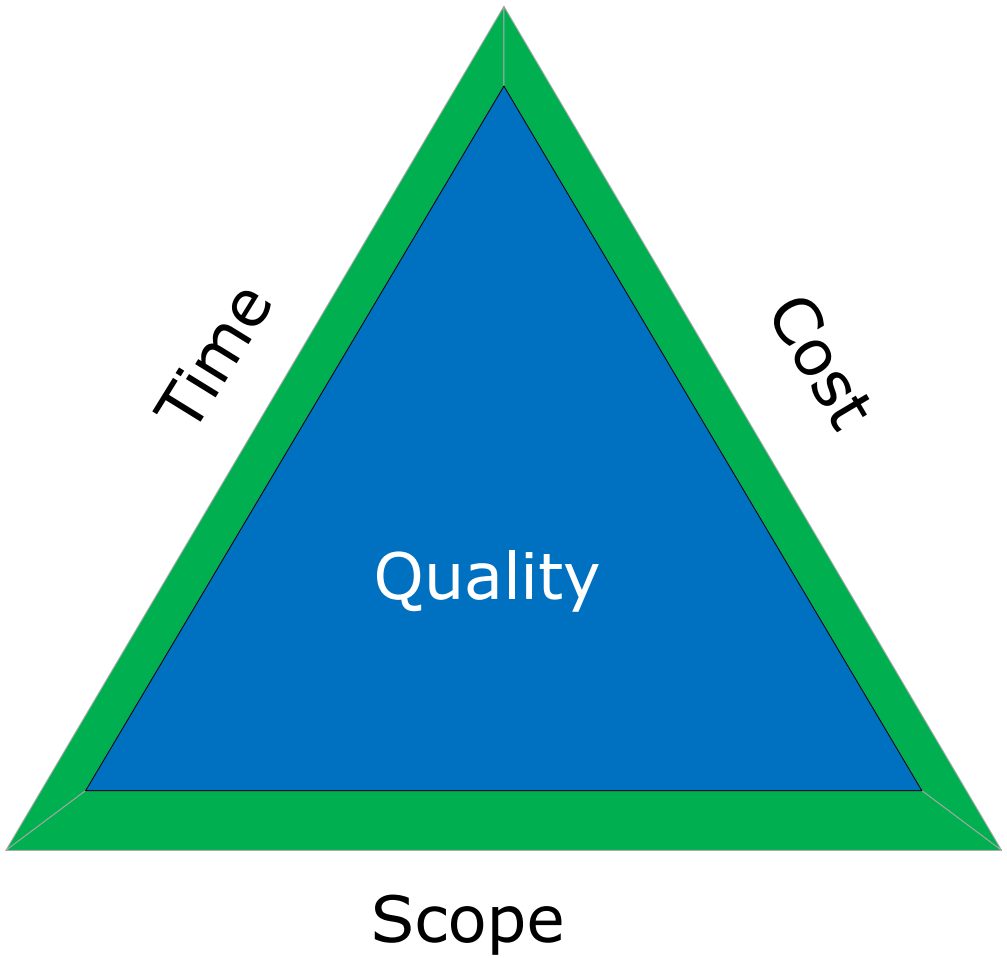
OPM3

- ✓ **O**rganizational **P**roject **M**anagement **M**aturity **M**odel
  Tool based on surveys that allows a company to analyze its **Organizational maturity** level in relation to project management.
- ✓ +585 recognized best practices developed that are used to evaluate a company's organizational maturity level.
- ✓ Scope: Projects, Programs, Portfolios

Organizational Strategy

Succesfull Projects

Triple Constraint



Triple Constraint

Triple Constraint

You're working on a project with high visibility for senior management, as it is key to the implementation of the strategy of the organization and covers a market demand. The scope of the initial project has been agreed. The agreed and signed project duration is 6 months.

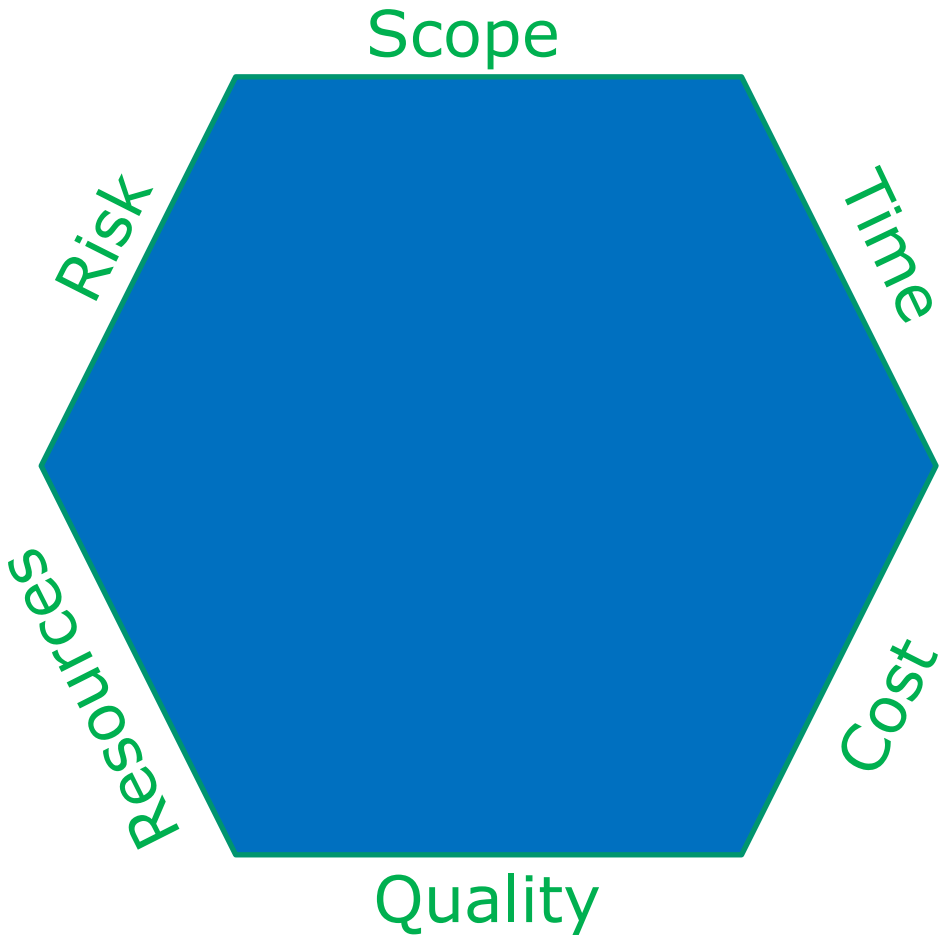
Due to changes in external factors, competitors launched similar solutions in five months, the management thinks that the launch of the solution should be shortened to 4 months instead of 6.

Playing Time !!!

You are called on a crisis meeting.

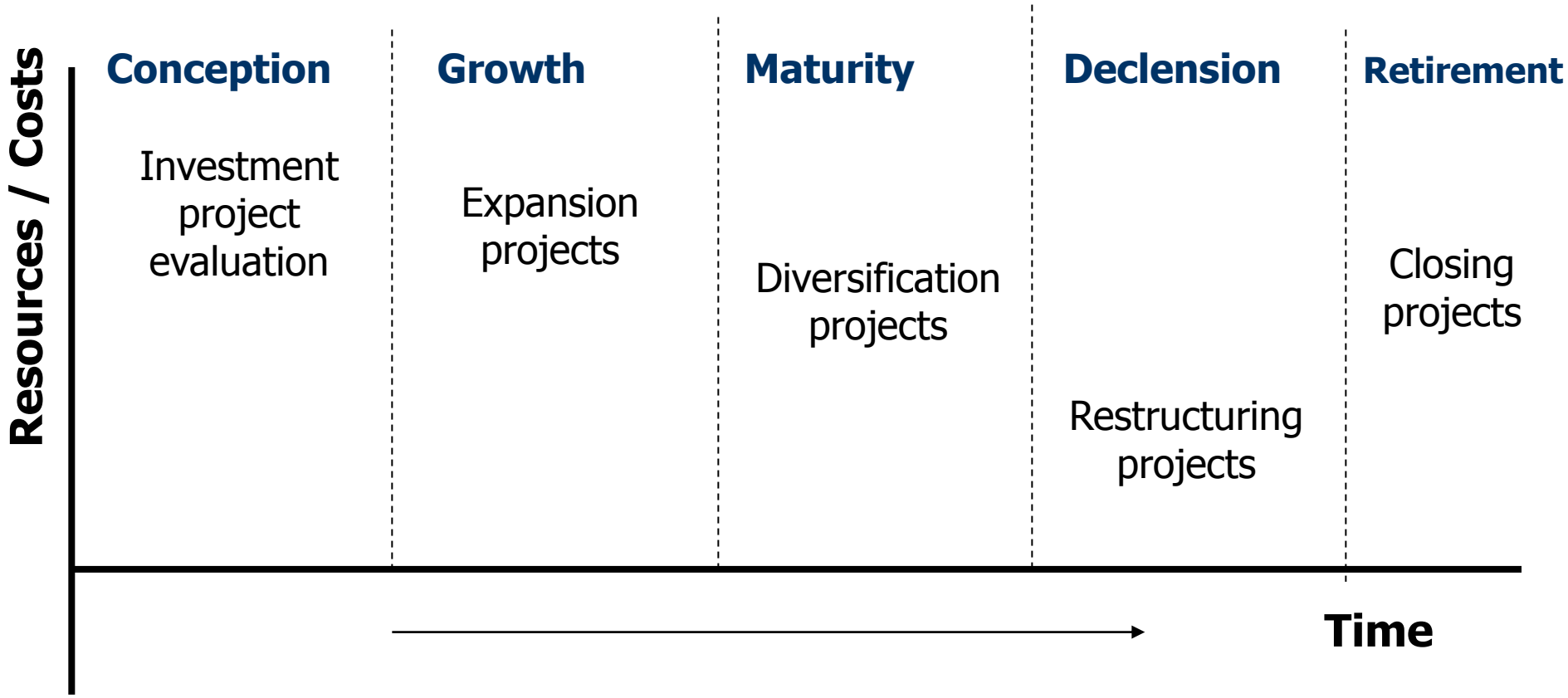
¿ How can you handle the situation ?

Project Constraints

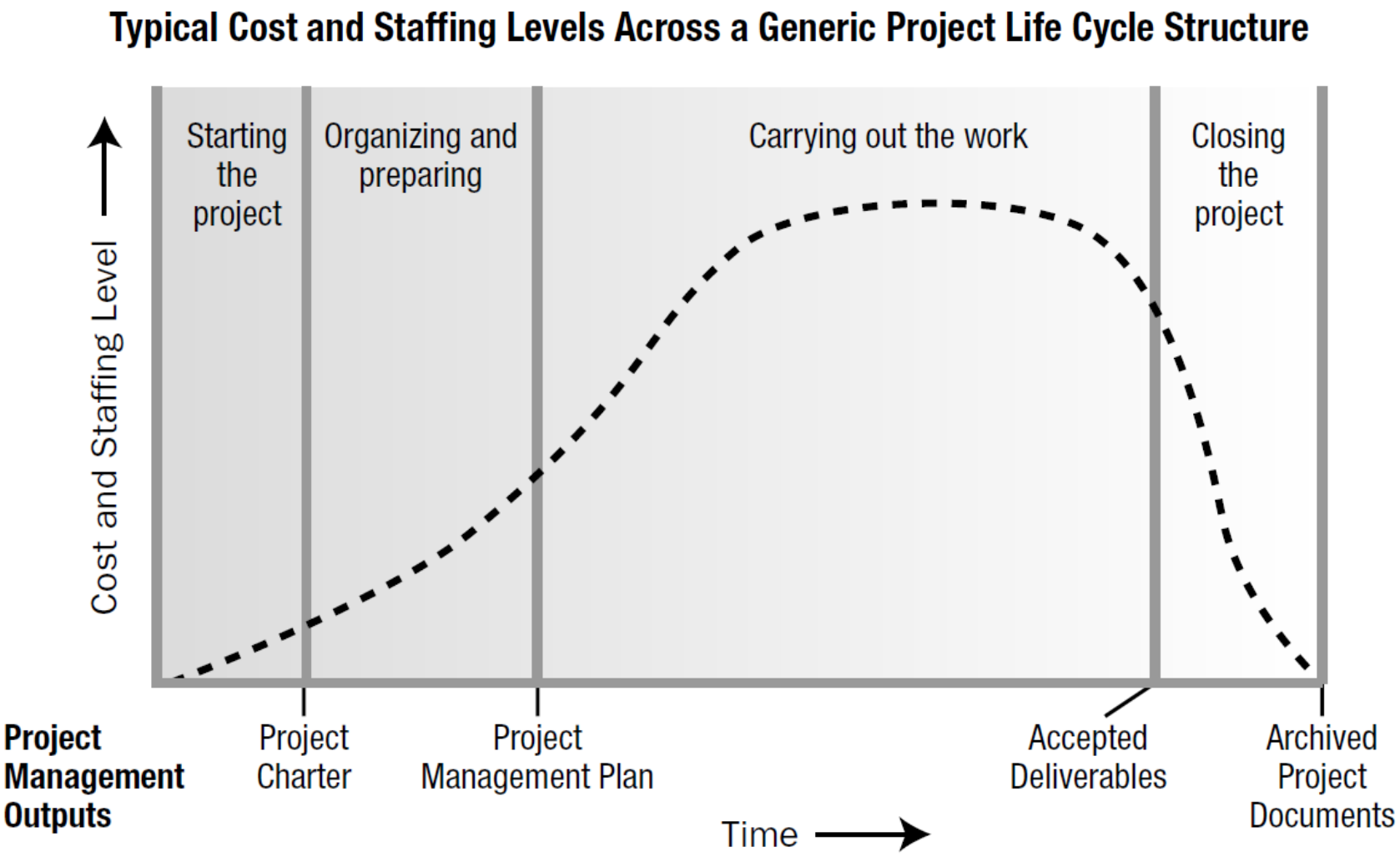


Product Life Cycle

- ✓ Time between product developments until it is retired from the market
- ✓ many projects start during a product life

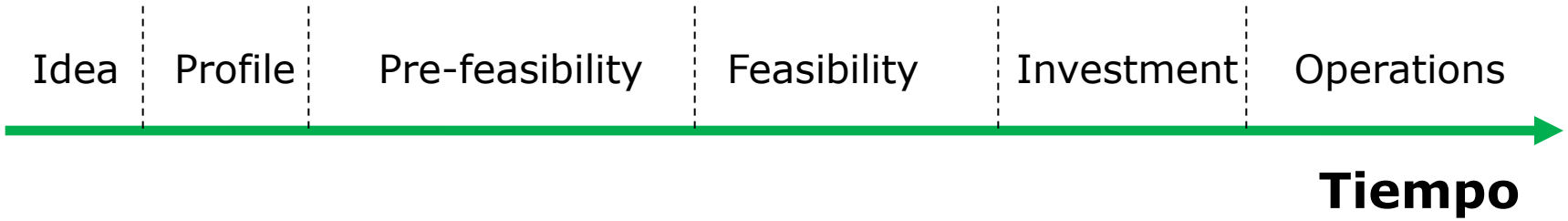


Project Life Cycle

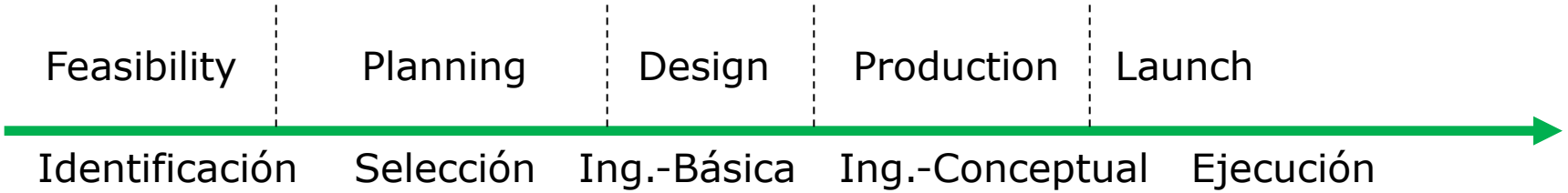


Life cycle of different projects

Investment Projects



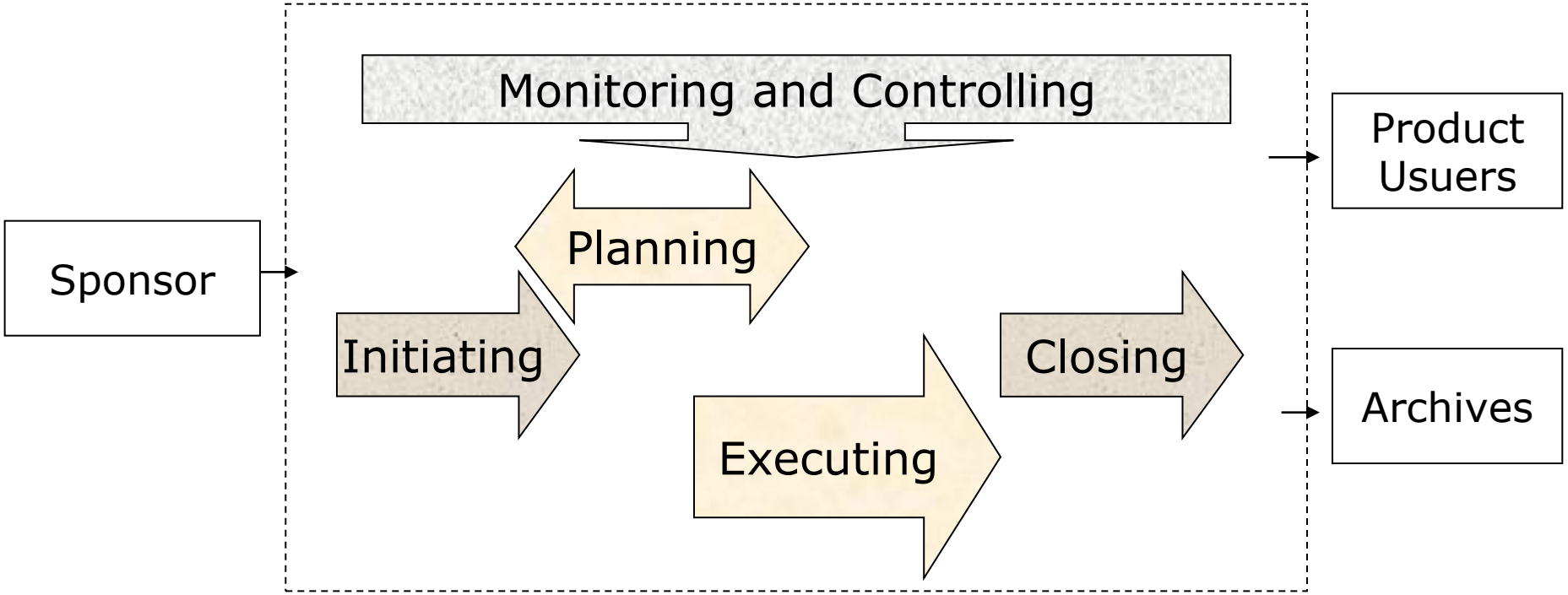
Construction Projects



IT Projects

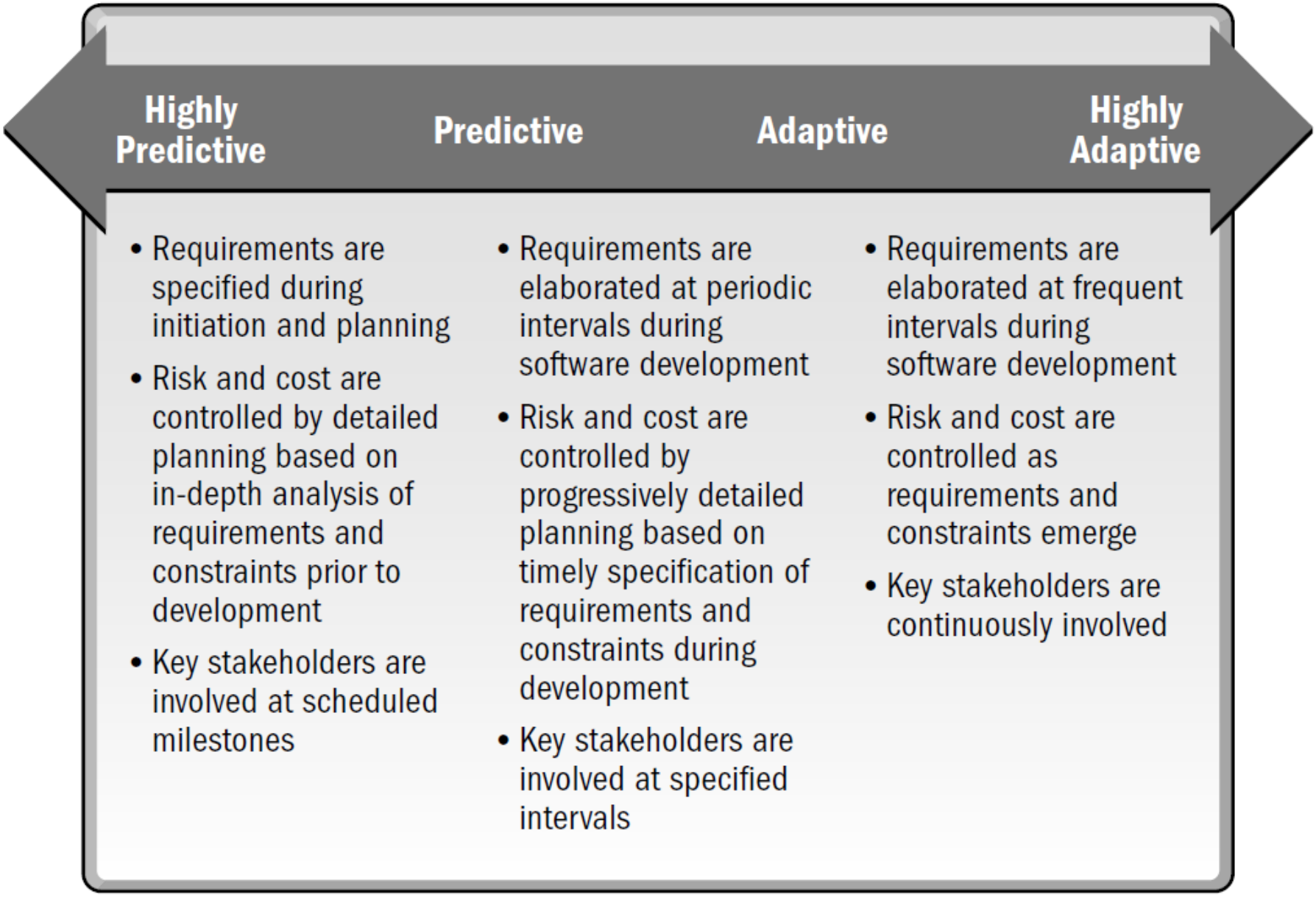
Process Groups

- ✓ Each phase can be a project
- ✓ Each project requires **processes**



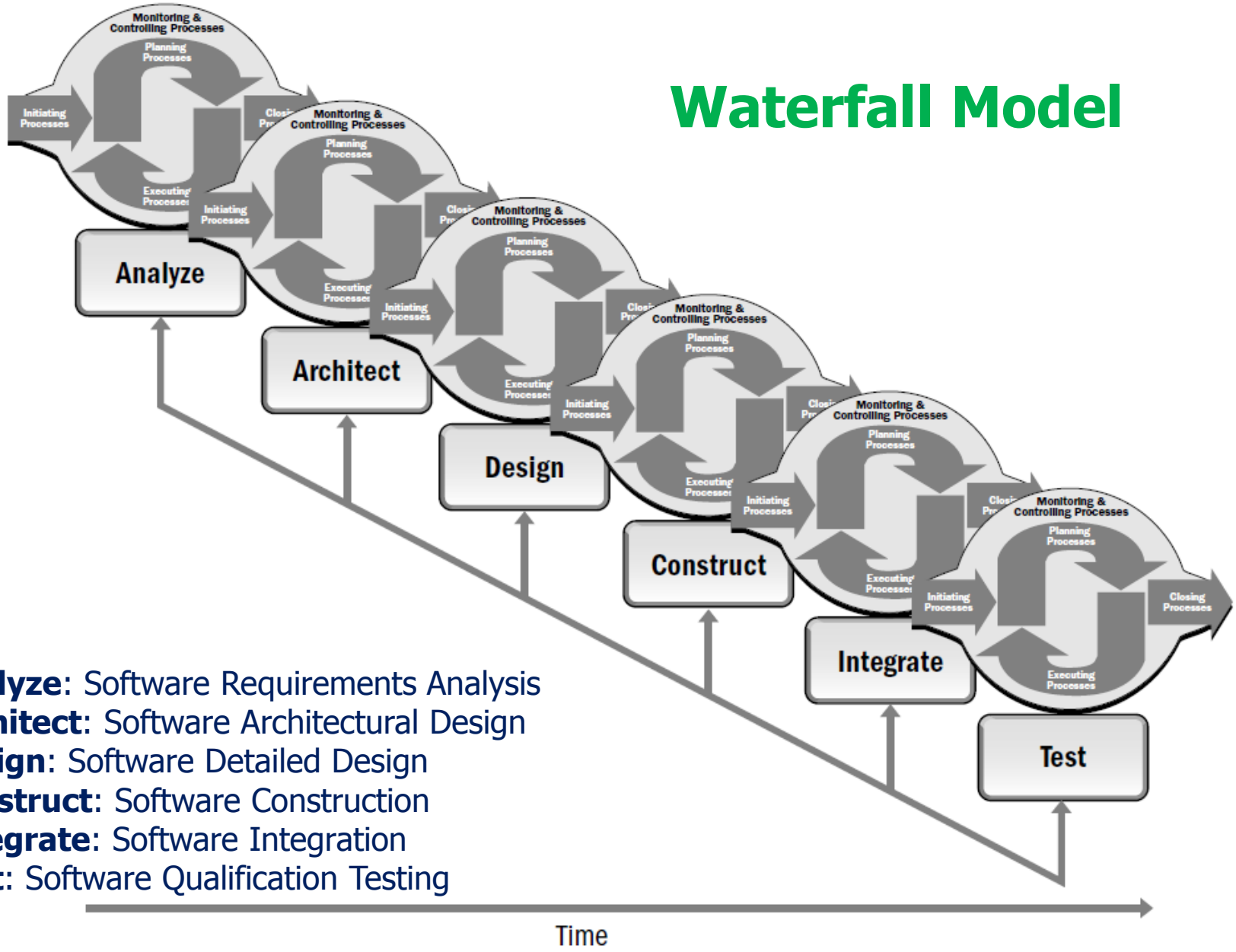
Which project phase is the one where stakeholders are more influential?

The Continuum of Software Project Life Cycles



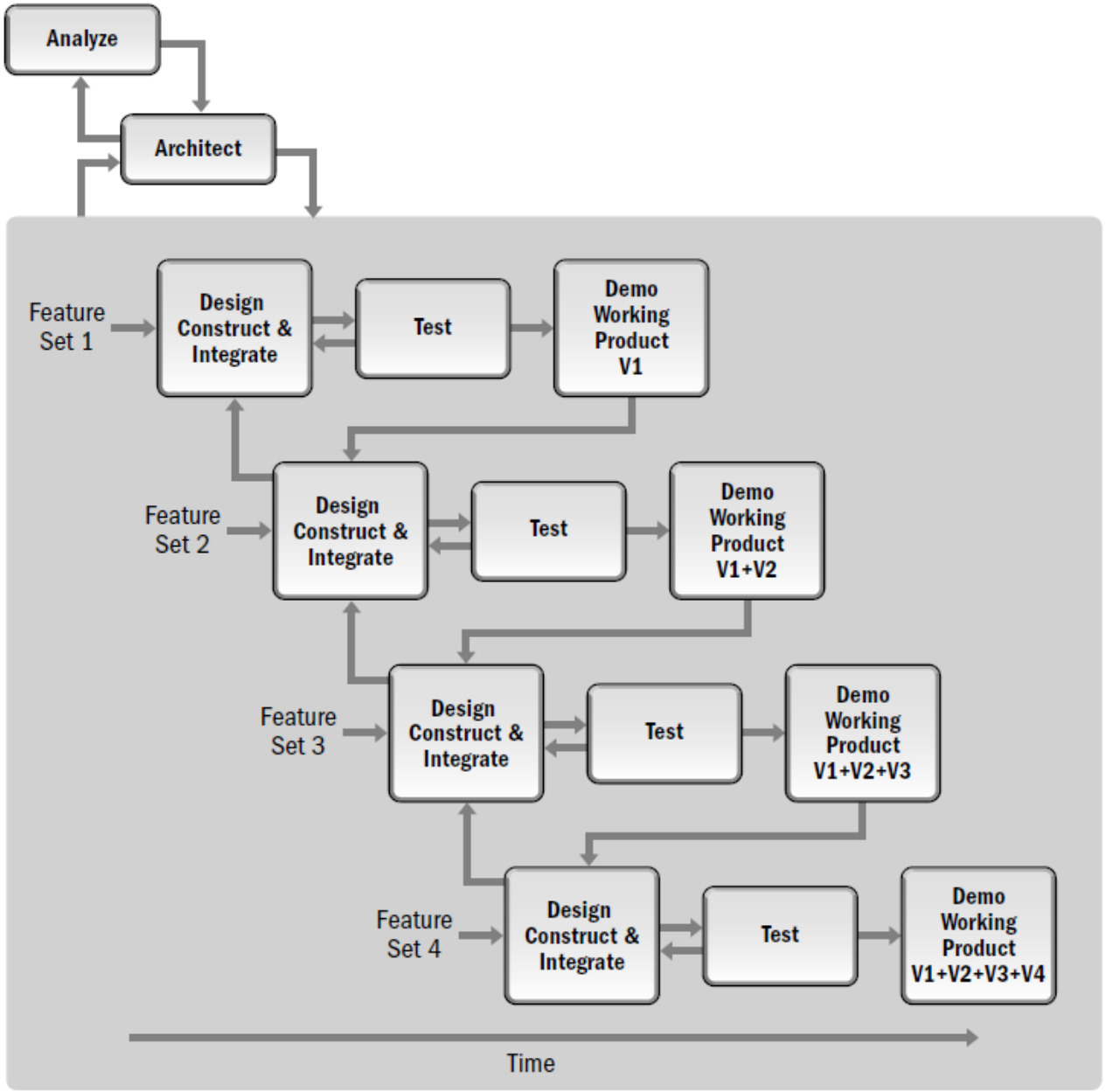
Predictive Software Project Life Cycle

Waterfall Model

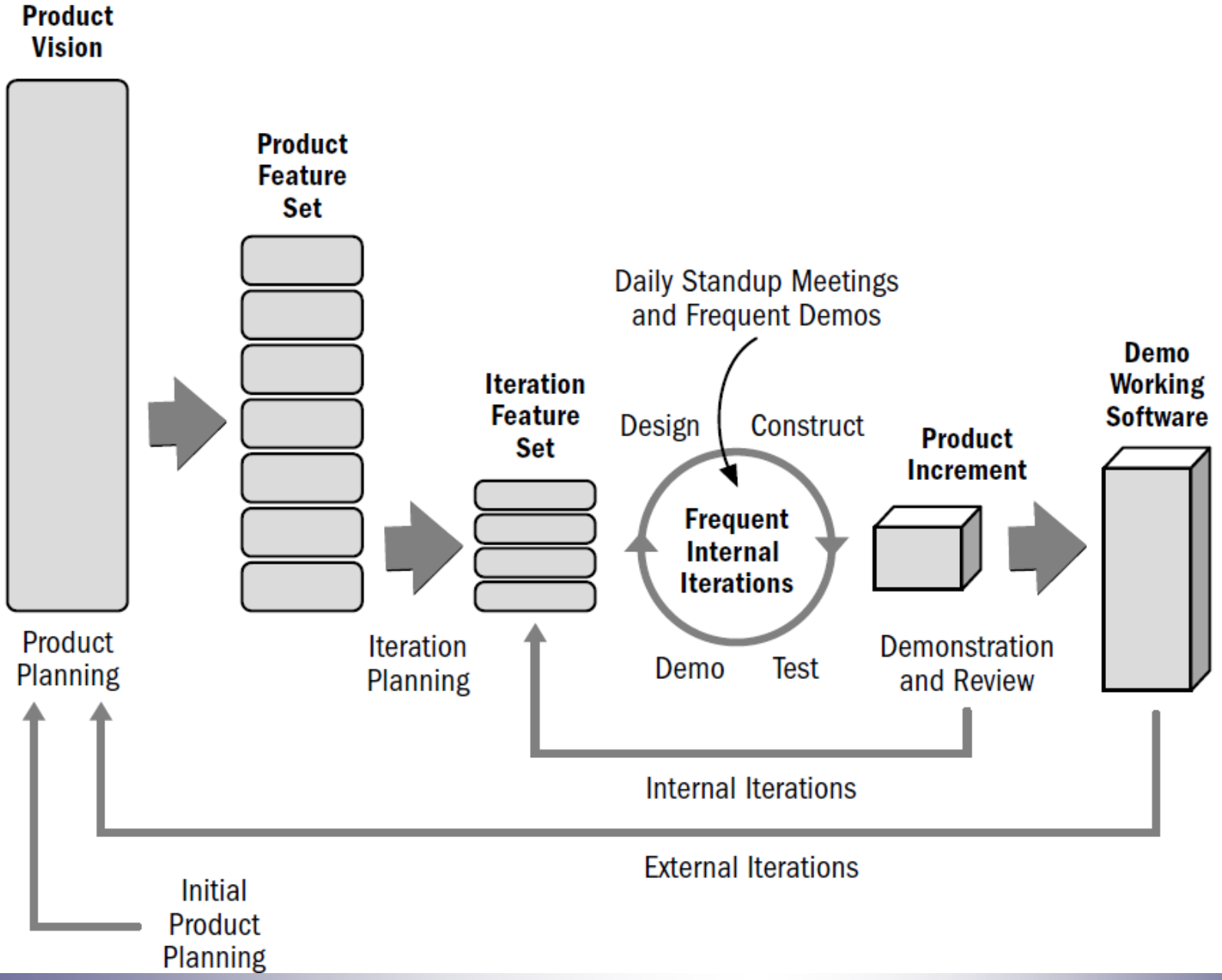


- **Analyze**: Software Requirements Analysis
- **Architect**: Software Architectural Design
- **Design**: Software Detailed Design
- **Construct**: Software Construction
- **Integrate**: Software Integration
- **Test**: Software Qualification Testing

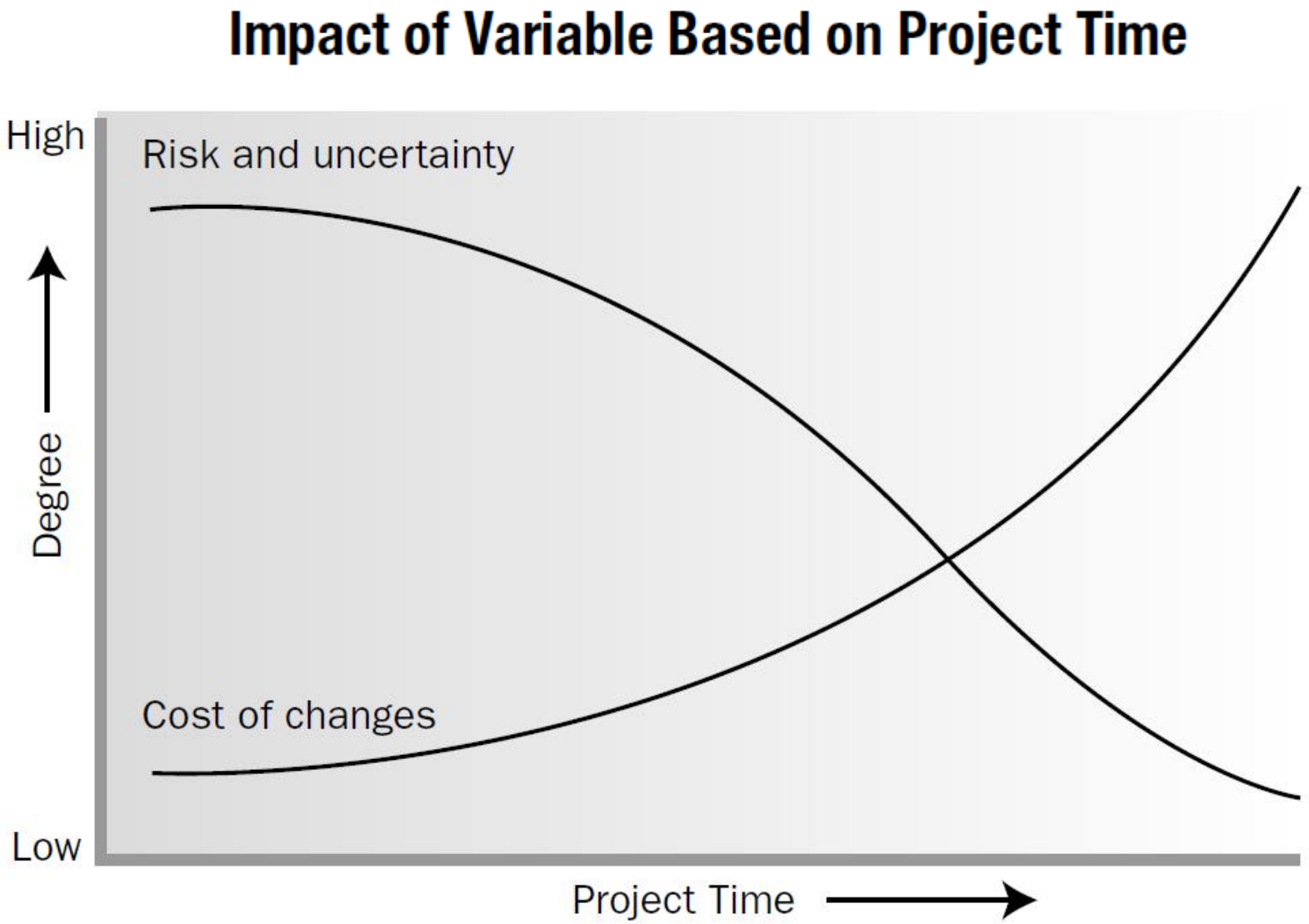
Incremental SPLC



Adaptative SPLC (Agile Methods)



Process Groups



Knowledge Areas

To become a **good PM** you must know different project management areas of knowledge.

Based on the PMBOK® Guide, there are **10 knowledge areas**:

1. Project Integration Management
2. Project Scope Management
3. Project Time Management
4. Project Cost Management
5. Project Quality Management
6. Project Human Resource Management
7. Project Communication Management
8. Project Risk Management
9. Project Procurement Management
10. Project Stakeholder Management

Lessons learned

- ✓ Project Management knowledge areas
- ✓ Product and project life cycle
- ✓ Project Coordinator
- ✓ Project phases and process groups
- ✓ Project Expeditor
- ✓ Stakeholders, Stakeholder Management
- ✓ OPM3®
- ✓ Functional organization
- ✓ Matrix organization: strong, weak, balanced
- ✓ Projectized organization
- ✓ PMO: Project Management Office
- ✓ Project, Program, Portfolio
- ✓ Project Constraints
- ✓ Role of the project manager
- ✓ Operative work

PROCESSES

Initiating

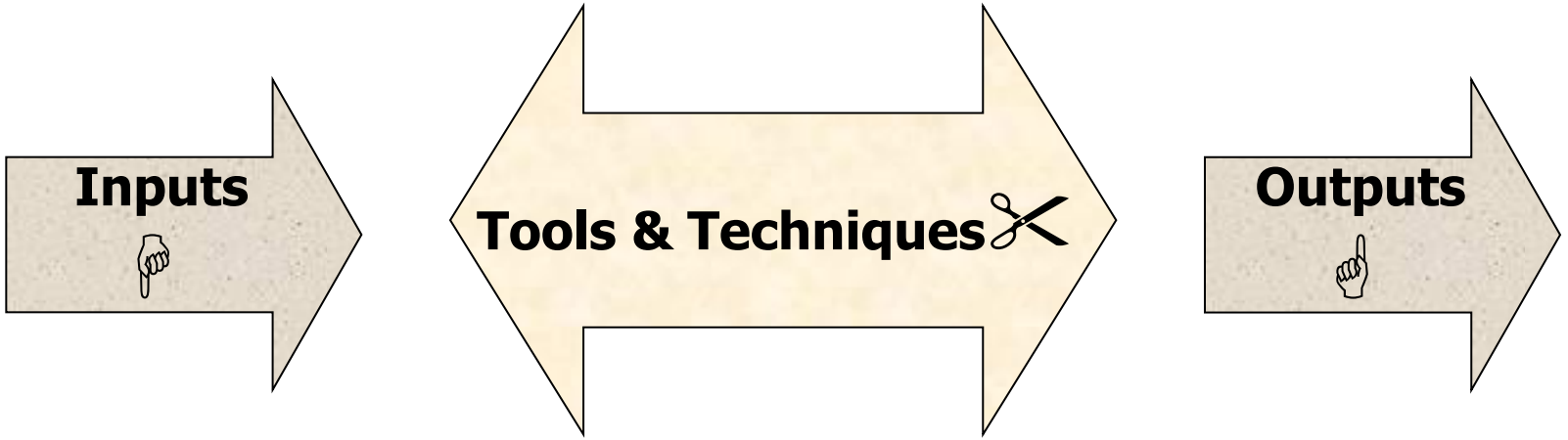
Planning

Executing

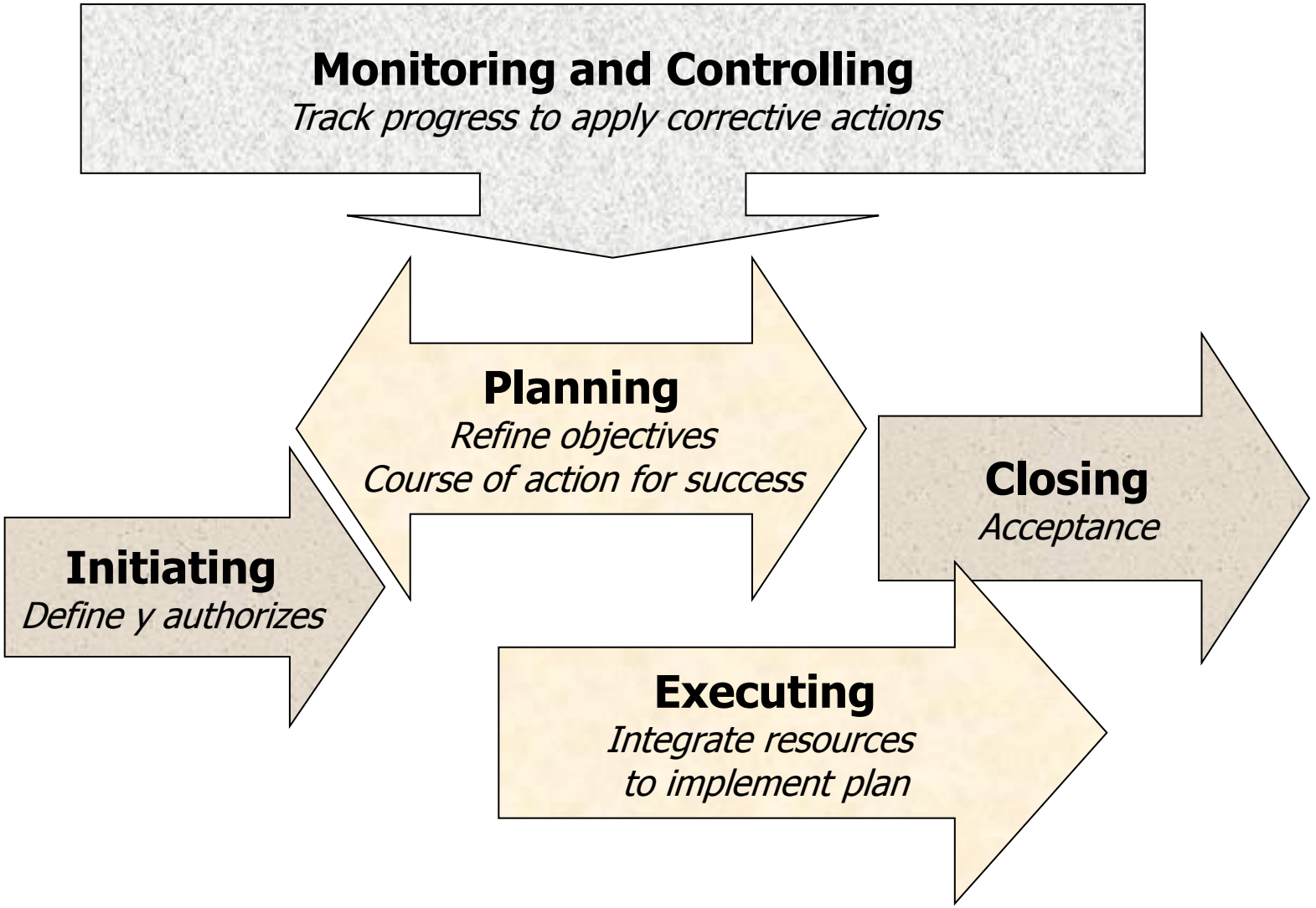
Monitoring and Controlling

Closing

Process



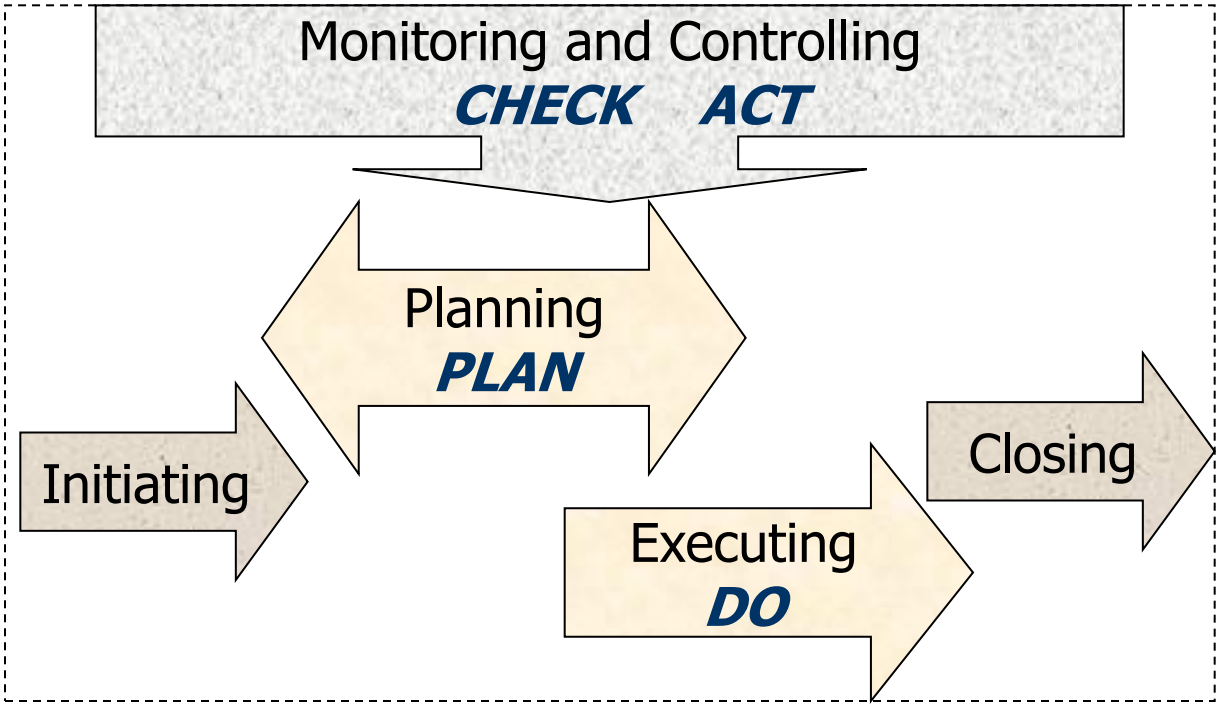
Project management process groups



Project management process groups

- ✓ Relationship with **Quality** Processes (Deming):

PLAN – DO – CHECK – ACT



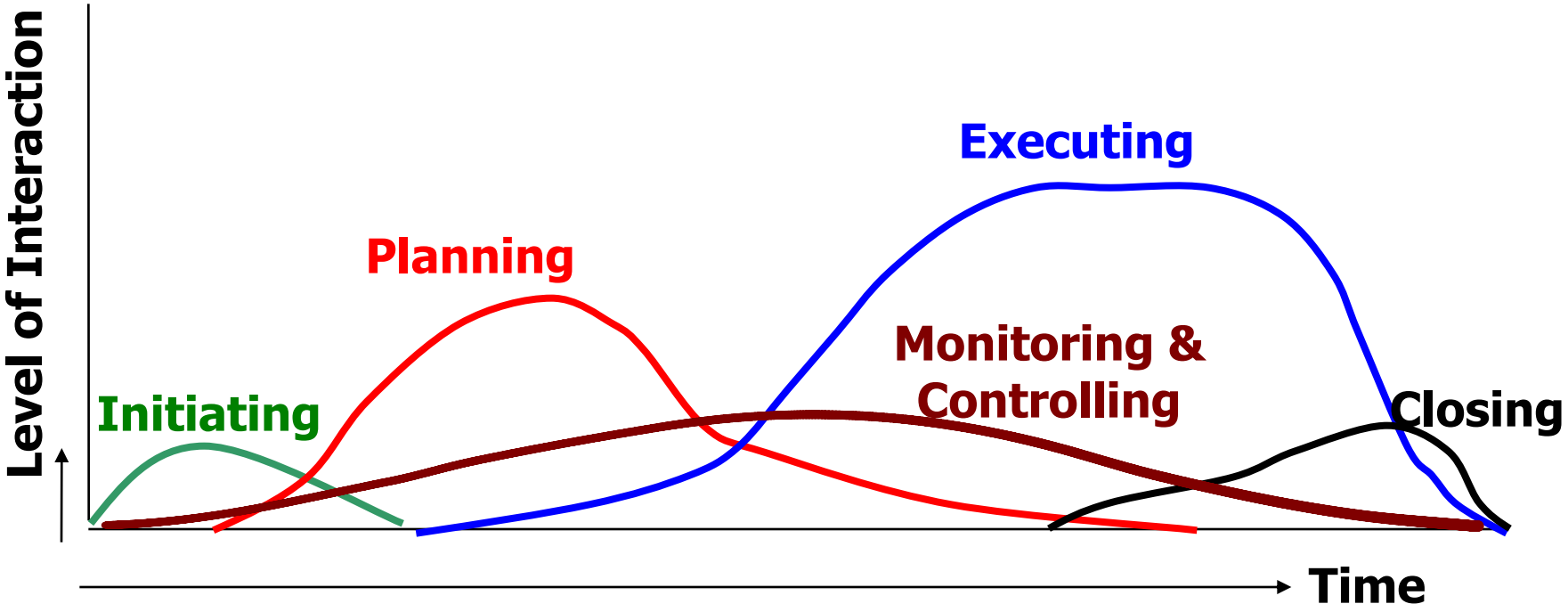
Project management process groups

Processes per process group and knowledge area

	Initiating	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		4		2	
Time		6		1	
Cost		3		1	
Quality		1	1	1	
Human Resources		1	3		
Communications		1	1	1	
Risks		5		1	
Procurement		1	1	1	1
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

PROCESSES = 47

Process groups interaction



Initiating Processes

↘ **Project statement of work** from the sponsor or client
↘ **A contract or business case**

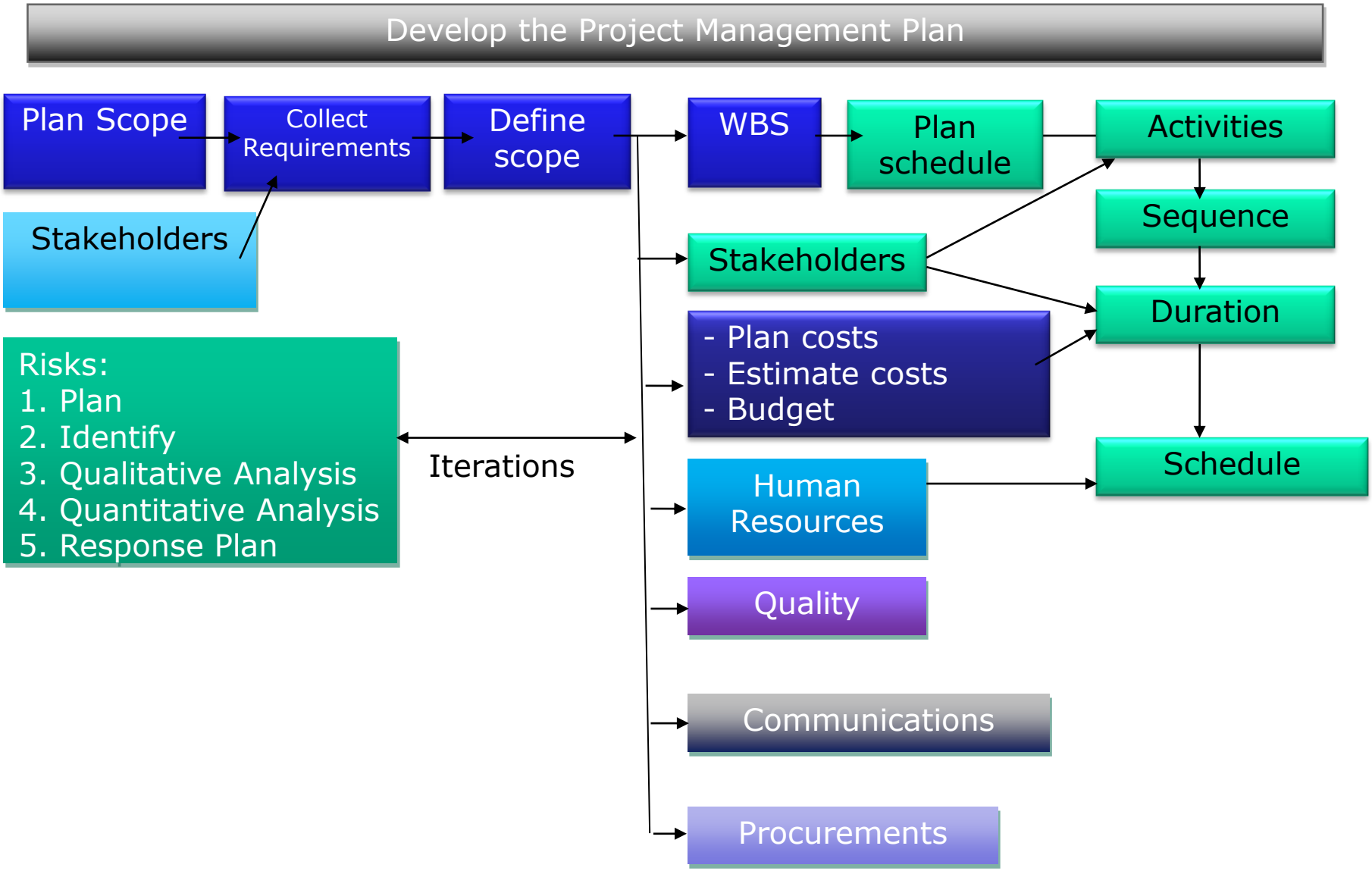
↘ **Enterprise environmental factors**: culture, systems, human resources, etc. (*backpack)*

↘ **Organizational process assets**: policies, processes, norms, historical information and lessons learned (*not having to reinvent the wheel)*

↗ **Project charter**
↗ **Stakeholder** register

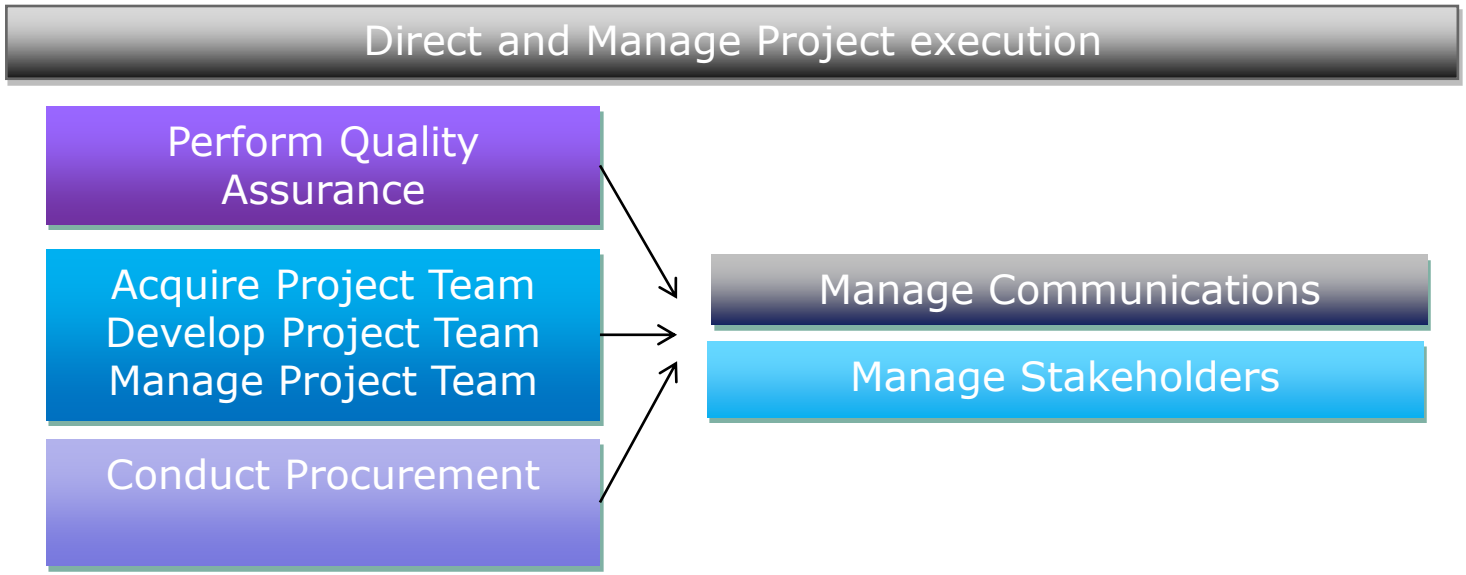
↗ **Preliminary objectives**
↗ **Project Manager**
↗ **Formal authorization** to proceed with the planning

Planning Processes



Executing Processes

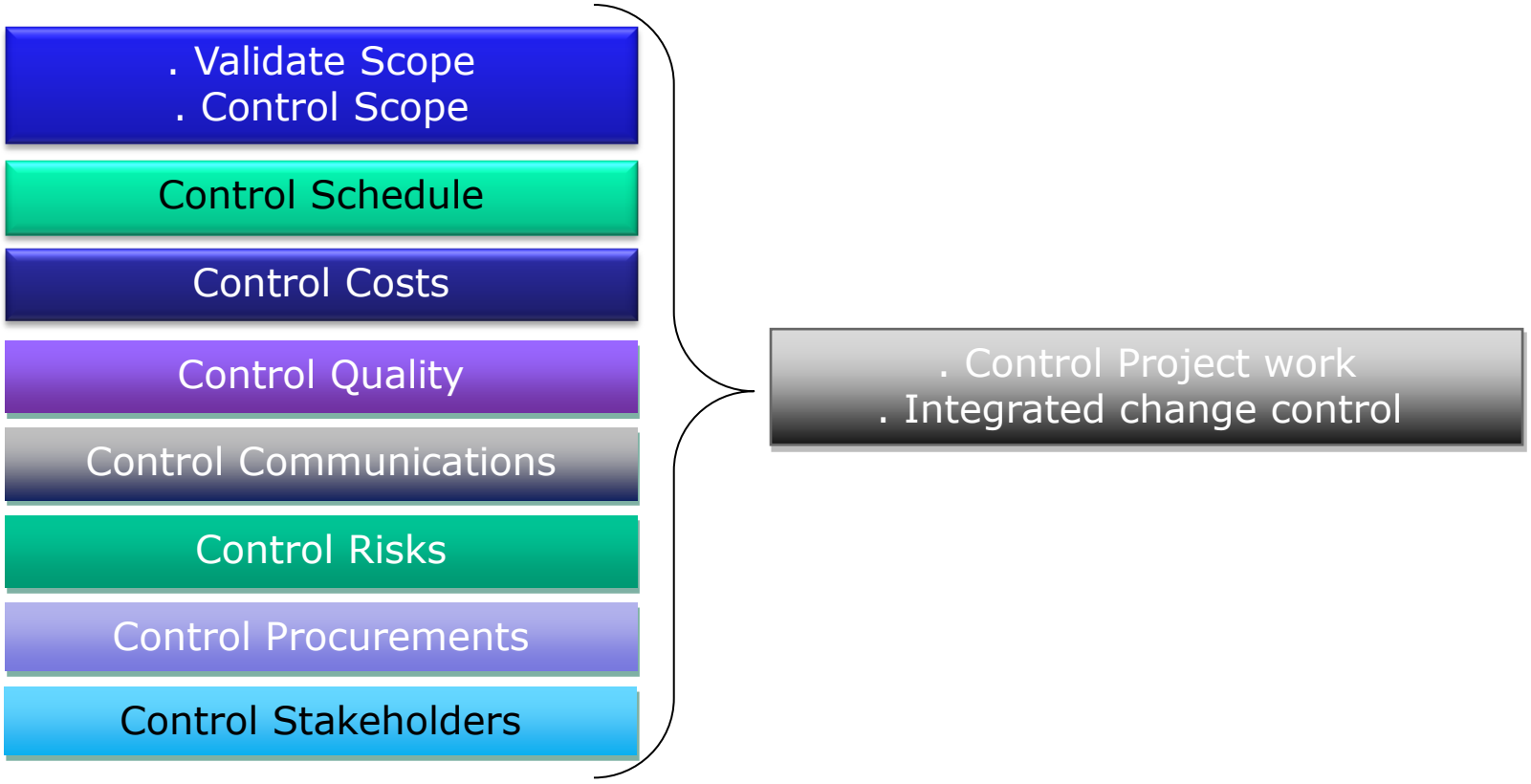
- ✓ People management
- ✓ Coordinate all processes
- ✓ Distribute information
- ✓ Proactive of the PM
- ✓ The majority of its budget during this stage



PMI®

Monitoring and Controlling Processes

- ✓ Ensure that only approved changes are implemented
- ✓ Feedback => preventive and corrective actions
- ✓ All knowledge areas are CONTROLLED (exc. HR)



Closing Processes

- ✓ Close project and procurements
  - ✓ Administrative closing (internal)
  - ✓ Procurements closing (external) – Formal acceptance
- ✓ Reintegrate the resources
- ✓ Archives
- ✓ Lessons learned
- ✓ Celebrate!

Lessons Learned

- ✓ Organizational process assets
- ✓ Inputs and outputs
- ✓ Enterprise environmental factors
- ✓ Process interaction level
- ✓ Plan-do-check-act
- ✓ Closing process group
- ✓ Executing process group
- ✓ Initiating process group
- ✓ Planning process group
- ✓ Monitoring and Controlling process group

INTEGRATION

Project selection methods

Project charter

Project management plan

Direct and manage project execution

Monitor and control project work

Integrated change control

Close project

Integration Processes

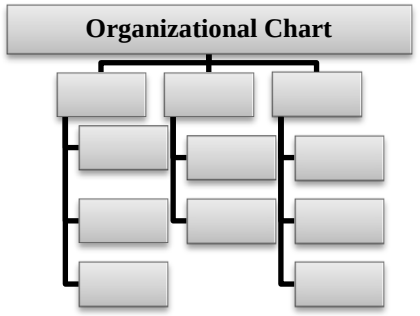
	Initiating	Planning	Executing	Controlling	Closing
Integration	Project Charter	Project Management Plan	Direct Project Execution	. Control Project Work . Integrated Change Control	Close Project
Scope		4		2	
Time		6		1	
Cost		3		1	
Quality		1	1	1	
Human Resources		1	3		
Communications		1	1	1	
Risks		5		1	
Procurement		1	1	1	1
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

A project's integrated vision

Why?

Problem
Vision- Mision
Objectives
Strategy

Who?

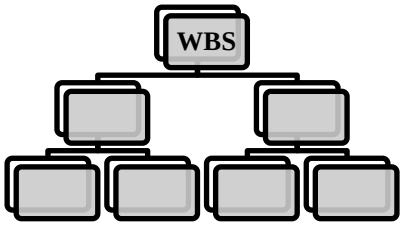


Responsibility Matrix			
	Peter	Mary	John
1	R	C	I
2	R	A	I
3	A	I	R

When?

Schedule			
	Month 1	Month 2	Month n
1			
2			
3			

What?



How?

How much?

Budget
HR
Materials
Equipment

Project Plan

Comunications?

Risks?

Stakeholders?

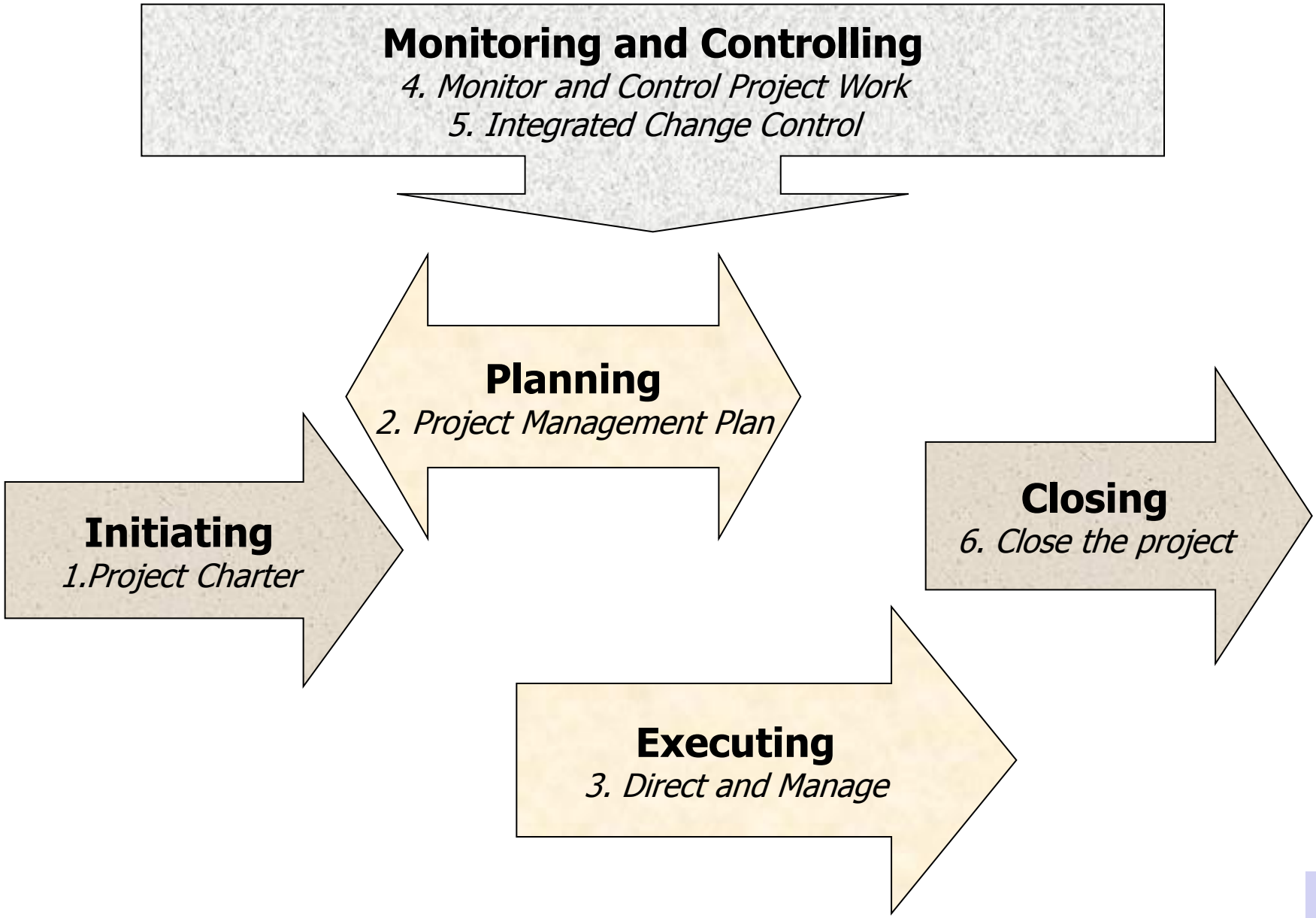
Quality?

Procurement?

Integration

- ✓ What is the main role of the PM? *Integrate and communicate*
- ✓ And the **project team** role ? *Complete the work*
- ✓ And the **sponsor** role? *Avoid unnecessary changes and protect the resources*

Integration Processes



Initiating: Selection methods

- ✓ **Benefit Measurement** Methods: scoring models, benefit contribution, economic model (Net Present Value, Internal Rate of Return), etc.

i.e.: Project selection matrix

- ✓ **Mathematical models:** linear programming, integer programming, dynamic programming, multi-objective programming, etc.

i.e.: Solver

✍ *The PM may not have to deal with the project selection*

→ *HR & Risk*

1. Project Charter

Inputs

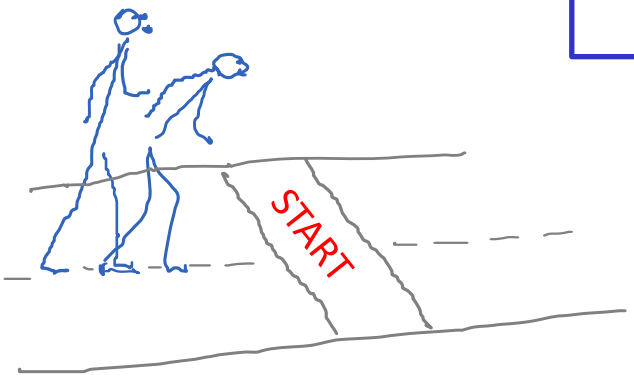
- Environmental factors
- Organiz. Assets
- S.O.W.
- Business case
- Contract

Tools

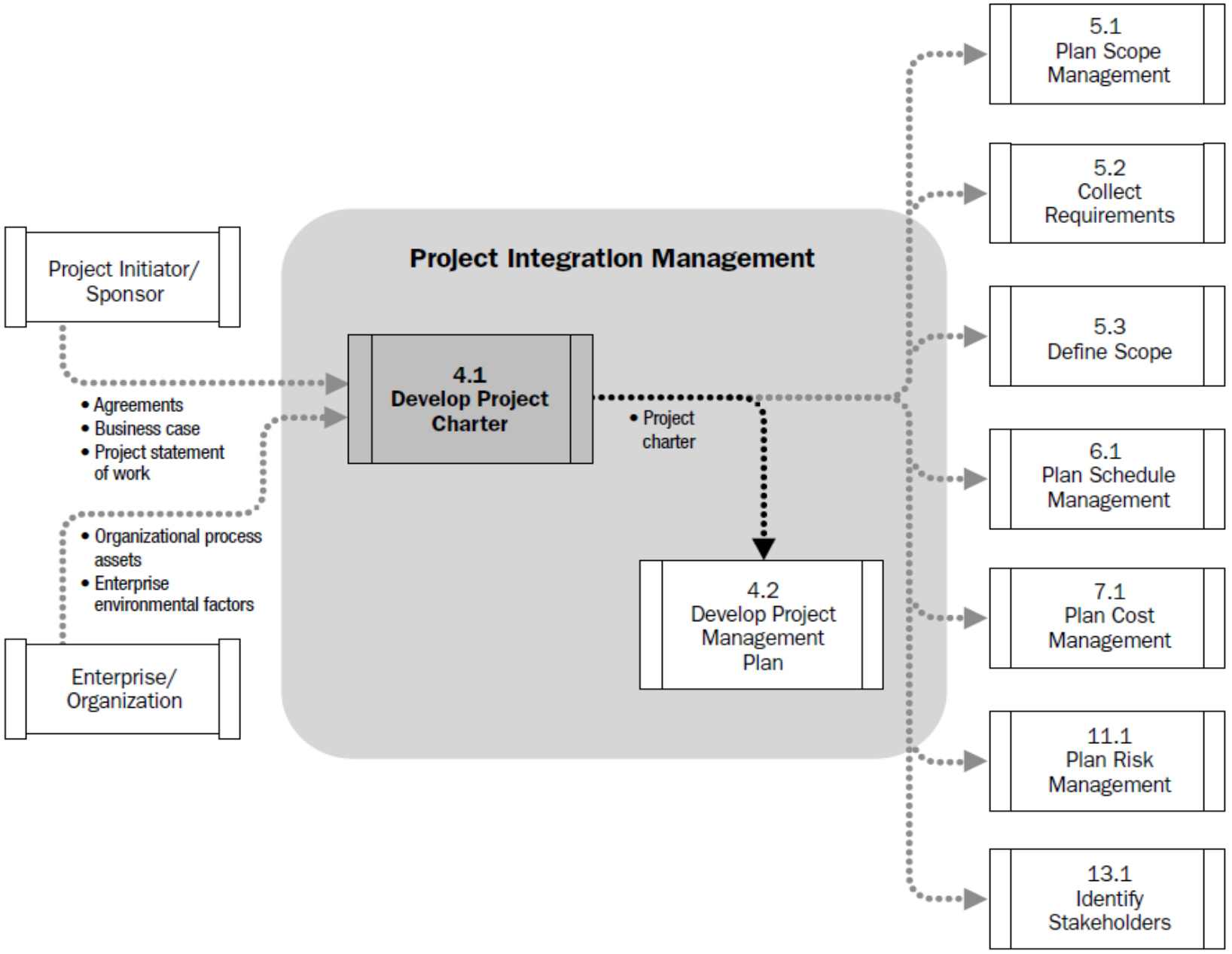
- Expert judgment
- Facilitation techniques

Outputs

- Project Charter



1. Project Charter



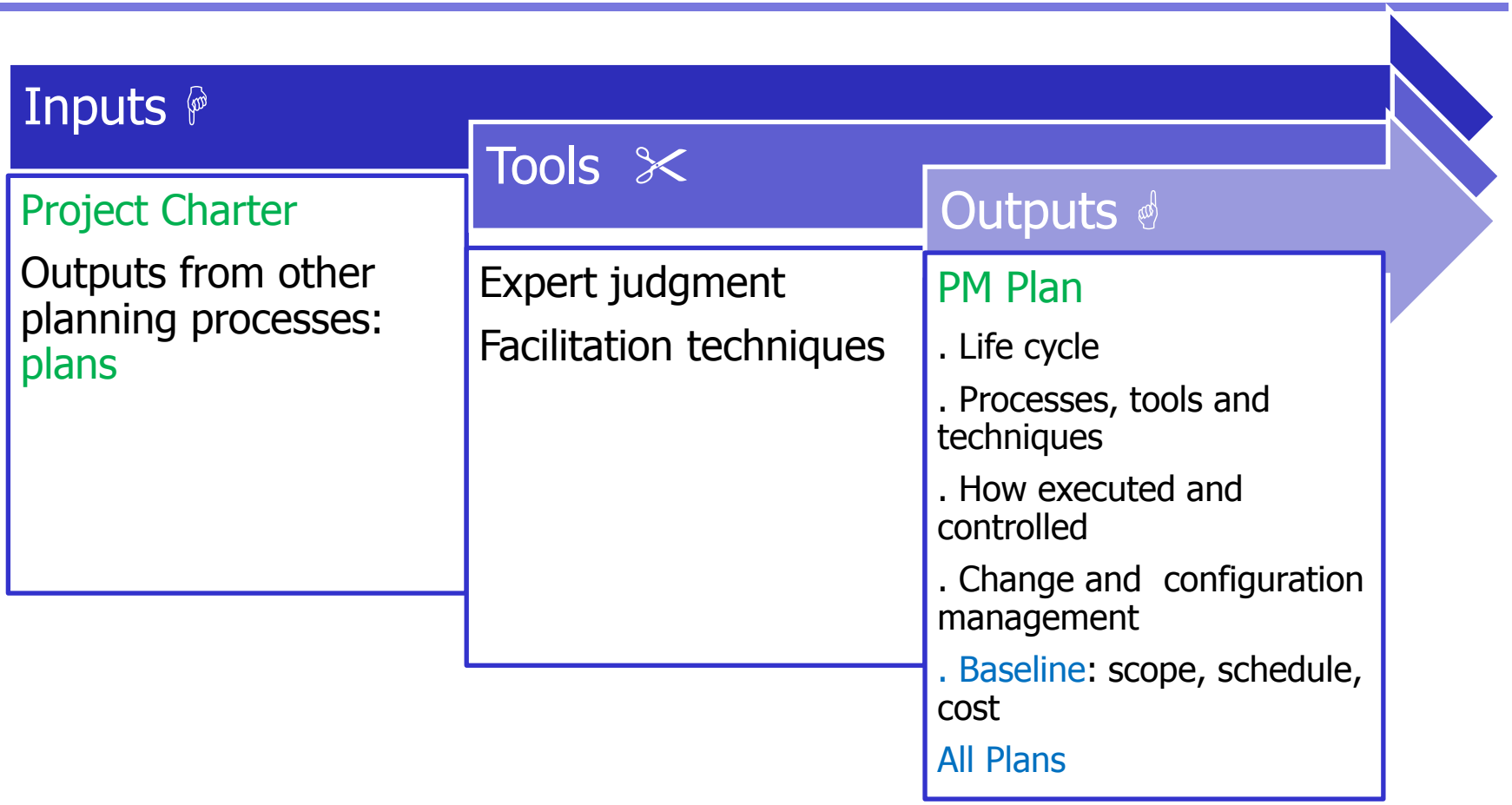
Project Charter: – Contents

- ✓ Project justification
- ✓ Measureable objectives and criteria for success
- ✓ General requirements and project boundaries
- ✓ General description of the project
- ✓ Preliminary risks
- ✓ Summary of schedule of milestones
- ✓ Summarized preliminary budget
- ✓ Acceptance criteria
- ✓ Project Manager, responsibility, and level of authority
- ✓ Stakeholders
- ✓ Name of the sponsor and the level of authority

If there is no Project Charter, the project does not exist. Should be generic, don´t need to modify it anytime there are changes in the project.

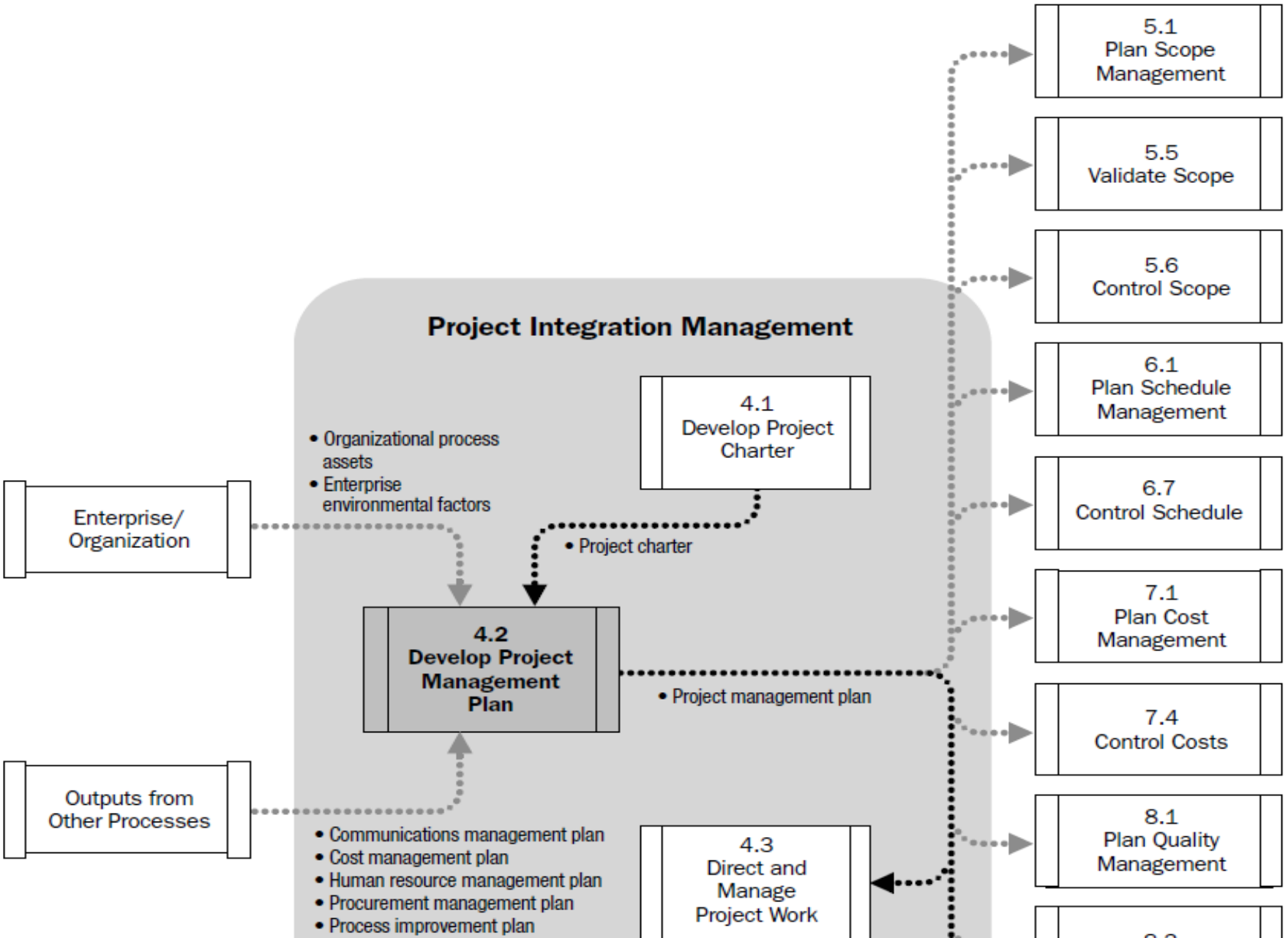
→ ***Proposal***

2. Project Management Plan



scope, time, cost, quality, human resources, communications, risks, procurement and stakeholders

2. Project Management Plan



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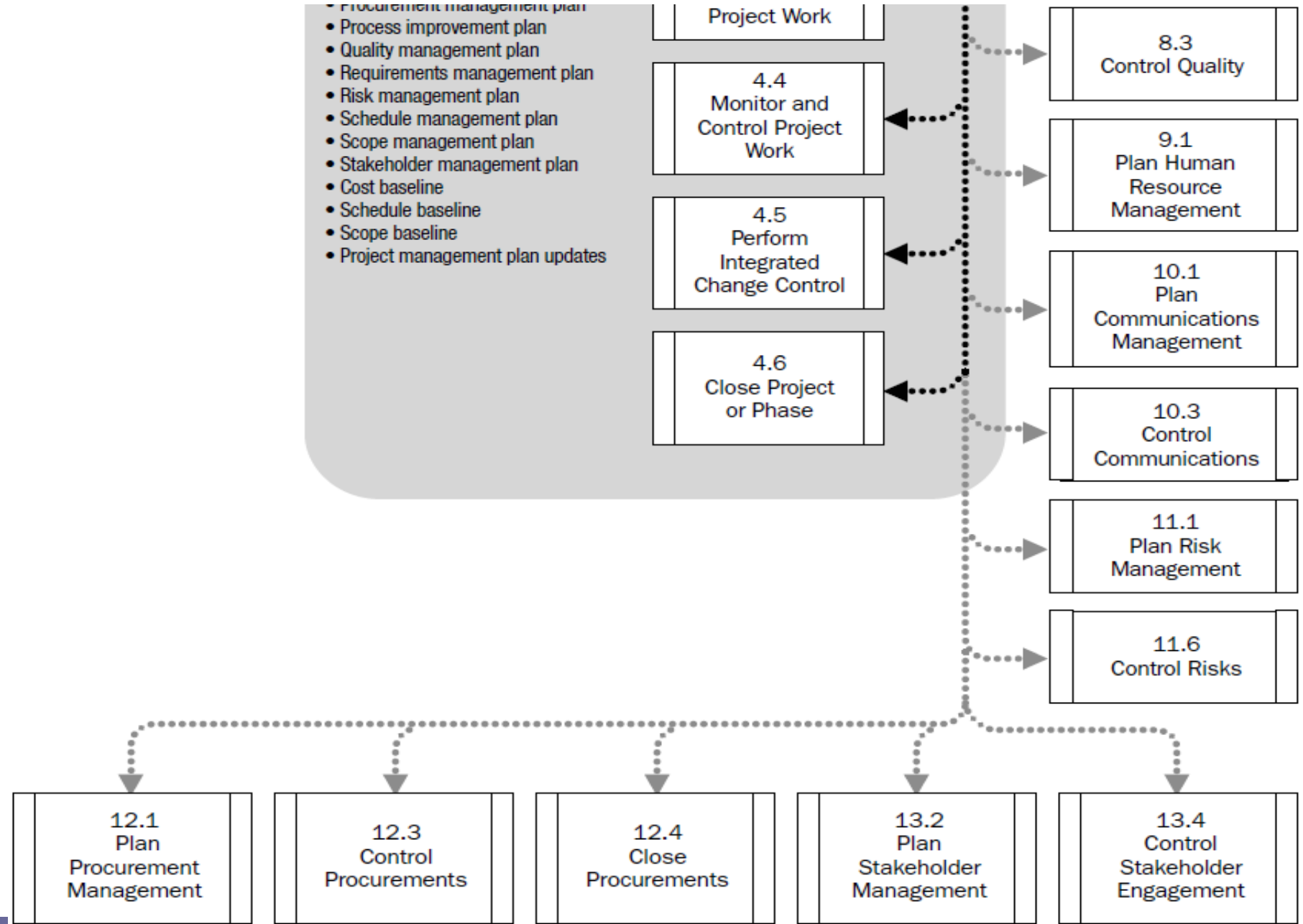
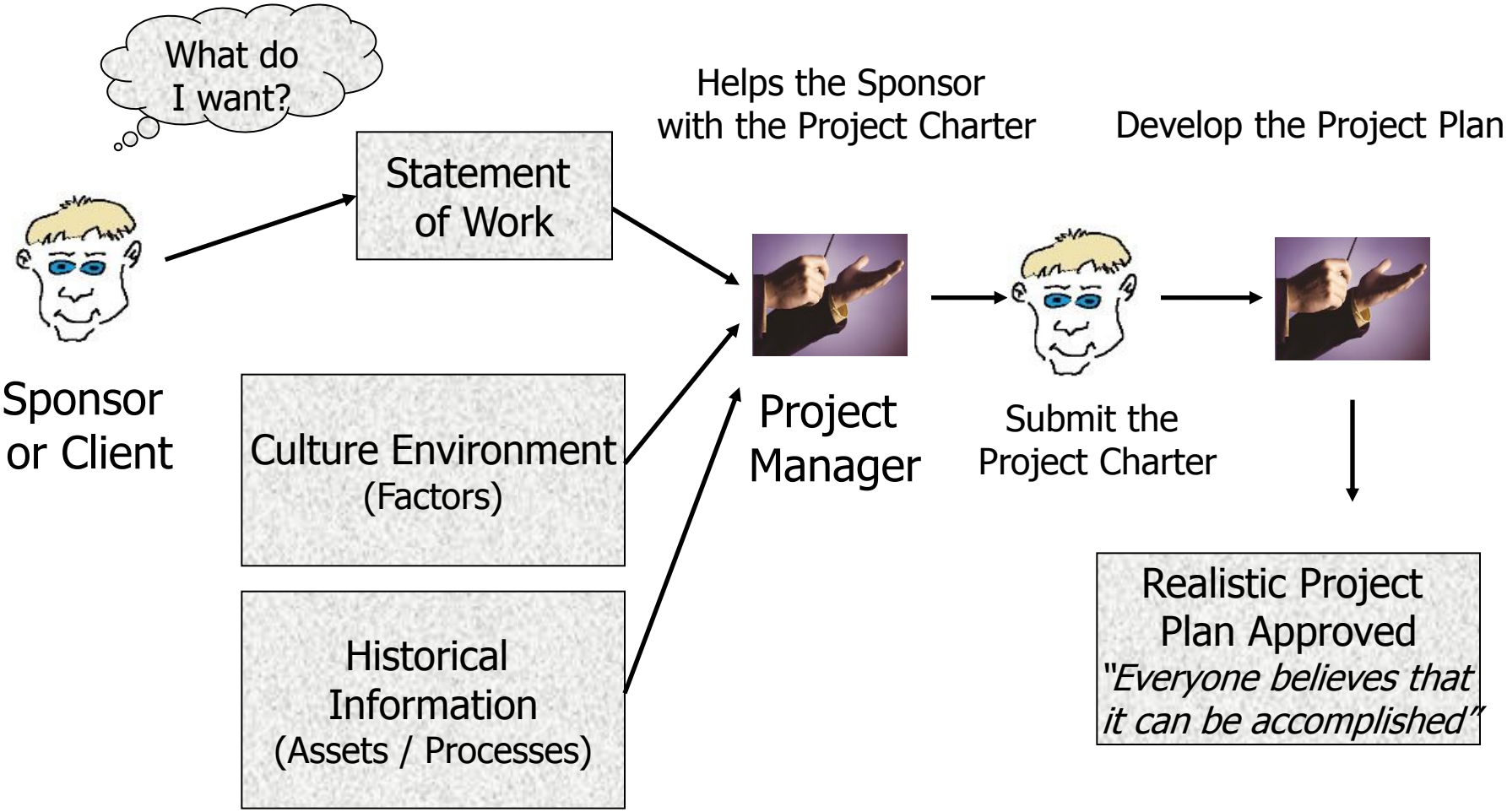
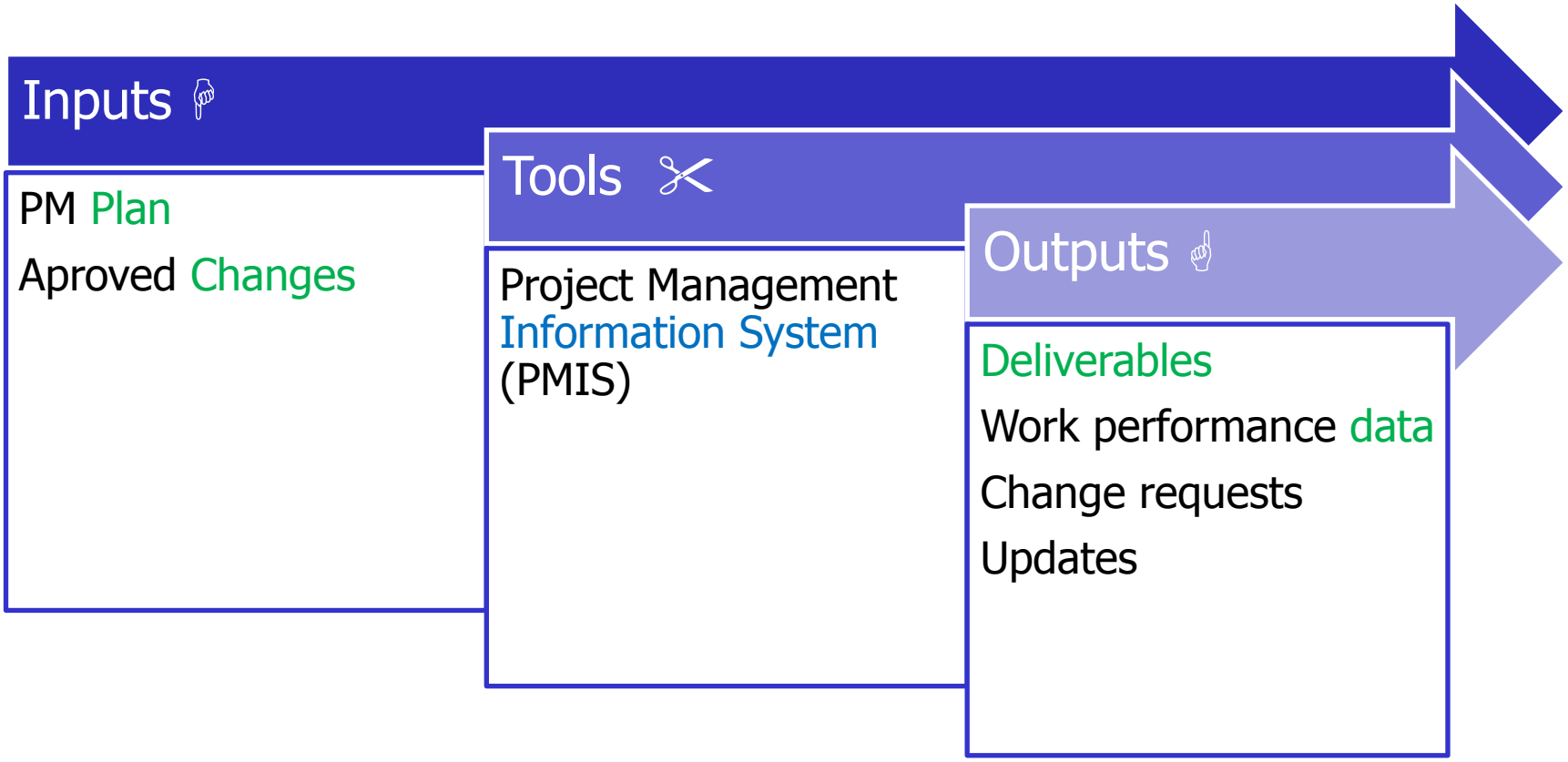


Summarizing ...

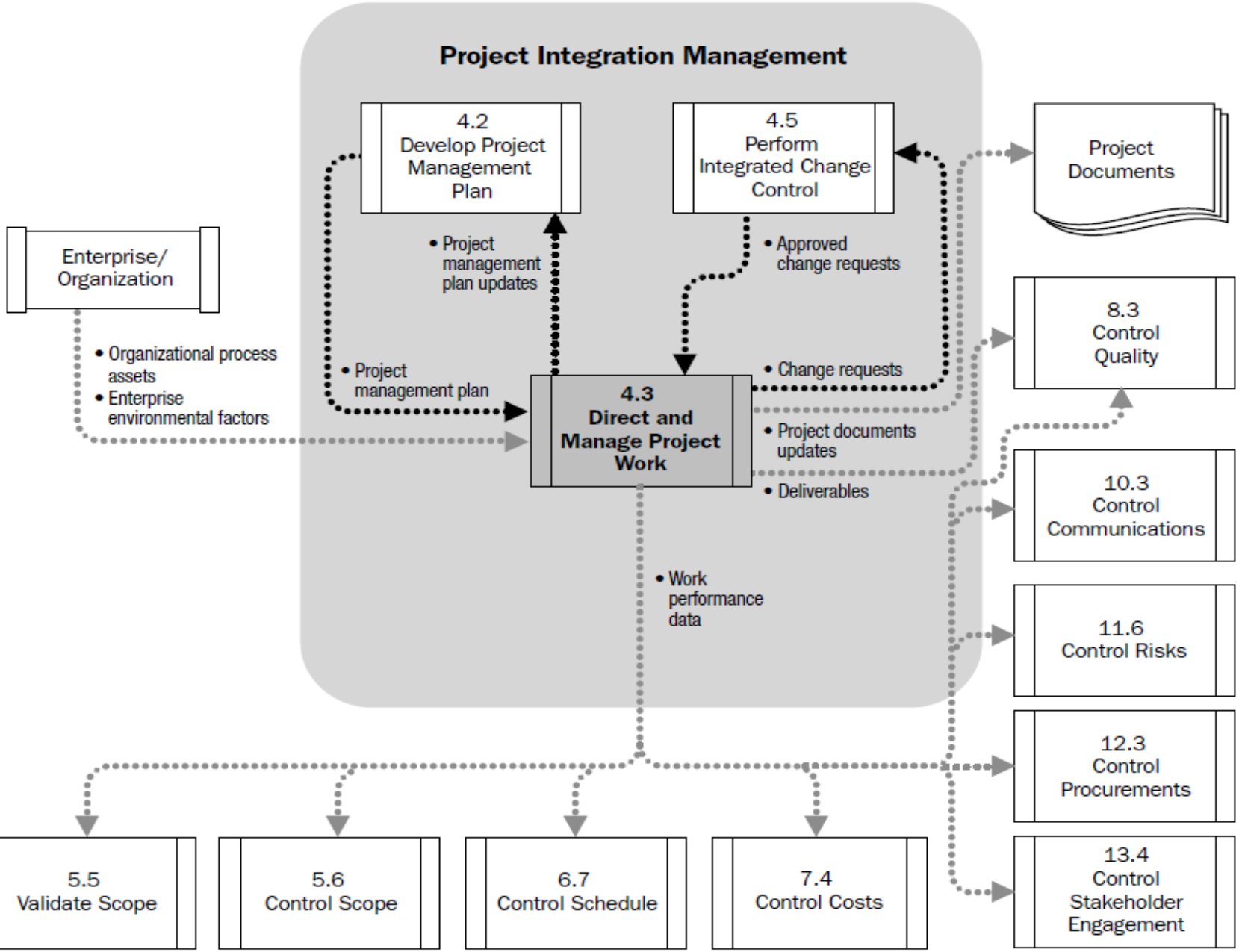


The project management plan is the reason for the existence of PMs.

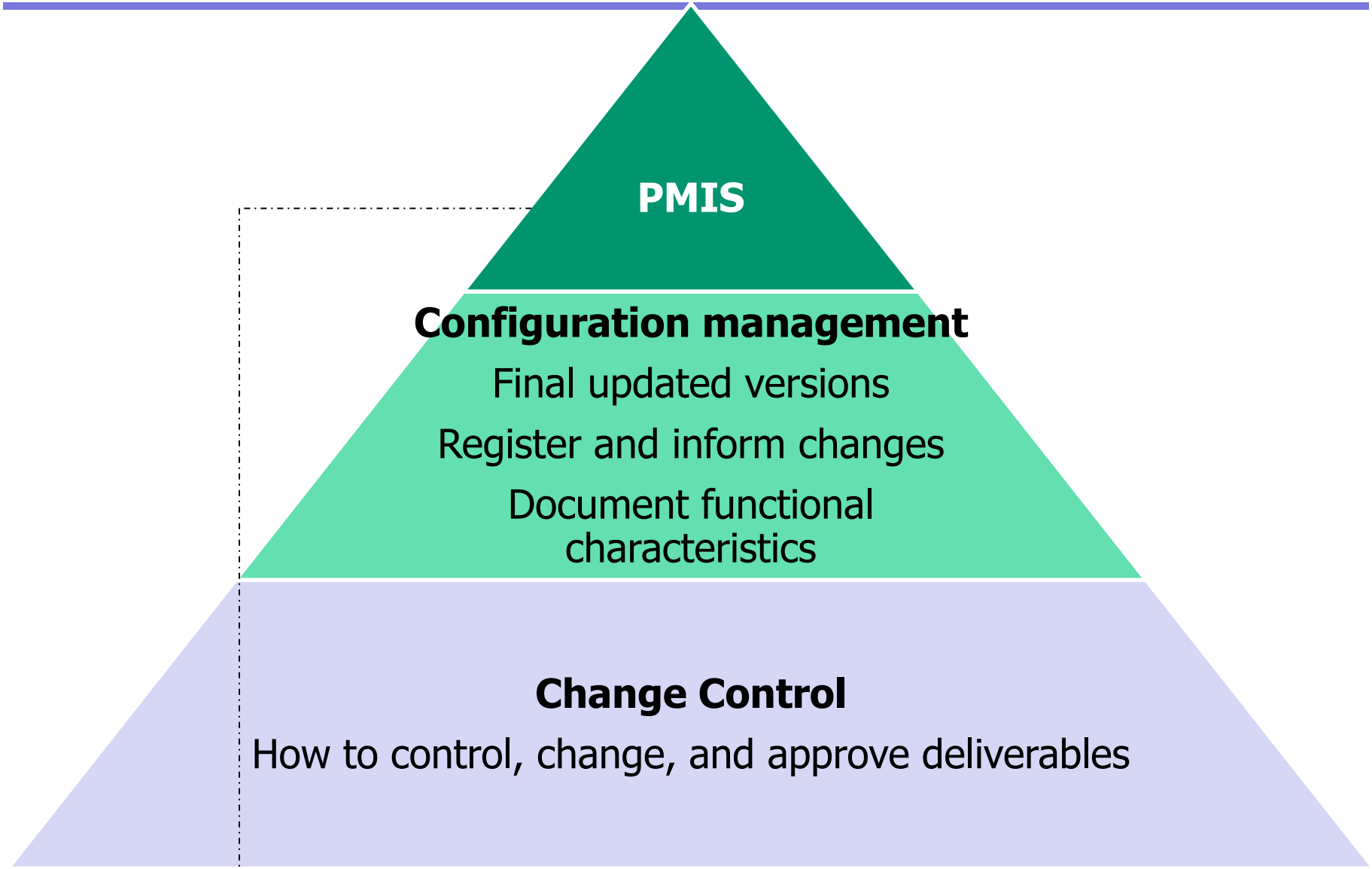
3. Direct and Manage Project Execution



3. Direct and Manage Project Execution

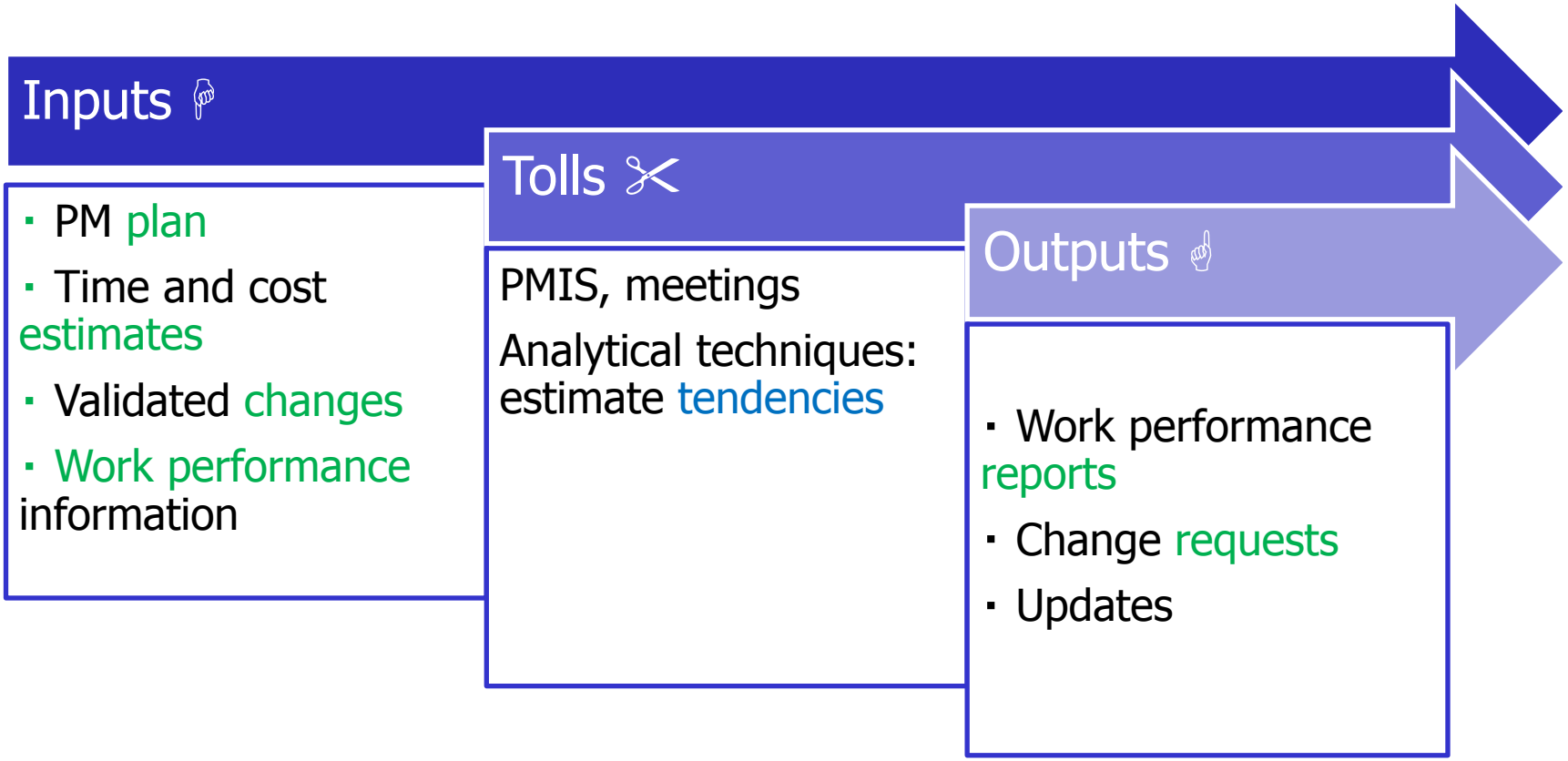


Project Management Information Systems



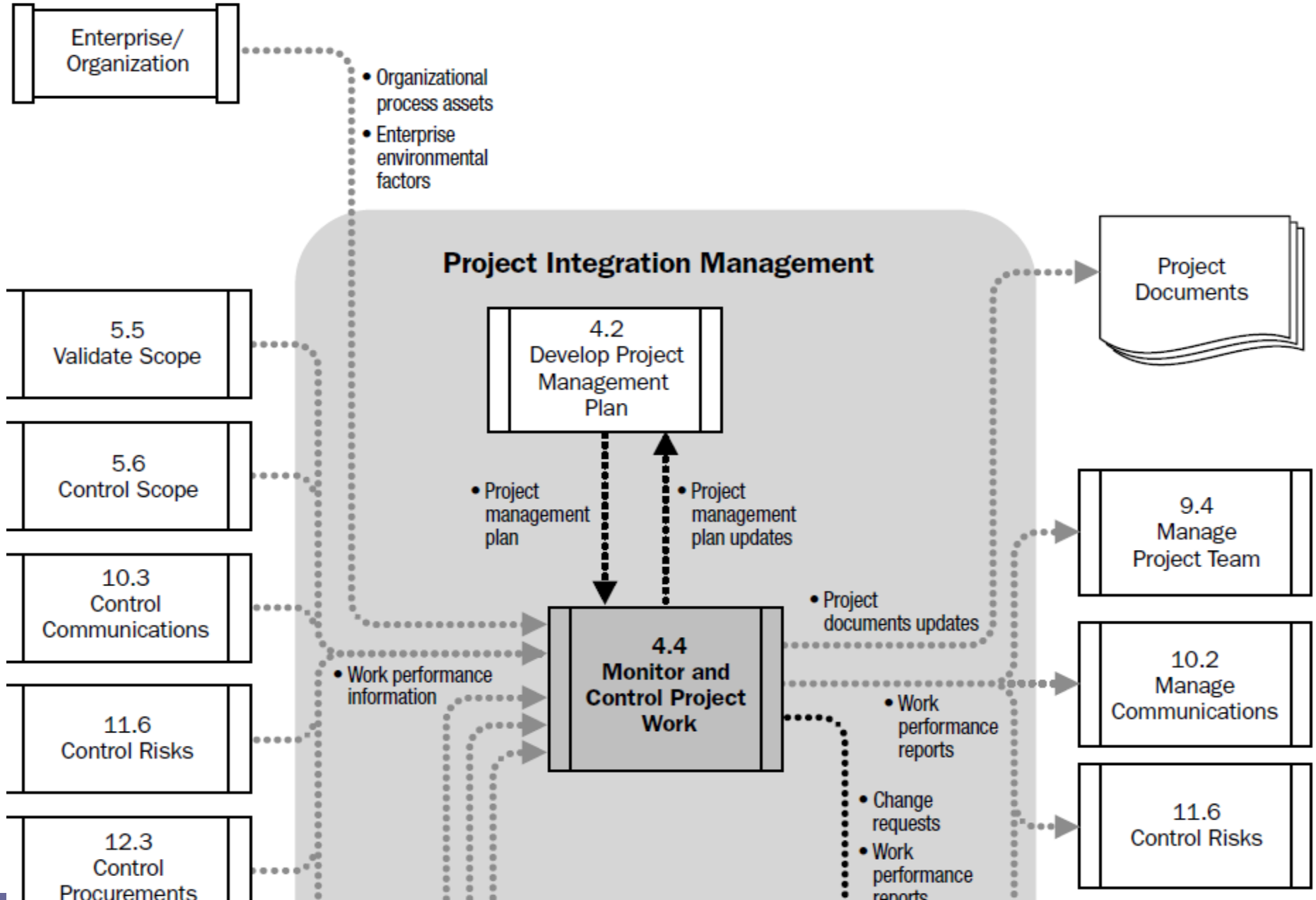
Work authorization system. Procedures for notifying the team or contractors when start the work

4. Monitor and Control Project Work

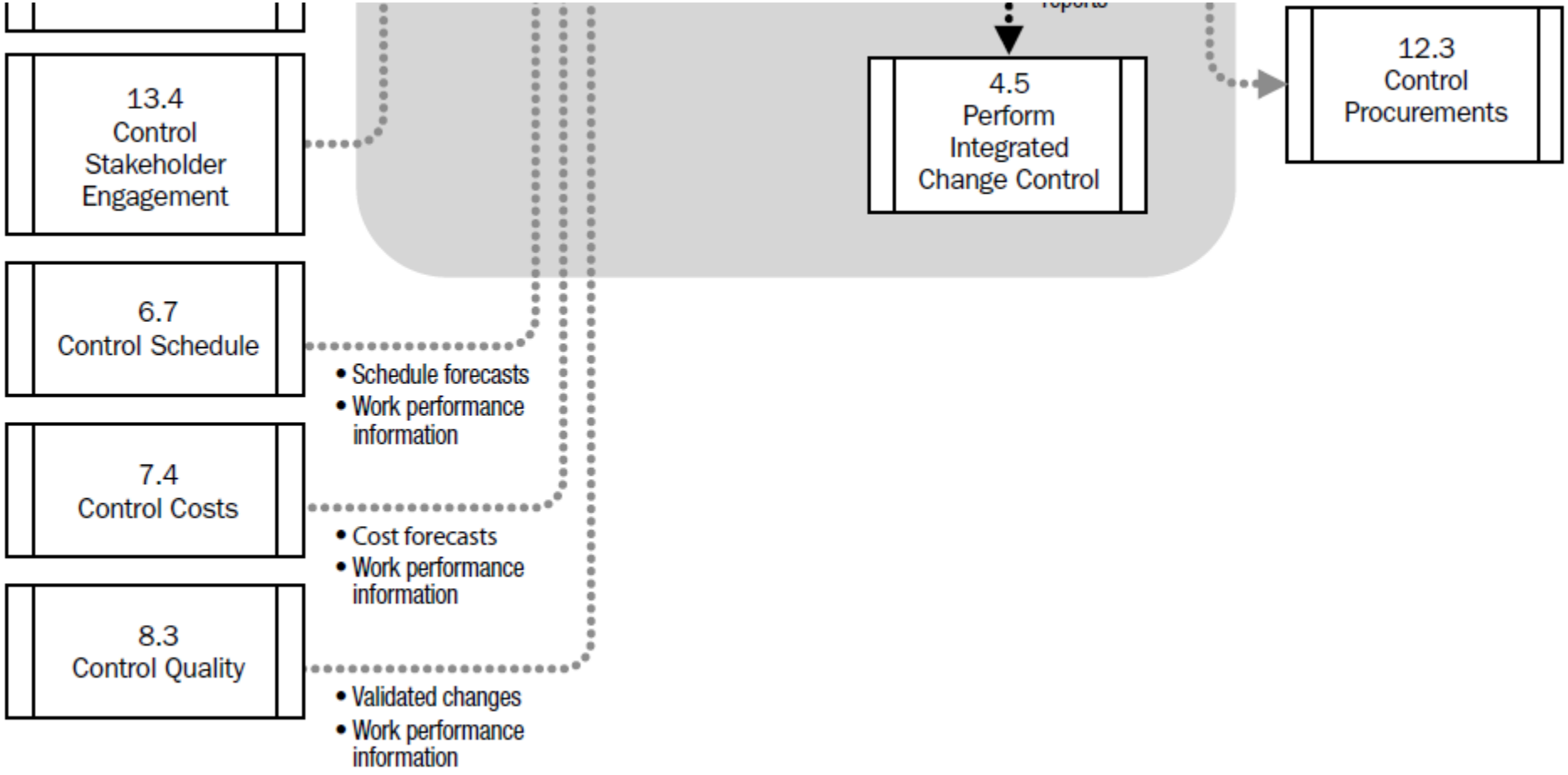


" Internal Control"

4. Monitor and Control Project Work

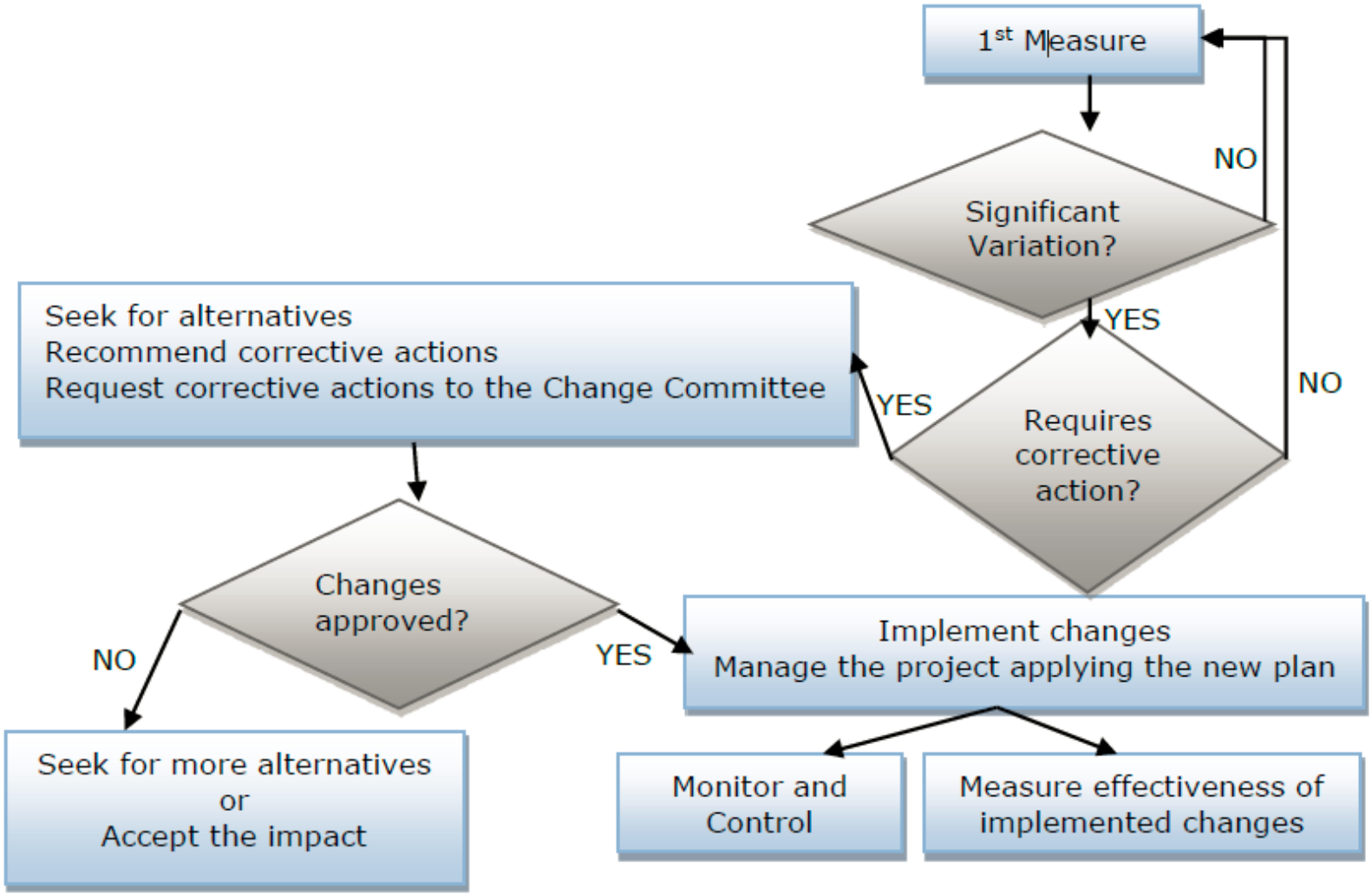


4. Monitor and Control Project Work



4. Monitor and Control Project Work

Corrective Actions Flowchart

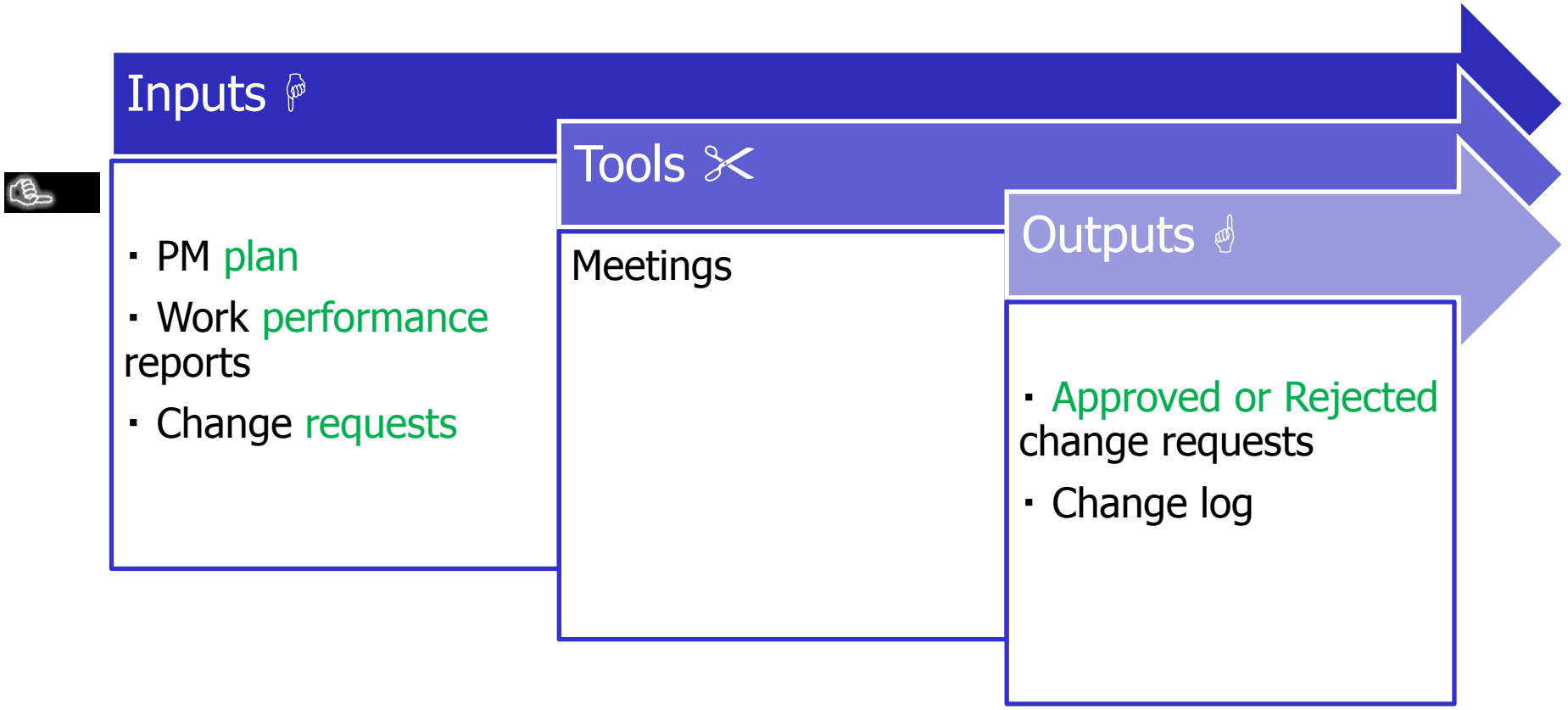


The other requested changes usually are **preventive actions** or requests for **repairs of detected defects**.

4. Monitor and Control Project Work

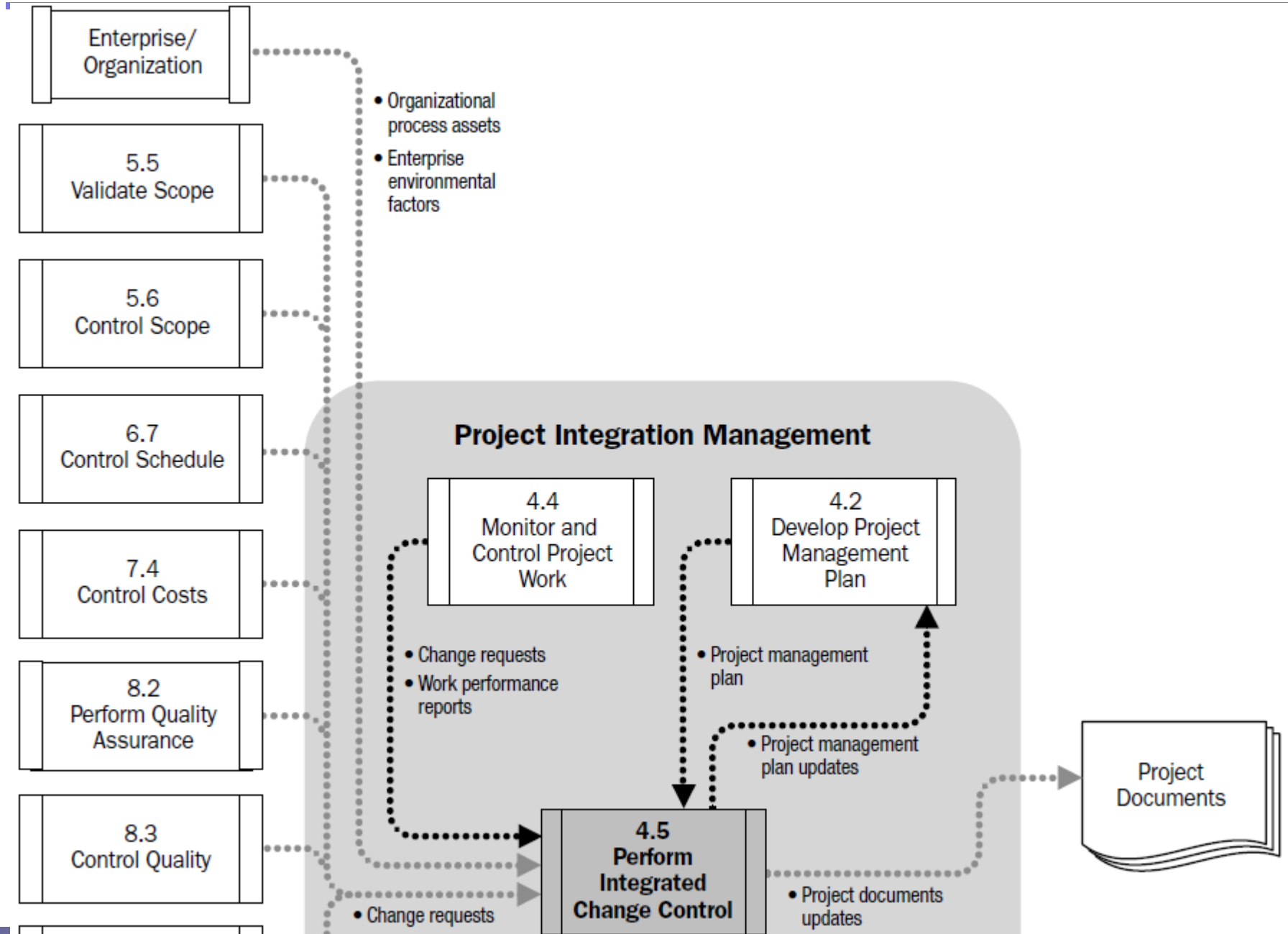
Project Report →

5. Integrated Change Control



"External Control"

5. Integrated Change Control



5. Integrated Change Control

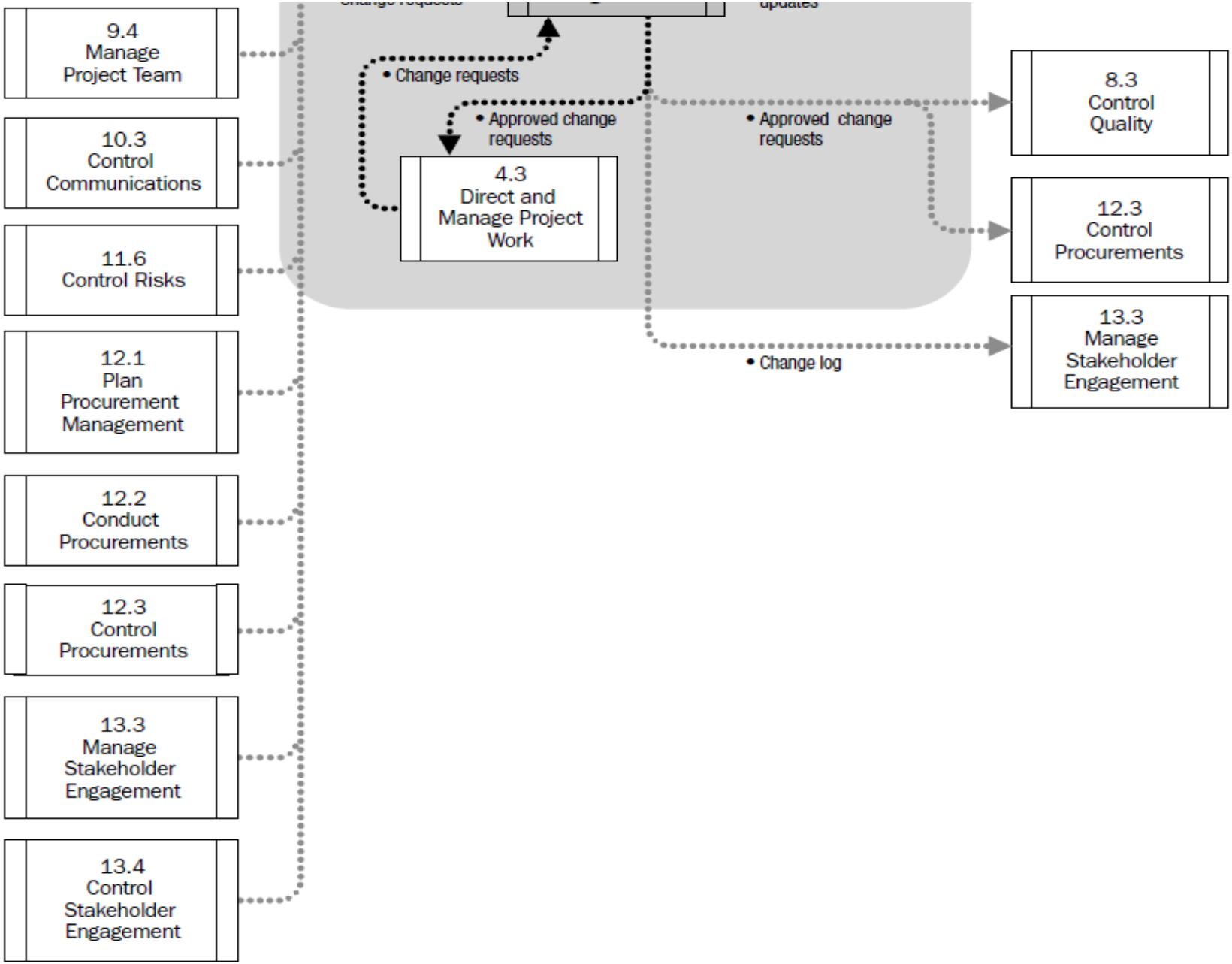
The supervision and control of the project is the responsibility of the PM and its project management team. On the other hand, the **process of integrated change control** goes beyond the PM and it requires an integrated change committee.

This **Change Committee** can be composed of the following:

- **Sponsor** (has vote)
- **Client** (has vote)
- **Project Manager** (no vote, only opinion)

This Committee is the only one who can approve changes. The only exception to the rule would be in extreme cases where the PM could make emergency changes.

5. Integrated Change Control



5. Integrated Change Control

Change Log							
Project: Network Upgrade Project						Date: 04/01/20xx	
Change No.	**Change Type**	**Description of Change**	**Requestor**	**Date Submitted**	**Date Approved**	**Status**	**Comments**
CR001	Design/ Scope	This change request calls for replacing existing ABC network routers with NextGen 3000 routers.	J. Doe	03/25/xx	N/A	Denied	This request was denied by the change control board because there is not adequate funding available for the purchase of new routers and because the request is outside of the project's scope.
CR002	Schedule	This change request calls for delaying the existing schedule by one week to ensure all applications are backed up which was not considered in the original project plan.	A. White	03/26/xx	04/10/xx	Approved	This request was approved to ensure the security and continuity of all applications. One week will be added to the project schedule and the project manager will communicate the impact of this change to all stakeholders.
CR003	Design/ Scope	This change request calls for modifying existing network firewalls to add intrusion detection systems to enhance network security.	B. Brown	03/27/xx	N/A	Deferred	This request was deferred and is pending a determination of the impact to the project's costs, schedule and scope.

Integrated Change Control

A stakeholder wants to increase the scope of the project. You estimate that this change will delay the project by 20 days. What is the next thing you should do?

A. Look for alternatives to compress the agenda and include the change

B. Ask the sponsor to approve the change

C. Negotiate a time extension to include the change

D. None of the above

Answer: D. Evaluate the impact of the change on the rest of the variables of the triple constraint: cost, quality, resources and risk.

Integrated Change Control

A functional manager wants to make a change to the project. What are the next steps to follow?

ANSWER

1st Evaluate the impact (Is it necessary? What is the effect on other variables?)

2nd Look for alternatives (compression, fast tracking, re-estimation)

3rd Get the approval from the Change Committee

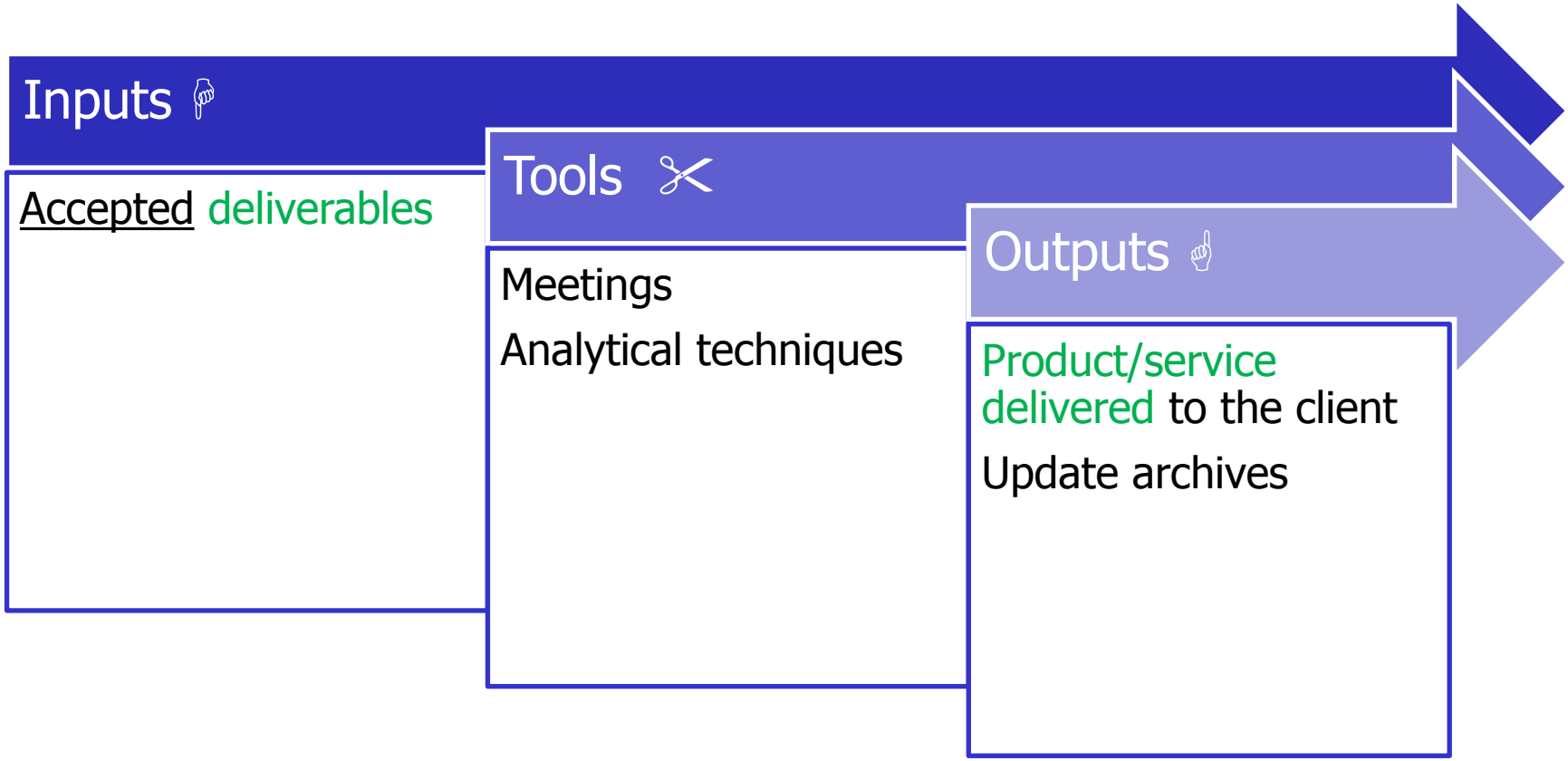
4th Update the baseline and the plan

5th Notify the stakeholders

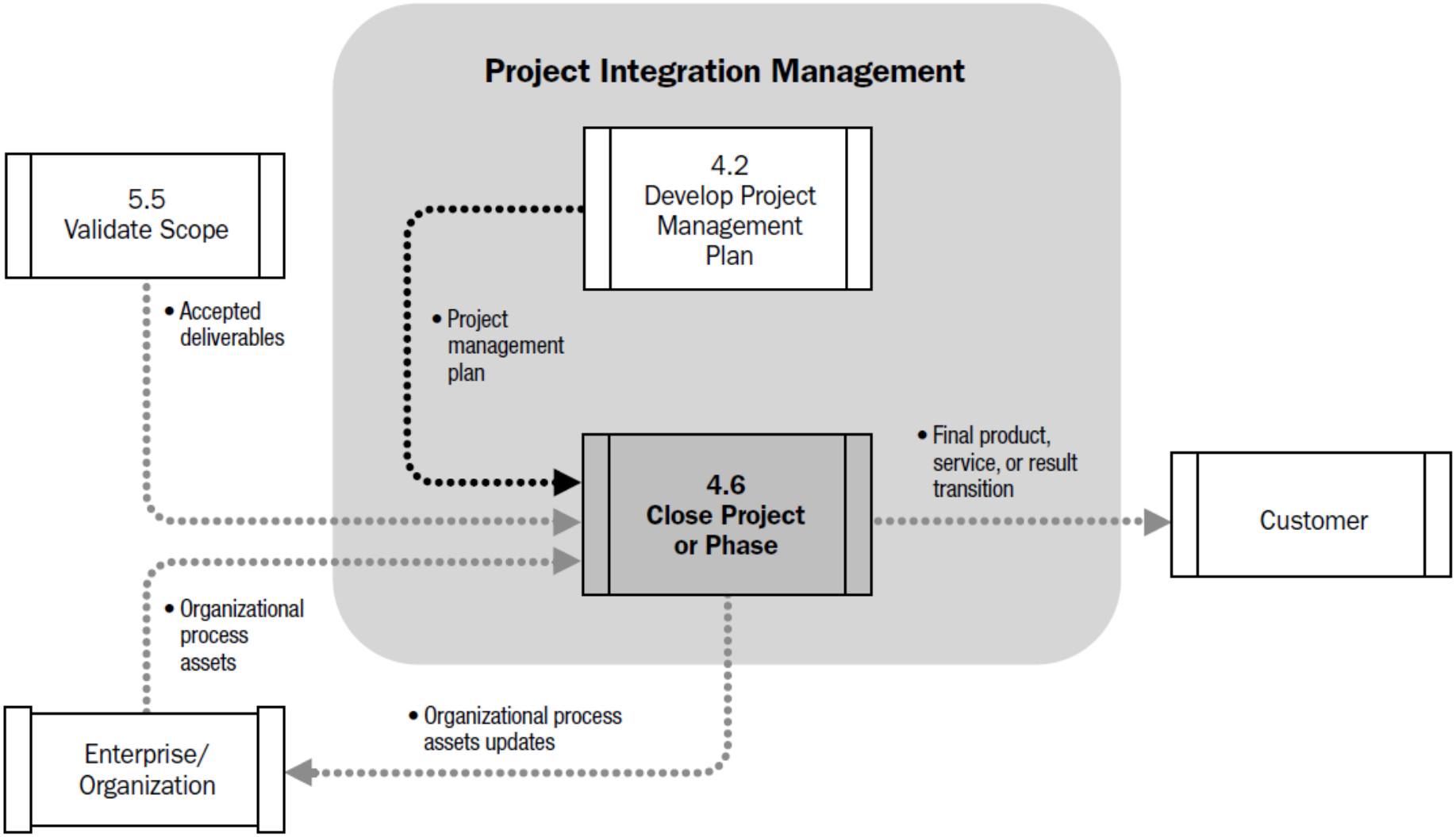
6th Manage the project according to the new plan

The more advanced the project is, the more expensive will be the change.

6. Close Project or Phase



6. Close Project or Phase



Administrative closure

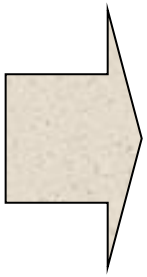
Final report

- ✓ Final budget
- ✓ Final schedule
- ✓ Archives index
- ✓ Participant directory: vendors, consultants, executing and management team, etc.
- ✓ ARCHIVE all the documentation indexed, so it can be easily found in the future

Release team

- ✓ Work delivery
- ✓ Final evaluation of team members

Lessons learned



What can we improve on our future projects?

Administrative Closure Survey

Client: Eli R Corp. Project Manager: Paul Leido		Start Date: 15 July End Date: 20 December	
Project Scope	☐ Exceeded objectives	☐ Met objectives	☐ Not meet objectives
Due Dates	☐ Before schedule	☐ On time	☐ Delayed
Budget	☐ Less than estimated	☐ Within budget	☐ Greater than estimated
In general, the project was successful?		Yes ☐ No ☐	

What did we do well?

What can we improve?

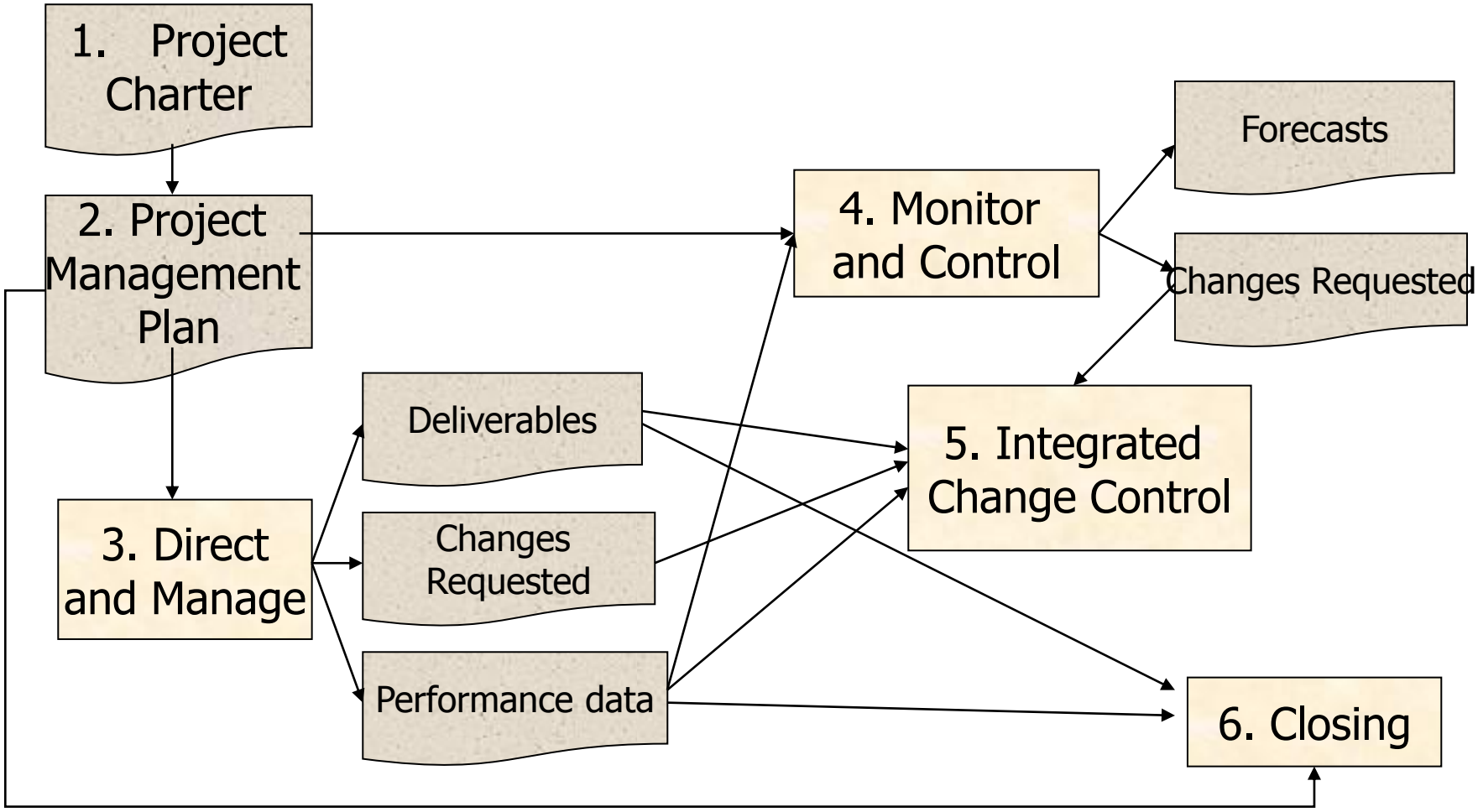
What did we do wrong?

What would you do different in a similar project?

What recommendations would you make for future projects?

MasConsulting

Summarizing Integration



Lessons learned

- ✓ Corrective actions
- ✓ Project charter
- ✓ Change committee
- ✓ Integrated change control
- ✓ Project selection methods
- ✓ Project management plan
- ✓ Work authorization system
- ✓ Change control system
- ✓ Project management information system
- ✓ Configuration management system
- ✓ Change request

SCOPE

Project scope vs. product scope

Scope planning

Scope management processes

Collect requirements

Define scope

Work breakdown structure

Verify scope

Control scope

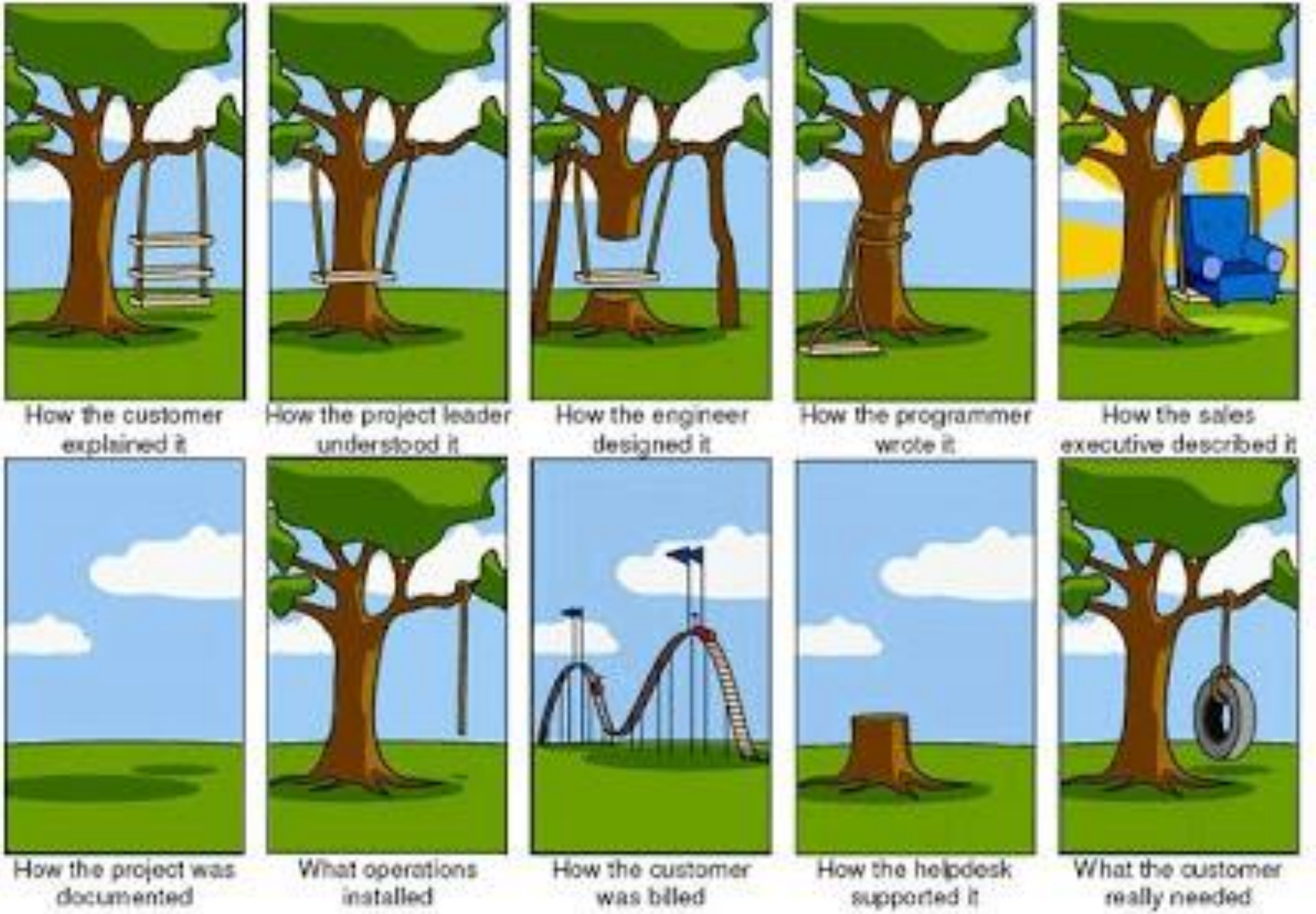
Scope Processes

	Initiation	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		. Plan scope . Collect Requirements . Define Scope . Create WBS		. Verify Scope . Control Scope	
Time		6		1	
Cost		3		1	
Quality		1	1	1	
HR		1	3		
Communications		1	1	1	
Risks		5		1	
Procurements		1	1	1	1
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

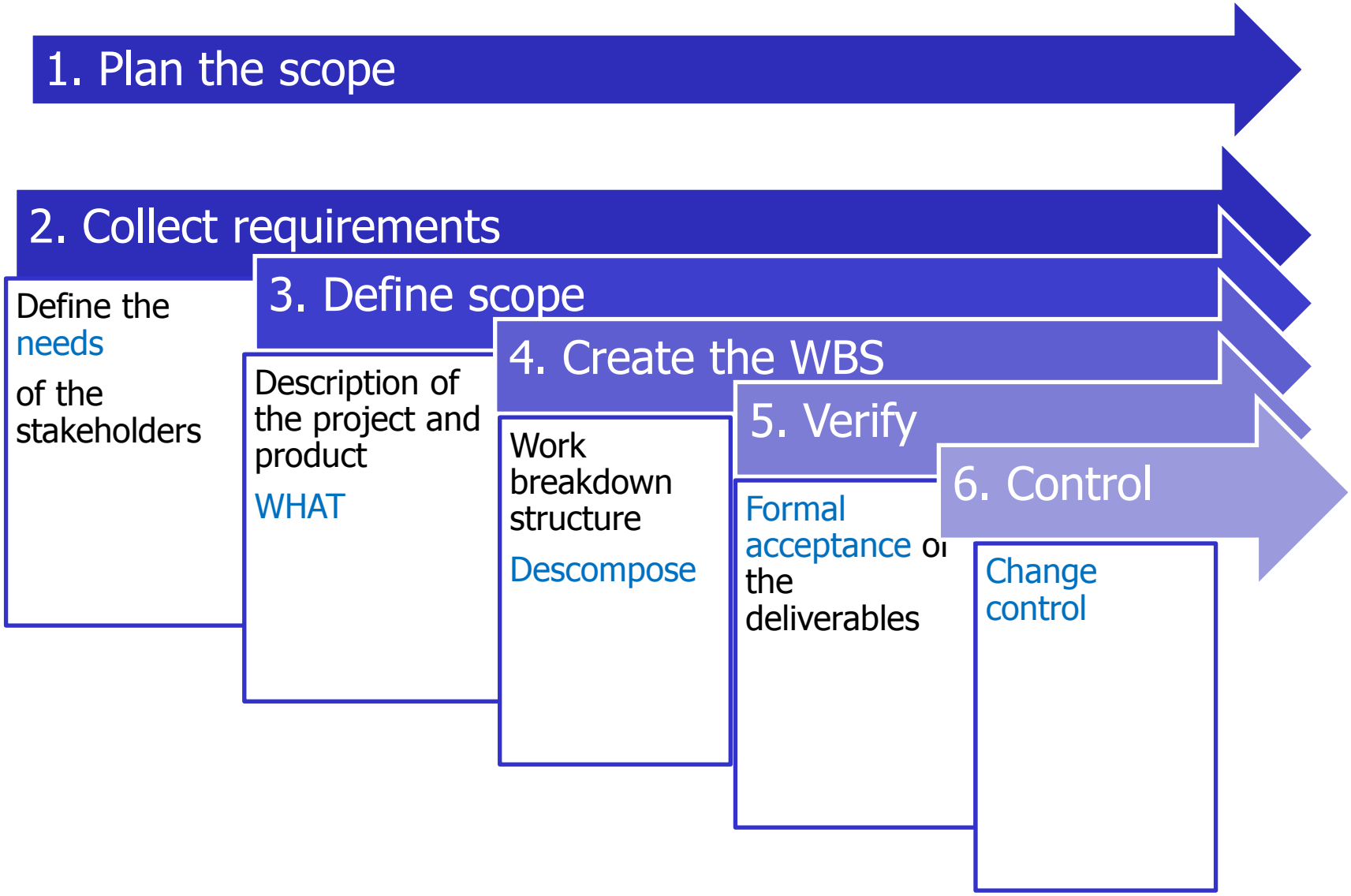
What is the Scope of the project?

- ✓ **What** work we need to achieve a successfull project => PROCESES
- ✓ Ensure that we perform all the work, and **only that work**. Deliver to the client what she requested, no more, no less!
- ✓ Prevent unsolicited work ("gold plating") **extras** that did not go through integrated change control.

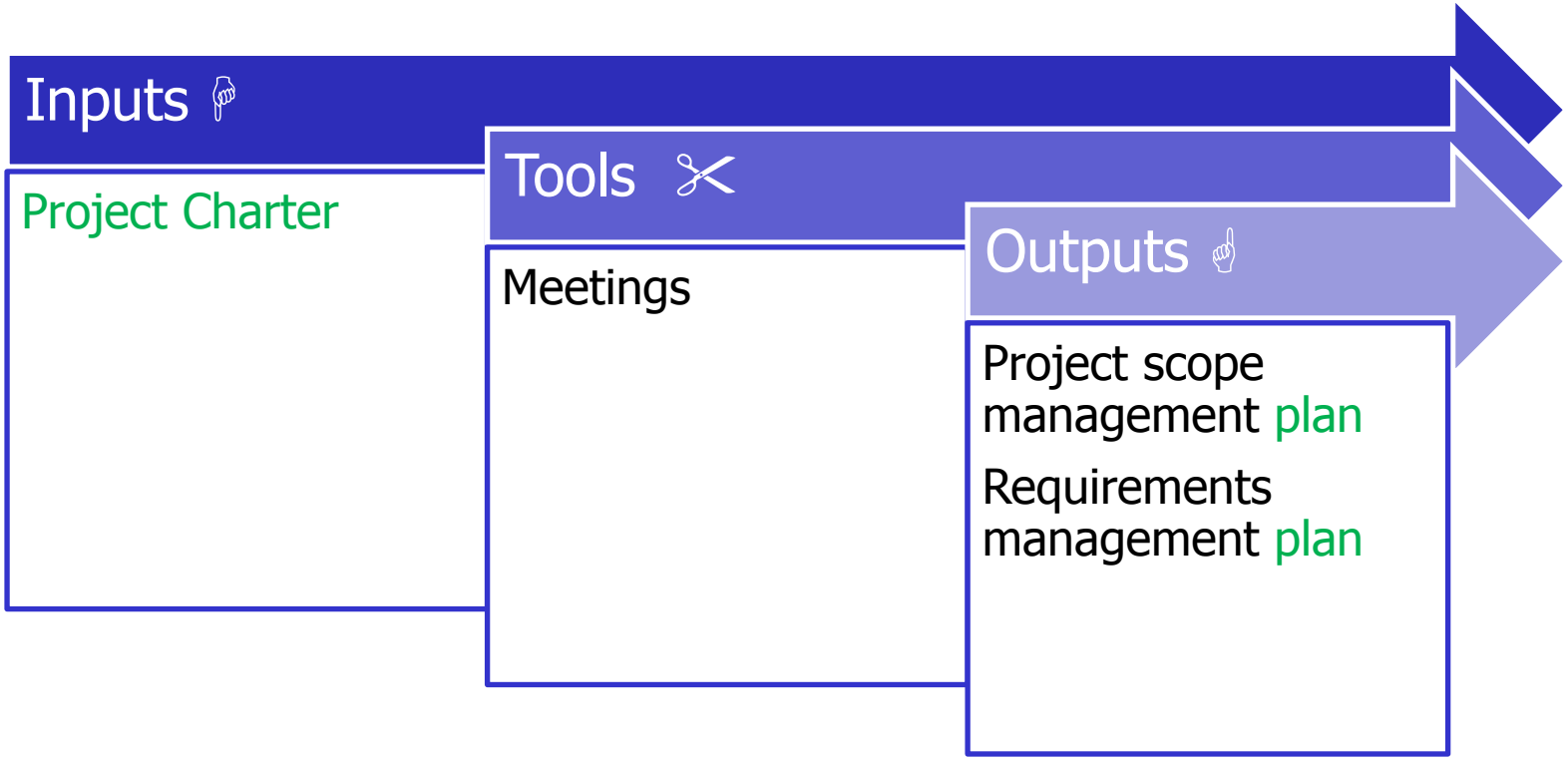
Why ?


How the customer explained it
How the project leader understood it
How the engineer designed it
How the programmer wrote it
How the sales executive described it
How the project was documented
What operations installed
How the customer was billed
How the helpdesk supported it
What the customer really needed

Scope management processes

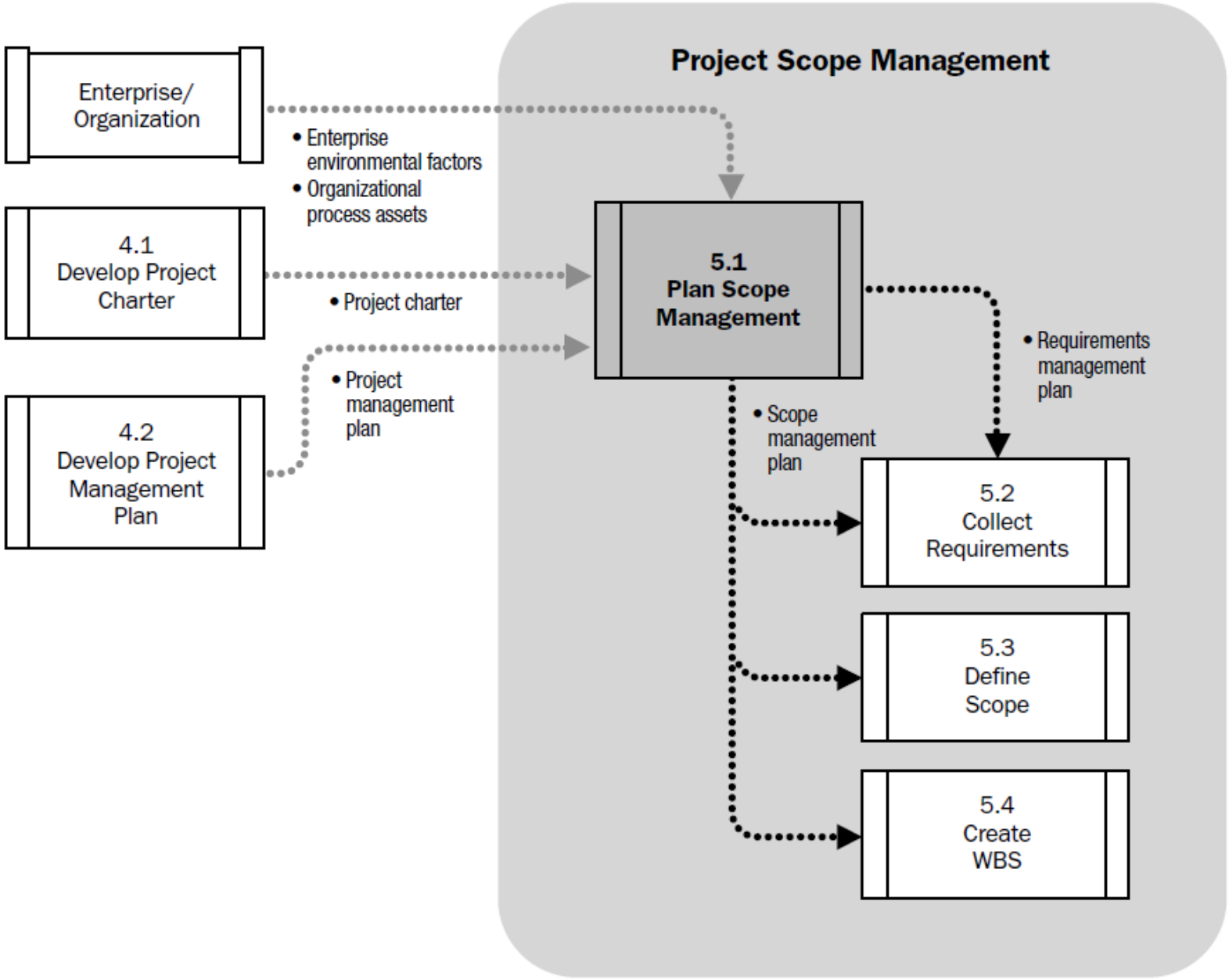


1. Scope management planning



*Scope planning requires various **iterations***

1. Scope management planning



Management plans

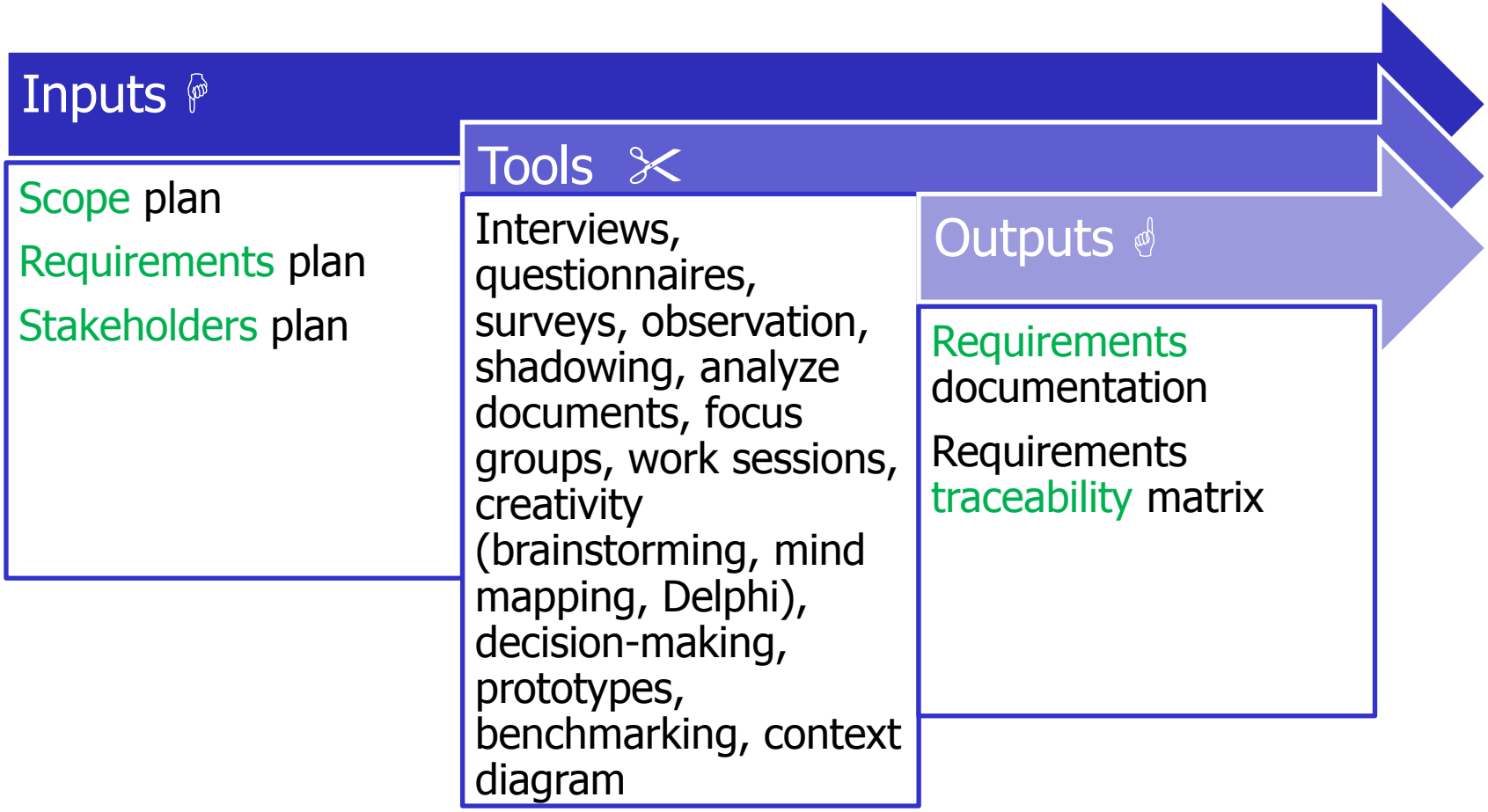
Scope - defines the procedures to:

- ✓ Prepare the scope statement
- ✓ Create and approve the WBS
- ✓ Perform scope validation
- ✓ Process and approve scope changes

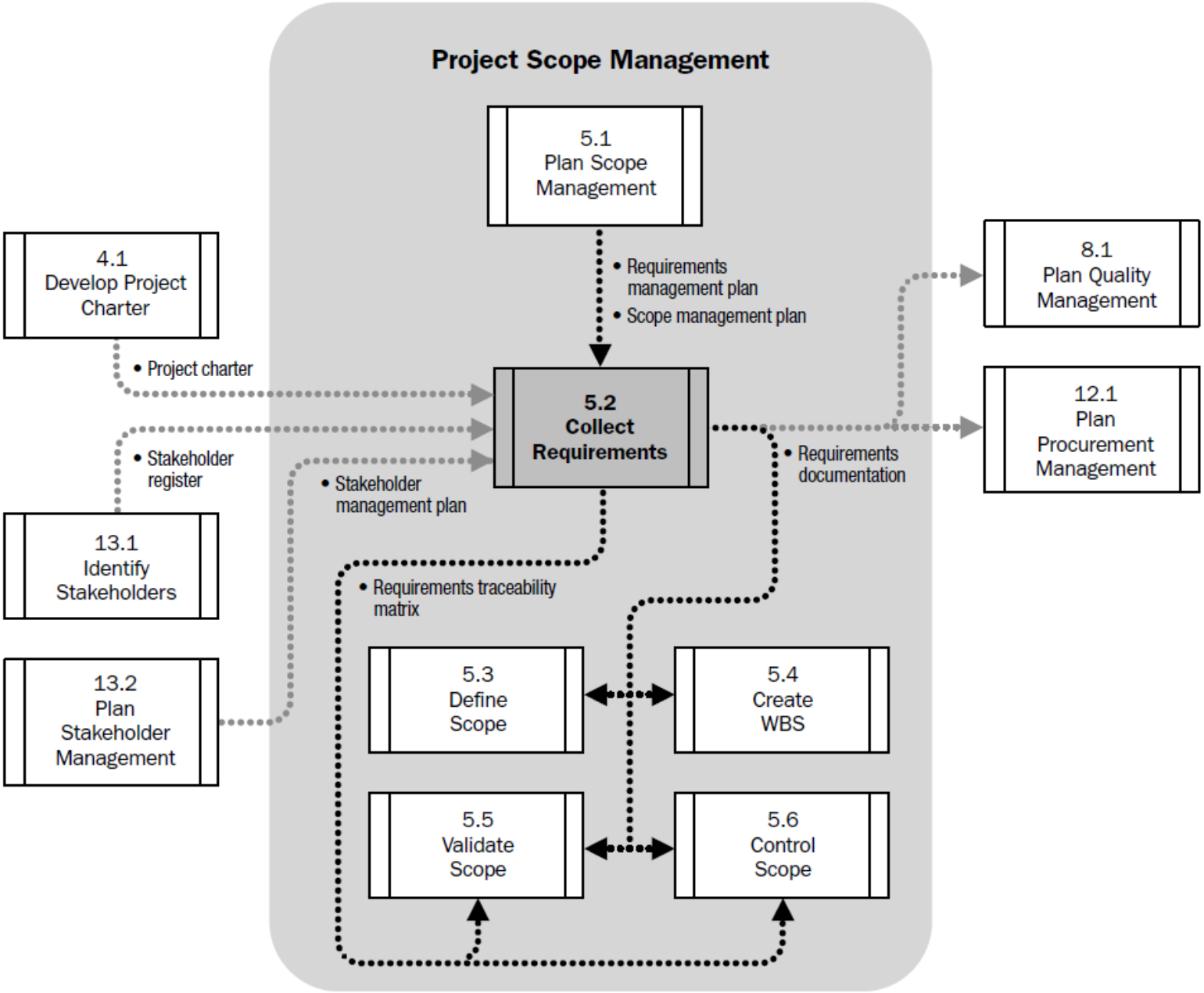
Requirements:

- ✓ How to document and communicate the requirements?
- ✓ What will be the process to monitor and control requirements?
- ✓ Who will make changes to the requirements and how?
- ✓ How to prioritize the requirements?

2. Collect requirements



2. Collect requirements



Requirements

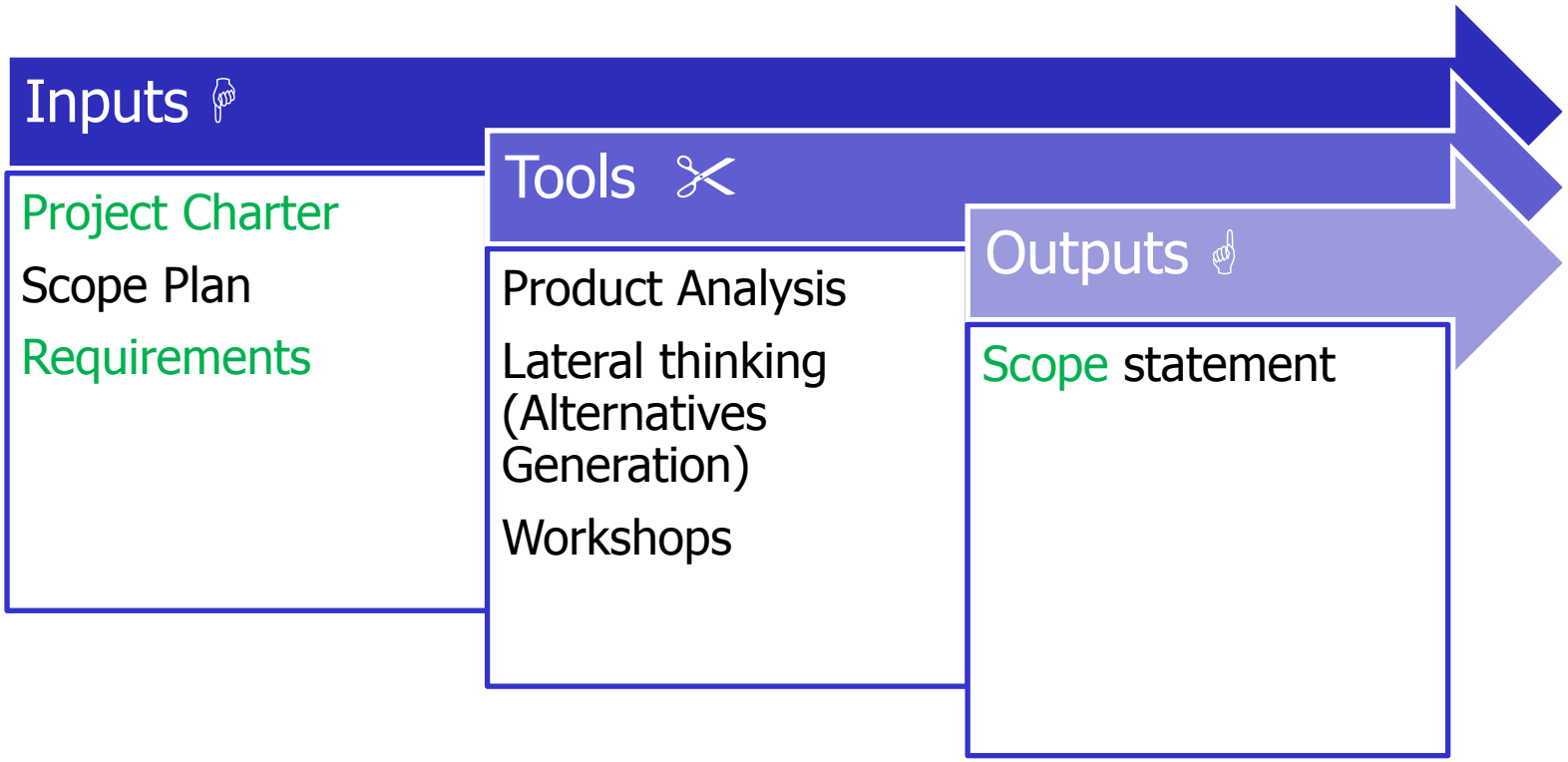
Document Requirements: WHAT

- Project justification and objectives
- Funcionality of the product
- Quality and Security
- Acceptance criteria
- Assumptions and contraints

Requirements traceability matrix:

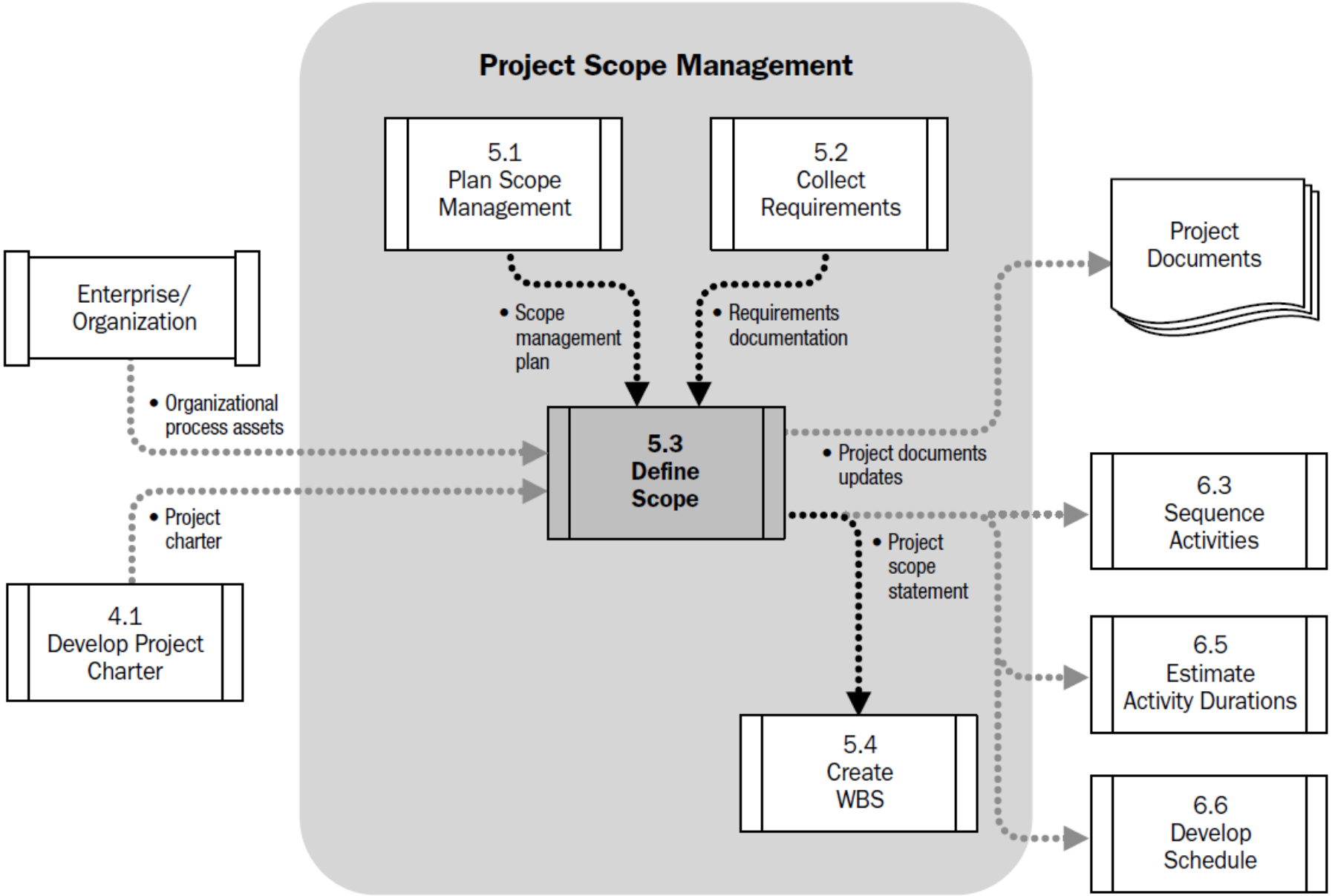
#	Requirement	Date	Requested by	Objetive	Priority High Medium Low	Status Approved Cancelled Postponed Finished	Delive-rable	Acceptance criteria	Respon-sable

3. Define scope



What is included and y what is NOT included in the project

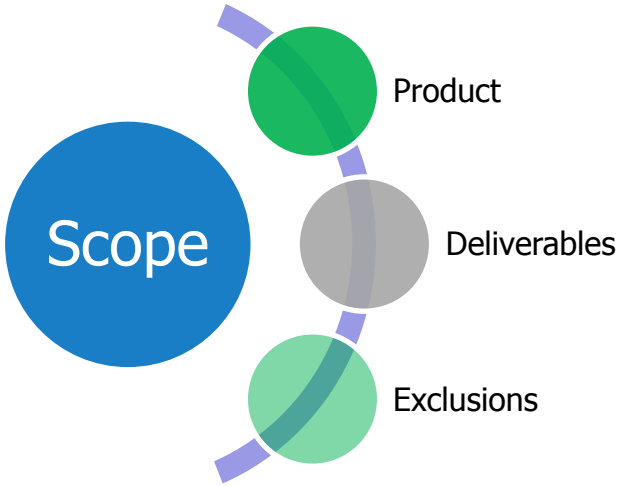
3. Define scope



Scope Statement

Components

- ✓ Product Scope
- ✓ Deliverable descriptions
- ✓ Tasks to create those deliverables
- ✓ Analyzes whether the preliminary assumptions
- ✓ Project boundaries: what is NOT included!



Possible documents

Business Requirements Document:

A formal document that effectively provides a contract between a supplier (or a vendor) and a client.

1. Summary and overview
2. Business Requirements
   a. Functional Requirements
   b. User Interface Requirements
   c. Reporting Requirements
   d. User Access Requirements
   e. Performance Requirements
   f. Data Protection Requirements
   g. Post Implementation Review Requirements
   h. Finance Requirements
   i. Operations Requirements
   j. Parameterization Requirements
   k. Backup Requirements
   l. Risks Requirements
   m. Regulatory Requirements
   n. Legal Requirements
3. Business Process Flow
4. Assumptions/Constraints
5. Business Glossary

Possible documents

Software Requirements Specification:

- Blueprint document
- Description of a software system to be developed
- Functional requirements
- Non-functional requirements
- Use cases

Table of Contents

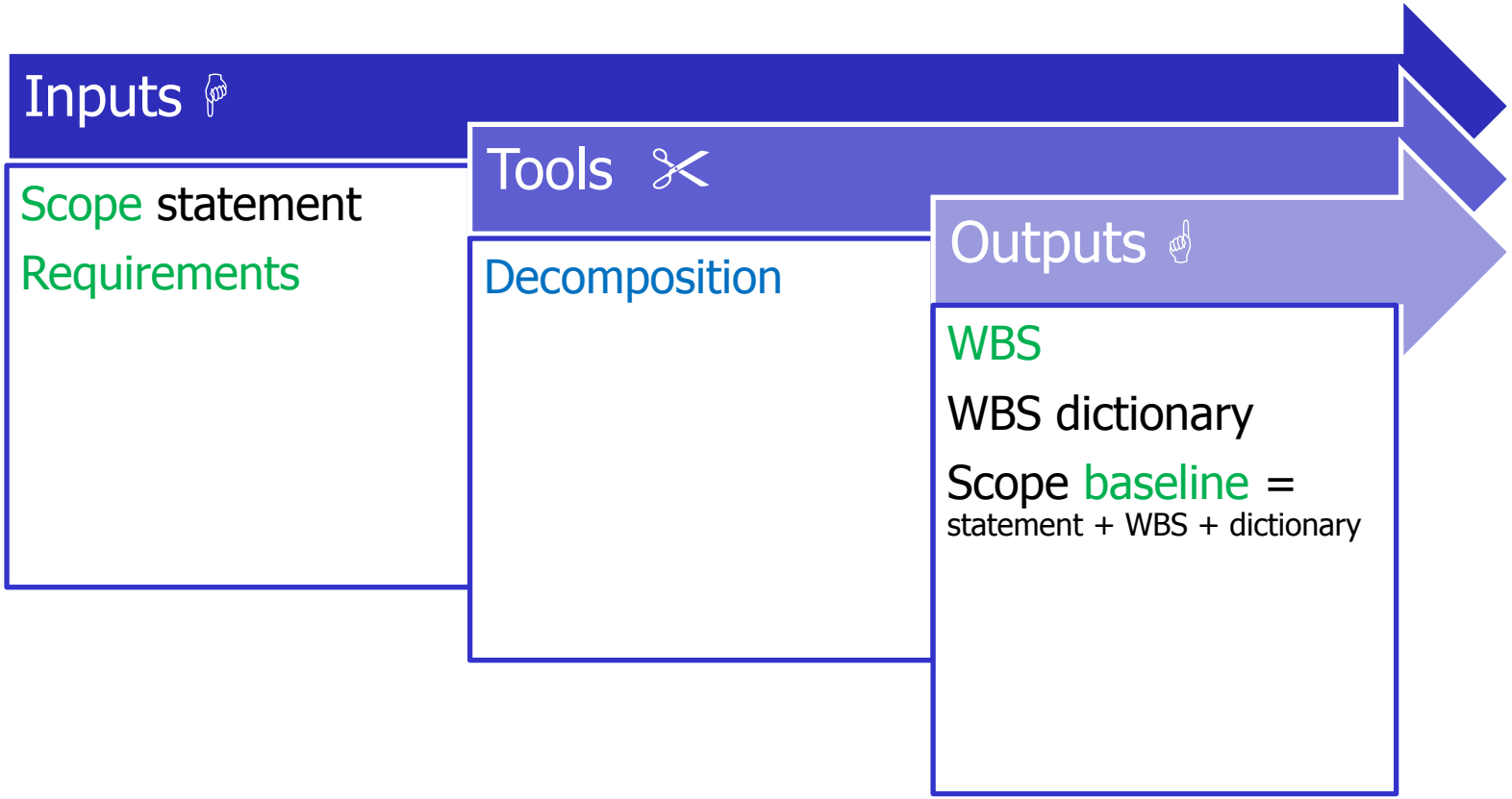
Possible documents

Software Design Specification:

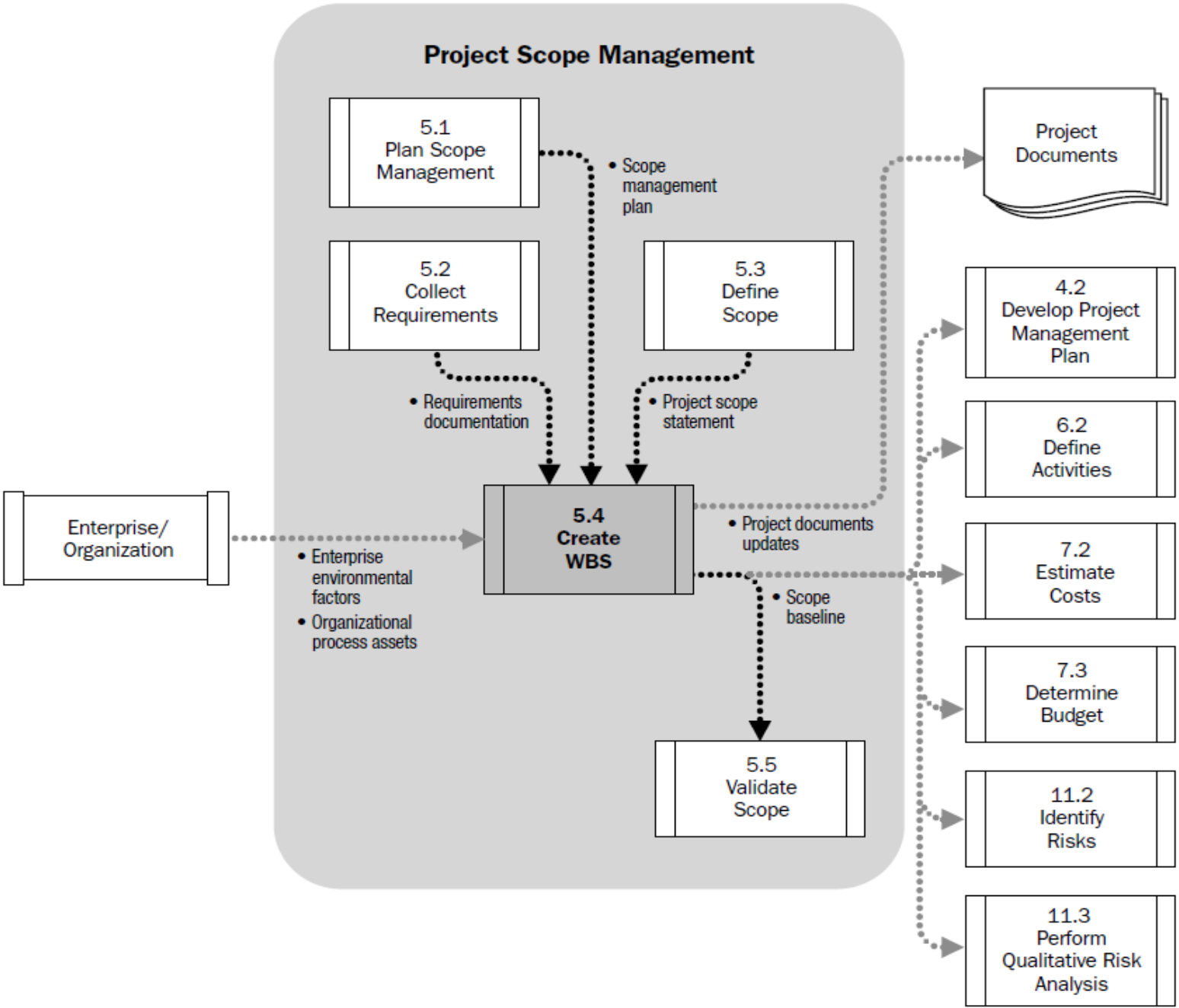
- UML class diagram
- UML sequence diagrams
- Interaction diagram
- Coding style guidelines
- System Architecture
- High-Level design
- Low-Level design
- Workflow

4. Create the WBS

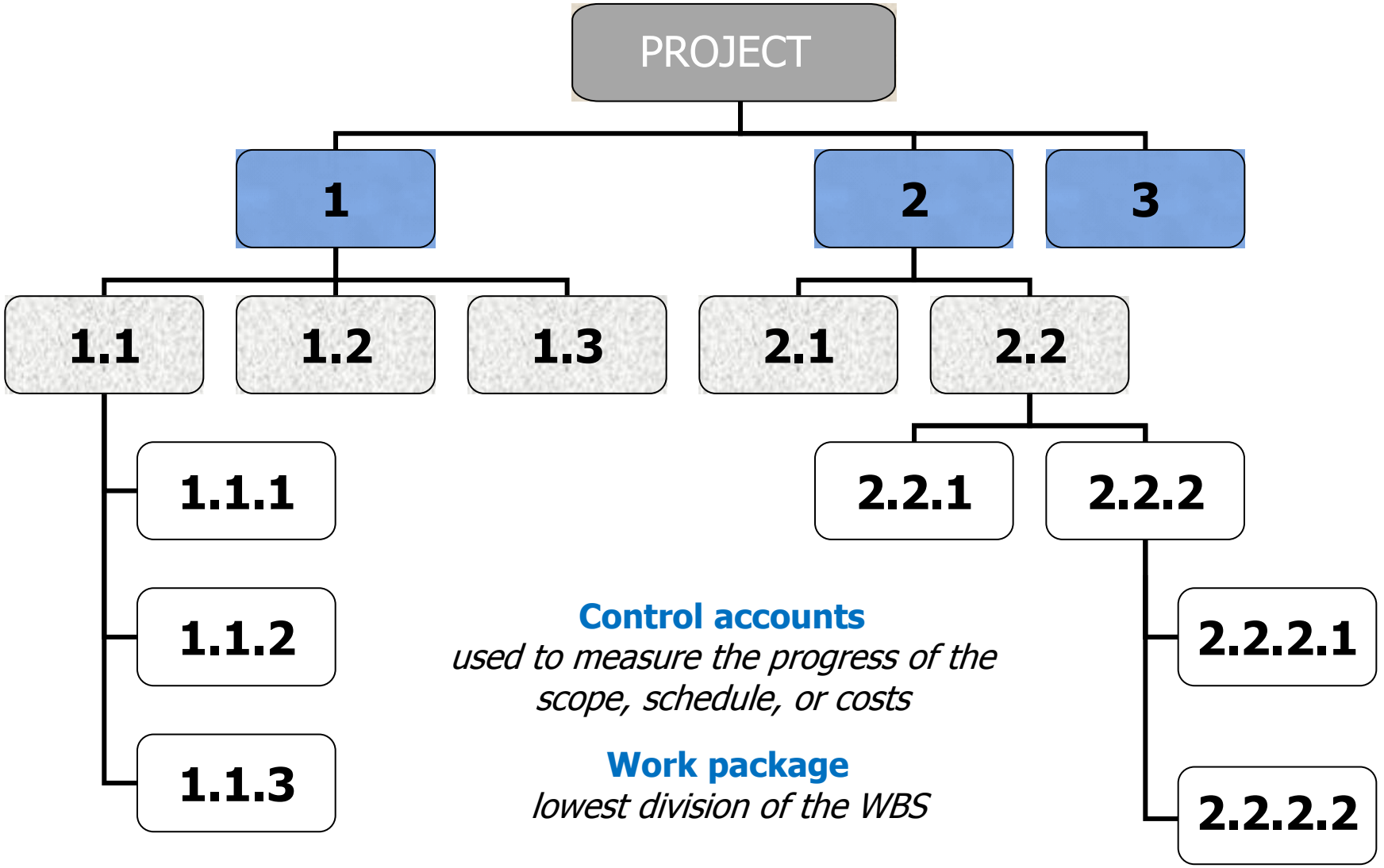
WBS: Work Breakdown Structure



4. Create the WBS



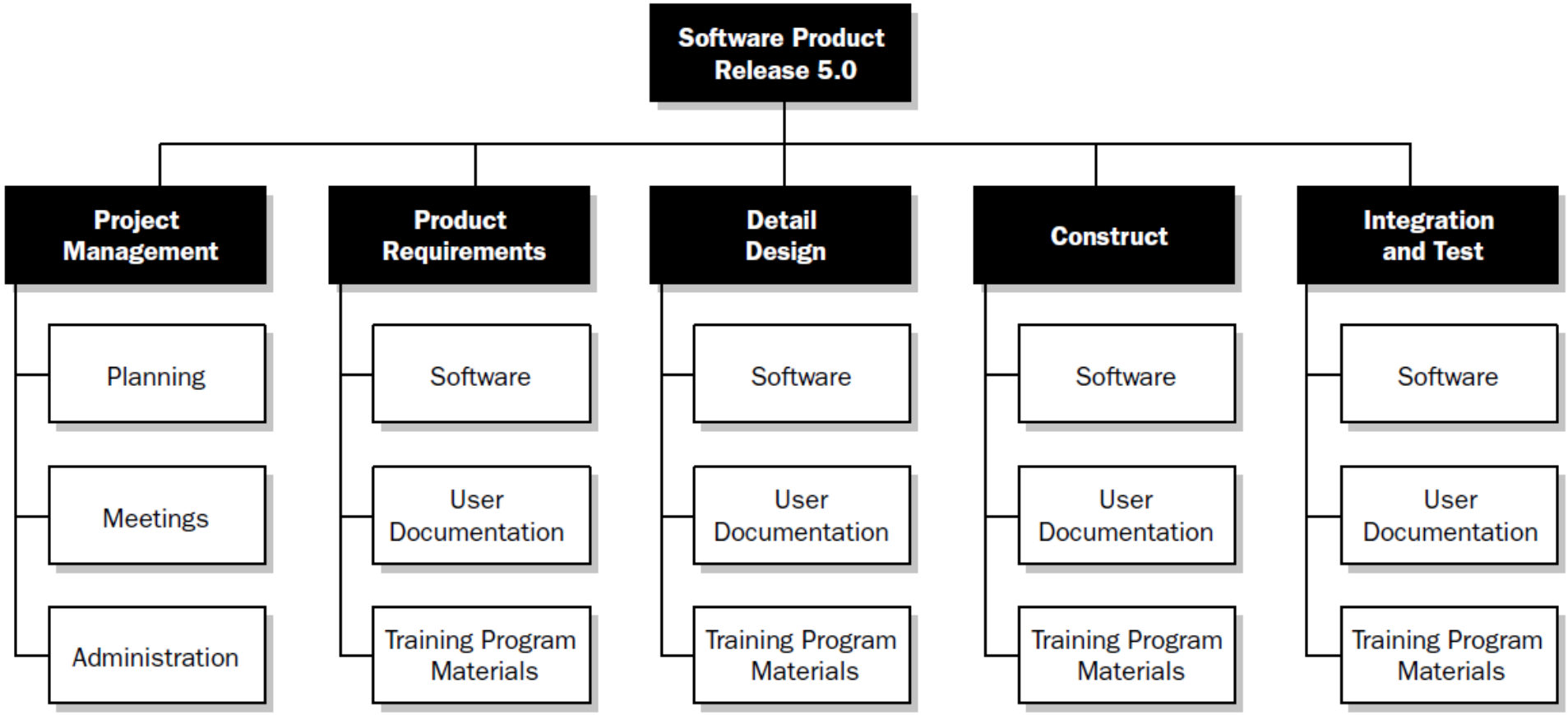
WBS



First WBS hierarchical level: Requirements, Design, Construct, Test

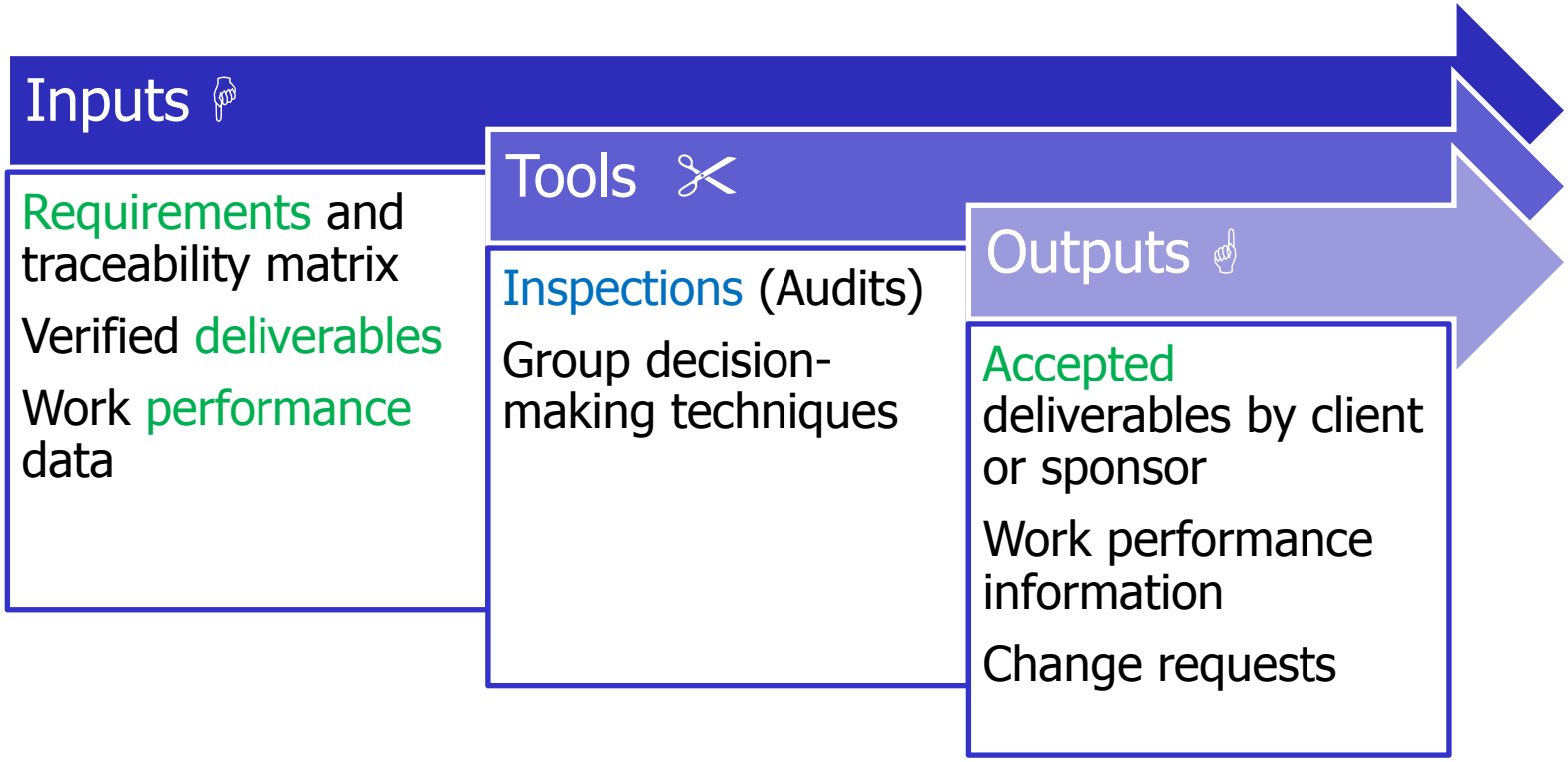
→ *Exercise WBS*

WBS– Example

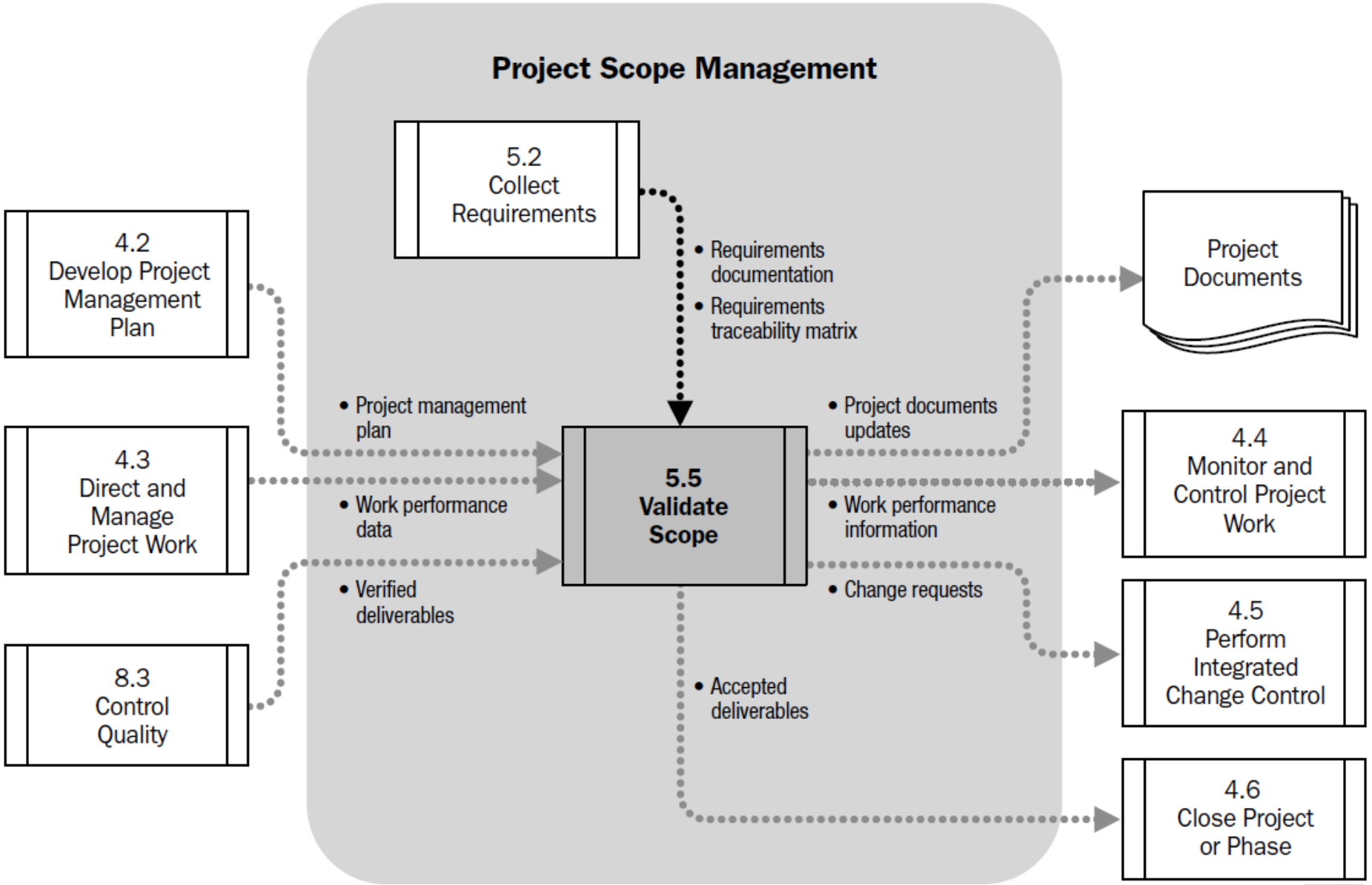


The WBS is illustrative only. It is not intended to represent the full project scope of any specific project, nor to imply that this is the only way to organize a WBS on this type of project.

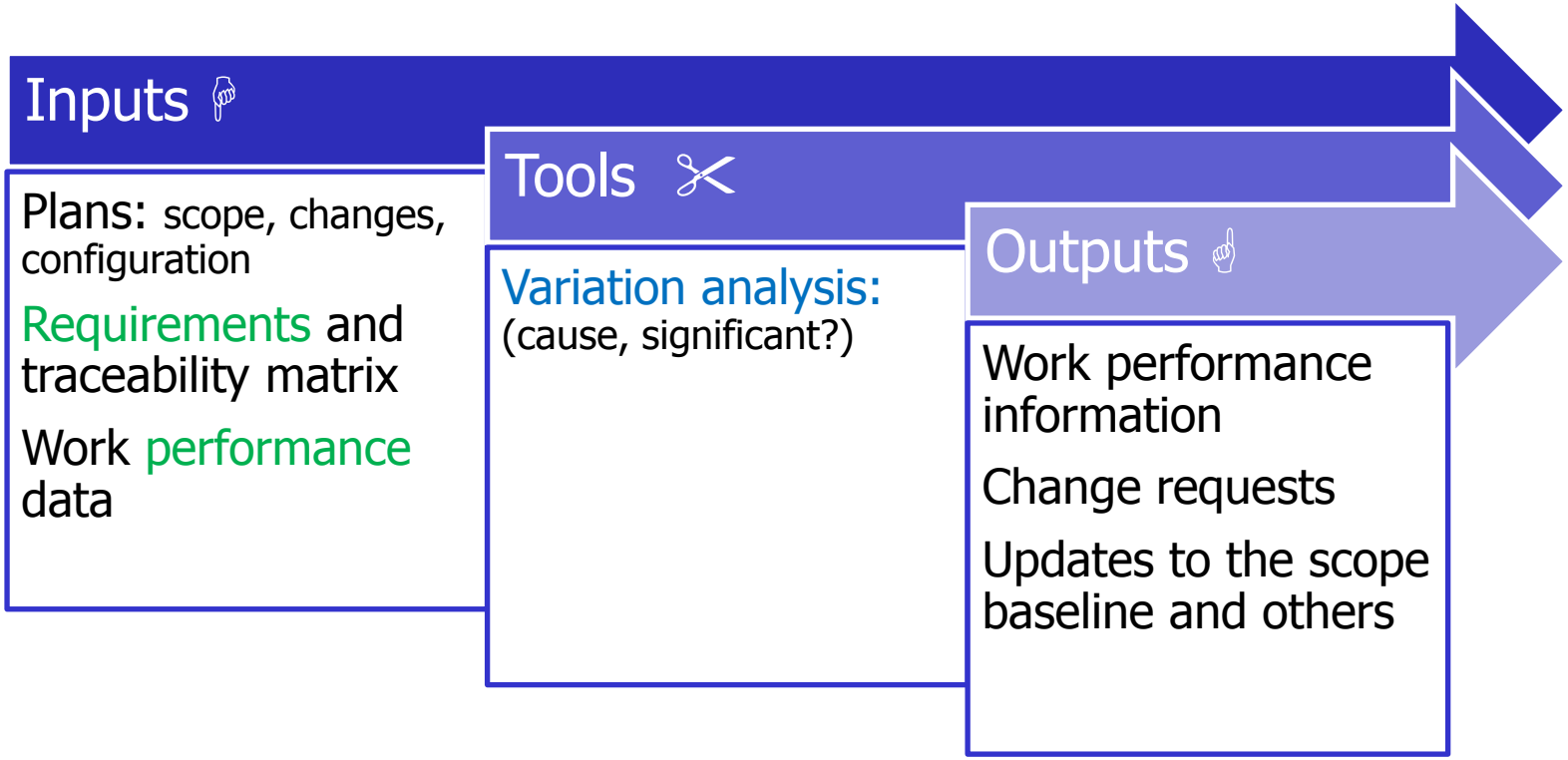
5. Validate scope



5. Validate scope

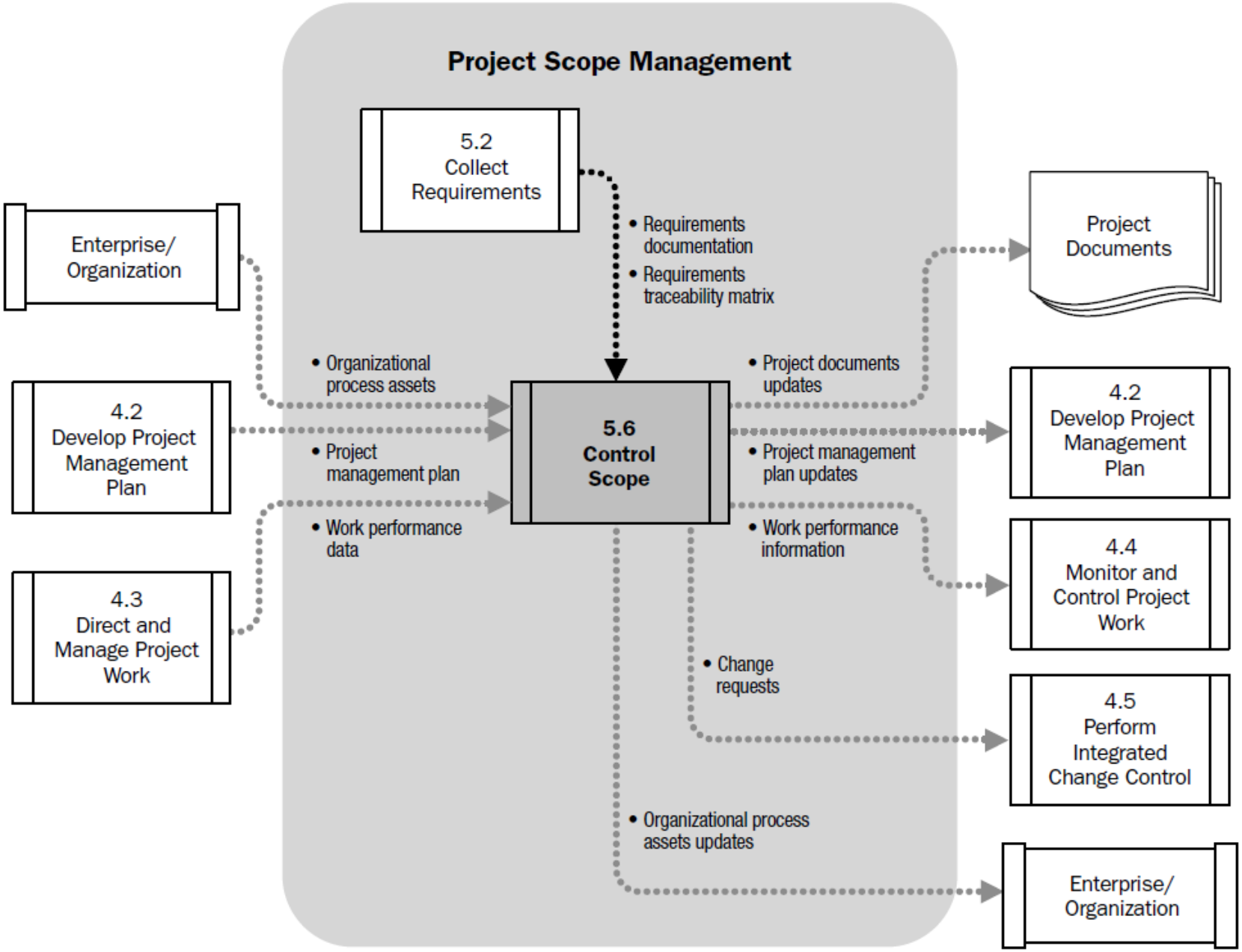


6. Control scope

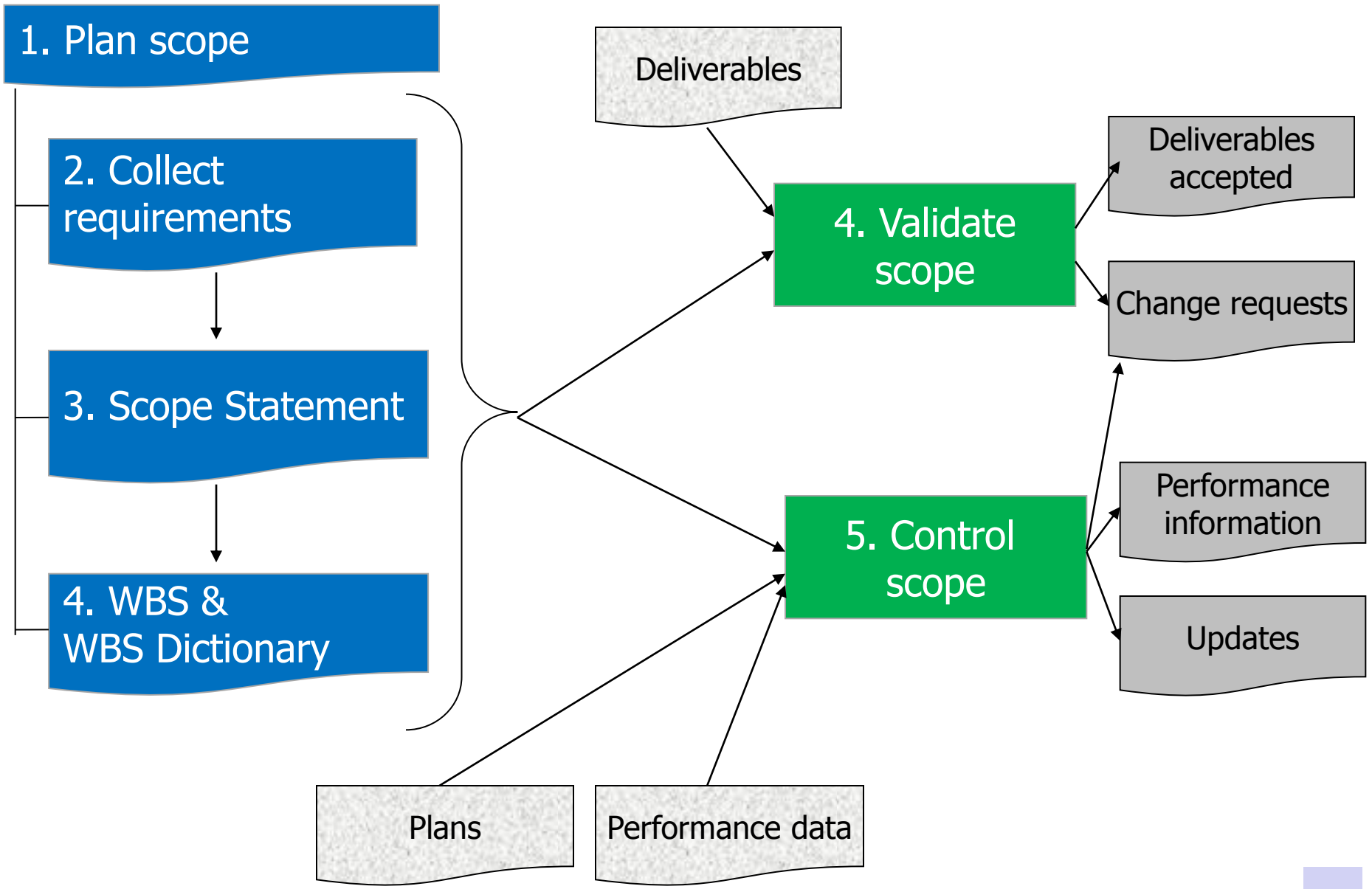


"Evaluate impacts"
"Be Proactive"

6. Control scope



Summarizing the scope



Lessons learned

- ✓ Product scope
- ✓ Project scope
- ✓ Control scope
- ✓ Scope corruption
- ✓ Control account
- ✓ Define scope
- ✓ Decomposition
- ✓ WBS dictionary
- ✓ Scope statement
- ✓ Work breakdown structure
- ✓ Scope baseline
- ✓ Work packages
- ✓ Requirements
- ✓ Validate scope

TIME

Define activities

Sequence activities

Estimate resources

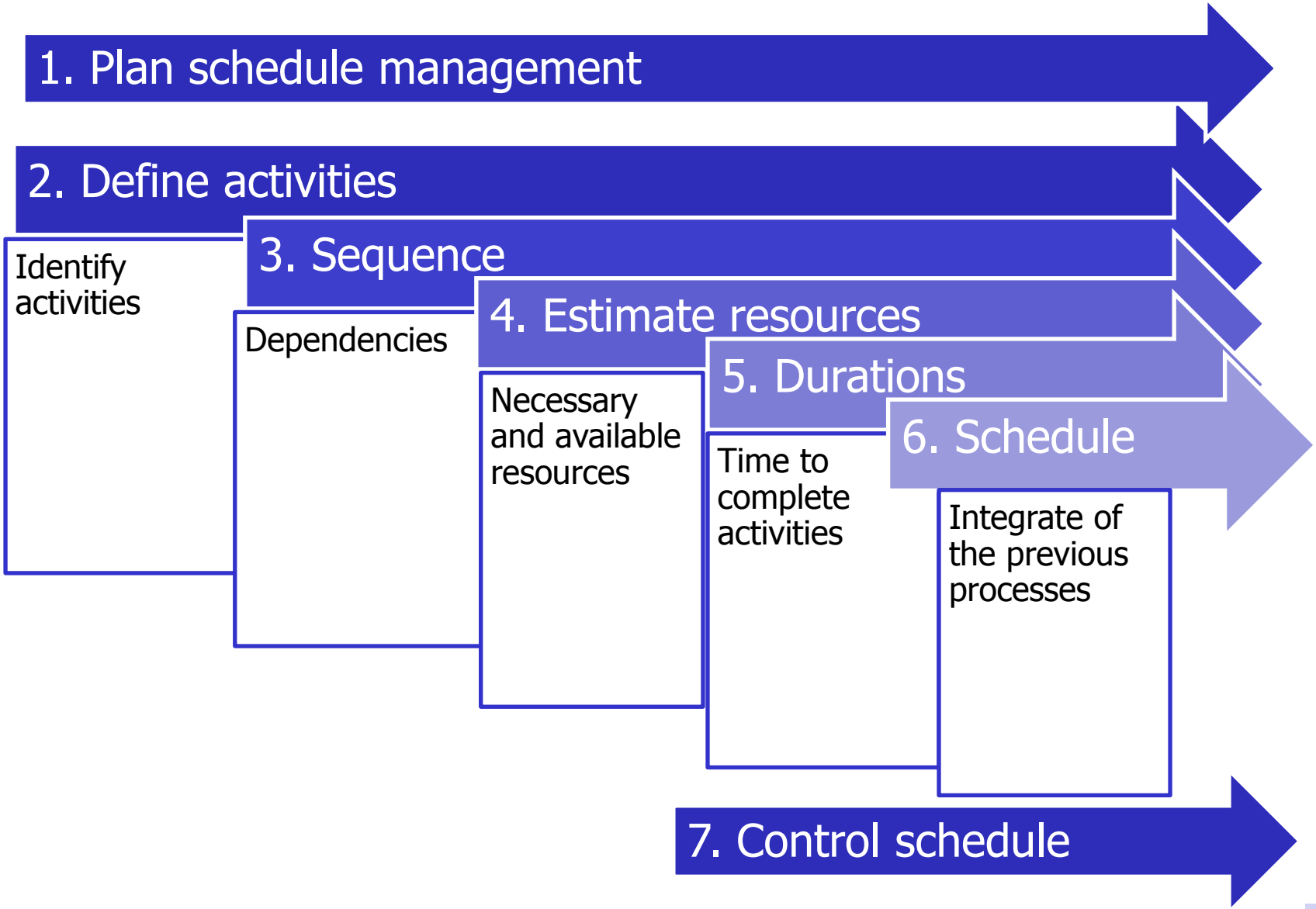
Estimate durations

Develop schedule

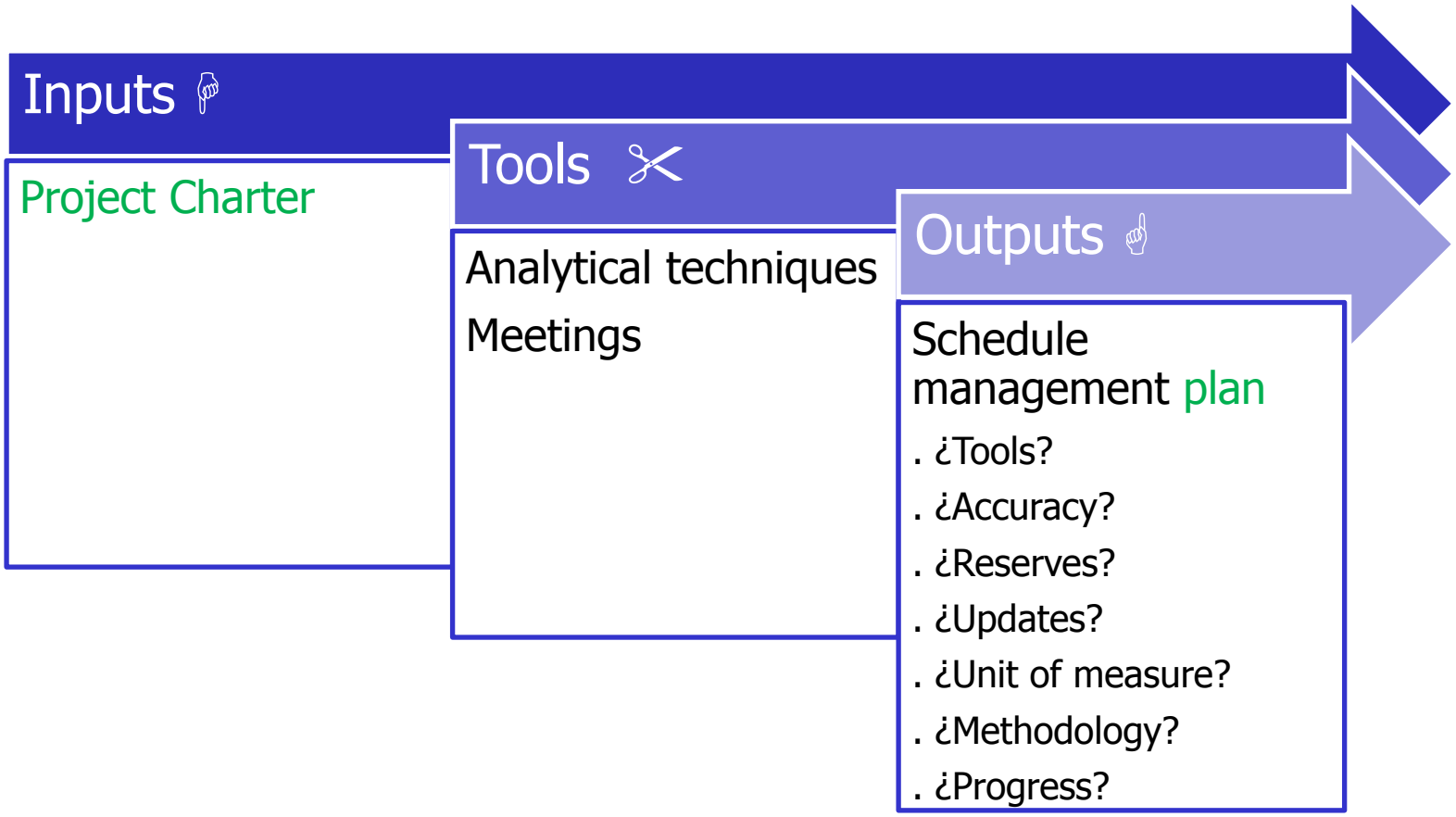
PM Process Groups

	Initiating	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		4		2	
Time		. Plan schedule . Define activities . Sequence activities . Estimate resources . Estimate durations . Develop schedule		Control schedule	
Cost		3		1	
Quality		1	1	1	
Human Resources		1	3		
Communications		1	1	1	
Risk		5		1	
Procurement		1	1	1	1
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

Time management processes



1. Plan schedule management



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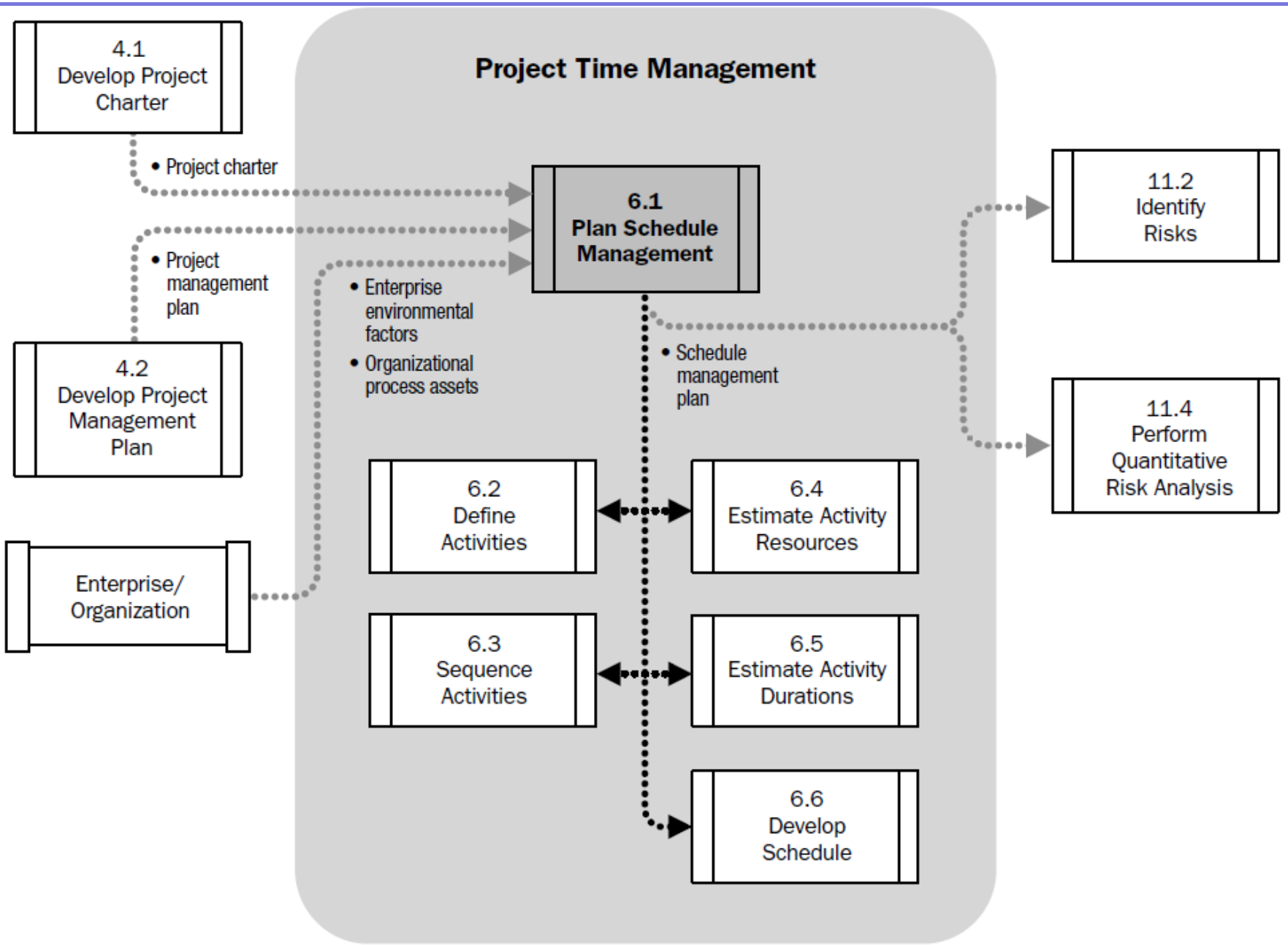
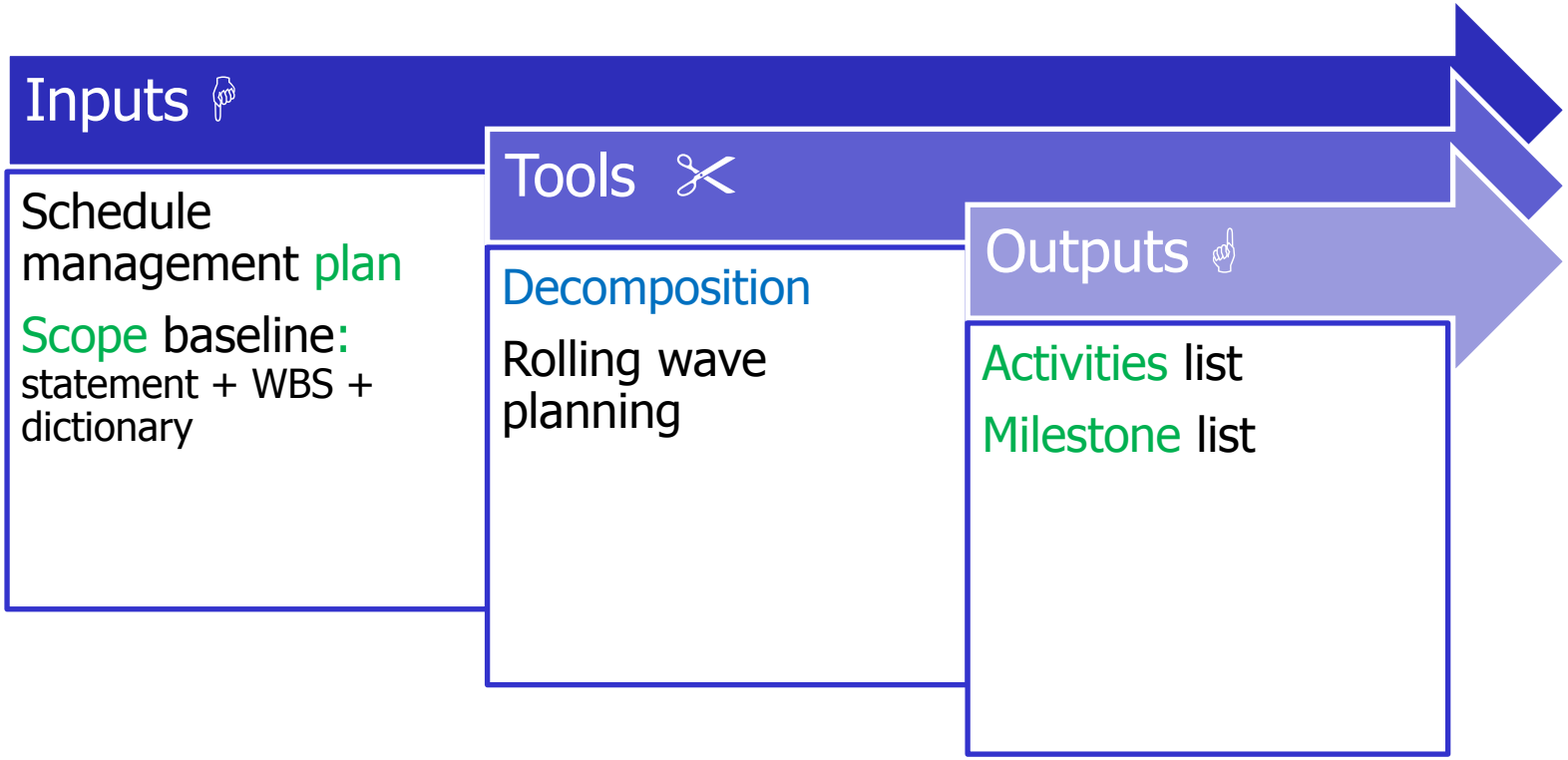


2. Define activities



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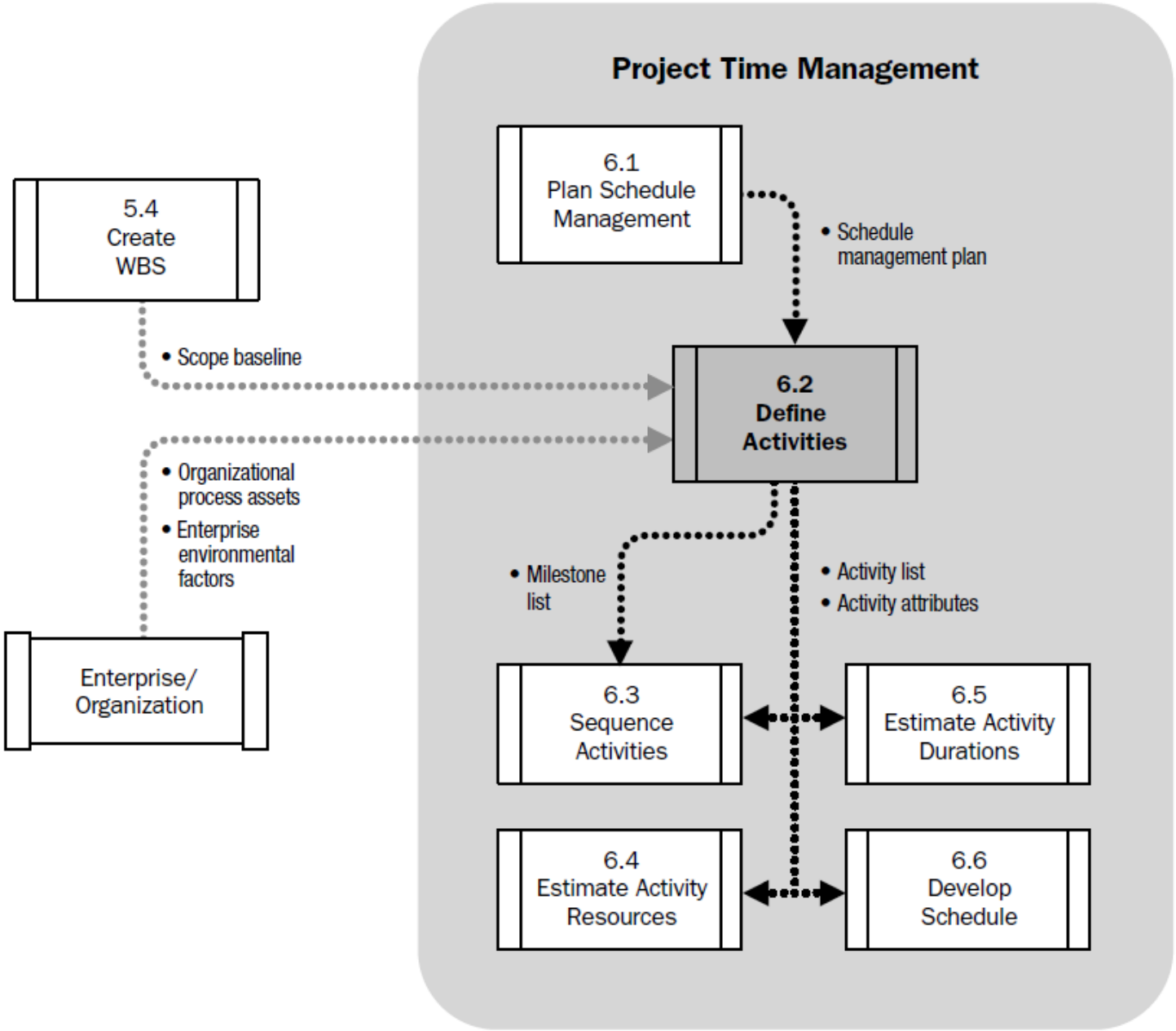
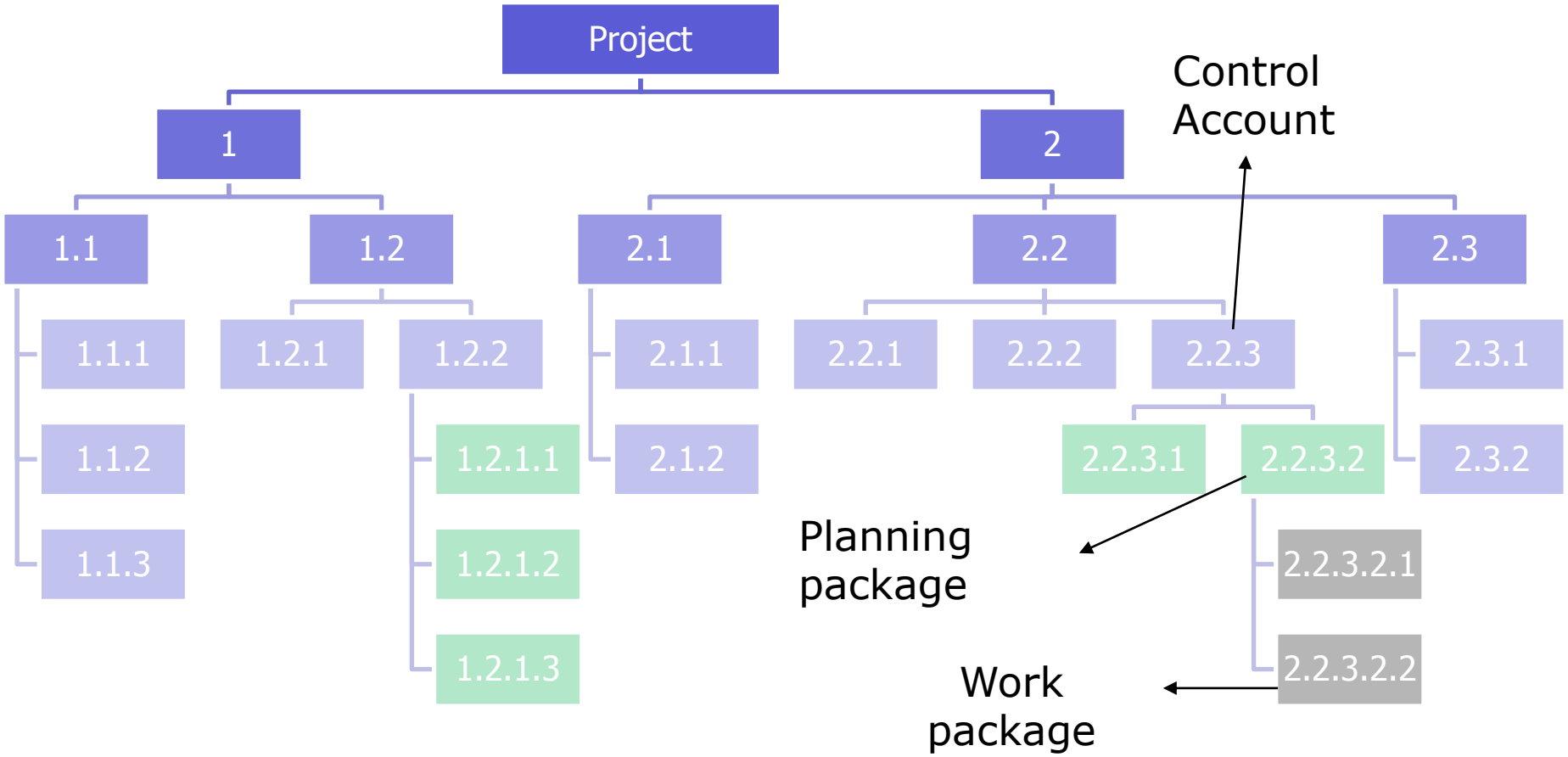
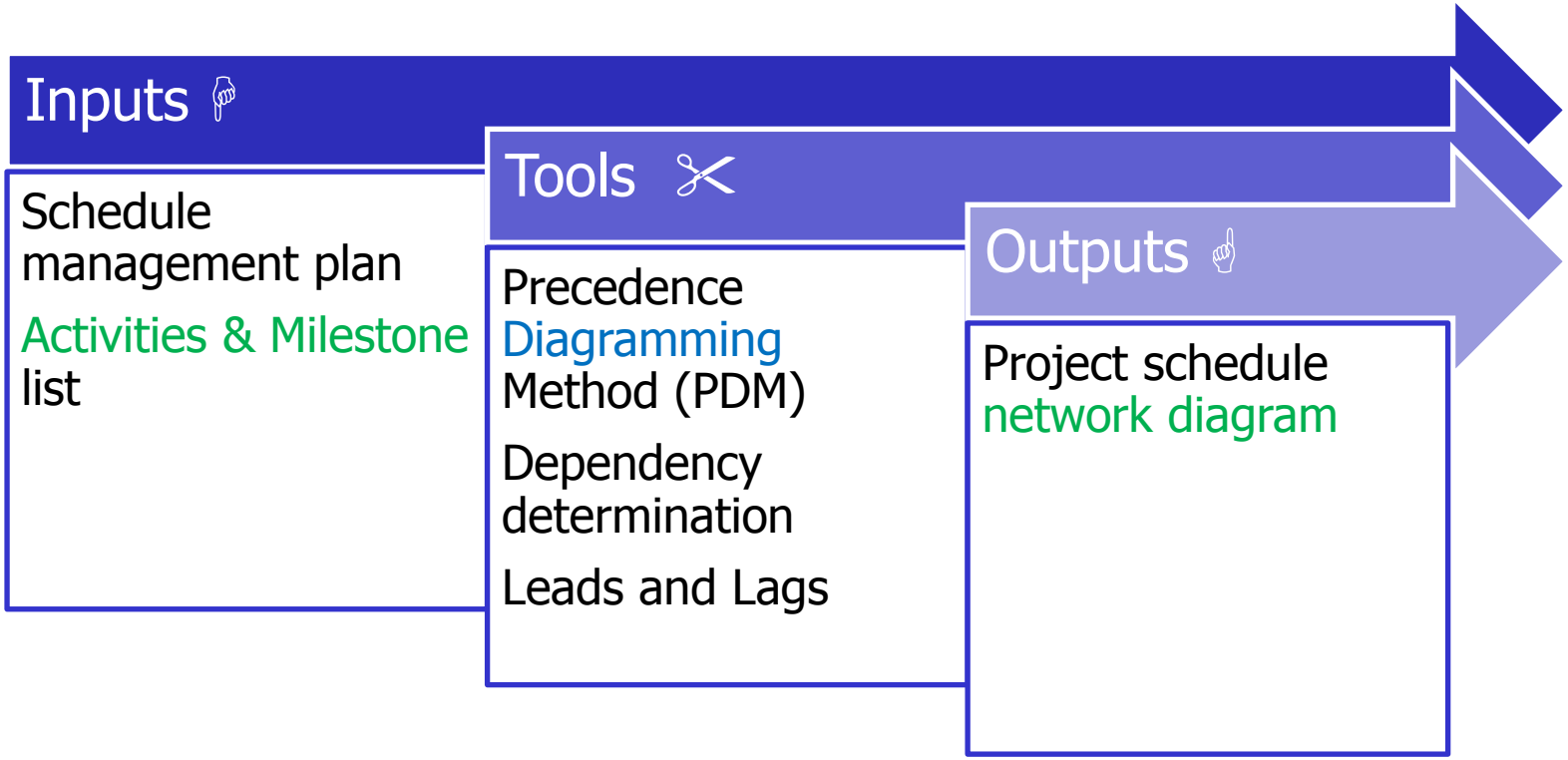


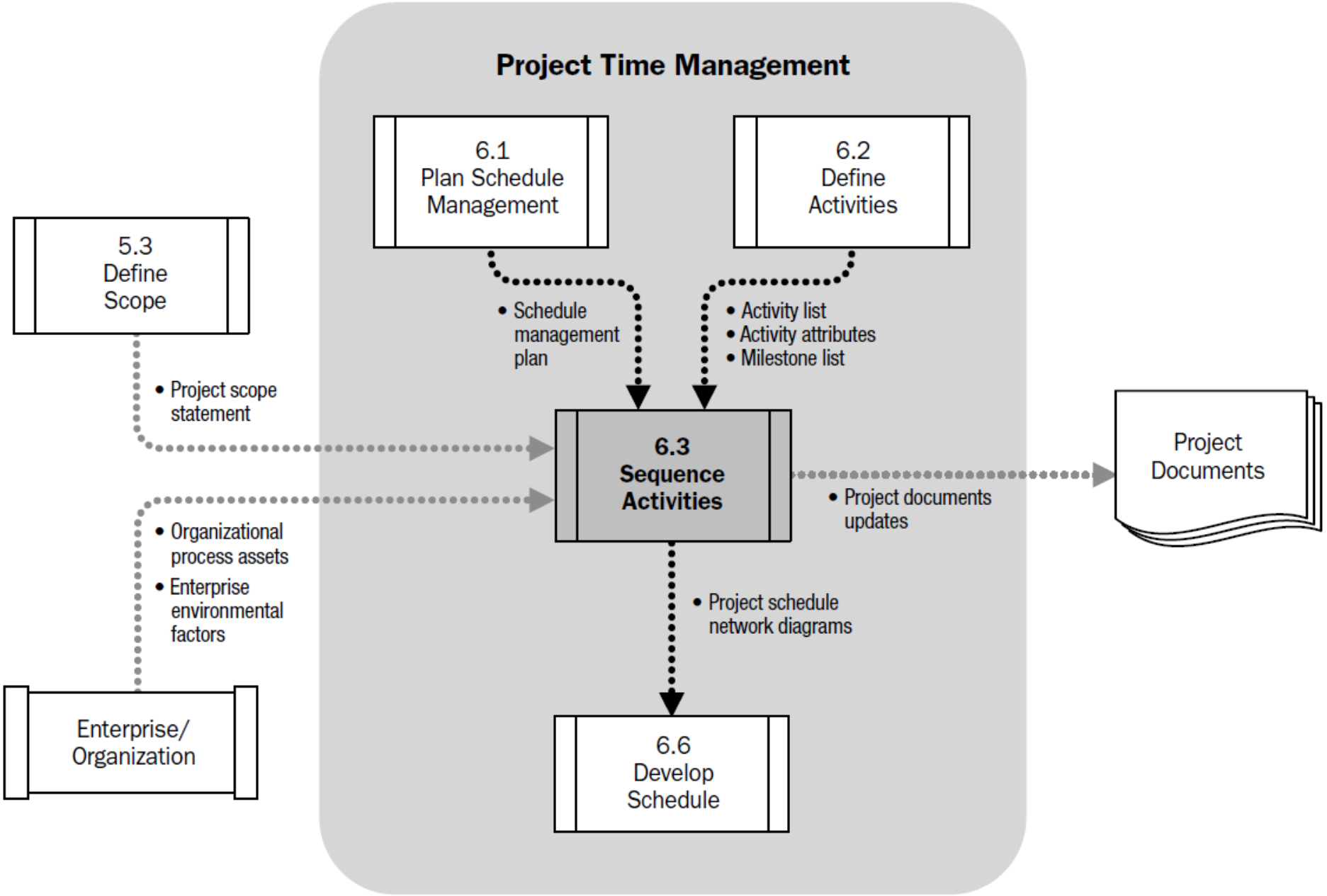
Planning components on the WBS



3. Sequence activities

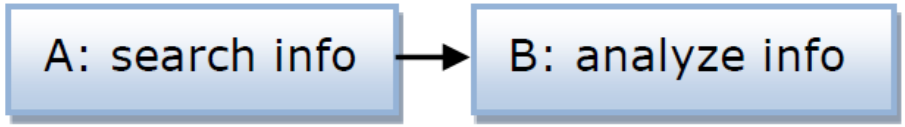


3. Secuenciar Activities

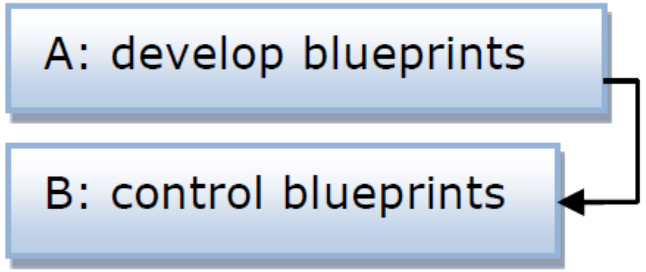


Types of dependencies of PDM

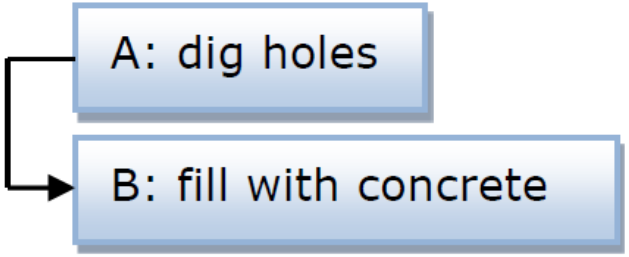
- Finish to start: B starts when A finishes



- Finish to finish: B cannot finish until A finishes



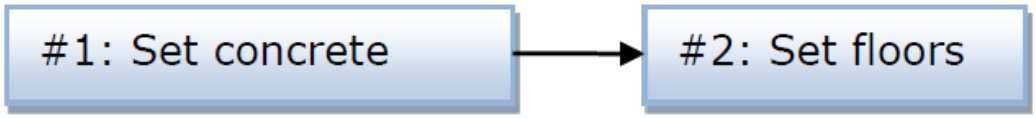
- Start to start: B cannot start until A starts



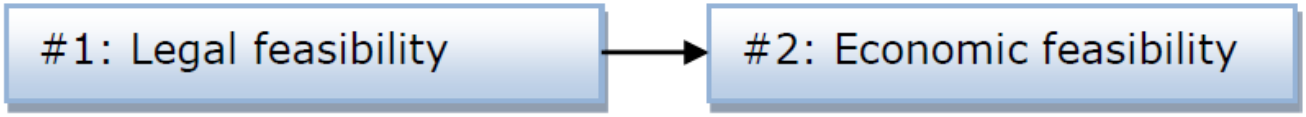
- Start to finish: B cannot finish until A starts (not used).

Types of dependencies

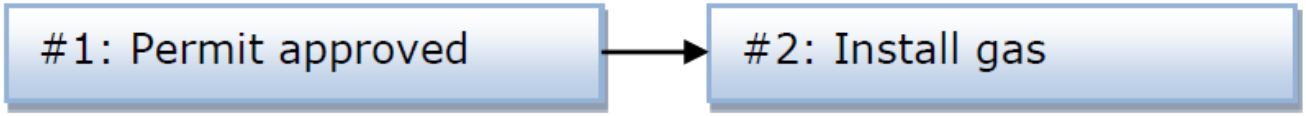
- **Mandatory sequence**: we cannot put the floor until the concrete is set.



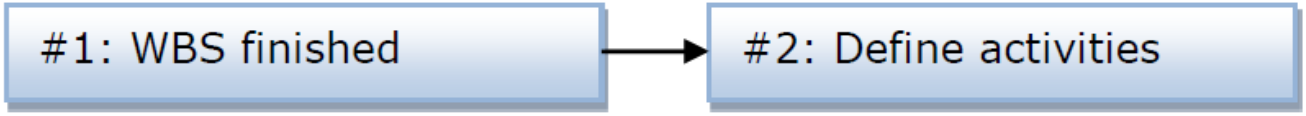
- **Discretionary sequence (or chosen)**: we can perform the legal feasibility study before the economic feasibility study, but it can be the other way around.



- **External sequence**: we cannot install the gas until the government approves the permit.

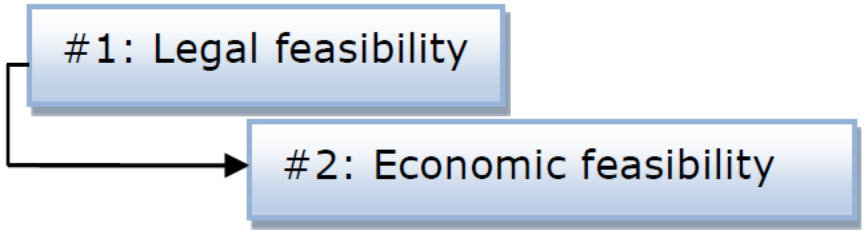


- **Internal sequence**: we cannot define activities until the team finishes the WBS.

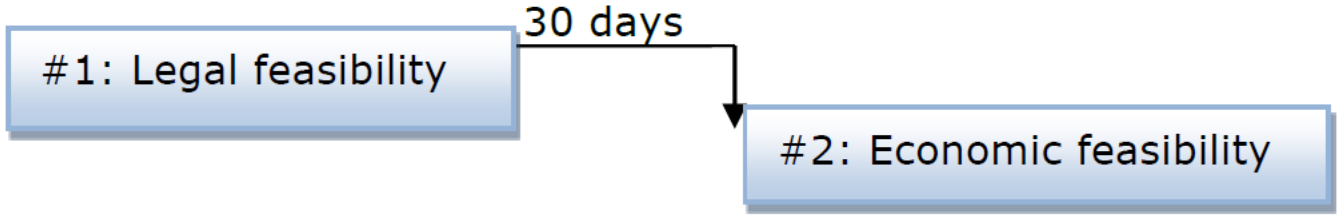


Leads & Lags

- **Lead**: the economic feasibility study start when the legal feasibility study is 50% advanced.

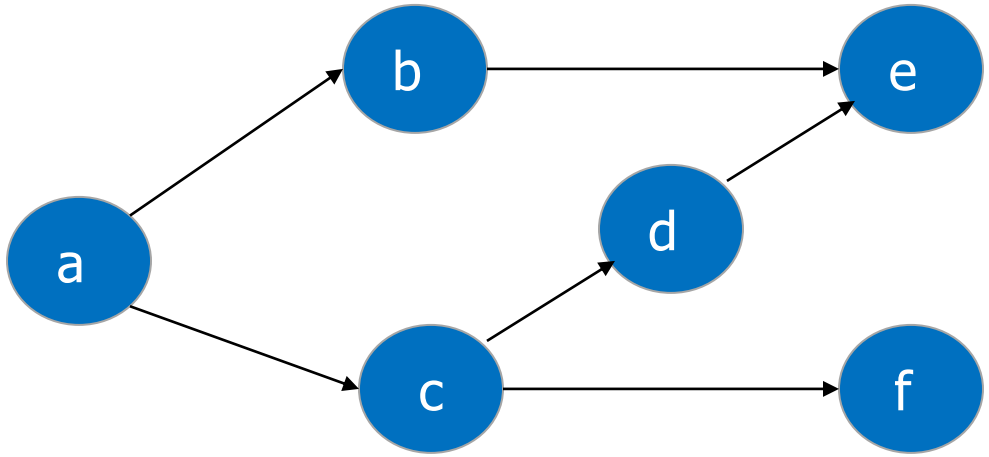


- **Lag**: the economic feasibility study start 30 days after finishing the legal feasibility study.



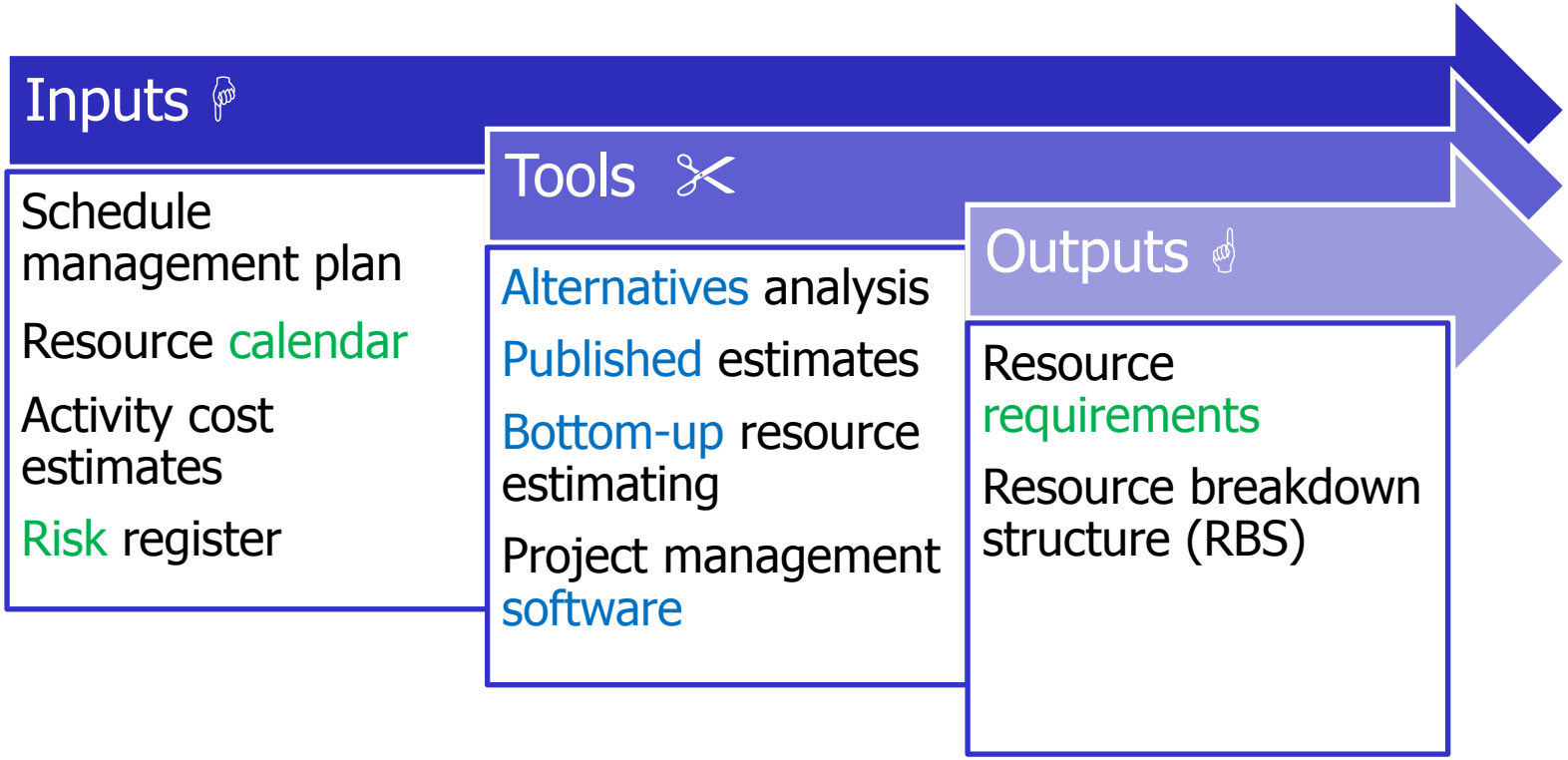
Precedence Diagramming Method (PDM)

AON (Activity On Node): the activities are located in each node and the arrows indicate precedence.

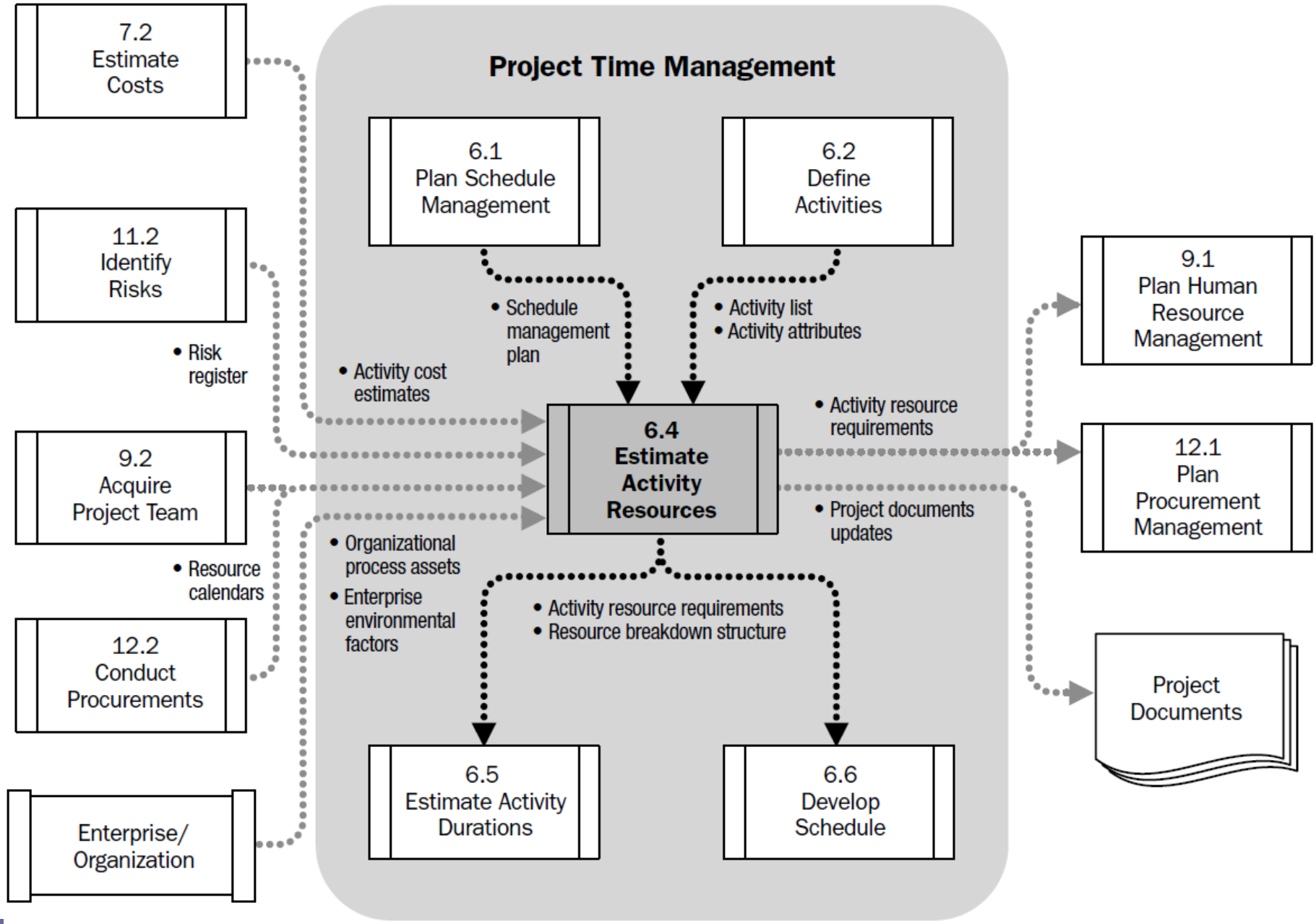


Network diagram

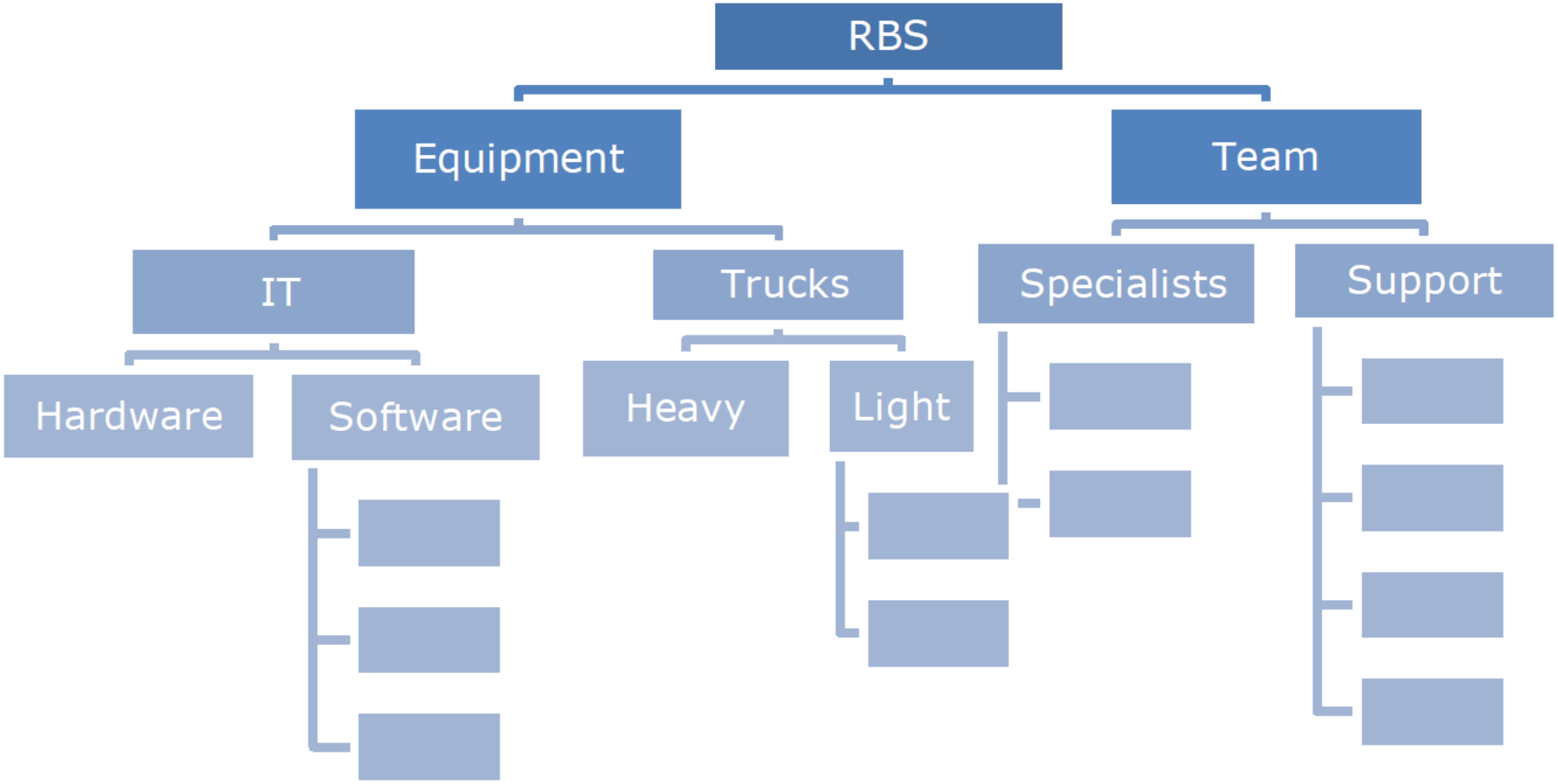
4. Estimate activity resources



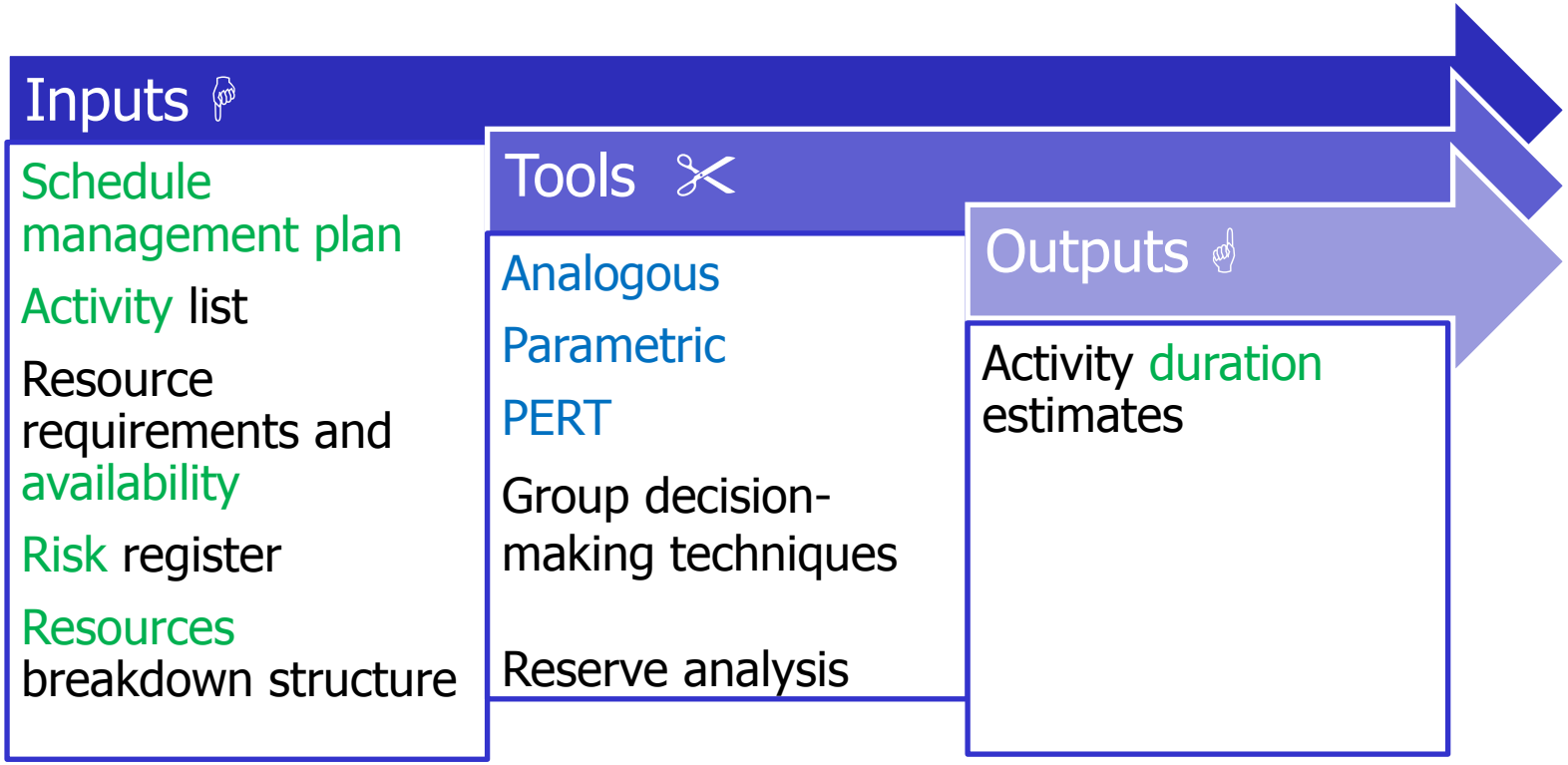
4. Estimate activity resources



Resource breakdown structure (RBS)



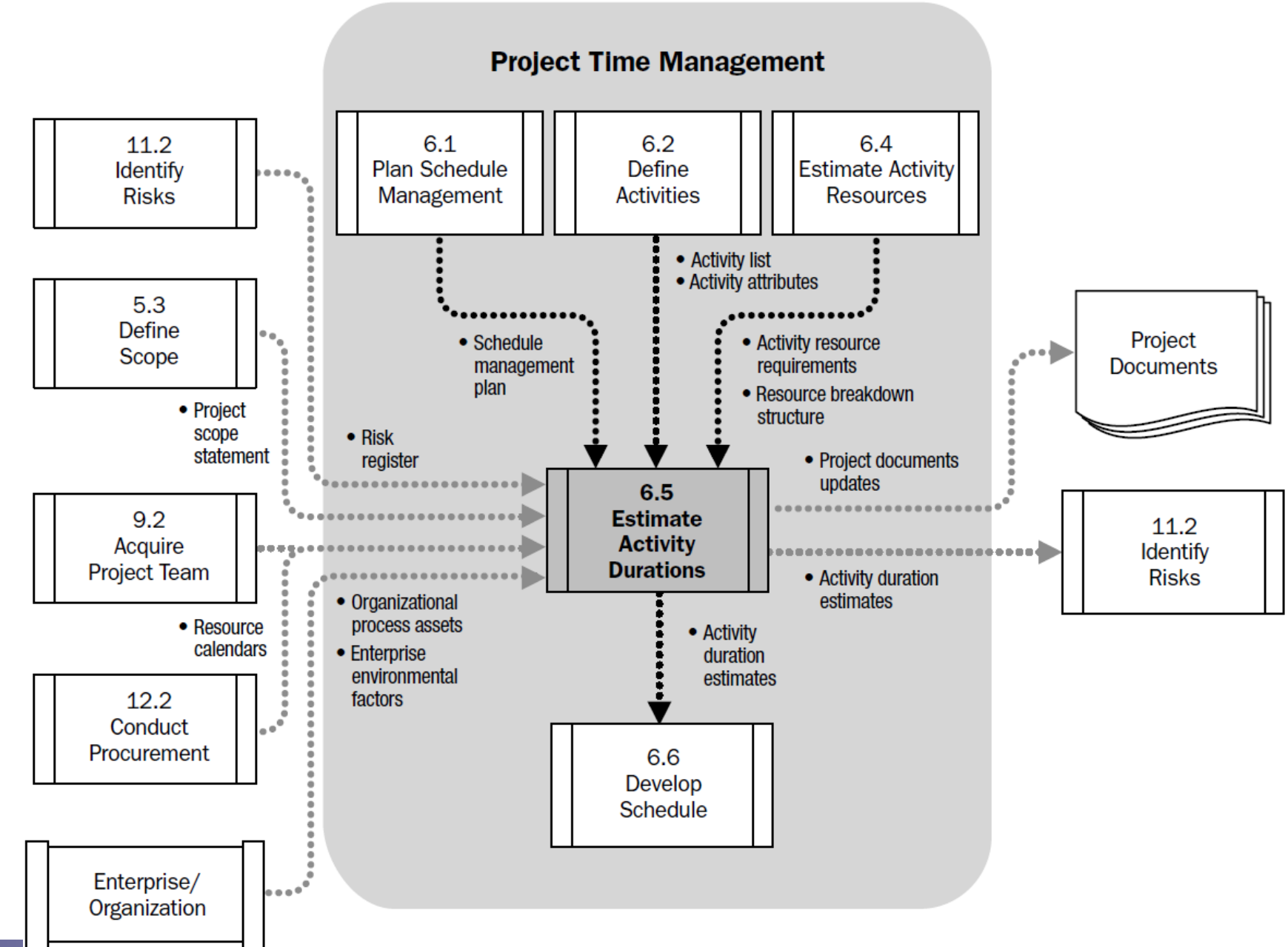
5. Estimate activity duration



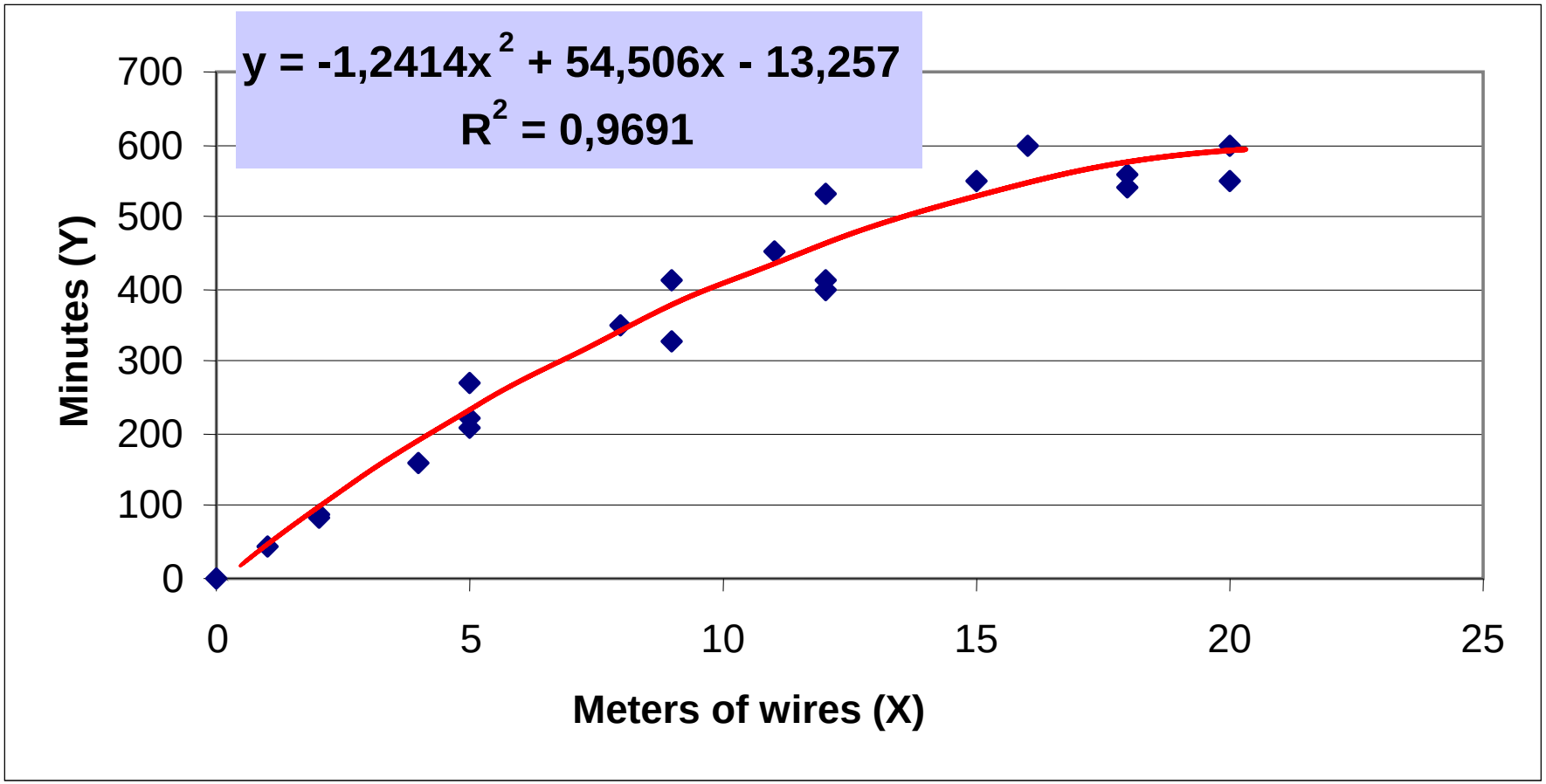
☺ Parkinson's Law: Work expands to fill the time available for its completion. In other words, if my boss told me that I can deliver my activity in 30 days, although I can do it in a couple of days, with luck I will deliver it on the 30th day.

→ *Estimate Exercise*

5. Estimate activity duration

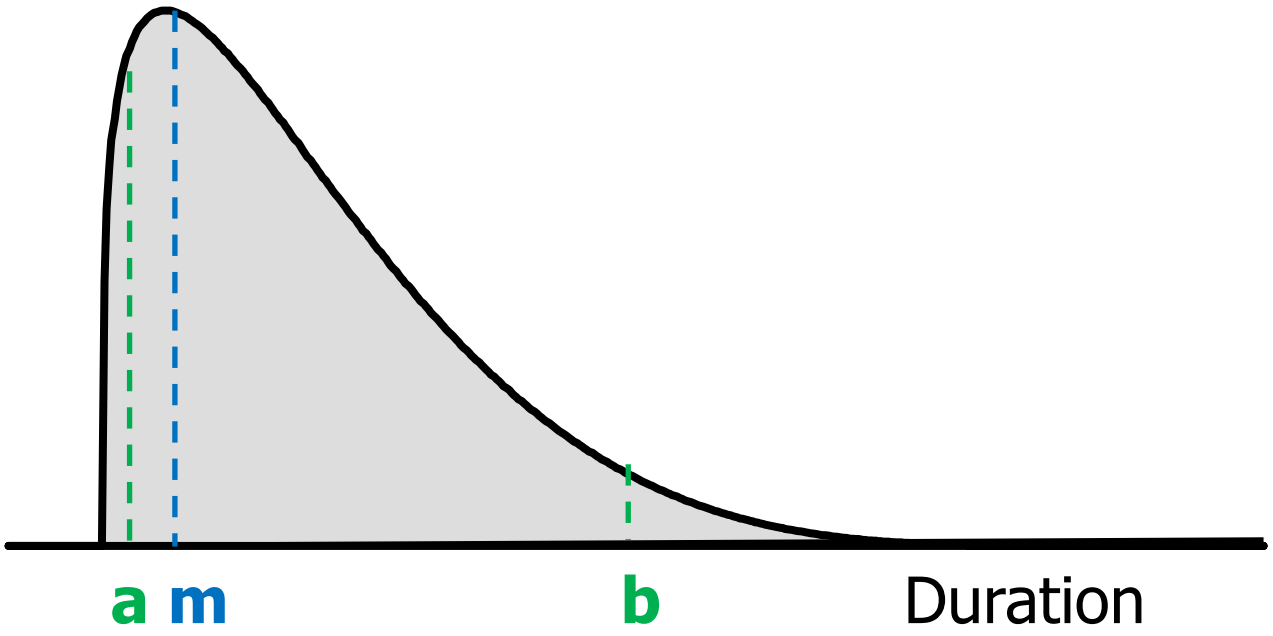


Parametric estimation



Estimate activity duration

- **Three-point estimate (PERT)**: 3 values as a Beta probability distribution



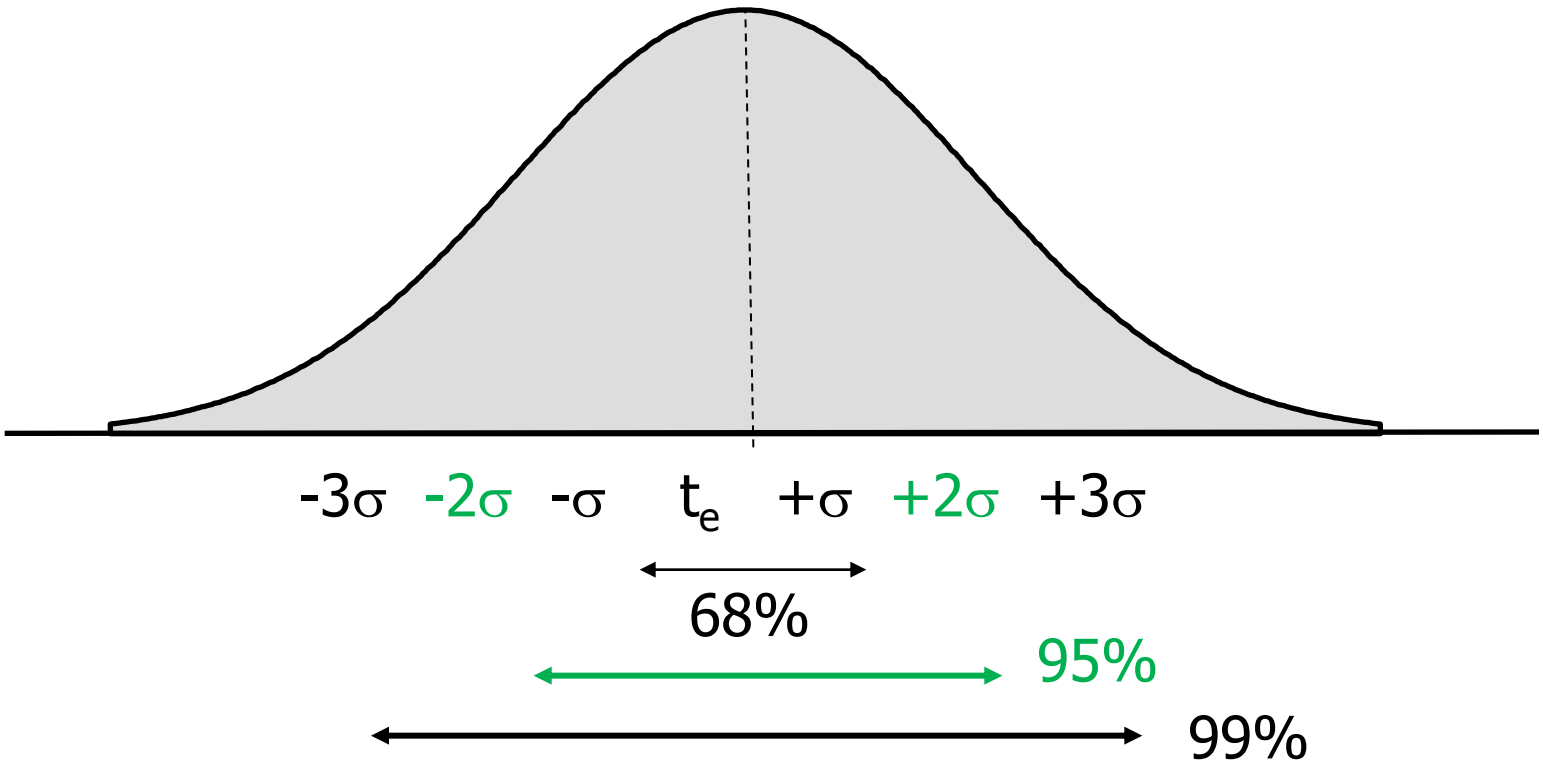
a: optimistic
m: most probable
b: Pessimistic

PERT

- Mean $t_e = \frac{a + 4m + b}{6}$
- Standard Deviation $\sigma = (\frac{b-a}{6})$
- Variance σ^2
- Project duration
  $T_e = \Sigma t_e$ (from critical path activities)
- Project Variance $\sigma^2 = \Sigma \sigma^2$ (from critical path activities)
-

Example: 4, **7**, 16
Mean = (4 + 4x7 + 16) / 6 = **8**
σ = (16 - 4) / 6 = **2**

Standard Normal Distribution

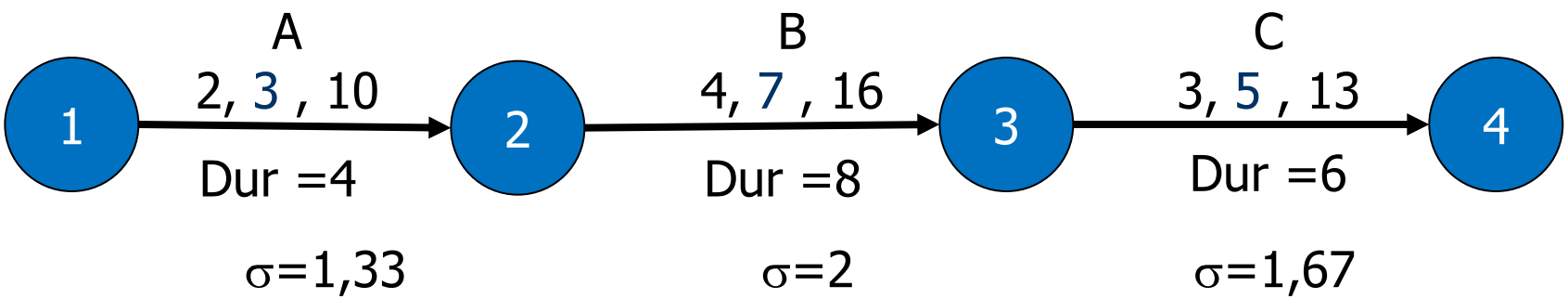


t_e = mean
σ = standard Deviation

8 +- 2 = (6 ; 10) 68% probability

8 +- 2 x 2 = (4 ; 12) 95% probability

PERT



Total duration = 4 + 8 + 6 = 18

σ^2 Total = $1{,}33^2 + 2^2 + 1{,}67^2$ = 8,56

σ Total = $\sqrt{8{,}56}$ = 2,92

$$t_e = \frac{a + 4m + b}{6}$$

$$\sigma = \left(\frac{b - a}{6}\right)$$

Probability	Result	Range
68%	18 +- 2,92	= (15,08 ; 20,92)
95%	18 +- 5,84	= (12,16 ; 23,84)
99%	18 +- 8,76	= (9,24 ; 26,76)

Software Estimation Methods

Source Lines of Code (SLOC):
Total lines of code counted in the software application.
Specific to the technology platform.

Function points (FP):
Business functionality delivered by the application being counted.
Size measured through FP method: independent of the technology.

Object points (OP):
Measures size of an application by counting the number of screens, reports, and interfaces (known as objects) required to complete the coding.
Objects themselves can be classified into different level of complexity such as simple, average, and complex.

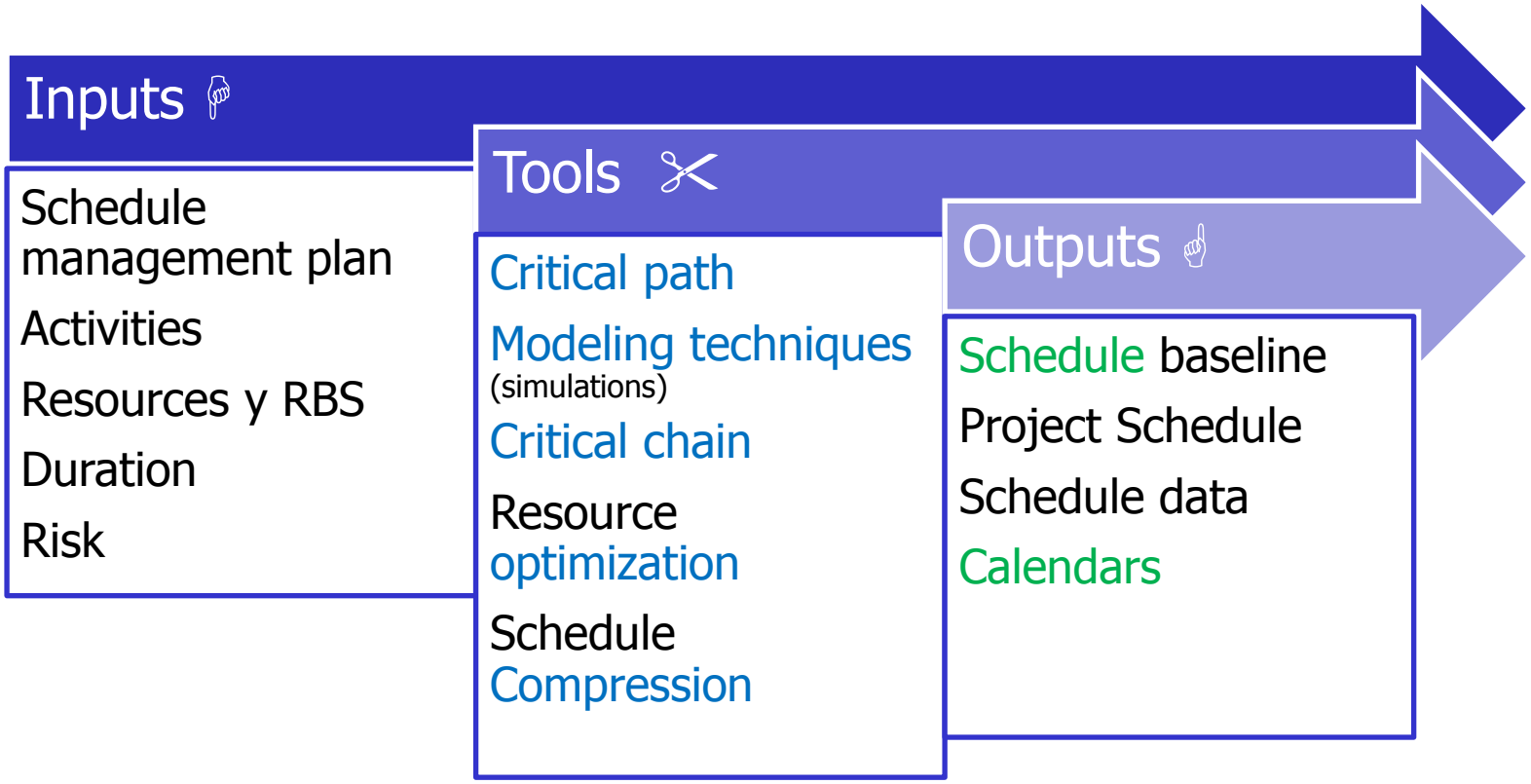
Software Estimation Methods

For example, consider a project that has a count of 1,000 FP. Assuming a delivery rate (productivity) of the project team on a selected platform to be 15 FP per person month, you get a total effort of approximately 67 person months (1,000 FP divided by 15 FP per person month).

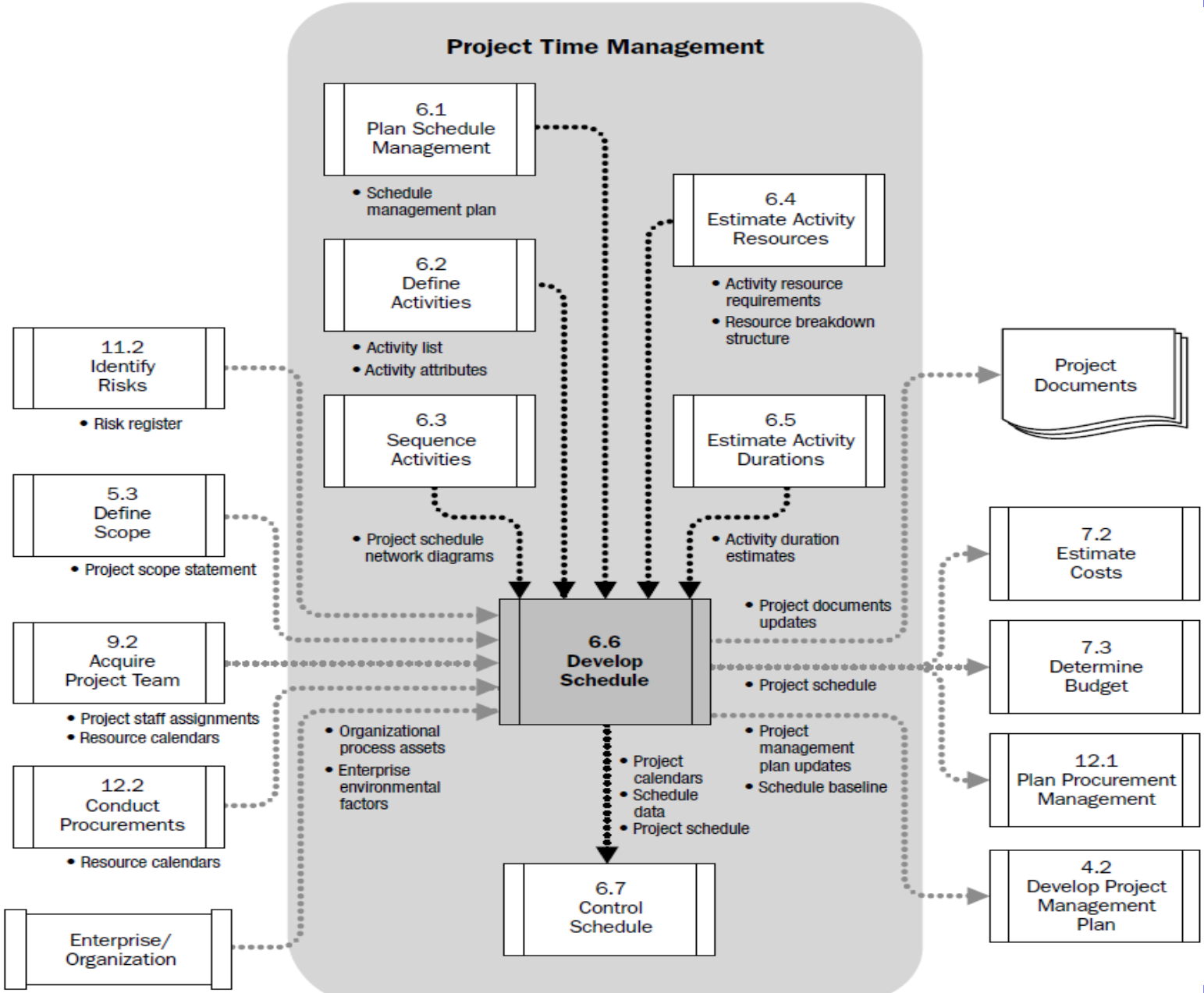
Can assume a lifecycle phase breakup of effort as:

Requirements: 15 %
Design: 20 %
Build: 40 %
Test: 25 %

6. Develop schedule



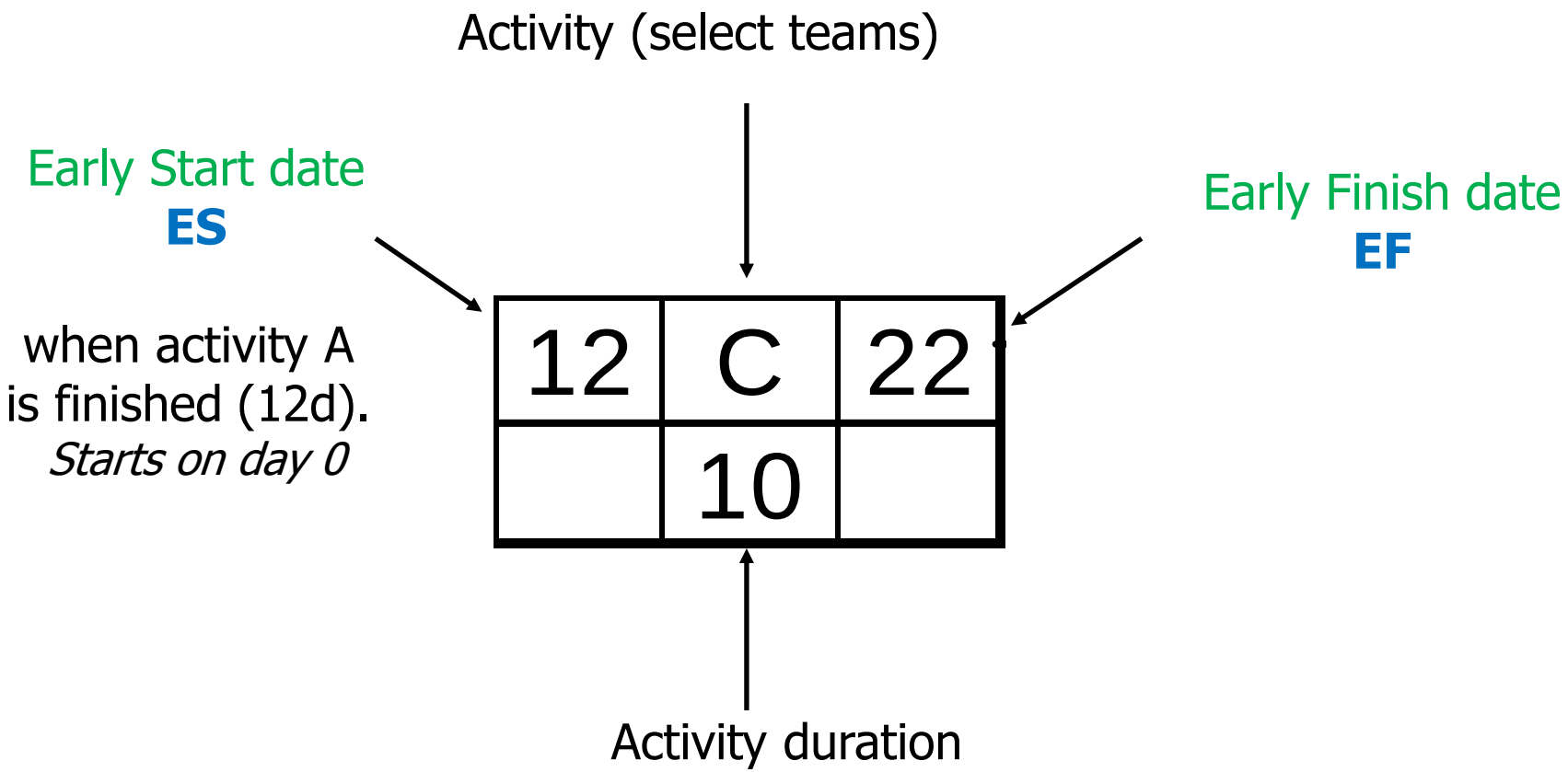
6. Develop schedule



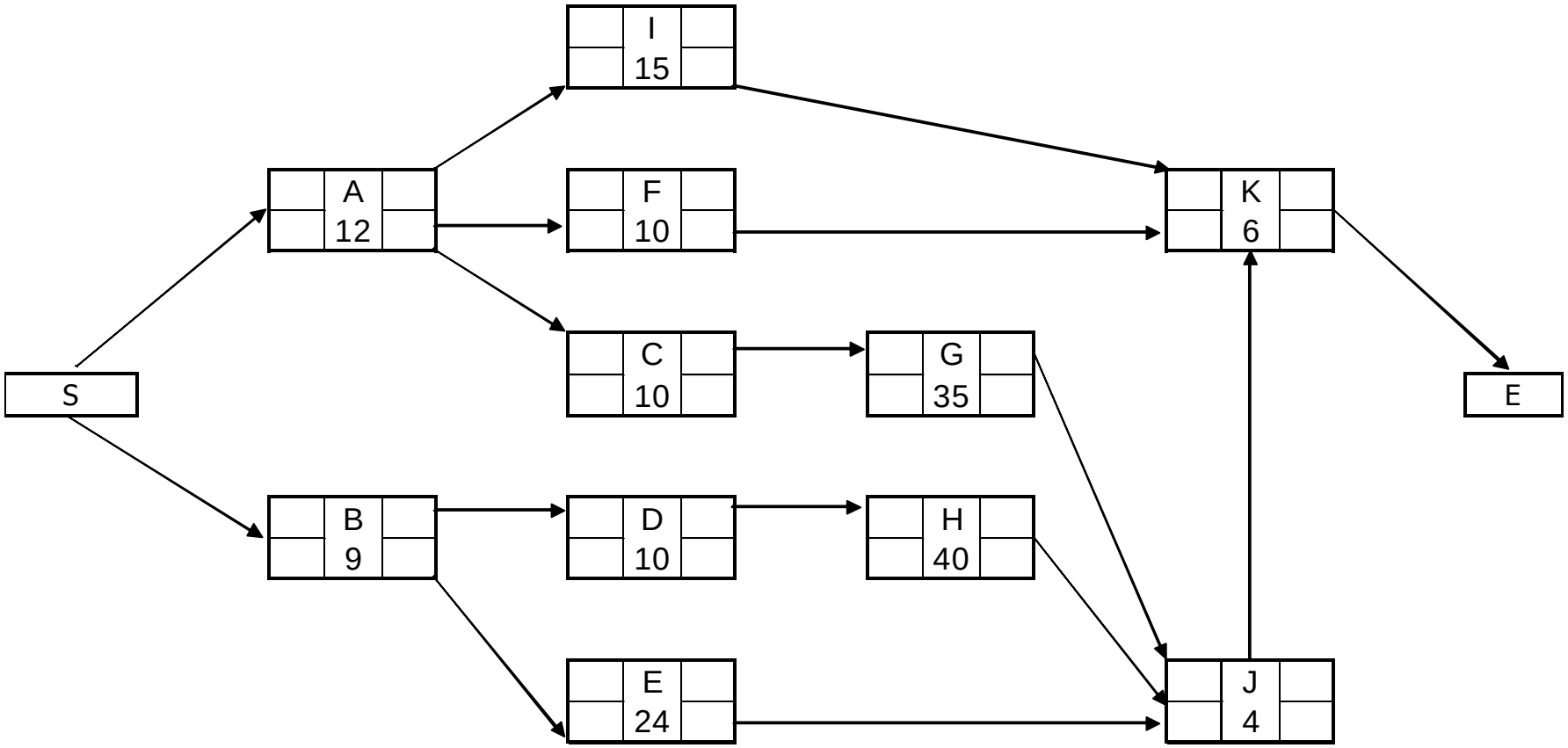
Example: Schedule

Name	Activity	Duration	Predecessor
1 – A	Select personnel	12	
2 – B	Select location	9	
3 – C	Select teams	10	1
4 – D	Make blueprints	10	2
5 – E	Install services	24	2
6 – F	Interview personnel	10	1
7 – G	Buy equipment	35	3
8 – H	Build hospital	40	4
9 – I	Install information systems	15	1
10 – J	Install equipment	4	5, 7, 8
11 – K	Train personnel	6	6, 9, 10

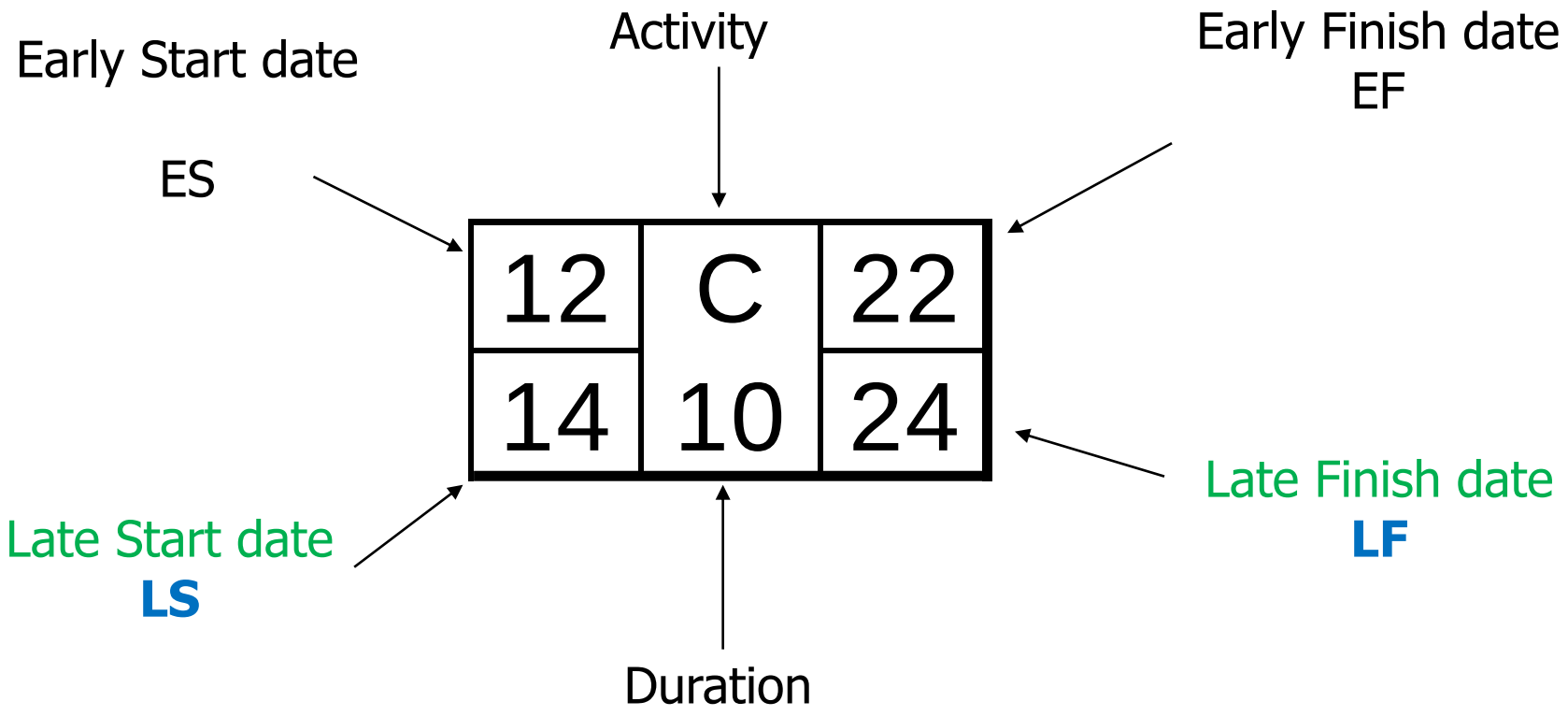
Early Dates


Activity (select teams)
Early Start date
ES
Early Finish date
EF
when activity A
is finished (12d).
Starts on day 0
12
C
22
10
Activity duration

Network diagram

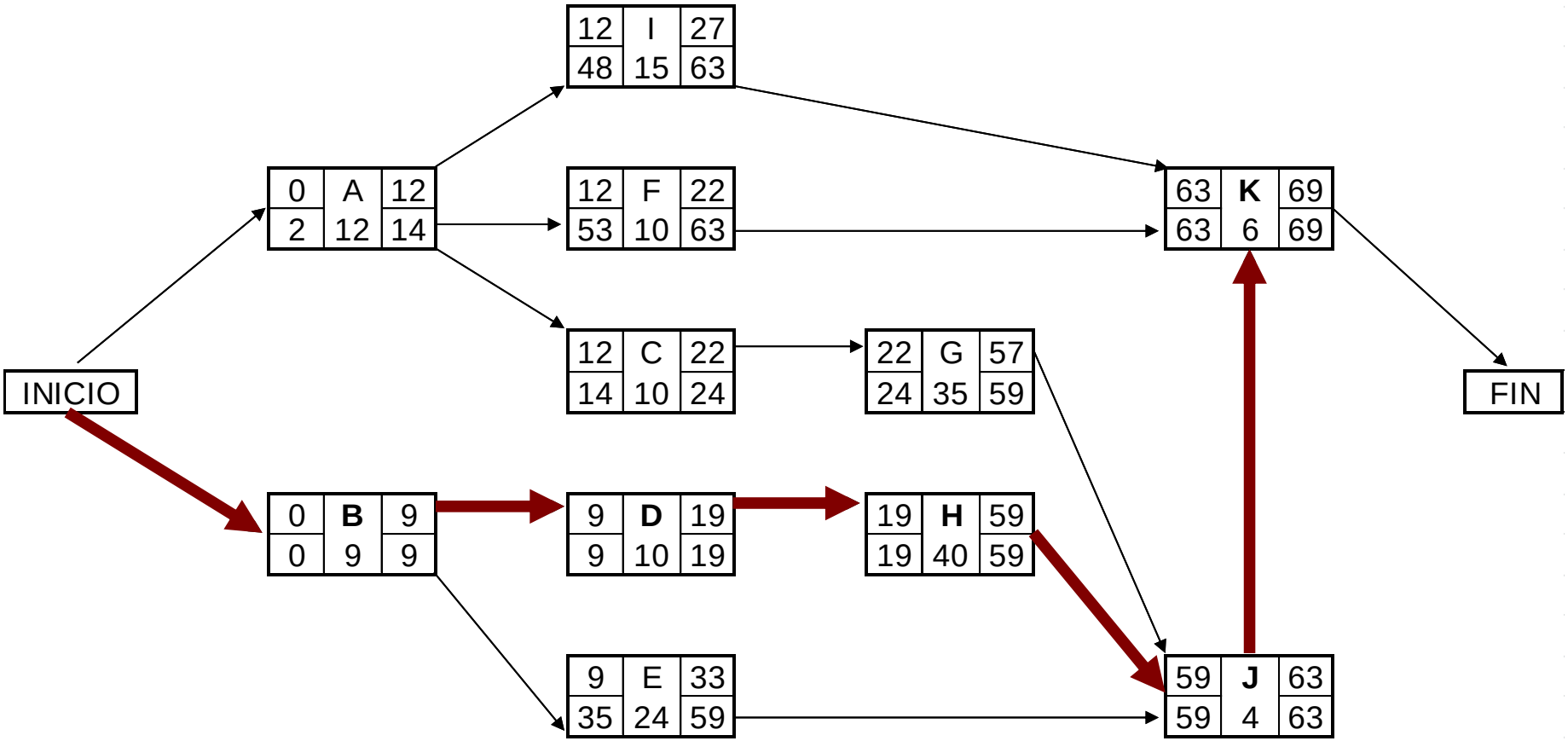


Late dates


Early Start date
ES
Activity
Early Finish date
EF
12
C
22
14
10
24
Late Start date
LS
Duration
Late Finish date
LF

Critical Path Method

Forward and Backward pass



Slack = LS – ES or LF - EF

The formula starts with LS or LF, because we are always late.

Slacks

Total slack: time that this activity can be delayed without changing the project duration.

Free slack: time an activity can be delayed without causing slippage (delay) to the early start date of any of its successors.

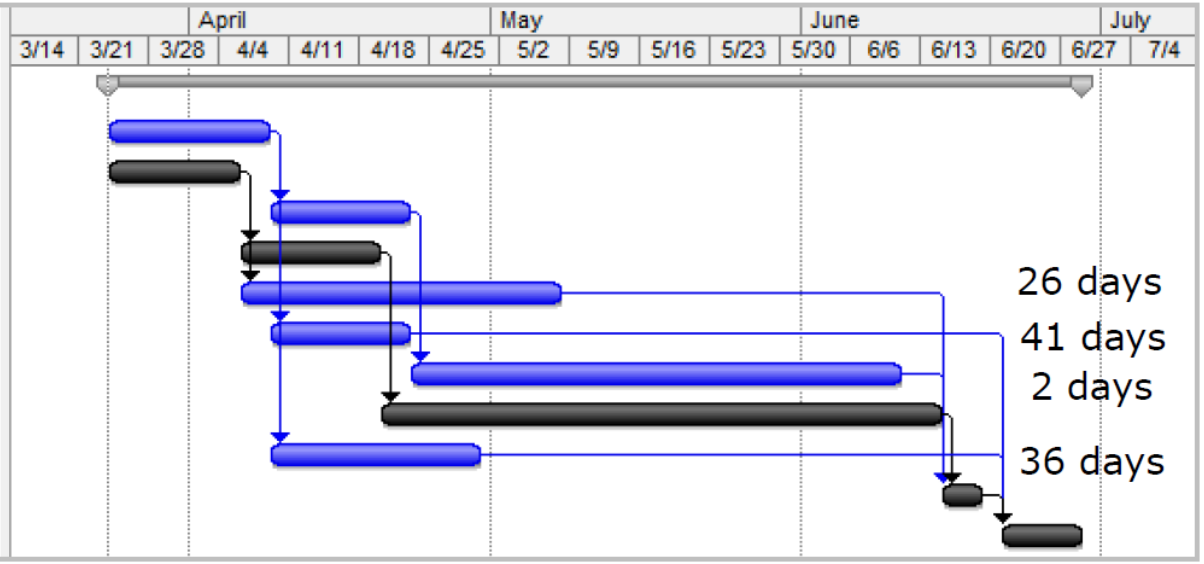
Project slack: time the project can be delayed without delaying the published finish date.

The slack can be negative. Example:
Planned finish date = 120 days
Established date on the contract = 100 days
Slack= 100 -120 = -20

Critical Path and Slack

Microsoft Project

	Task Name	Duration
0	**Hospital**	**69 days**
1	A- Select personnel	12 days
2	**B-Select location**	9 days
3	C-Select equipment	10 days
4	**D-Create blueprints**	10 days
5	E-Install services	24 days
6	F-Interview personnel	10 days
7	G-Purchase equipment	35 days
8	**H-Construct hospital**	40 days
9	I-Install information systems	15 days
10	**J-Install equipment**	4 days
11	**K-Train personnel**	6 days



Near-critical path: "almost" critical path

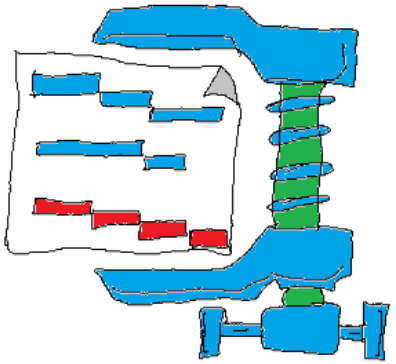
✂ Schedule compression

Shortening the project schedule without modifying the scope

Crashing:
Add more resources to accelerate => in general ↑ costs

How to obtain the maximum schedule compression at the minimum cost?

Fast-tracking:
Perform activities in parallel to accelerate
=> Adds risks to the project



Schedule compression

The General Manager has told you that you must finish the project three weeks ahead of schedule. What should you do?

A. Consult with the sponsor
B. Crashing
C. Inform the manager about the impact to the project
D. Fast-tracking

How to shorten the project schedule ?

Option	Impact on the Project
Fast-tracking	Increases risks Requires more time from the PM
Crashing	Increases costs Requires more time from the PM
Decrease scope	Saves time and costs Decreases client satisfaction
Cut quality	Could save time and costs Increases risks

Milestones Schedule

Critical event in the project (no duration)

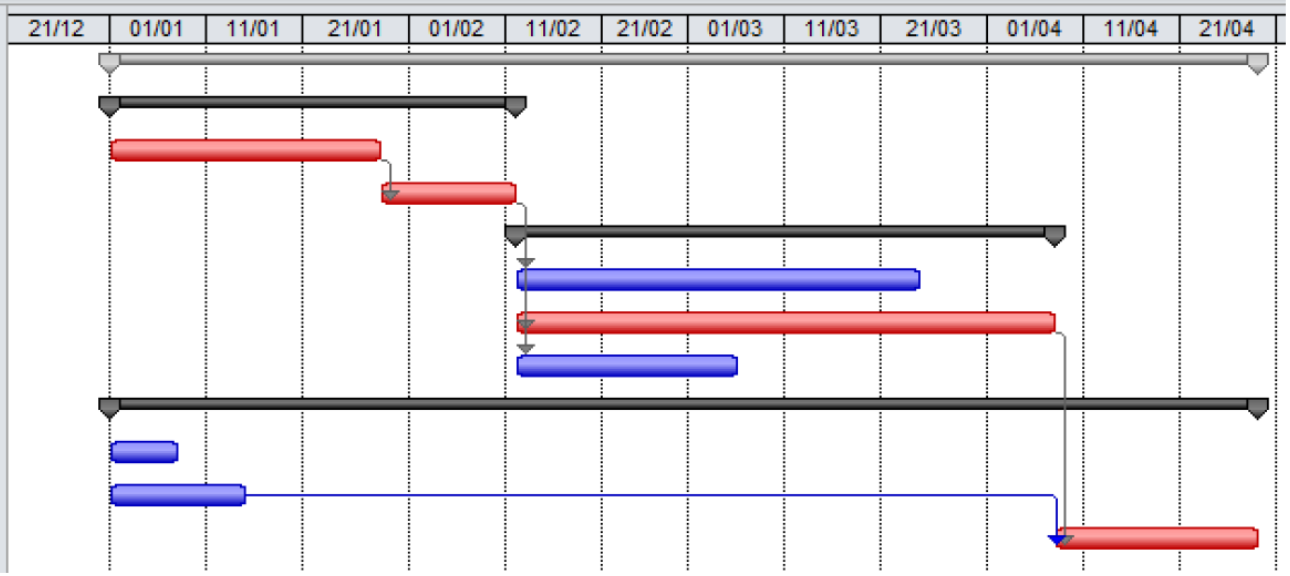
Example: date to test devices

#	Task name	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1	Sign contracts	7/16							
2	Define requirements		8/16						
3	Review design			9/16					
4	Test devices					11/6			
5	Produce devices							1/21	
6	Finalize product plan								2/15

Most adequate format to present to top management

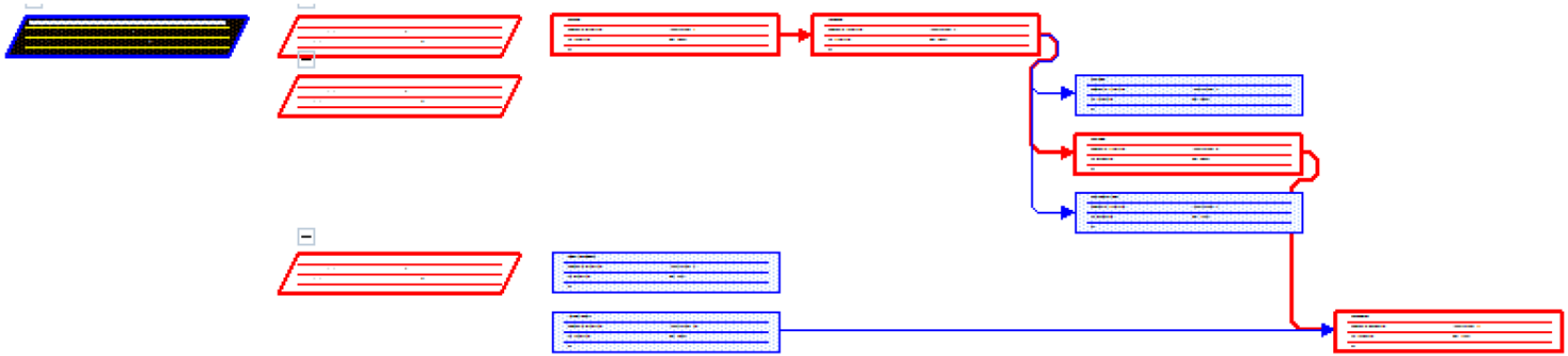
Bar chart (Gantt)

	Task name
0	**Agriculture Project**
1	**Prepare land**
2	Buy land
3	Level land
4	**Plantations**
5	Plant Olive
6	Plant Vine
7	Plant Plump trees
8	**Install irrigation system**
9	Select technology
10	Import inputs
11	Place hoses



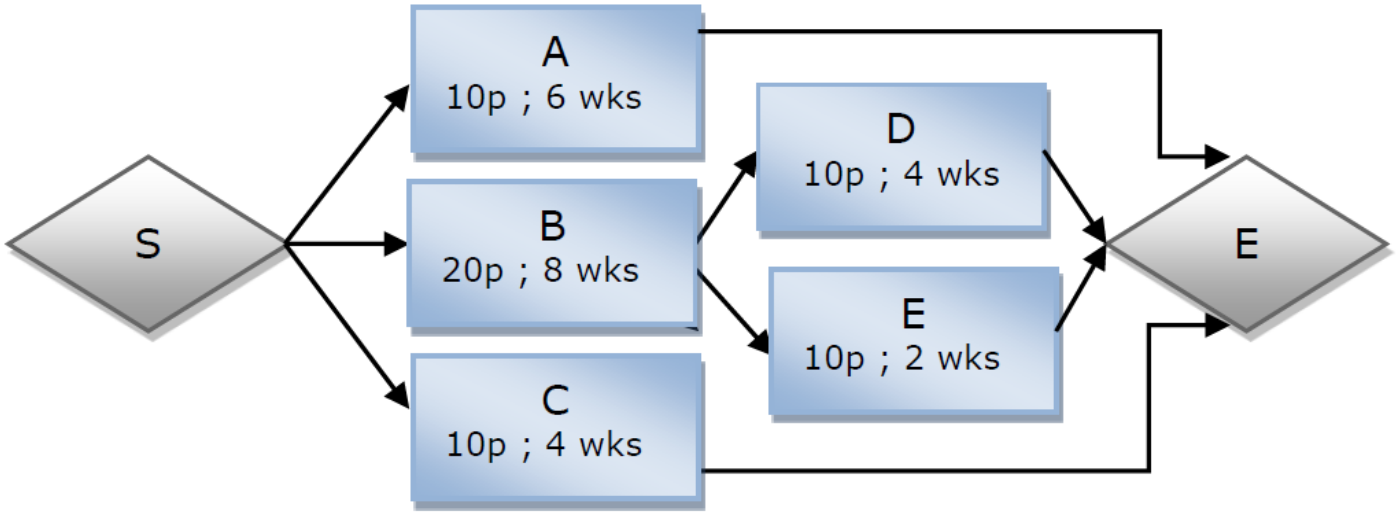
Most adequate format for the PM and the project team to manage the project

Network diagram



Resource smoothing example

As you can see on the following network diagram and table, we have added the necessary human resources and each activity's duration.



Activity	1	2	3	4	5	6	7	8	9	10	11	12
A	10	10	10	10	10	10						
B	20	20	20	20	20	20	20	20				
C	10	10	10	10								
D									10	10	10	10
E									10	10		
Resources	**40**	**40**	**40**	**40**	**30**	**30**	**20**	**20**	**20**	**20**	**10**	**10**

How would you smooth the resources to fix this problem and use less than 40 resources in the project ?

Resource smoothing example

Smoothing 1

Activity	1	2	3	4	5	6	7	8	9	10	11	12
A					10	10	10	10	10	10		
B	20	20	20	20	20	20	20	20				
C	10	10	10	10								
D									10	10	10	10
E									10	10		
Resources	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**10**	**10**

Smoothing 2

Activity	1	2	3	4	5	6	7	8	9	10	11	12
A	10	10	10	10	10	10						
B	20	20	20	20	20	20	20	20				
C							10	10	10	10		
D									10	10	10	10
E									10	10		
Resources	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**10**	**10**

Resource smoothing example

Smoothing 3

Activity	1	2	3	4	5	6	7	8	9	10	11	12
A							10	10	10	10	10	10
B	20	20	20	20	20	20	20	20				
C	10	10	10	10								
D									10	10	10	10
E									10	10		
Resources	**30**	**30**	**30**	**30**	**20**	**20**	**30**	**30**	**30**	**30**	**20**	**20**

Smoothing 4

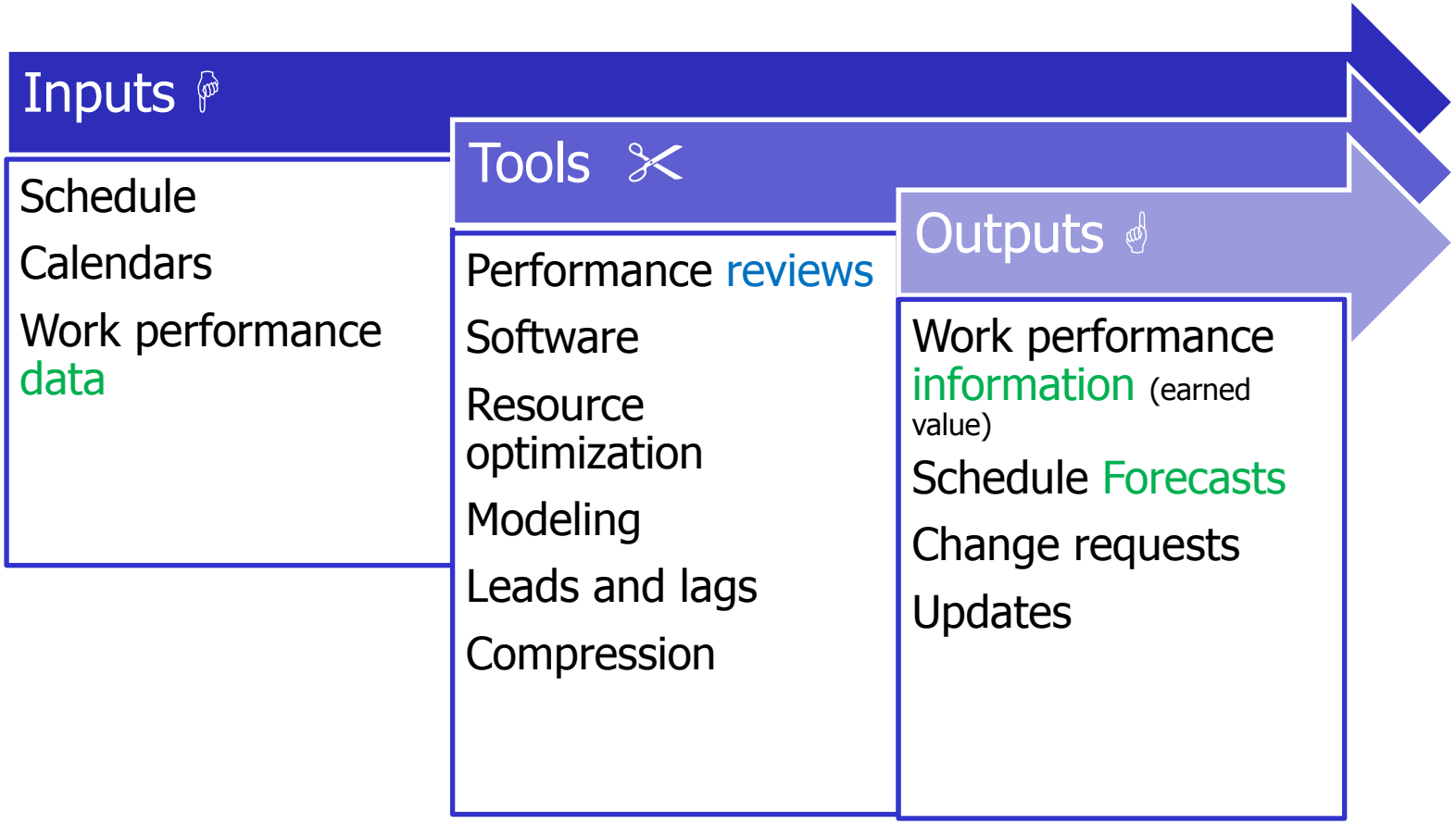
Activity	1	2	3	4	5	6	7	8	9	10	11	12
A	10	10	10	10	10	10						
B	20	20	20	20	20	20	20	20				
C									10	10	10	10
D									10	10	10	10
E									10	10		
Resources	**30**	**30**	**30**	**30**	**30**	**30**	**20**	**20**	**30**	**30**	**20**	**20**

Resource leveling example

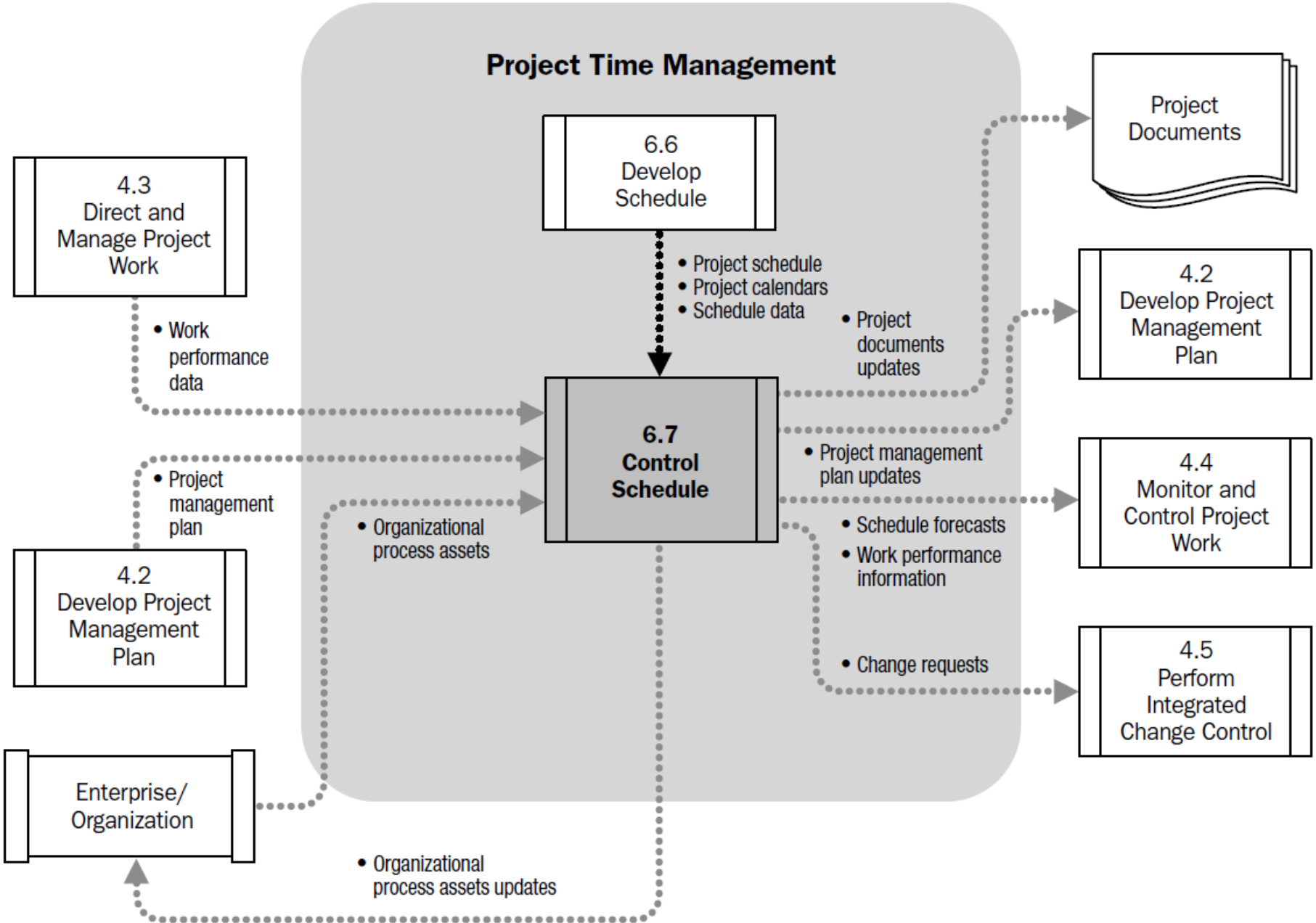
The plan that you have developed is very well. However, you have made a terrible error: you will only have 20 resources *per week available to perform this project!*

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A									10	10	10	10	10	10		
B	20	20	20	20	20	20	20	20								
C													10	10	10	10
D									10	10	10	10				
E															10	10
Resources	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**

7. Control Schedule



7. Control Schedule



Performance reviews: Status reports

- Asking for the percentage of work completed is not worth

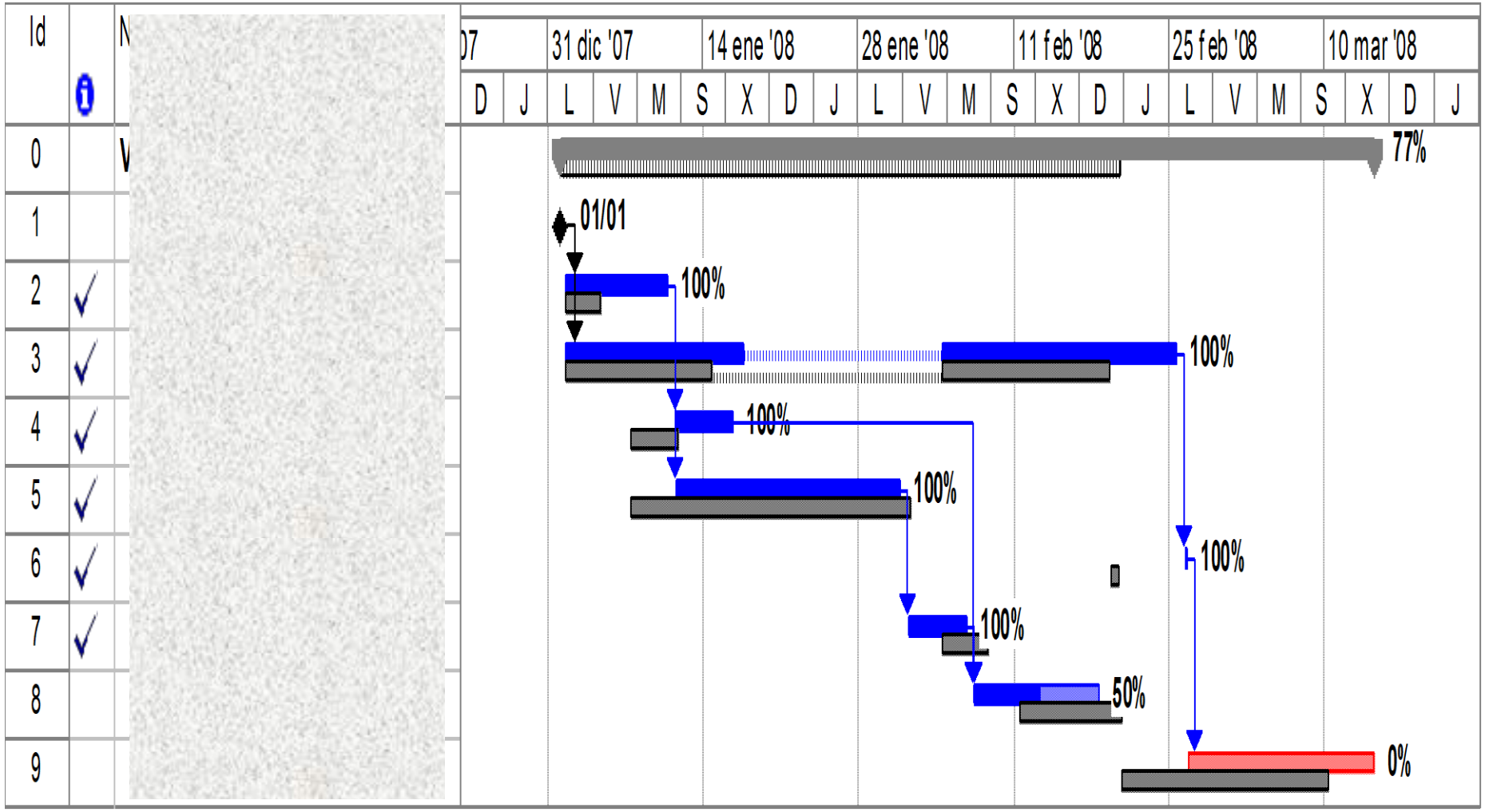
  The following rules are very useful:

  50/50 Rule: the activity is considered 50% complete if it is already started and the other 50% is only assigned when finished

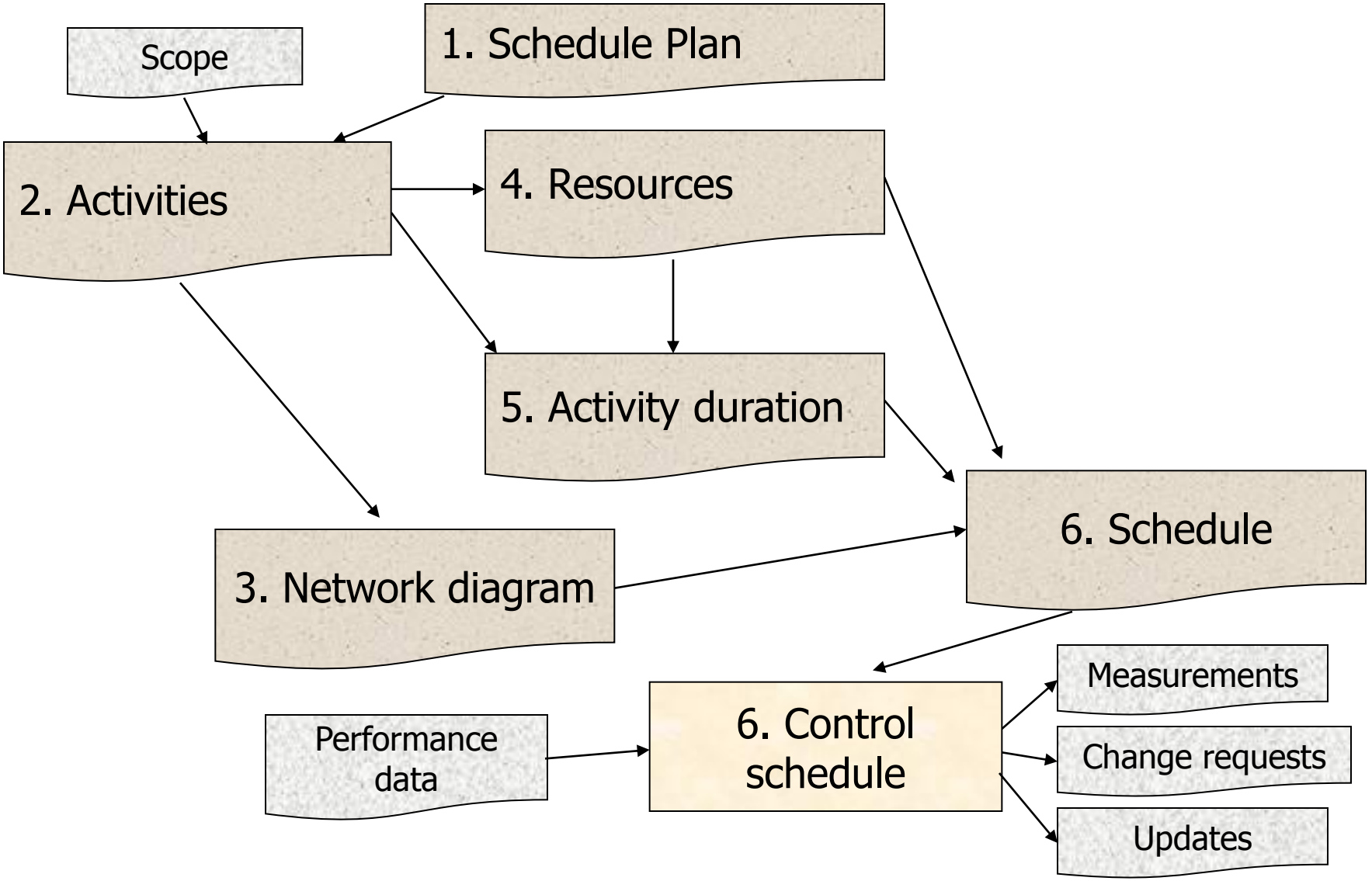
  20/80 Rule: 20% at the beginning and 80% at the end

  0/100 Rule: 100% at the end

Software and Bar Chart



Summarizing time management



Lessons learned

Activity on node (AON)
Leads and lags
Schedule compression
Dependencies: finish-start, finish-finish, start-start, start-finish
Dependencies: mandatory, discretional, external, internal
Decomposition
Bar charts
Milestone diagram
Network diagram
Precedence diagramming method (PDM)
Fast-tracking
Bottom-up estimating
Parametric estimation
Analogous estimation

Three-point estimate
Resource breakdown structure
Resource leveling
Slack: total, free, of the project
Crashing
Critical chain method
Critical path method
Modeling techniques
Resource smoothing
Planning package
PERT
50/50 Rule; 0/80 Rule; 0/100 Rule
Critical path and near critical path

COST

Activity costs

Budget

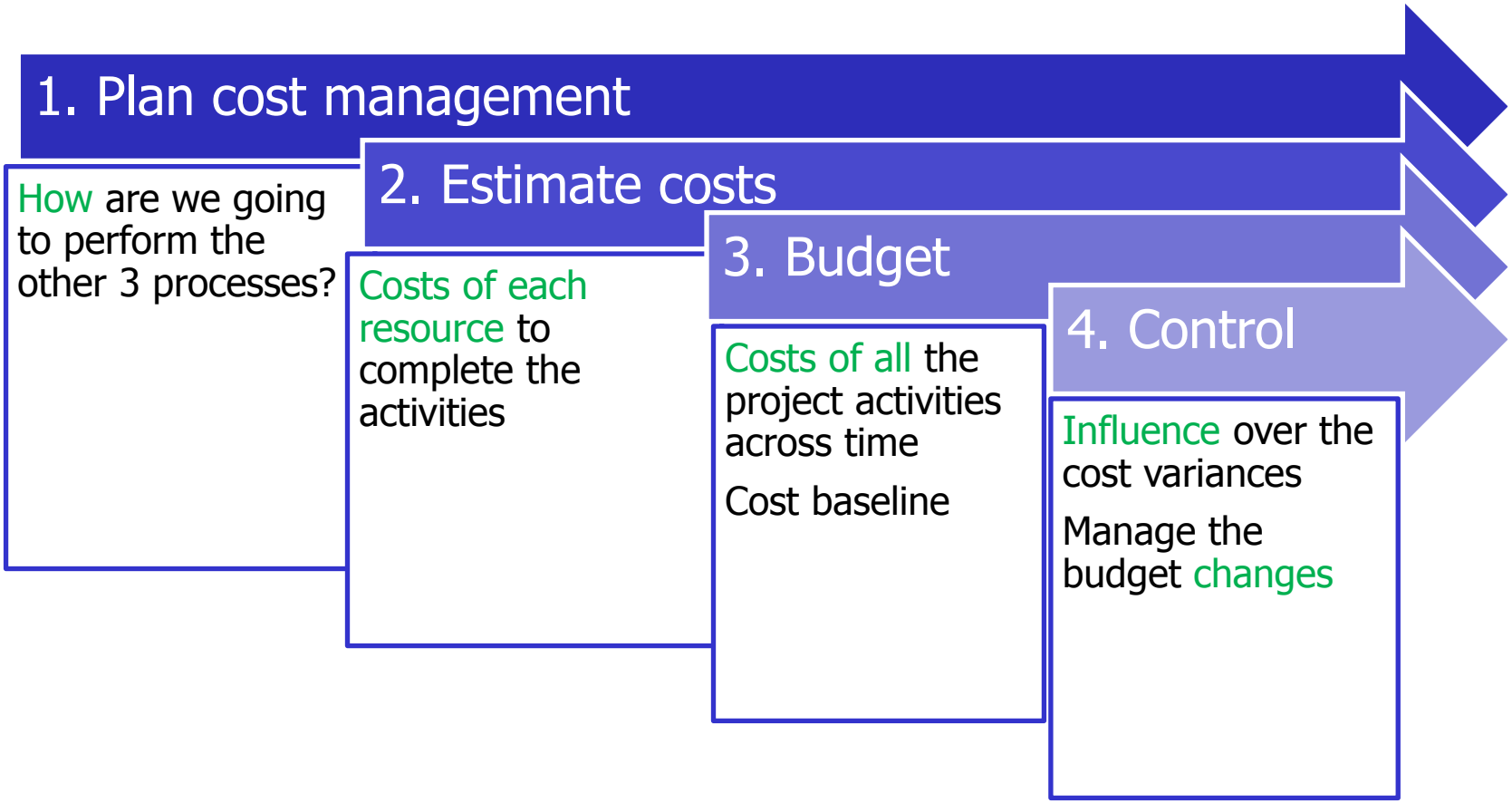
Control costs

Earned value management (EVM)

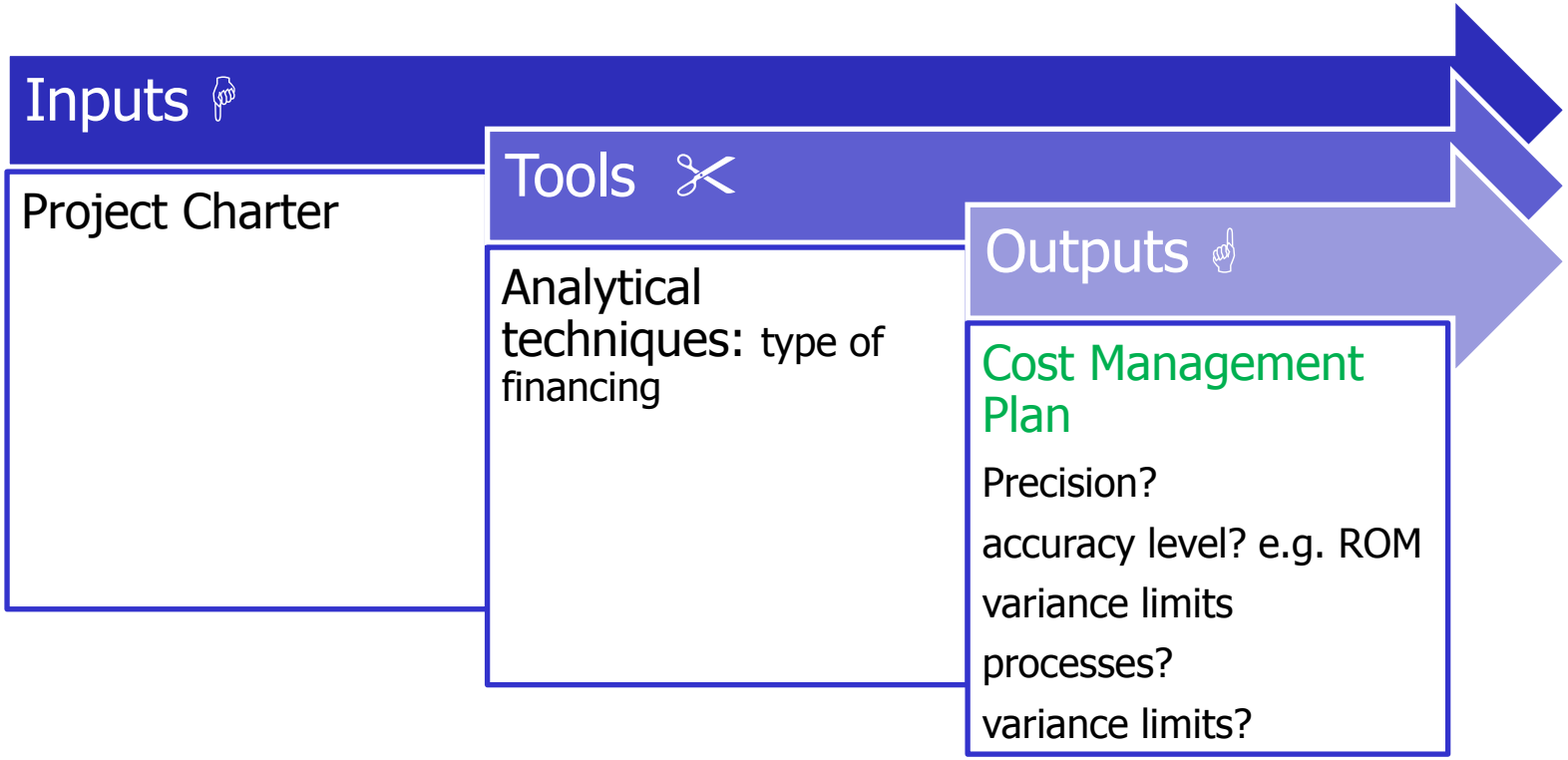
Cost management processes

	Initiating	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		4		2	
Time		6		1	
Cost		. Plan costs . Estimate Costs . Determine Budget		Control Costs	
Quality		1	1	1	
HR		1	3		
Communications		1	1	1	
Risks		5		1	
Procurements		1	1	1	1
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

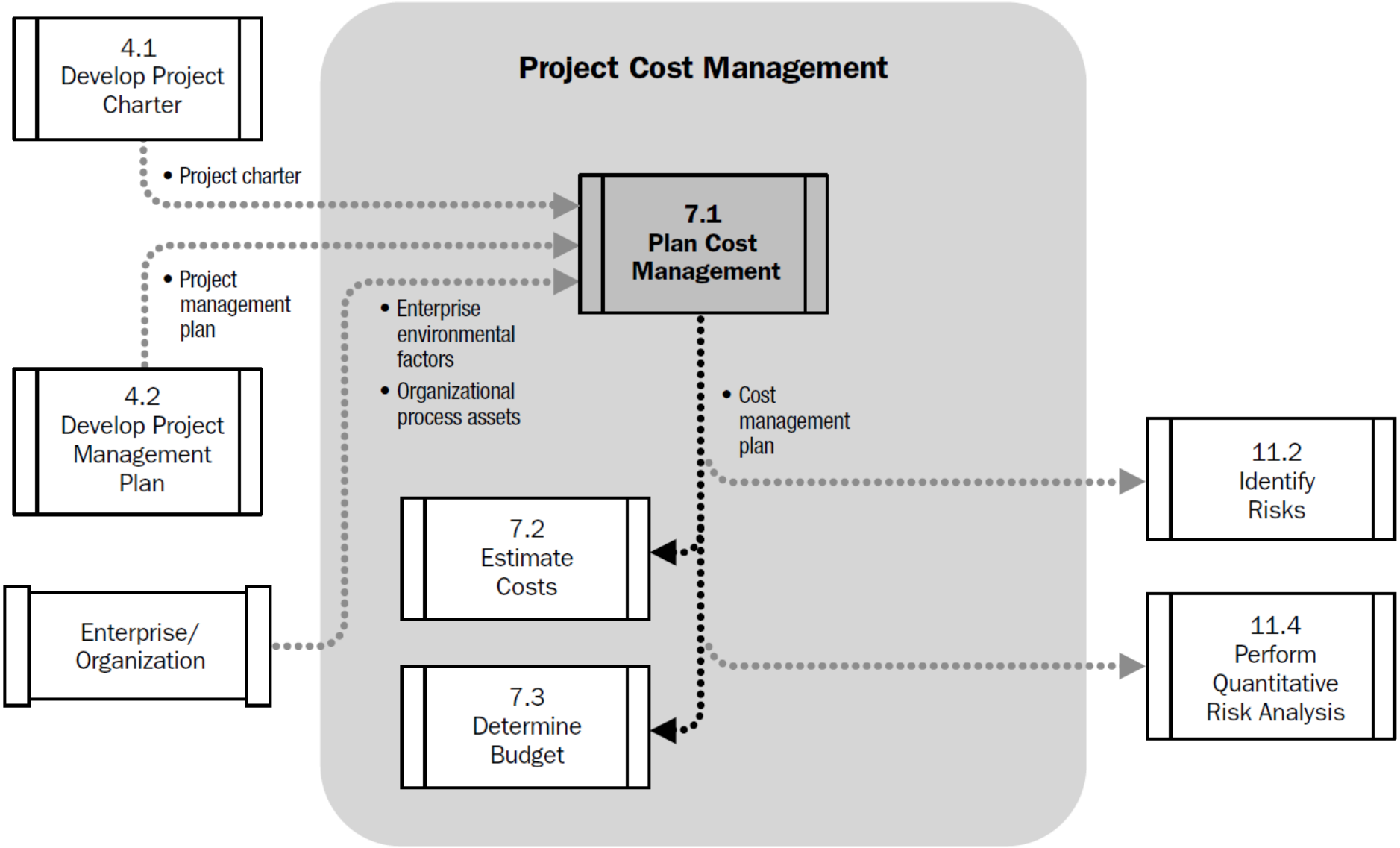
Cost management processes



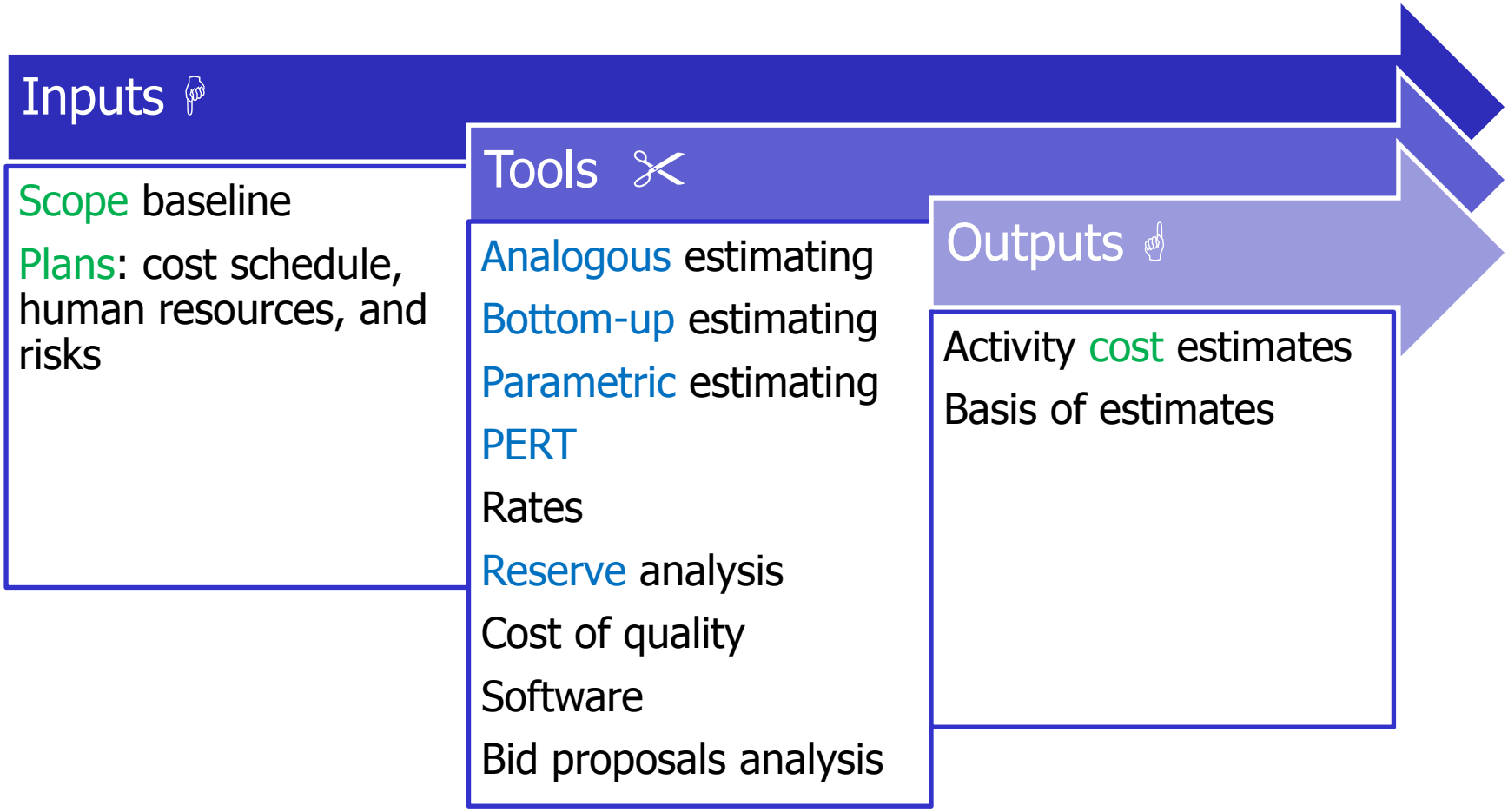
1. Plan cost management



1. Plan cost management



2. Estimate costs



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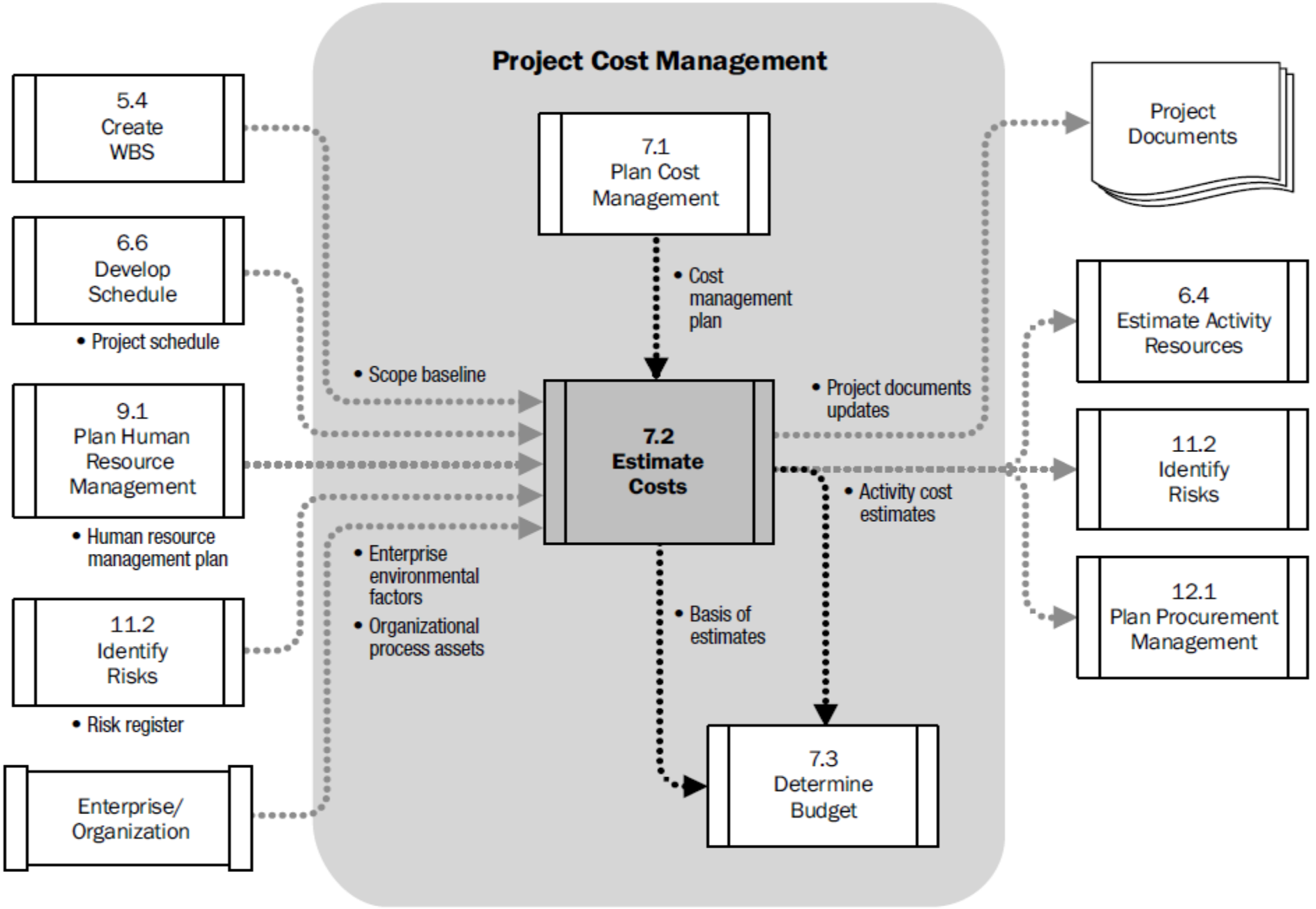
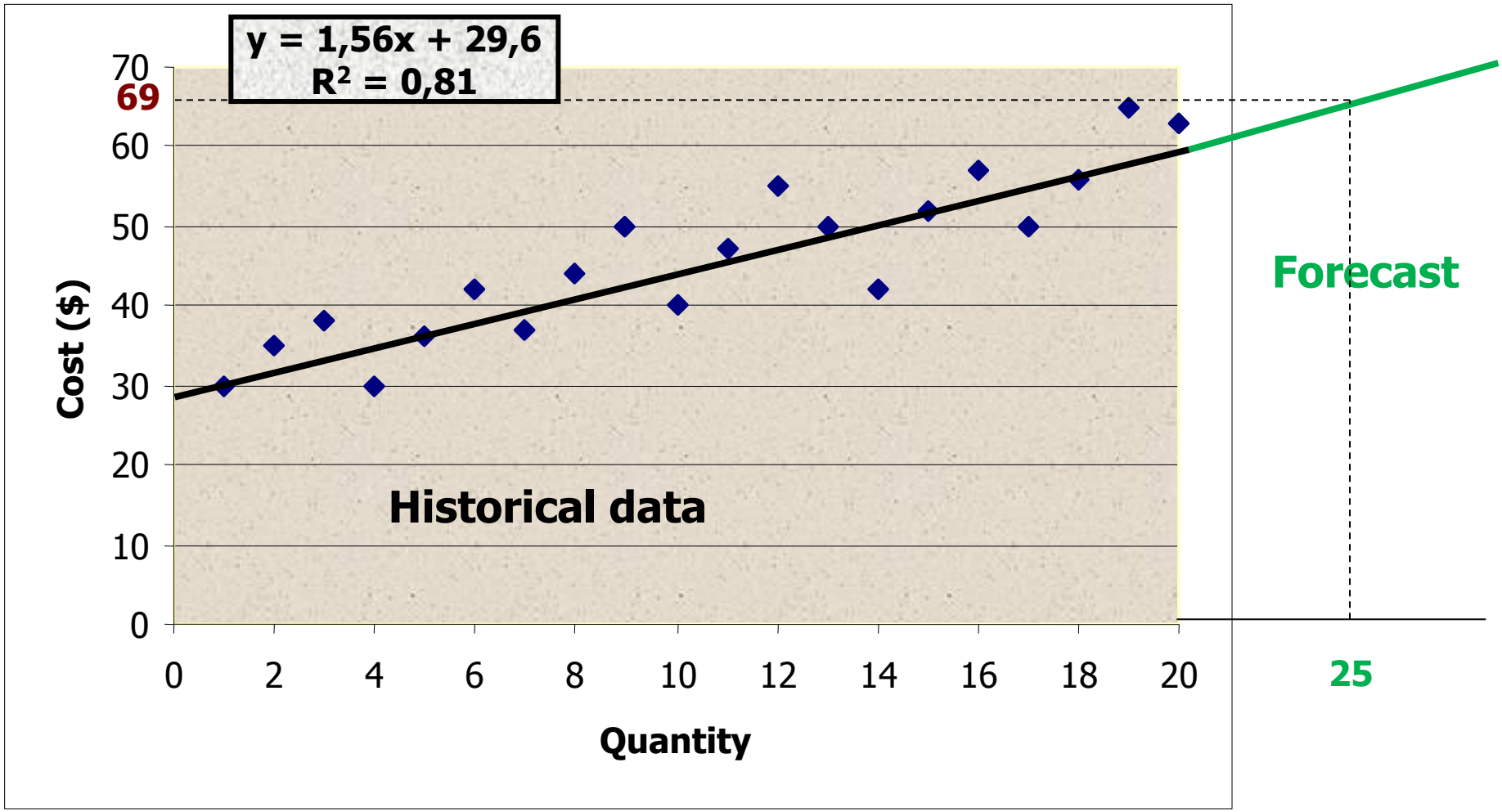


Parametric cost estimating



✂ Reserve analysis

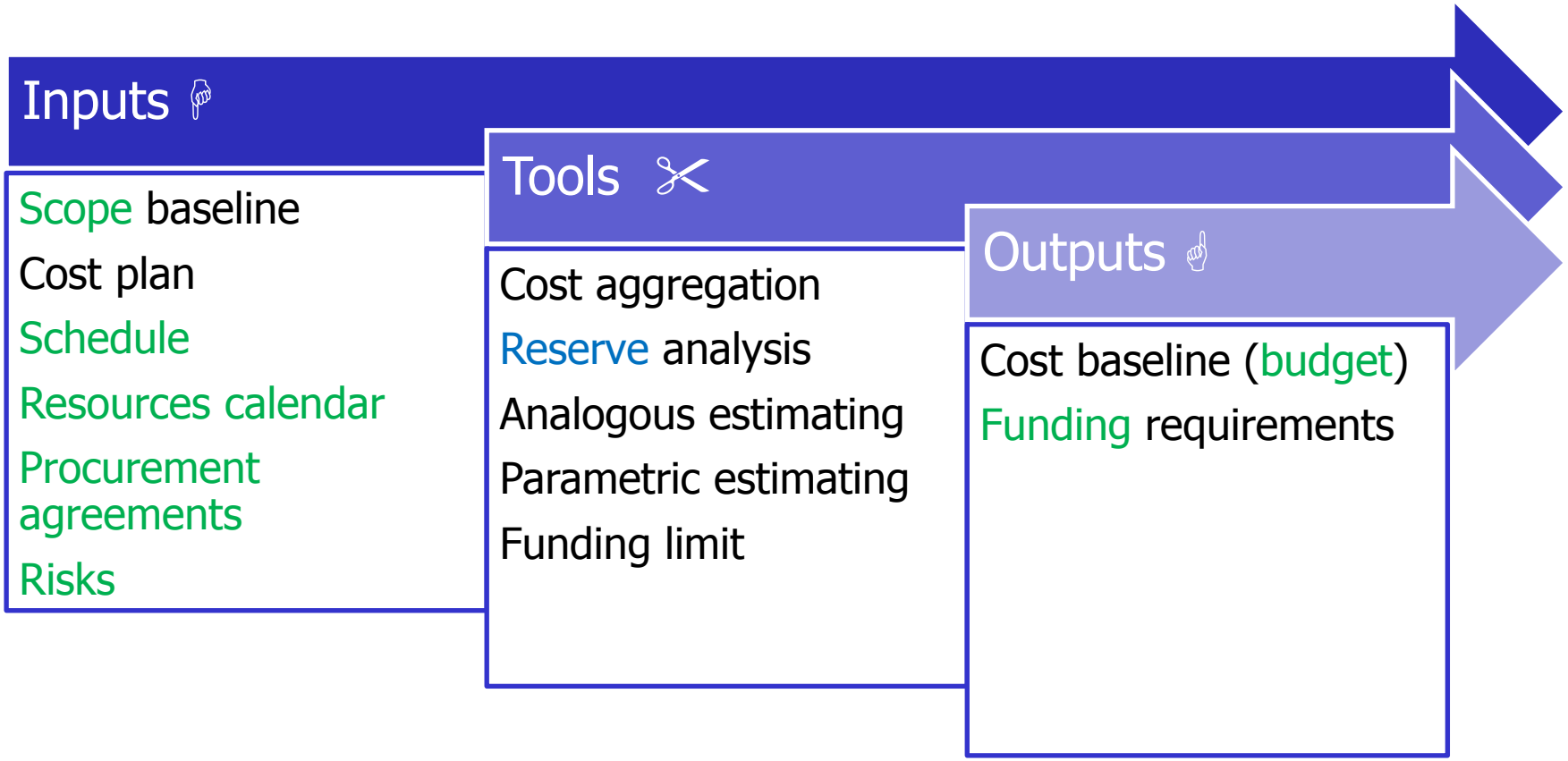
- Foreseen but uncertain events = "k**nown-unknowns**". Residual risk.
- Part of the cost baseline

		Contingency reserve COST ($)		
Activity	**Min.**	**Most likely**	**Max.**	**Max. Reserve**
A	7	10	13	3
B	7	10	13	3
C	7	10	13	3
Total	**21**	**30**	**39**	**$9**

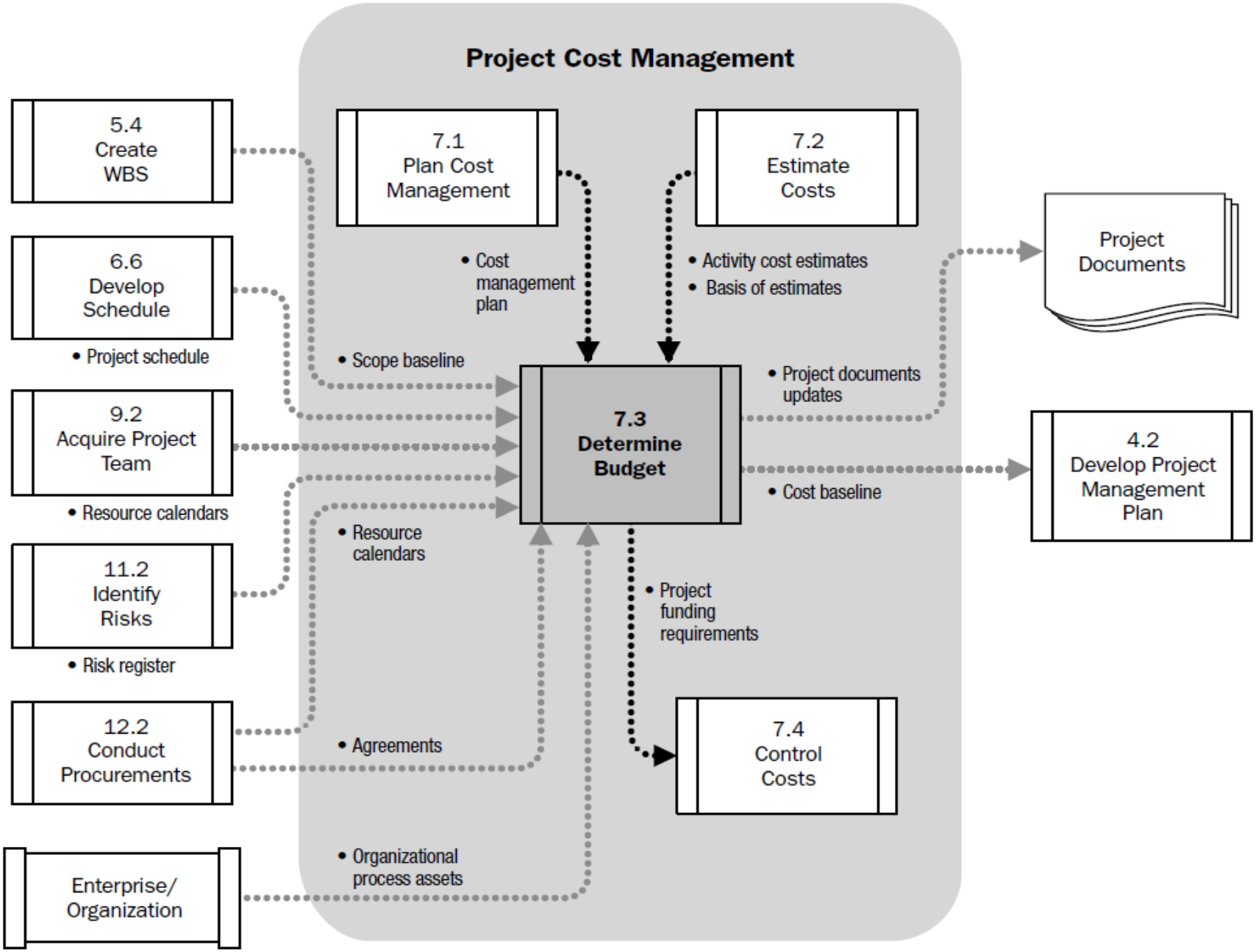
over-estimación

Monte Carlo Simulation => Reserve = $6

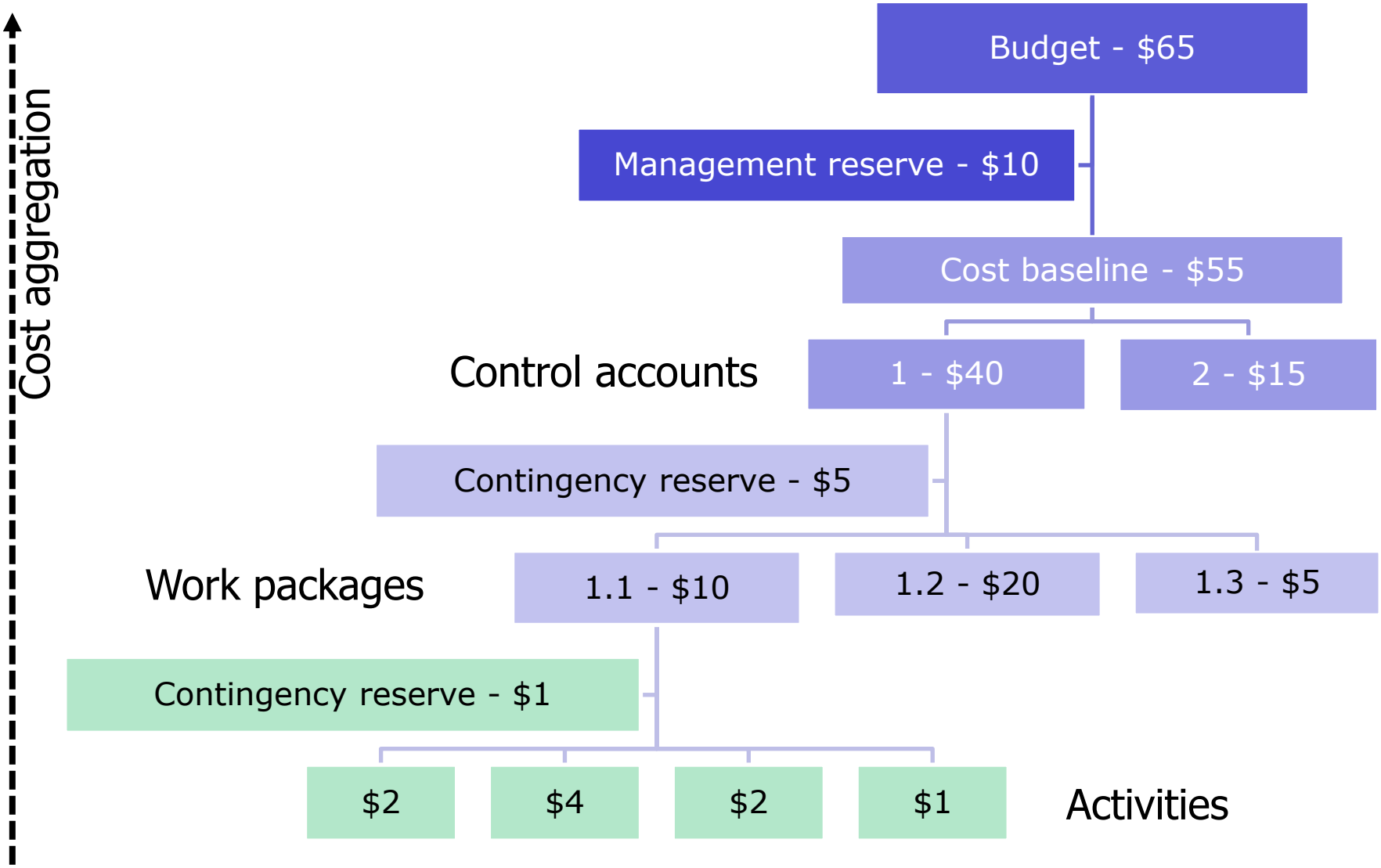
3. Determine budget



3. Determine budget



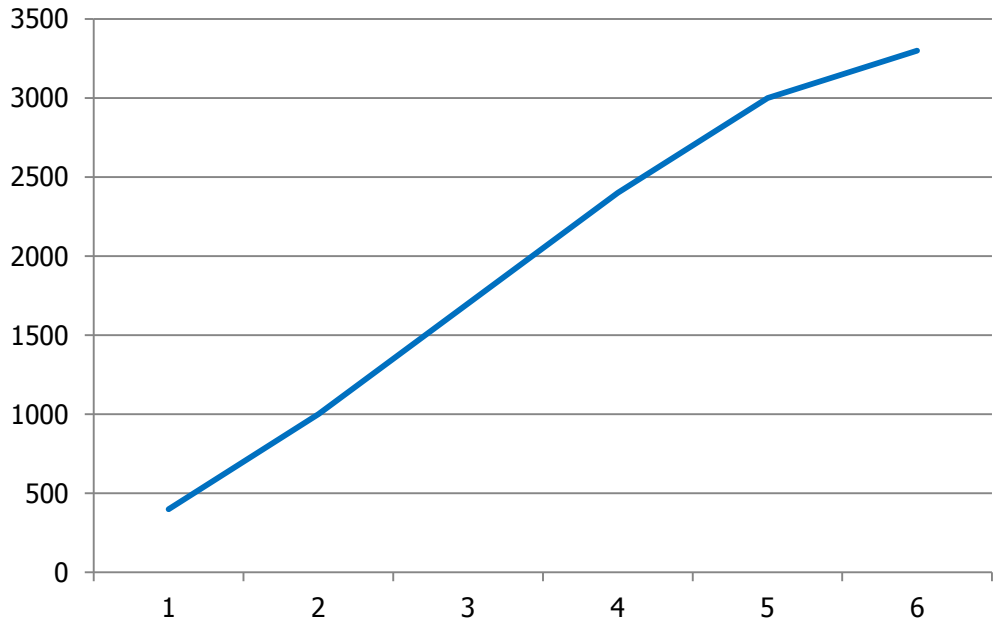
Reserves: contingency and management



Cost baseline

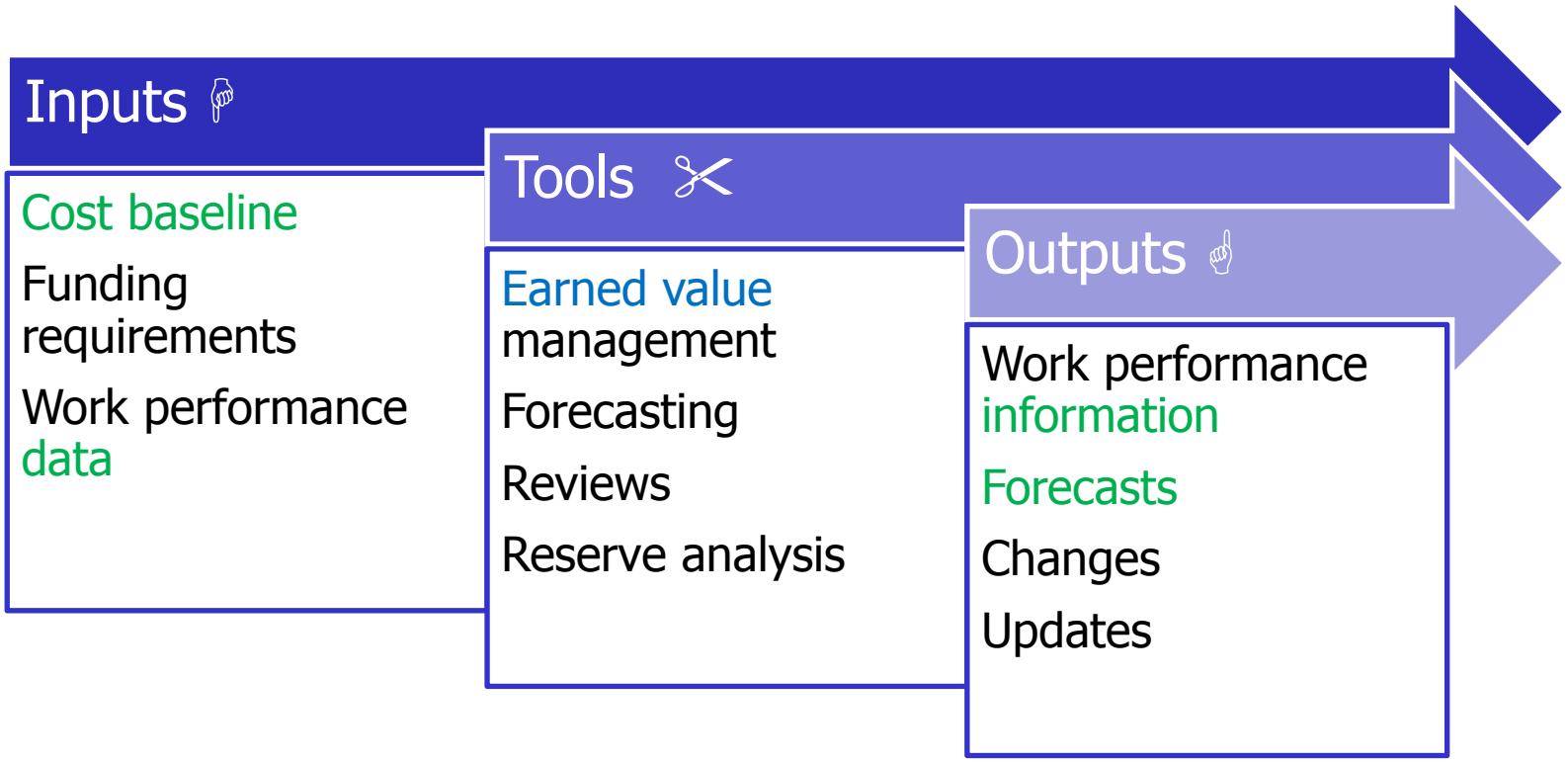
Accumulated project budget

Activity	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
A	300	400	500	500	500	200
B	100	200	200	200	100	100
TOTAL	**400**	**600**	**700**	**700**	**600**	**300**
Accumulated	400	1000	1700	2400	3000	3300

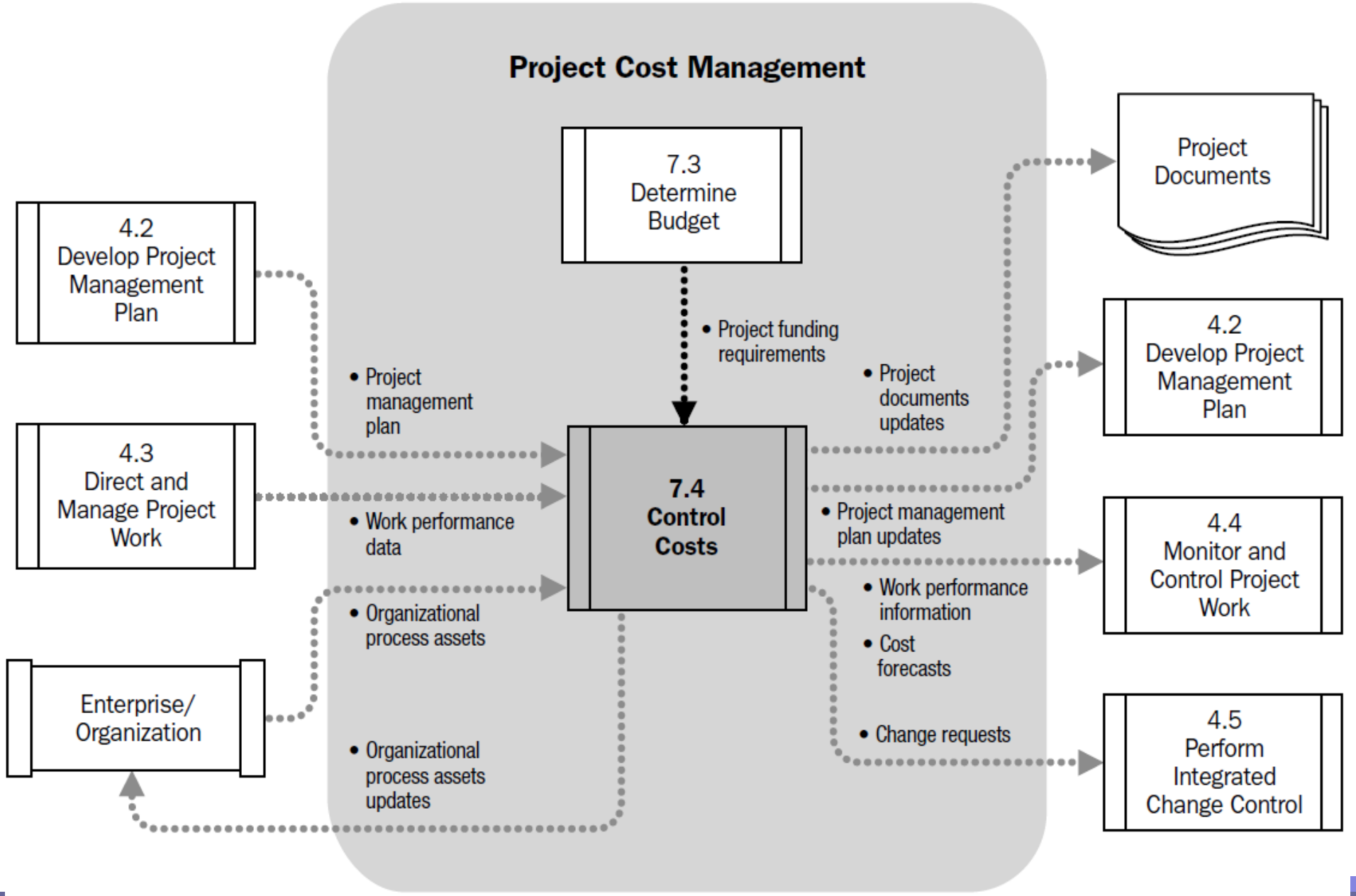


similar to an "S"

4. Control costs



4. Control costs



Control costs

1) Scope (WBS) y Activities

2) Schedule

3) Activity Cost

4) Cost baseline - Planned value (PV)

Budget	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	TOTAL
1 Design	1.500	1.500					3.000
2 Construction			2.000	2.000	2.000		6.000
3 Tests						1.000	1.000
TOTAL	1.500	1.500	2.000	2.000	2.000	1.000	10.000
Accumulated	1.500	3.000	5.000	7.000	9.000	10.000	-
% Accumulated	15%	30%	50%	70%	90%	100%	-

Control costs

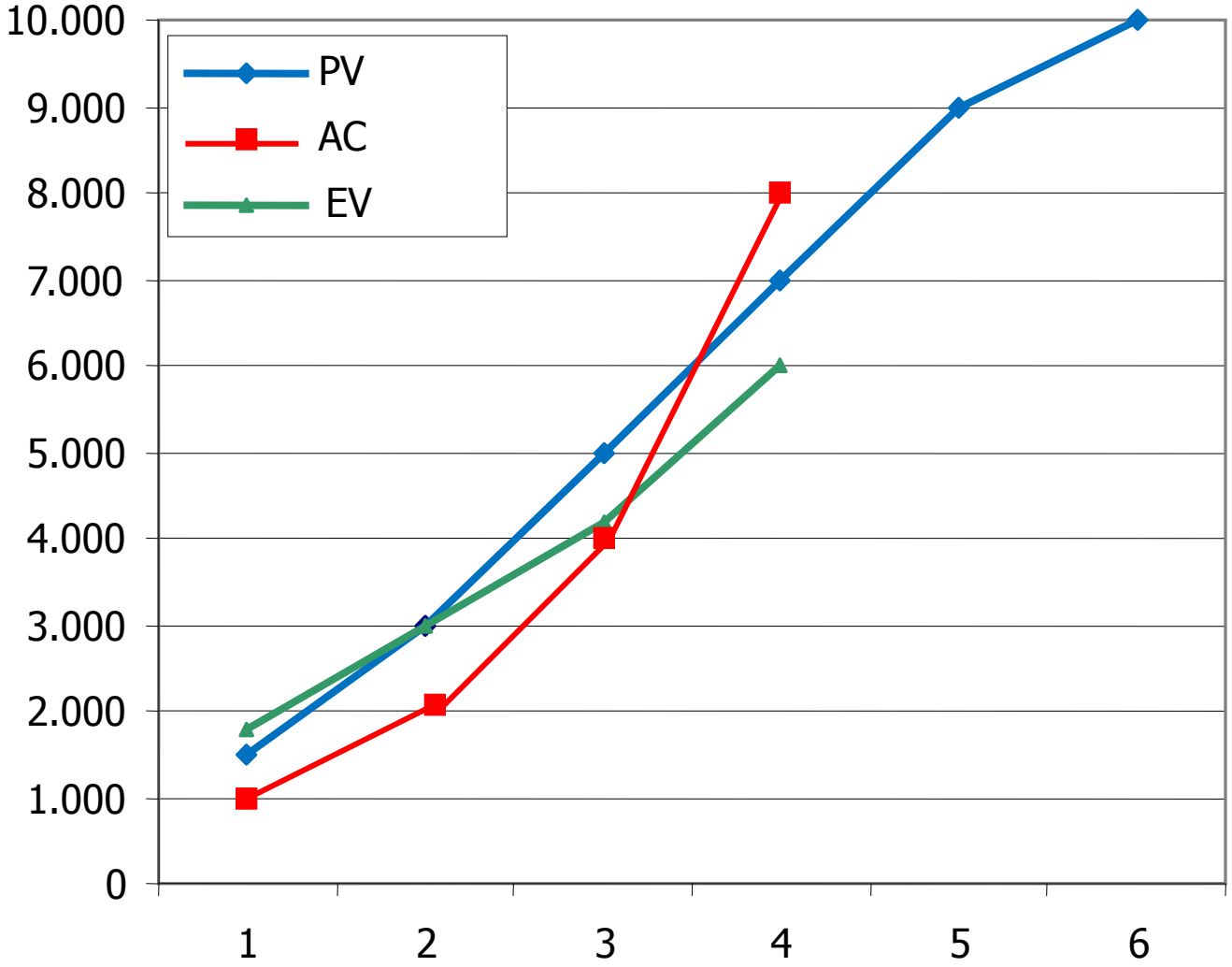
5) Actual cost (AC)

6) Compare

Actual cost	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	TOTAL
1 Design	1.000	1.000					2.000
2 Construction			2.000	4.000			6.000
3 Tests							
TOTAL	1.000	1.000	2.000	4.000			
Accumulated	1.000	2.000	4.000	8.000			-
% Accumulated	10%	20%	40%	80%			-

Budget	1.500	3.000	5.000	7.000	9.000	10.000	

Earned value (EV) or budgeted cost of work performed (BCWP)



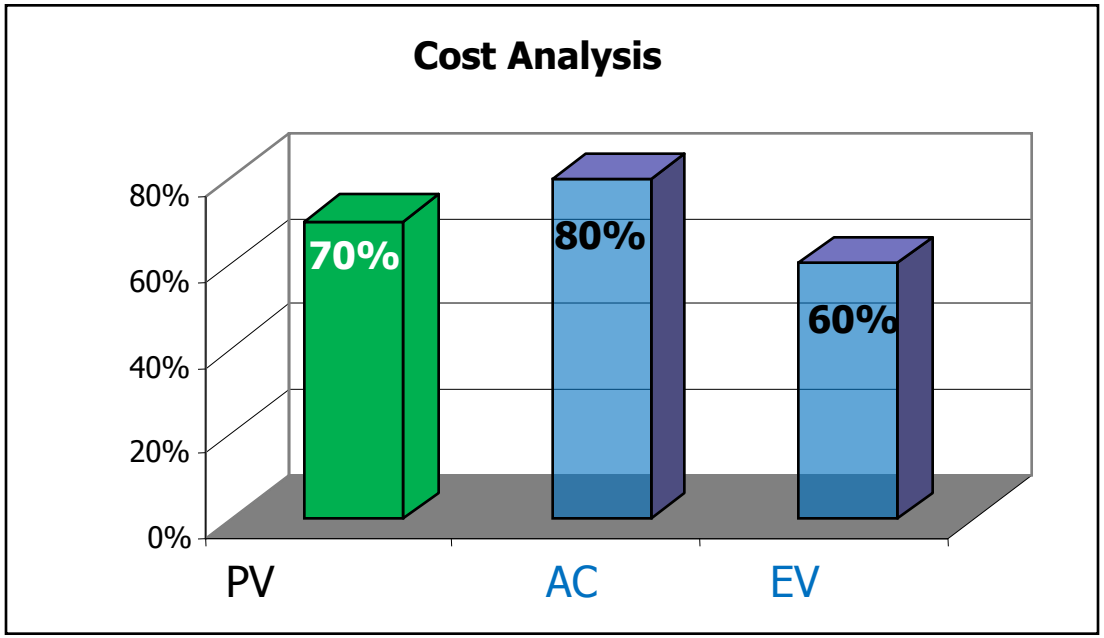
Valor ganado

7) Calculate Earned Value (work performed)

% work actually accomplished for each activity

Budget	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	TOTAL
✓ 1 Design	60%	100%	100%	100%			3.000
2 Construction			20%	50%			6.000
3 Tests							1.000
Work performed							
✓ 1 Design	1.800	3.000	3.000	3.000			
2 Construction			1.200	3.000			
3 Tests							
Total	1.800	3.000	4.200	6.000			
% Accumulated	18%	30%	42%	60%			
% budgeted	15%	30%	50%	70%	90%	100%	

Cost variance analysis



At the end of Month 4:

Budget (PV): $7.000

Actual cost (AC): $8.000

Earned Value (EV): $6.000

Cost Variance: CV = EV – AC

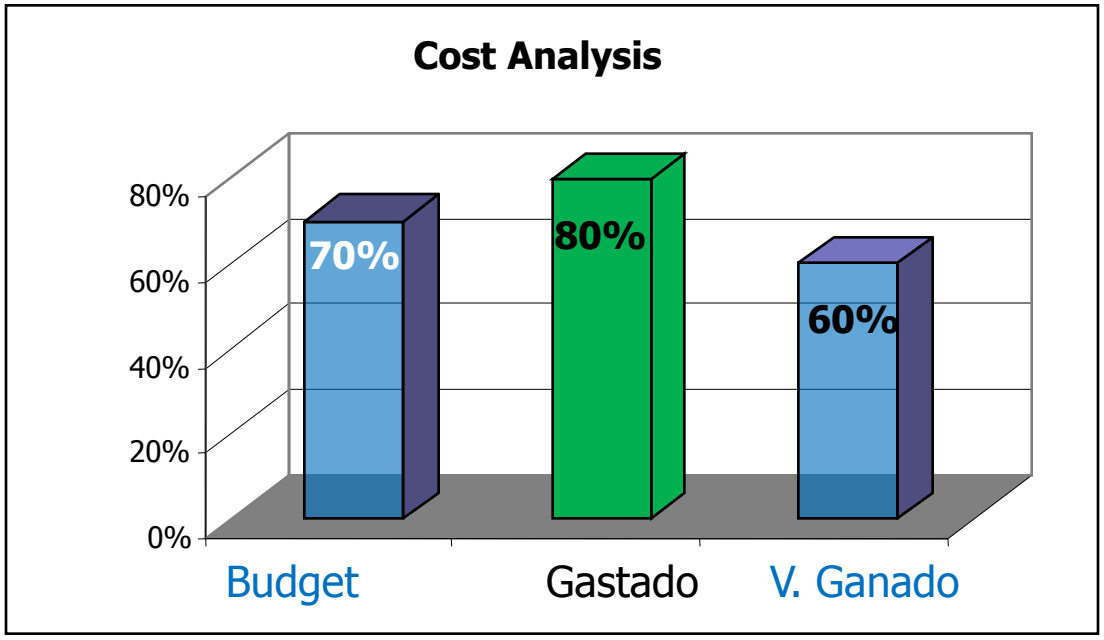
Cost Performance Index: CPI = EV / AC

CV = EV – AC = -2,000

CPI = EV / AC = 0.75 => Inefficiency

If CPI > 1 => Good ; If CPI < 1 => Alarm!

Schedule variance analysis



At the end of Month 4:

Budget (PV): $7.000

Actual cost (AC): $8.000

Earned Value (EV): $6.000

Schedule Variance: SV = EV – PV

Schedule Performance Index: SPI = EV / PV

SV = EV – PV = -1,000

SPI = EV / PV = 0.86 => Delay!

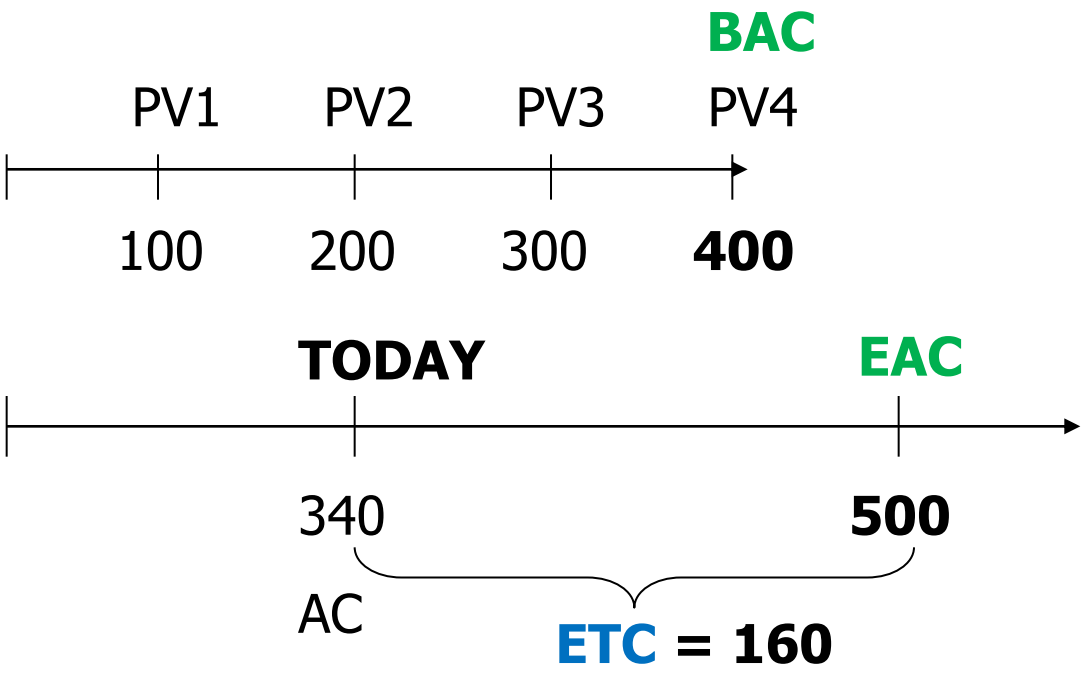
Si SPI>1 => OK ; Si SPI<1 => Delay Alarm!

Forecasting

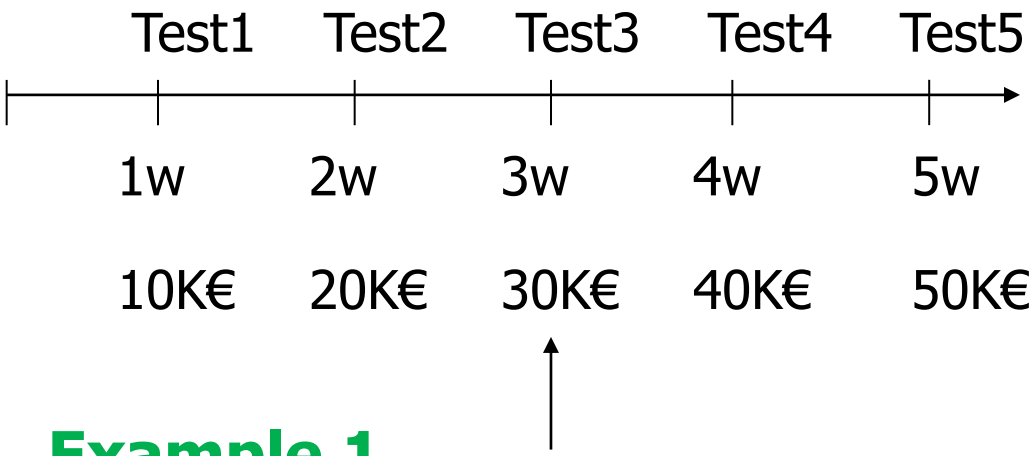
BAC (Budget at completion)

EAC (Estimate at completion)

ETC (Estimate to complete)



EVM Example



Example 1

PV=30K€
EV=20K€
AC=40K€

EV-AC=-20K€
EV-PV=-10K€

Example 2

PV=30K€
EV=40K€
AC=40K€

EV-AC=0K€
EV-PV=10K€

Earned value

The CPI of a project is 1.4 and the SPI is 0.8. This means that we are receiving $1.4 for each invested dollar. However, we are only at 80% of where we should be according to plan. What is the best thing to do?

A. Use less resources to decrease costs

B. Report to the client that the project is delayed

C. Compress the schedule

D. Fast track activities

Answer: C

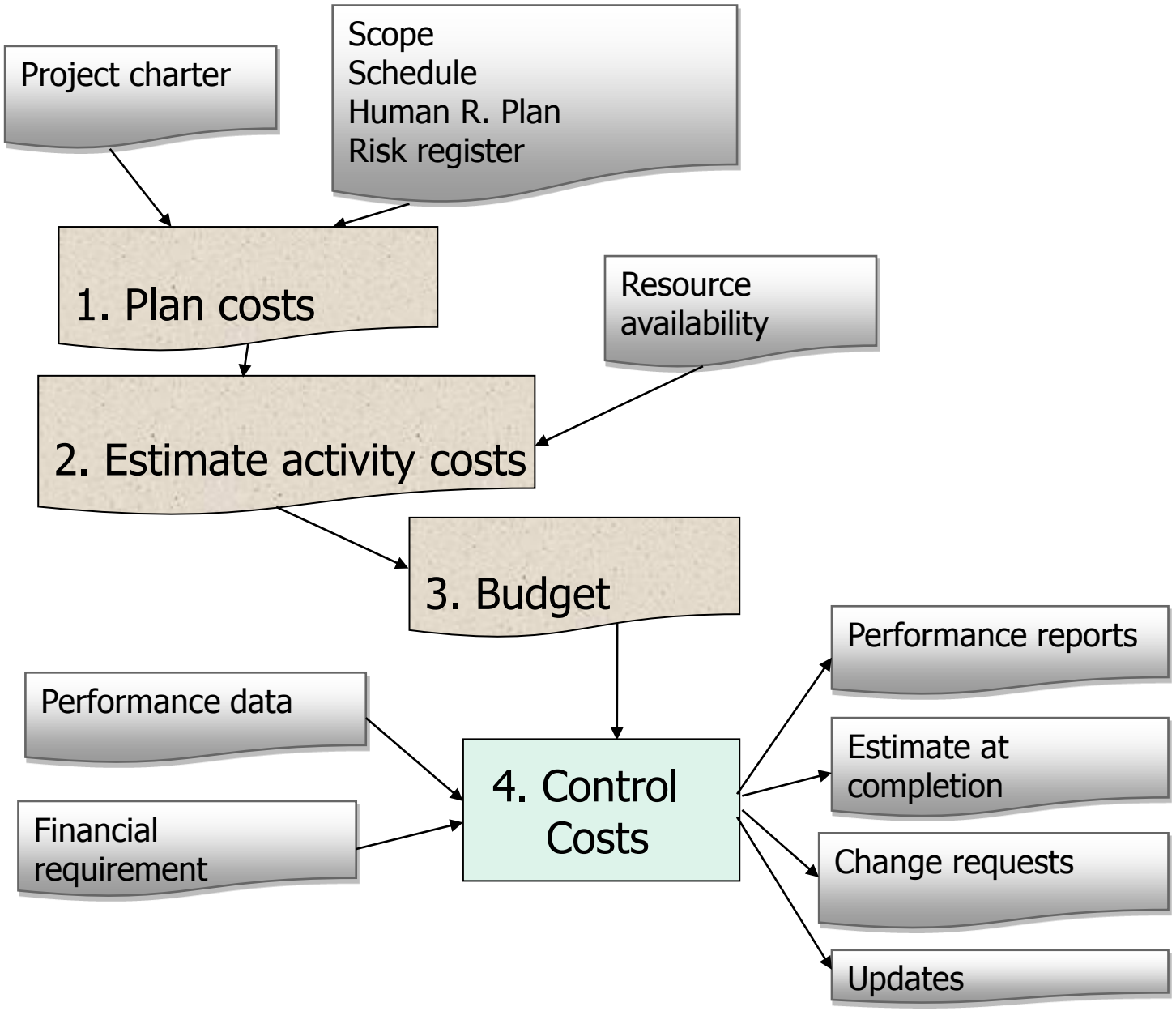
Financial decision methods

During the project initiating processes, different financial decision techniques are used=> **Project Selection**

- Net present value (**NPV**)
- Internal rate of return (**IRR**)
- Investment payback rule (**IPR**)
- Cost benefit ratio (**C/B**)

$$$

Summarizing cost management



Lessons learned

- Reserve analysis
- Value analysis
- Working capital
- Cost lifecycle
- Opportunity cost
- Actual cost (AC)
- Direct and indirect costs
- Fixed and variable costs
- Sunk costs
- Linear and accelerated depreciation
- Estimate at completion (EAC)
- Bottom up estimating
- Estimate to complete (ETC)
- Parametric estimating
- Analogous estimating
- Order of magnitude estimating (ROM)
- Cost performance index (CPI)
- Schedule performance index (SPI)
- To-complete performance index (TCPI)
- Funding limit
- Cost baseline
- Payback rule
- Budget at completion (BAC)
- Cost benefit ratio
- Internal rate of return (IRR)
- Earned value management (EVM)
- Earned value (EV)
- Net present value (NPV)
- Planned value (PV)
- Variance at completion (VAC)
- Cost variance (CV)
- Schedule variance (SV)

QUALITY

Basic quality concepts

Quality theories

Quality management processes

Quality planning

Cost of quality

Quality assurance

Continuous improvement

Quality control

PM Process Groups

	Initiating	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		4		2	
Time		6		1	
Cost		3		1	
Quality		Plan Quality	Quality Assurance	Quality Control	
Human Resources		1	3		
Communications		1	1	1	
Risk		5		1	
Procurement		1	1	1	1
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

Basic quality concepts

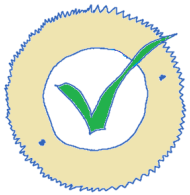
Quality management implies that the project **satisfies the needs** for what it was conceived for. For that, the following will be necessary:

- Convert the **stakeholders' needs and expectations** into project requirements
- Achieve **client satisfaction** when the project delivers what was originally planned and the product meets the real needs
- Perform **preventive actions over inspections**
- Permanently look for perfection: **continuous improvement**

Quality management

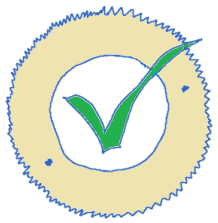
PM must:

- ✓ **Recommend improvements** to the company's quality processes and policies
- ✓ Establish **metrics** to measure quality
- ✓ **Review** quality before finishing the deliverable
- ✓ **Evaluate the impact** on quality whenever there is a change in scope, schedule, cost, resources and risks.
- ✓ Ensure that the integrated **change control** is used

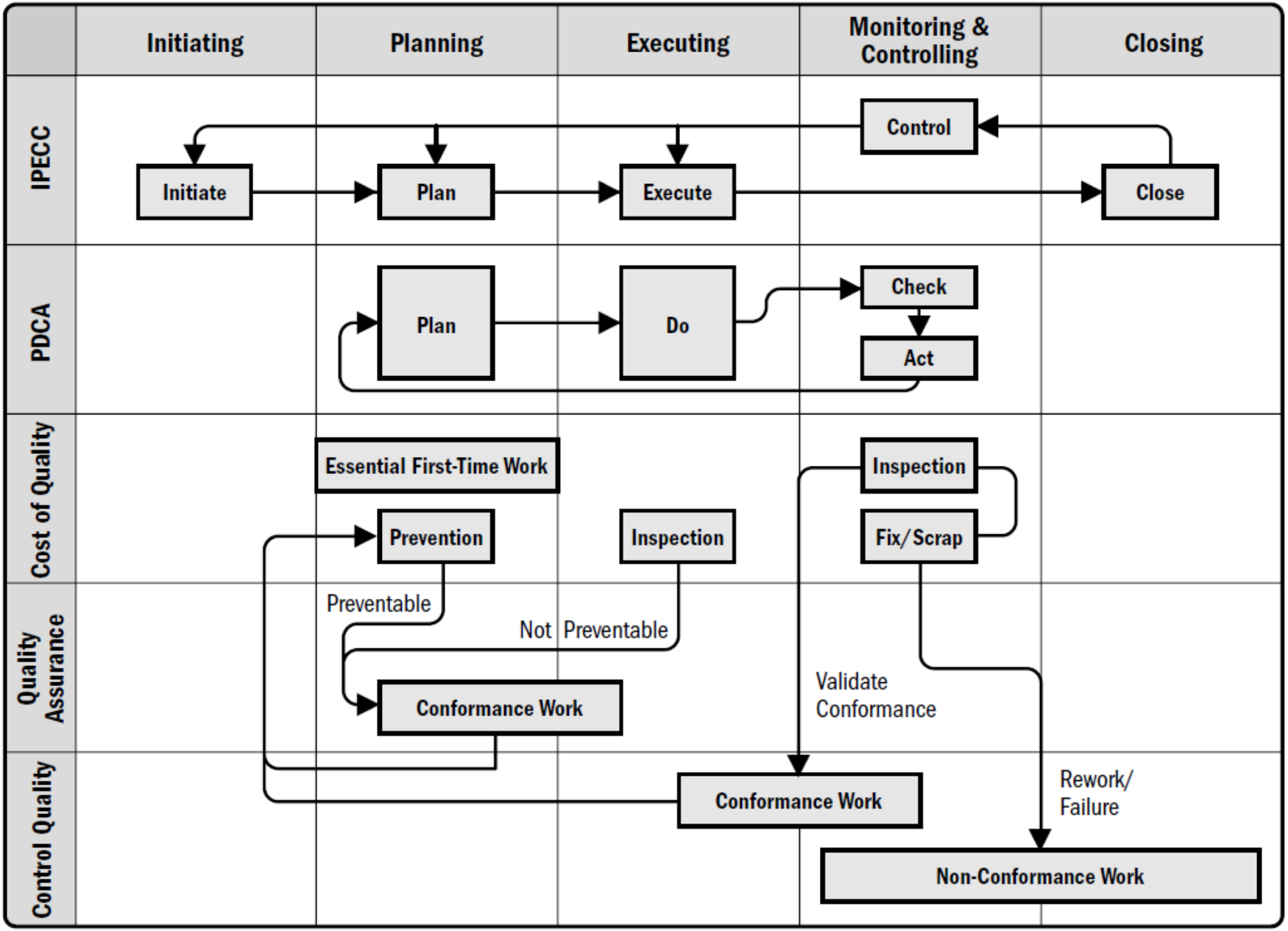


Quality management

- ✓ PMBOK® compatible con:
  - **ISO** (Organization for Standarization)
  - **Deming, Juran, Cosby, Ishikawa**
  - **TQM** (Total Quality Management)
  - **Six Sigma**
  - **Lean**
  - Cost of Quality (**COQ**)
  - **Continuous improvement**



Quality management



Question

The project manager finds out that one of its team members has created its own process for the installation of hardware. What should the project manager do?

A. *Thank the team member for creating a new process for the company*
B. *Analyze if the process is convenient for the company*
C. *Investigate the project plan to determine if a standard process can be used*
D. *Evaluate the cost-benefit ratio of the new process*

Answer: C

To think about…

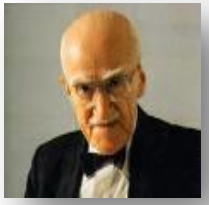
A client has called to tell us that the house that we delivered does not have an acceptable quality. However, it was never clear on the project scope what "acceptable quality" means for the client. What should you do next time to avoid this inconvenience?

1. Always define "acceptable quality" and convert it to a project requirement
2. Establish how quality will be measured
3. Determine all the necessary work, so the project meets that requirement

Quality Theorists

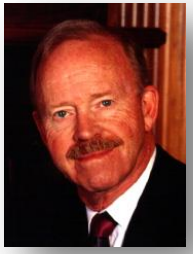
W. Edwards Deming (1900-1993)

Joseph Moses Juran (1904-2008)

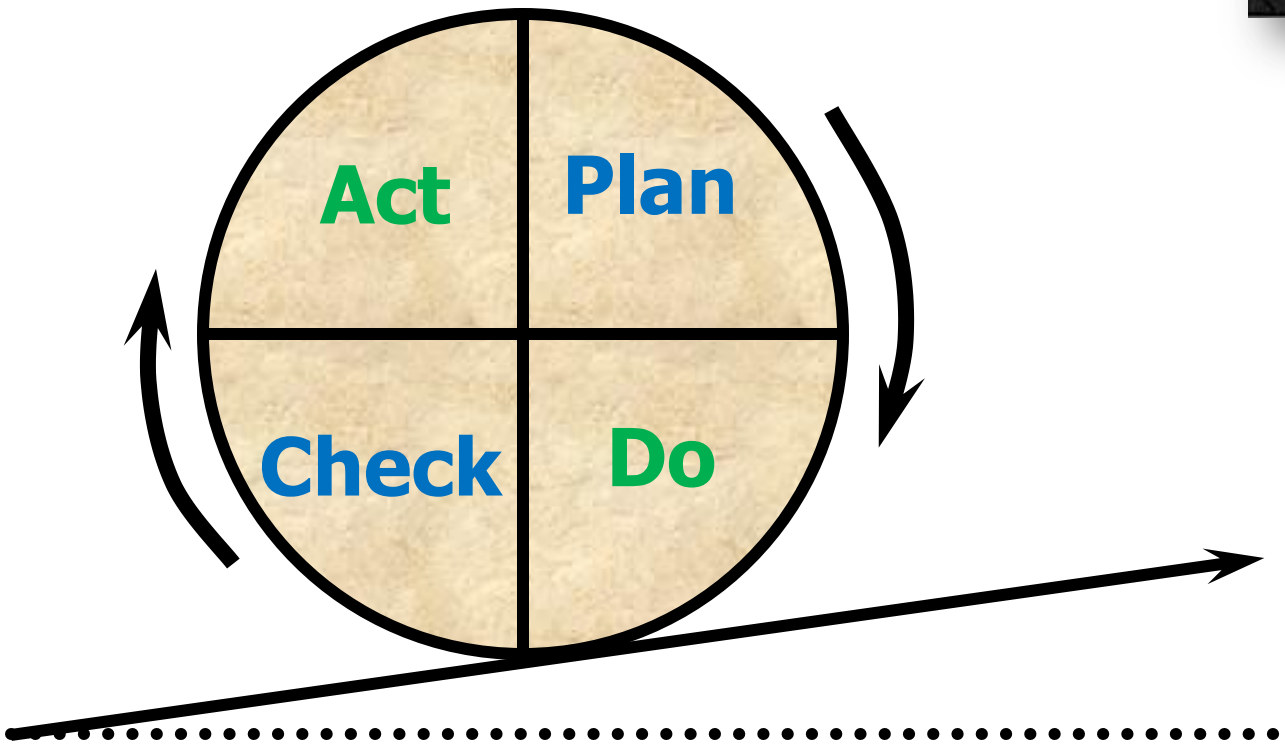


Kaoru Ishikawa (1915-1989)

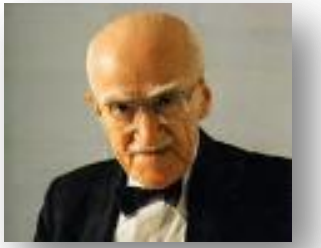
Philip Crosby (1926-2001)



Deming – Continuous Improvement



Juran



- **The trilogy:**
  1st Quality planning
  2nd Quality control
  3rd Quality improvement

- Made popular the Wilfred **Pareto** principle– **80/20**

- **Top management** must be involved

- Quality = "**fit for use**"

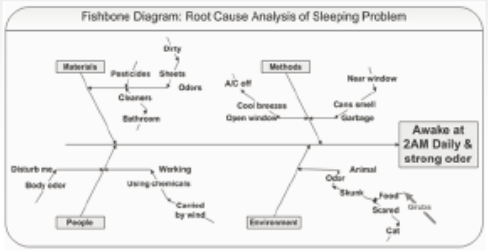
Ishikawa

- **Statistical** theories for quality control

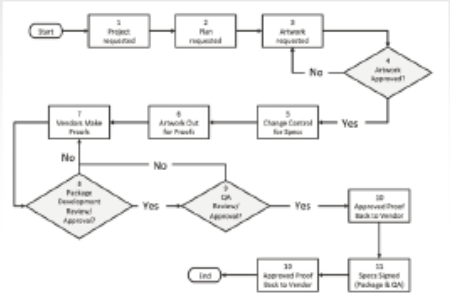
- The **7 basic tools** of quality:
  1. **Cause-and-effect** diagram: what causes problems
  2. **Flowcharts**: what is done
  3. **Check** sheets: recollect and organize the data
  4. **Histograms**: graphical view of the variations
  5. **Pareto** chart: problem ranking
  6. **Control** charts: variations control
  7. **Scatter** diagrams: relation between variables

7 basic tools

Cause & Effect Diagram



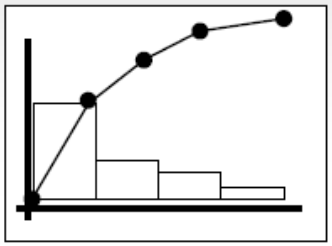
Flowcharts



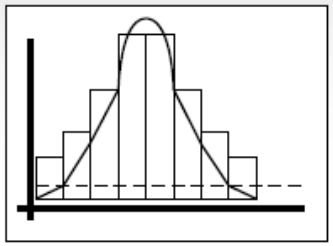
Checksheets

Category	*Strokes*	*Frequency*
Attribute 1		
Attribute 2		
Attribute ...		
Attribute n		

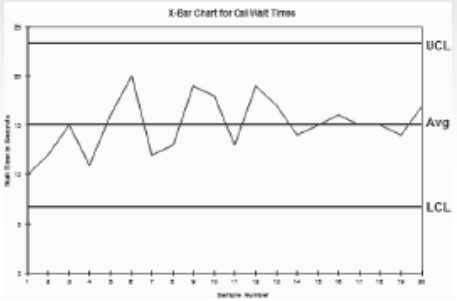
Pareto Diagrams



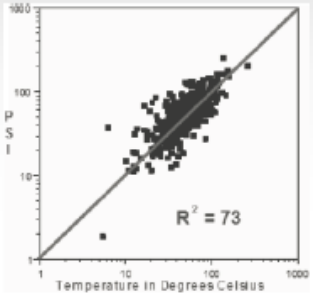
Histograms



Control Charts



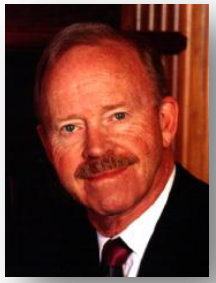
Scatter Diagrams



Crosby

- must be understood by everyone

= conformance to requirements



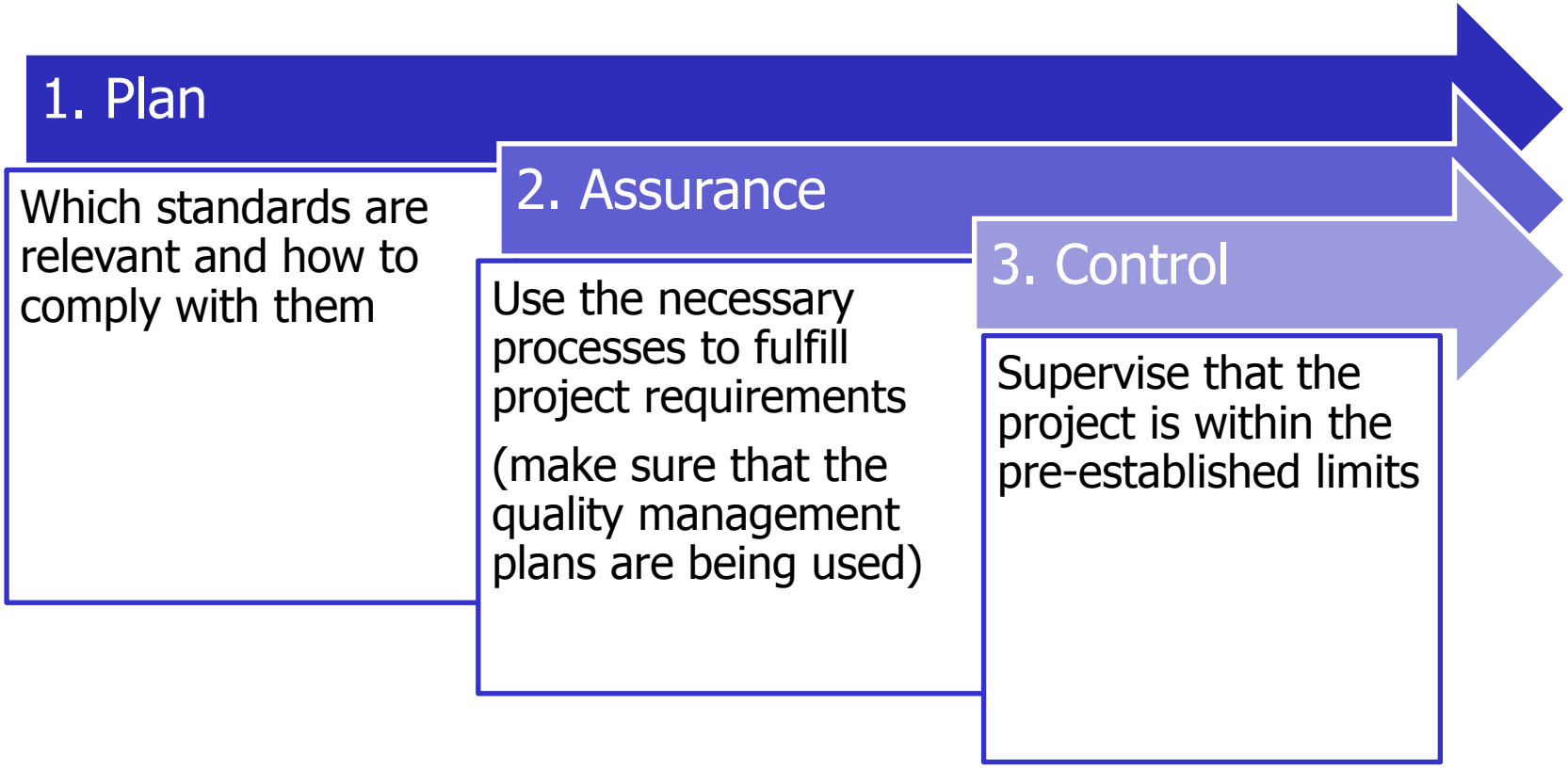
- system of quality management

= **Prevention over Inspection**

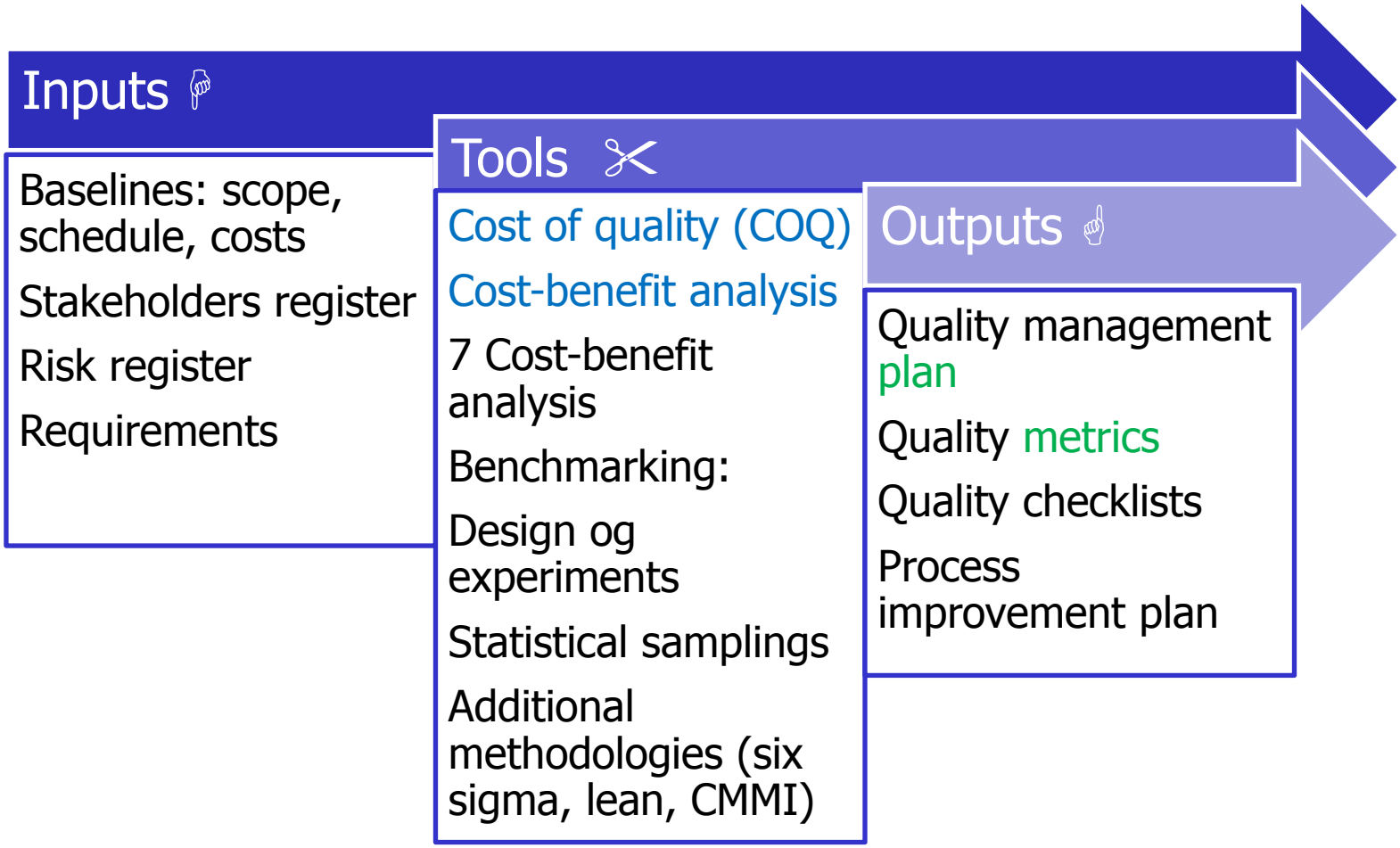
- Quality performance standard

= **0 defects**

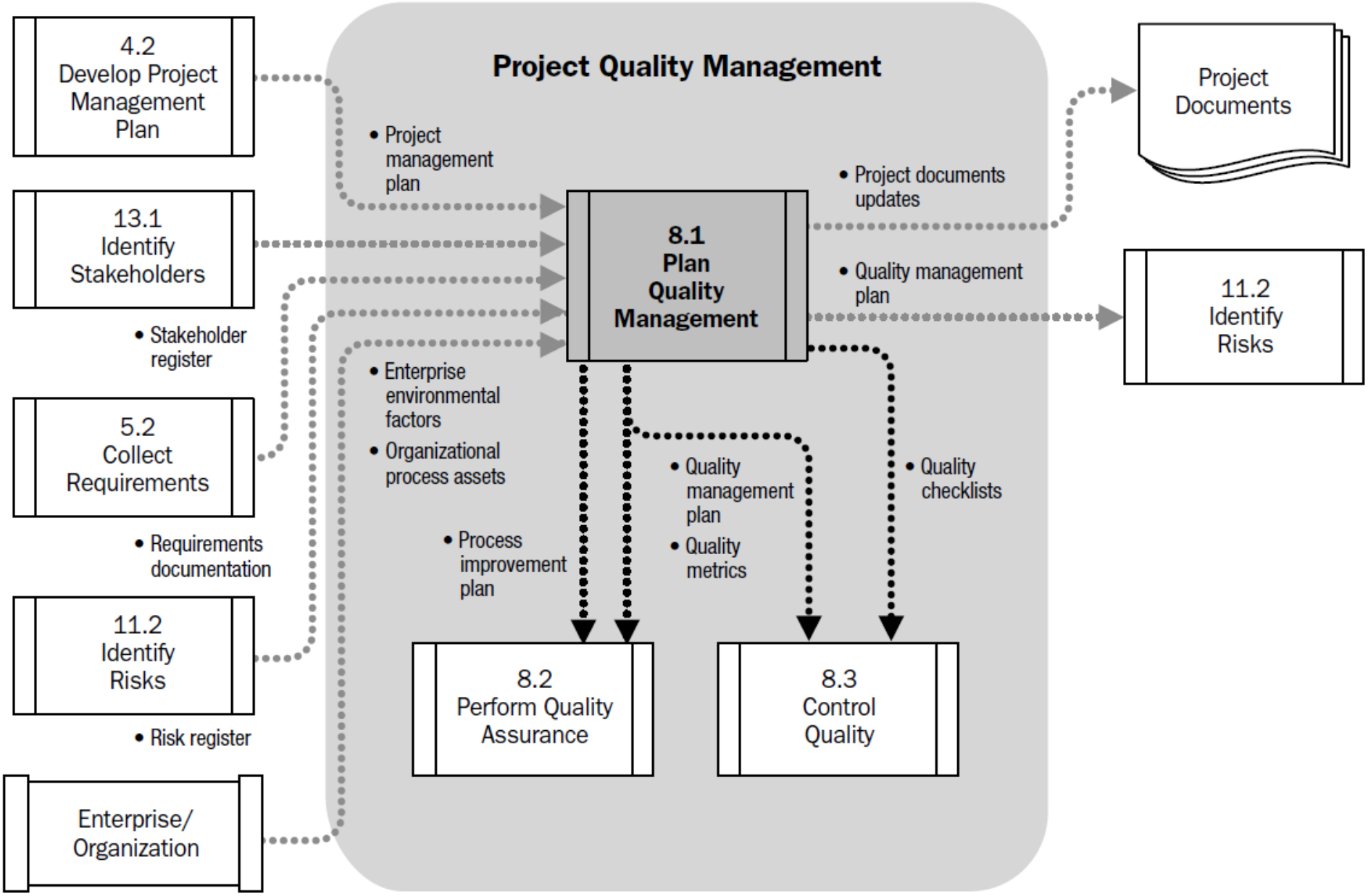
Quality management processes



1. Plan Quality Management



1. Plan Quality Management



Plan Quality Management

ISO 9000 Standards

1. **Write** what we do
2. **Do** what we have written
3. **Register** what we did
4. **Verify**
5. **Act** over differences (Improve)

Standars=> Not re-invent the wheel

Cost of quality (COQ)

COSTS OF CONFORMANCE (compliance)

Money spent during the project to **avoid failures**

1. **Prevent** noncompliance
   - Policies and **PROCESSES**
   - Maintenance
   - Training
   - Studies

$

2. **Evaluate** product's conformance
   - Supervision
   - Control
   - Testing
   - Inspection

$

✂ Cost of quality (COQ)

COSTS OF NONCONFORMANCE (Noncompliance)

Money spent during and after the project **because of failures**

3. **Internal failures**

   Repair defects before they reach the Client

   Rework

   Corrective actions

   Work with excess of inventory, less productivity

$$

4. **External failures (COSTS OF NONCONFORMANCE)**

   Defects detected "after the fact"

   Fines, warranties, devolutions

   Discounts, loss of sales

$$

Question

Which costs are greater, conformance or nonconformance costs?

Answer: *nonconformance. If not, why dedicate time and resources to quality improvements?*

Cost of quality (COQ)

Reactive approach – Example of costs ($)

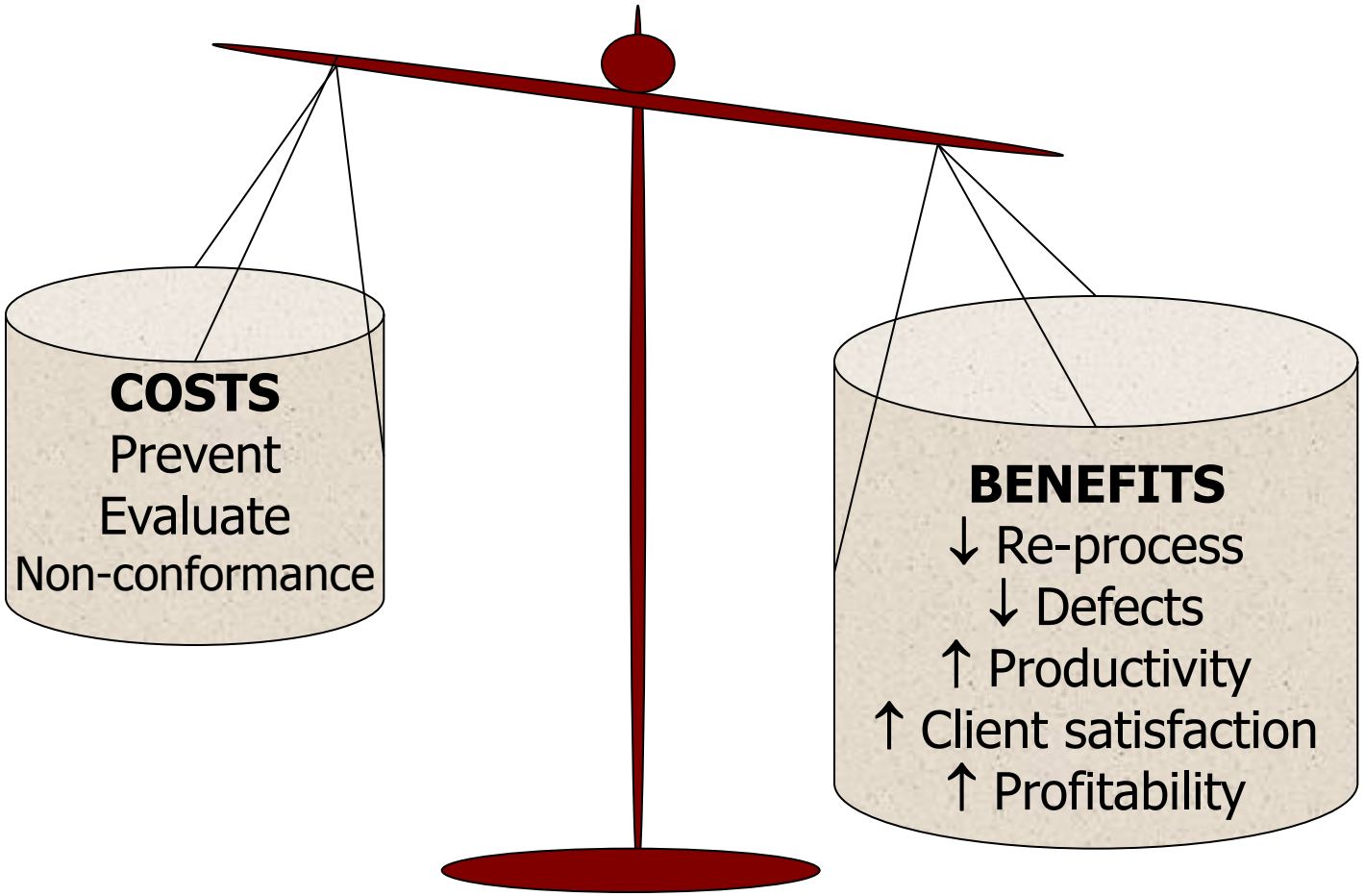
Prevention	5%
Evaluation	15%
Internal & external failures	80%
TOTAL	100%

Nonconformance costs

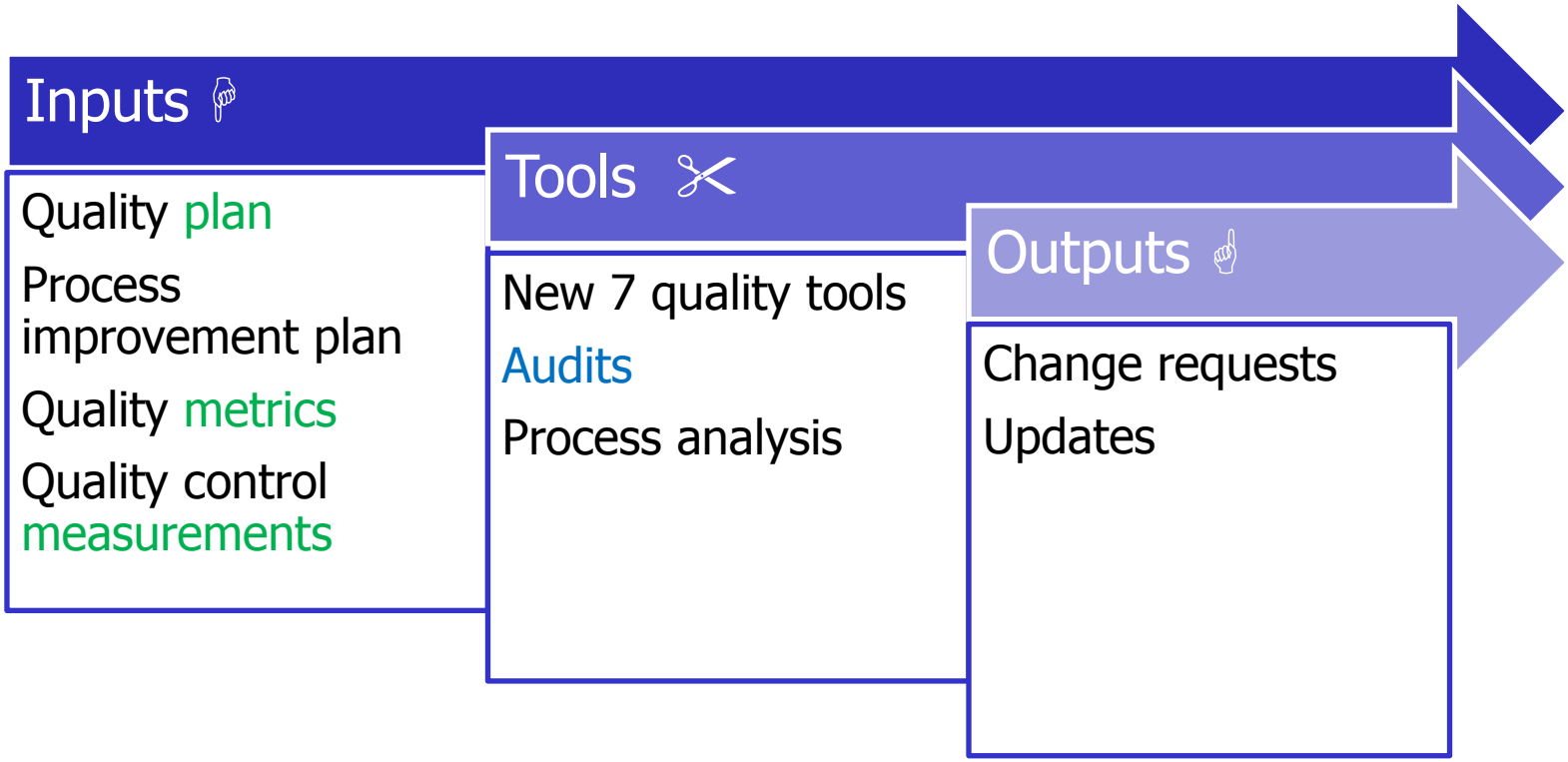
- The average business never has any news of 96% of their unhappy clients
- The average client that has had problems, tells 10 other people
- Clients that have solved the problem, tell 5 other people

Source: TARP Worldwide

Cost-benefit analysis

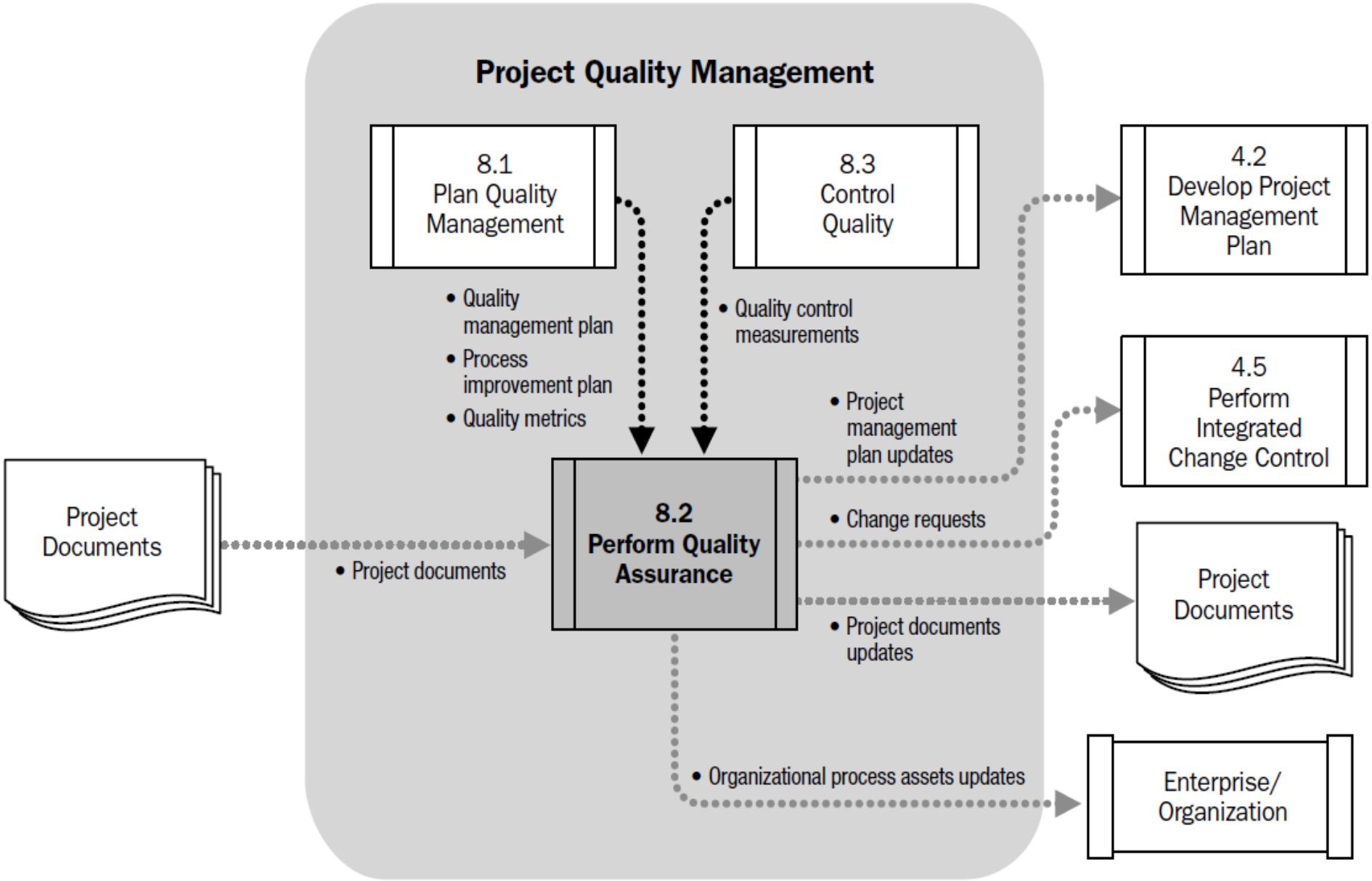


2. Perform Quality Assurance



audits with **a** of assurance ≠ inspection (quality control)

2. Perform Quality Assurance



New 7 quality tools

Affinity diagrams: organizes many ideas by common interest groups.

Process decision program chart (PDPC): identifies what might be wrong in a plan under development. We use it to understand an objective and its relationship with the steps to reach it.

Relations diagram: shows the cause-effect relationships and analyzes the different aspects of a problem.

Tree diagram: decomposes big categories into smaller groups to facilitate decision-making from general aspects to particular ones. Examples: WBS, Resources breakdown structure, etc.

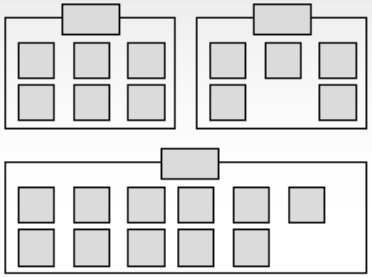
Prioritization matrix: uses math criteria to weight and select pairs of alternatives, until we reach the optimal decision.

Activity arrow diagram: represent the activities sequence in a figure. Example: AON.

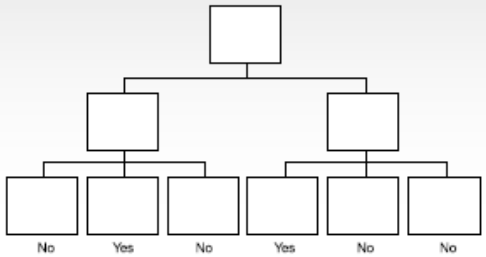
Matrix diagram: shows the logical relationships between factors, causes and objectives represented on the rows and columns of a matrix.

New 7 quality tools

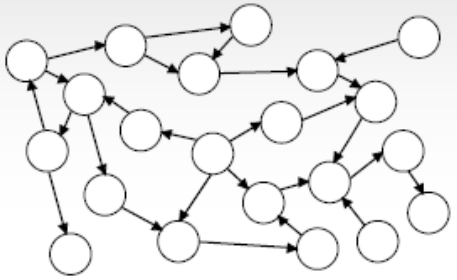
Affinity Diagram



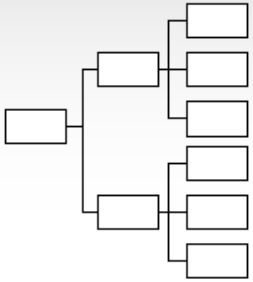
PDPC



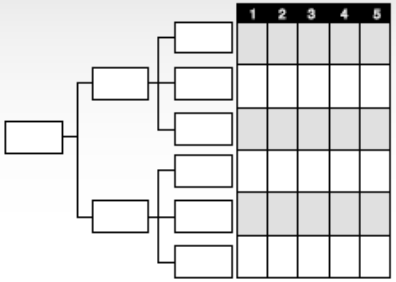
Interrelationship Digraph



Tree Diagrams

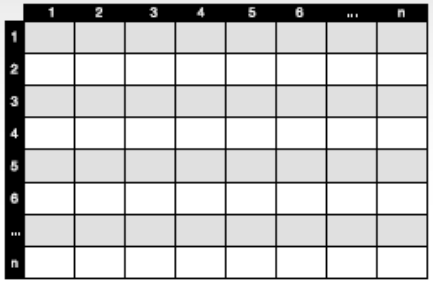


Prioritization Matrices



Network Diagrams

Matrix Diagrams



Perform Quality Assurance

Quality audits

Are quality policies and standards being applied?

Are current processes effective and efficient?

Achieve the objective *Achieve the objective at minimun cost*

Performed by the QA Dept., if not PM

Process analysis

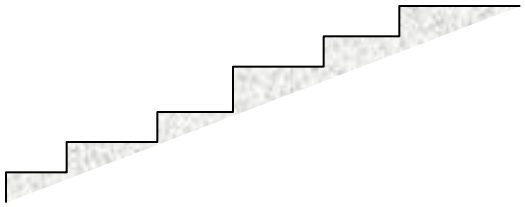
Whenever a project has repetitive processes

e.g.: plan the revision of the software installation process every 10 computers

Continuous improvement

Continuous improvement

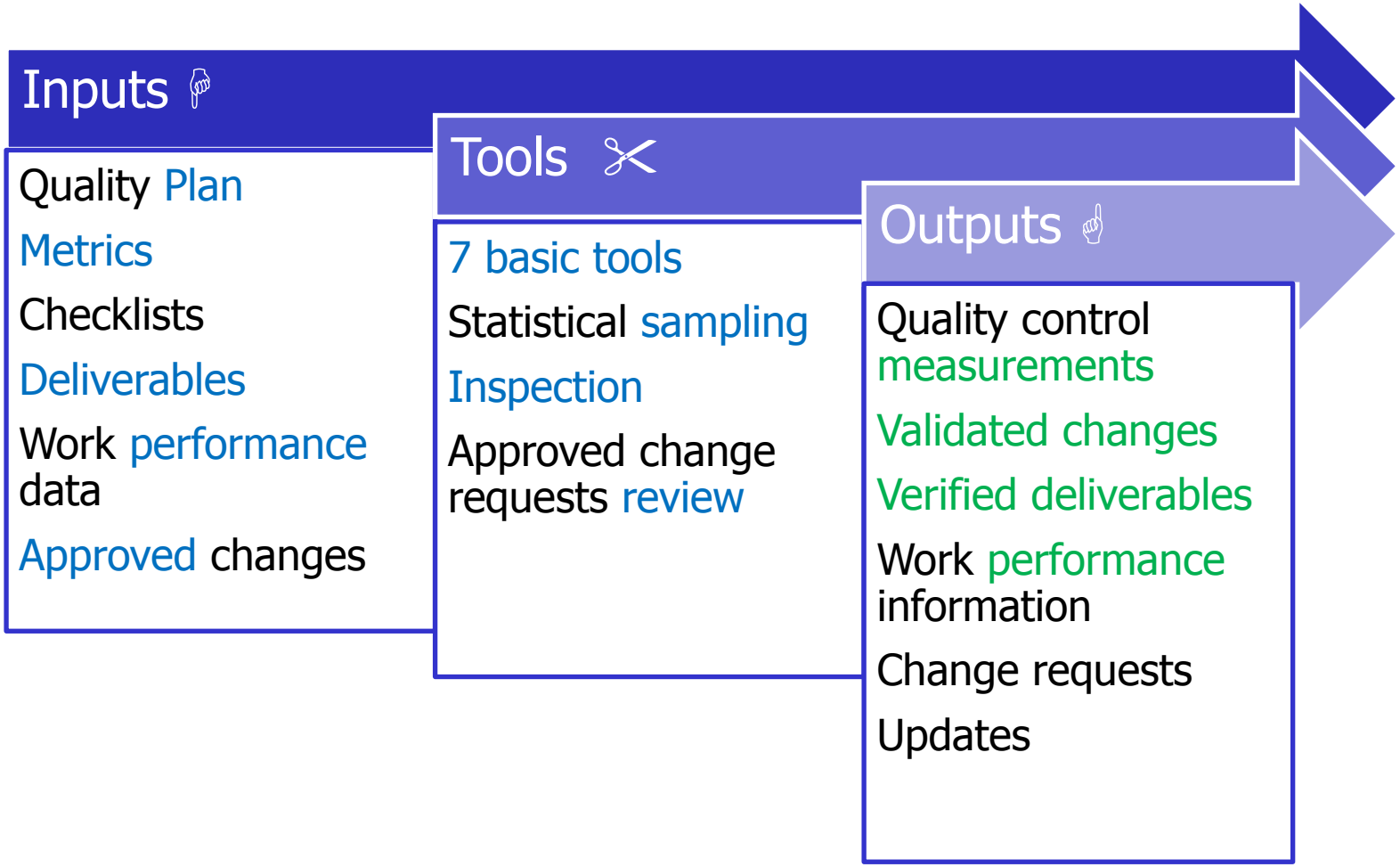
Improvement (**Kaizen**)	Innovation (**Kairyo**) 的基本信息
Many small improvements	One big improvement
HR re-engineering	Process re-engineering
Small investment	Big investment
High maintenance	Low maintenance
Involves everybody	Involves the "chosen ones"
Conventional experience + PDCA cycle	Technological or organizational innovation



zen with **e** of "**e**asy steps"

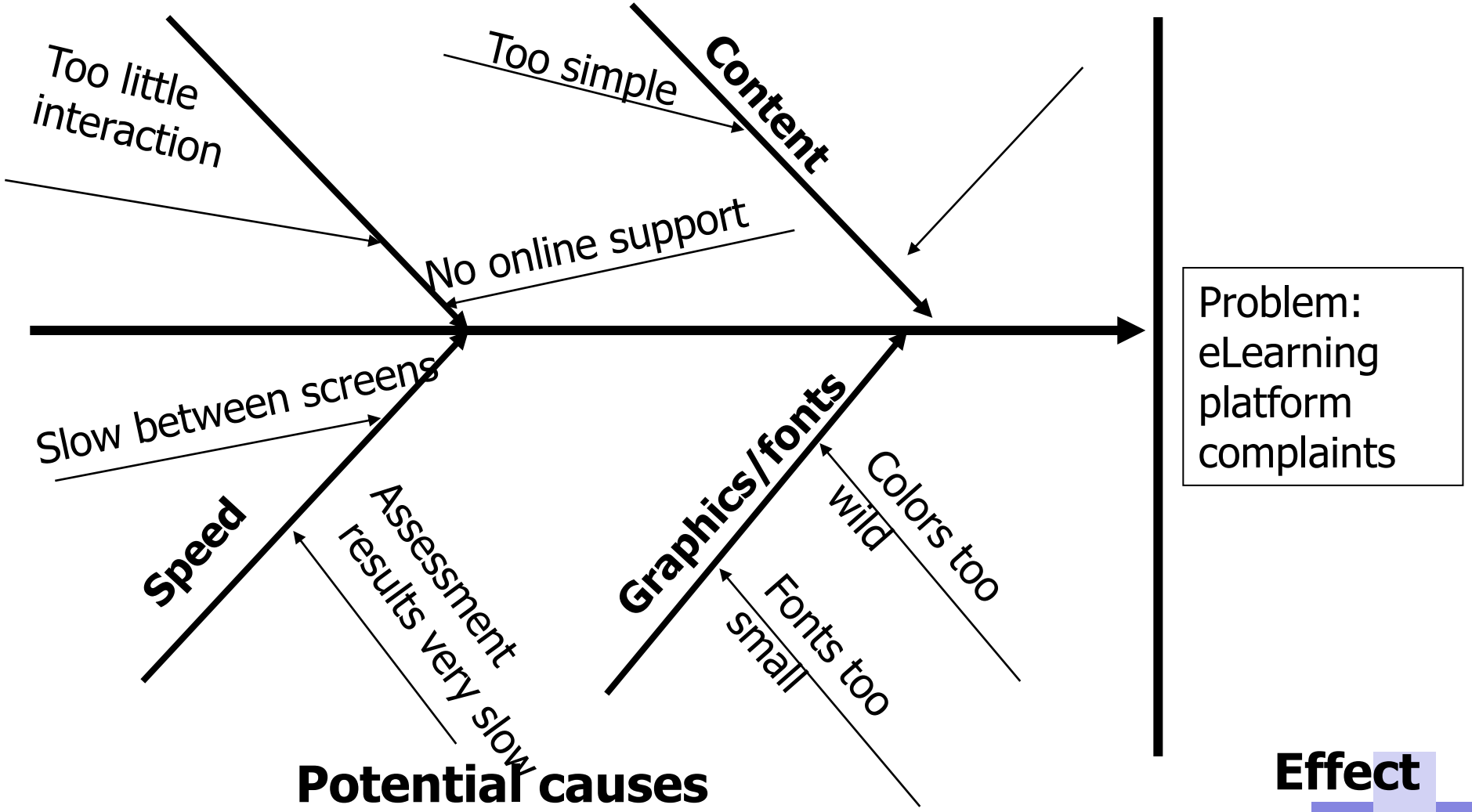
ryo with **o** of "**o**ne big step"

3. Control Quality

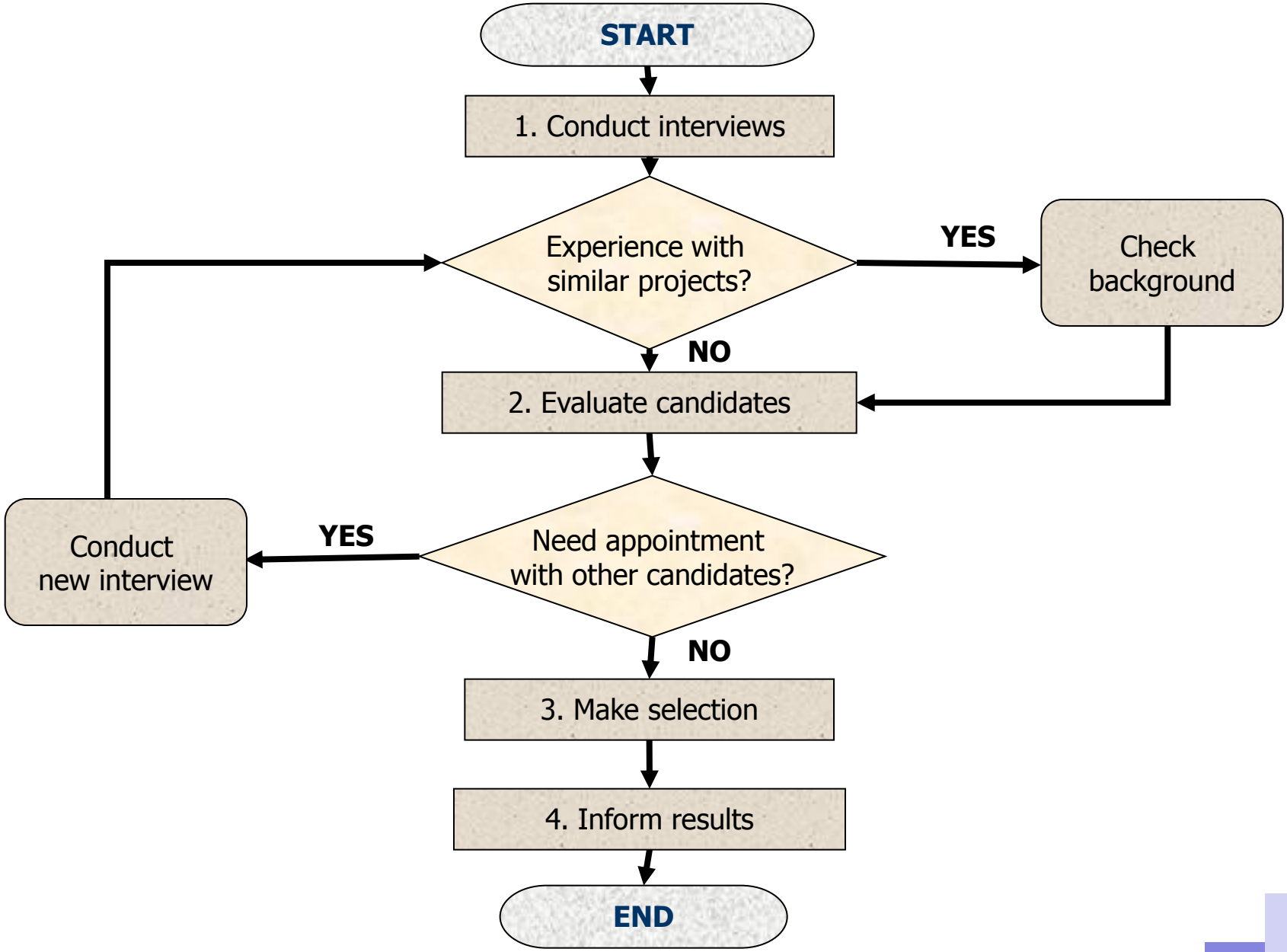


1. Cause and effect diagrams

- **Ishikawa** or **fishbone** Diagrams
- Identifies the causes of problemas
- Useful to inspire ideas and generate discussion



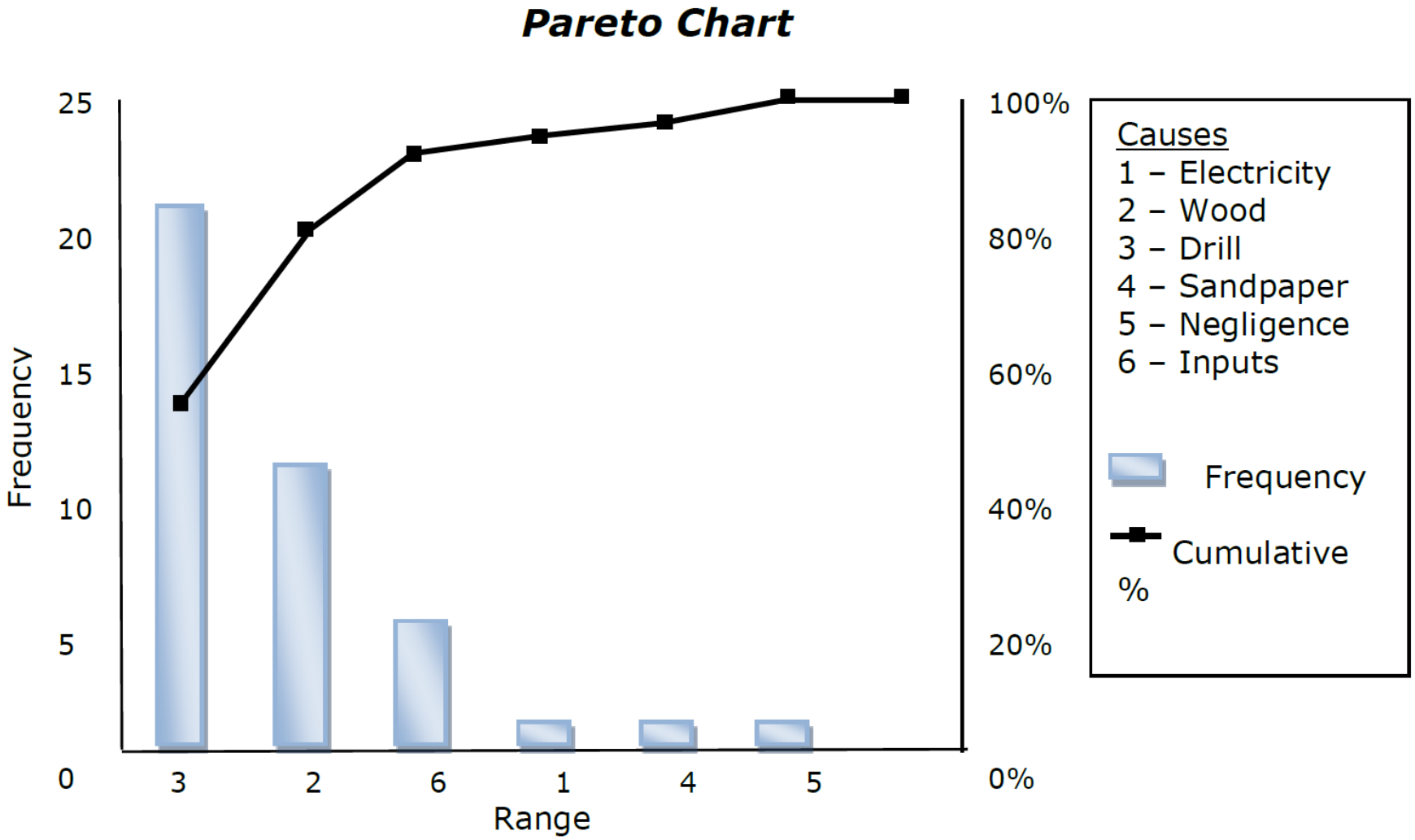
2. Flowchart


START
1. Conduct interviews
Experience with similar projects?
YES
Check background
NO
2. Evaluate candidates
Need appointment with other candidates?
YES
Conduct new interview
NO
3. Make selection
4. Inform results
END

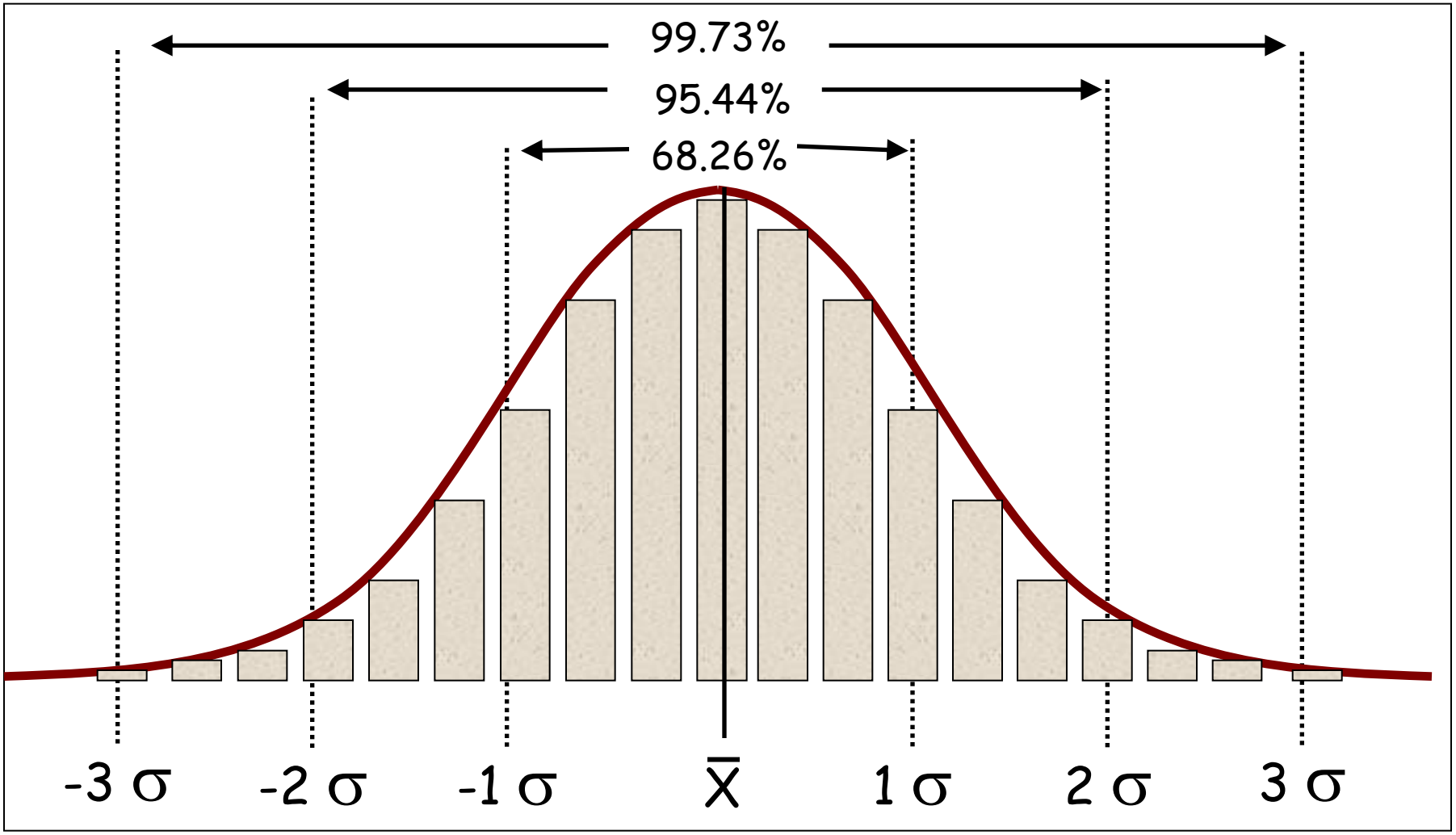
4. Pareto Chart

- 80/20 Principle = Pareto Law

80% of the problems come from 20% of the causes



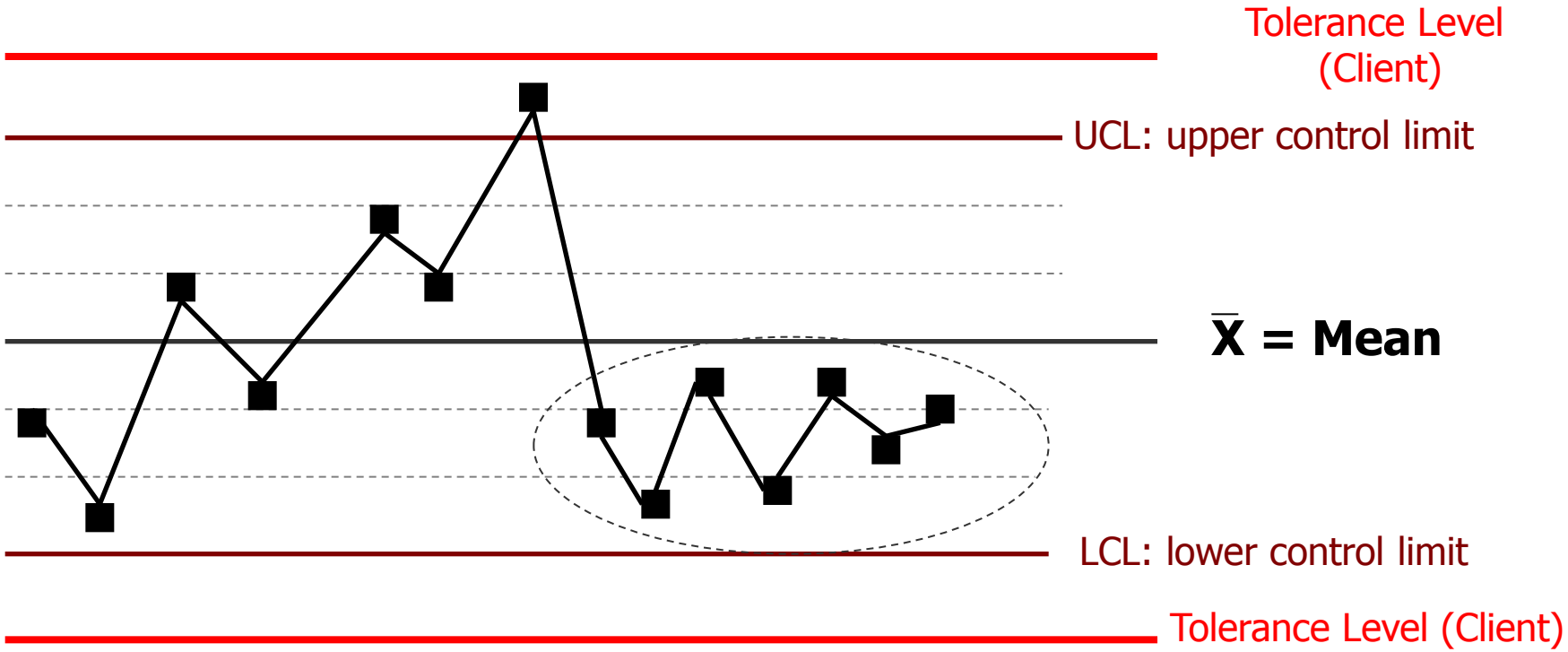
Standard Normal Distribution



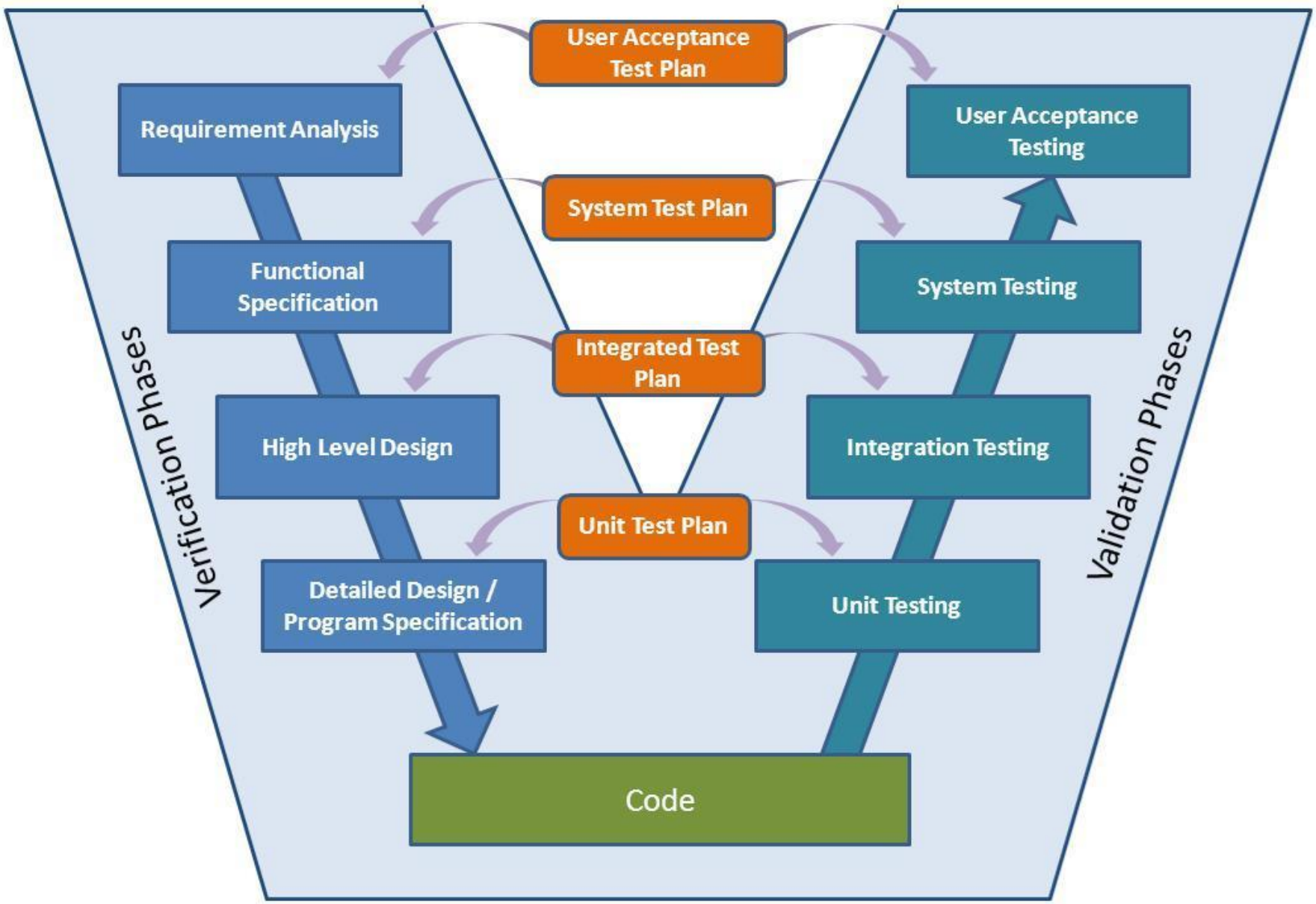
6 σ = 99,99966% => 3,4 defects per million

6. Control Chart

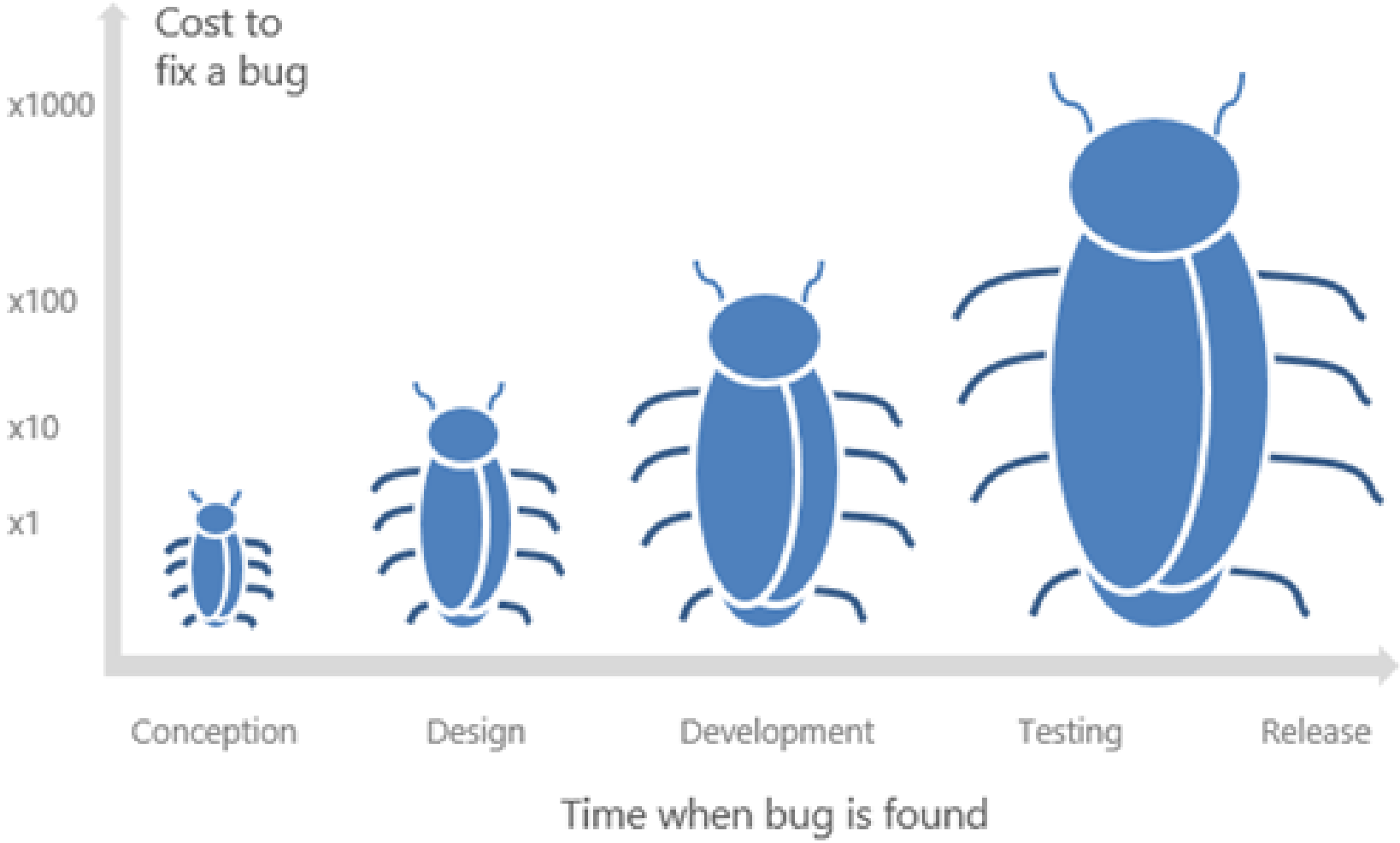
- Evaluate the process behavior throughout time
- Tolerance & control limits
- Rule of Seven: Out of control
- R chart: measures the amplitude of the variations



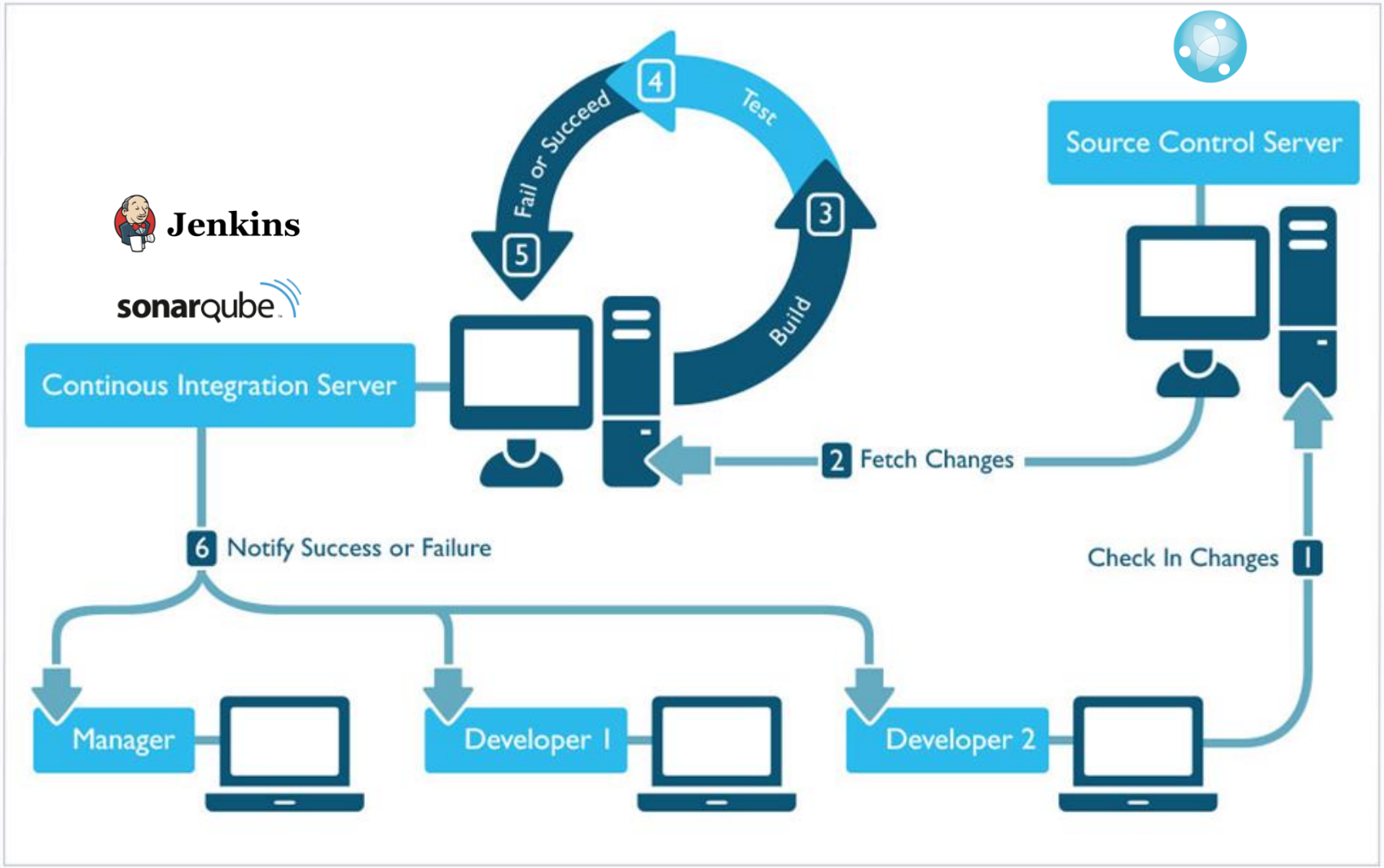
V-Model


User Acceptance Test Plan
Requirement Analysis
User Acceptance Testing
System Test Plan
Functional Specification
System Testing
Integrated Test Plan
High Level Design
Integration Testing
Unit Test Plan
Detailed Design / Program Specification
Unit Testing
Code
Verification Phases
Validation Phases

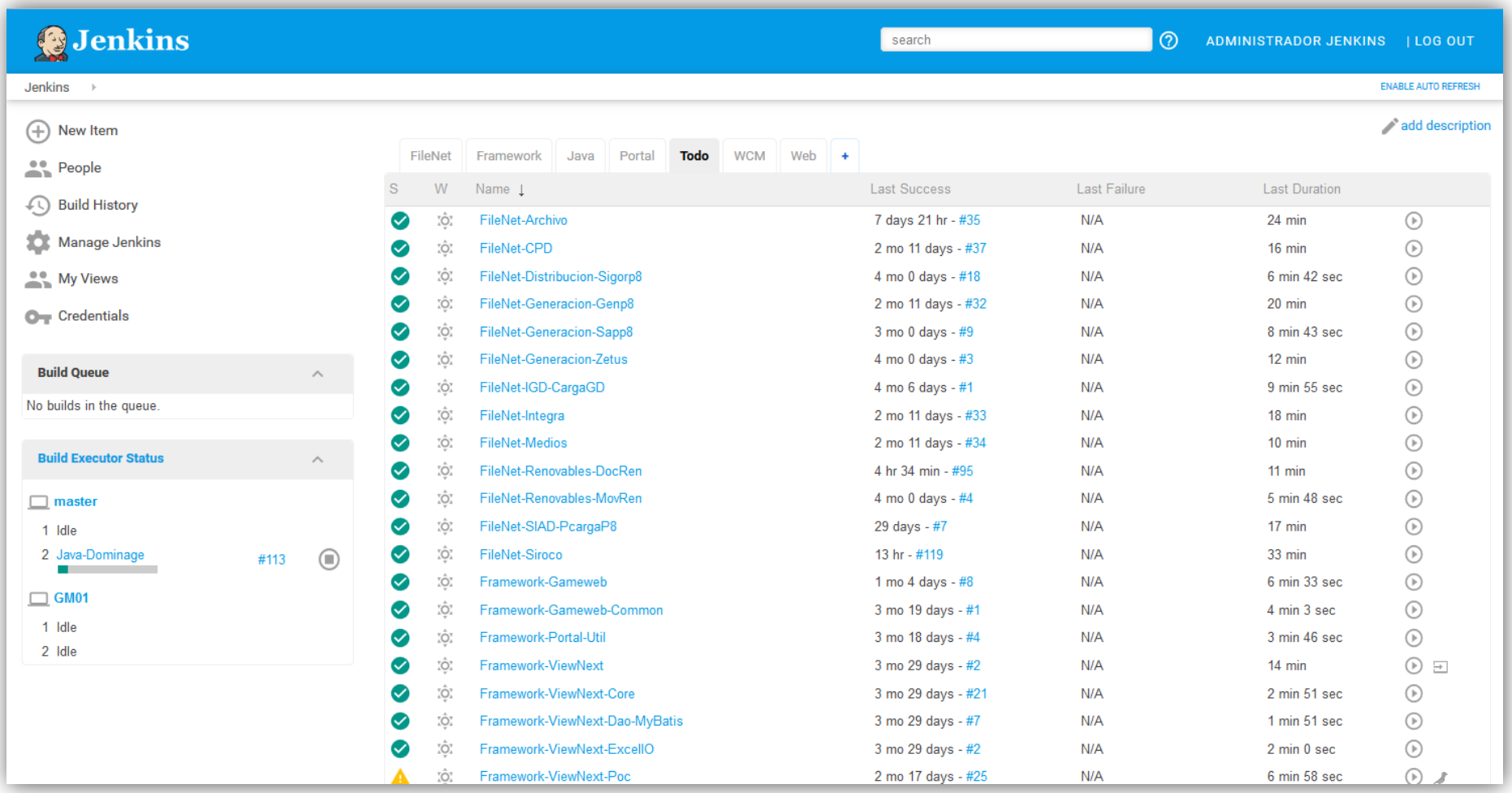
Continuous Integration



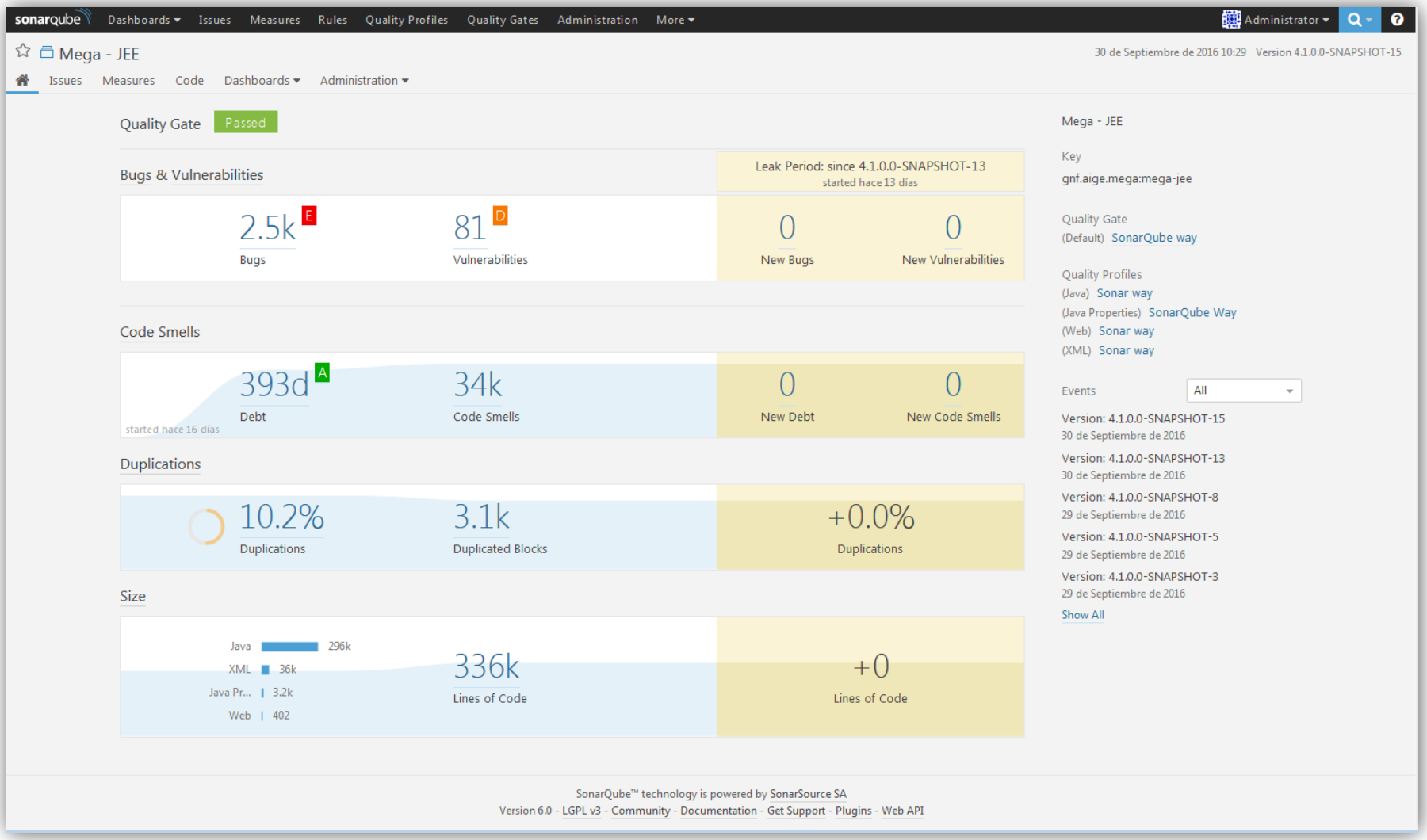
Continuous Integration



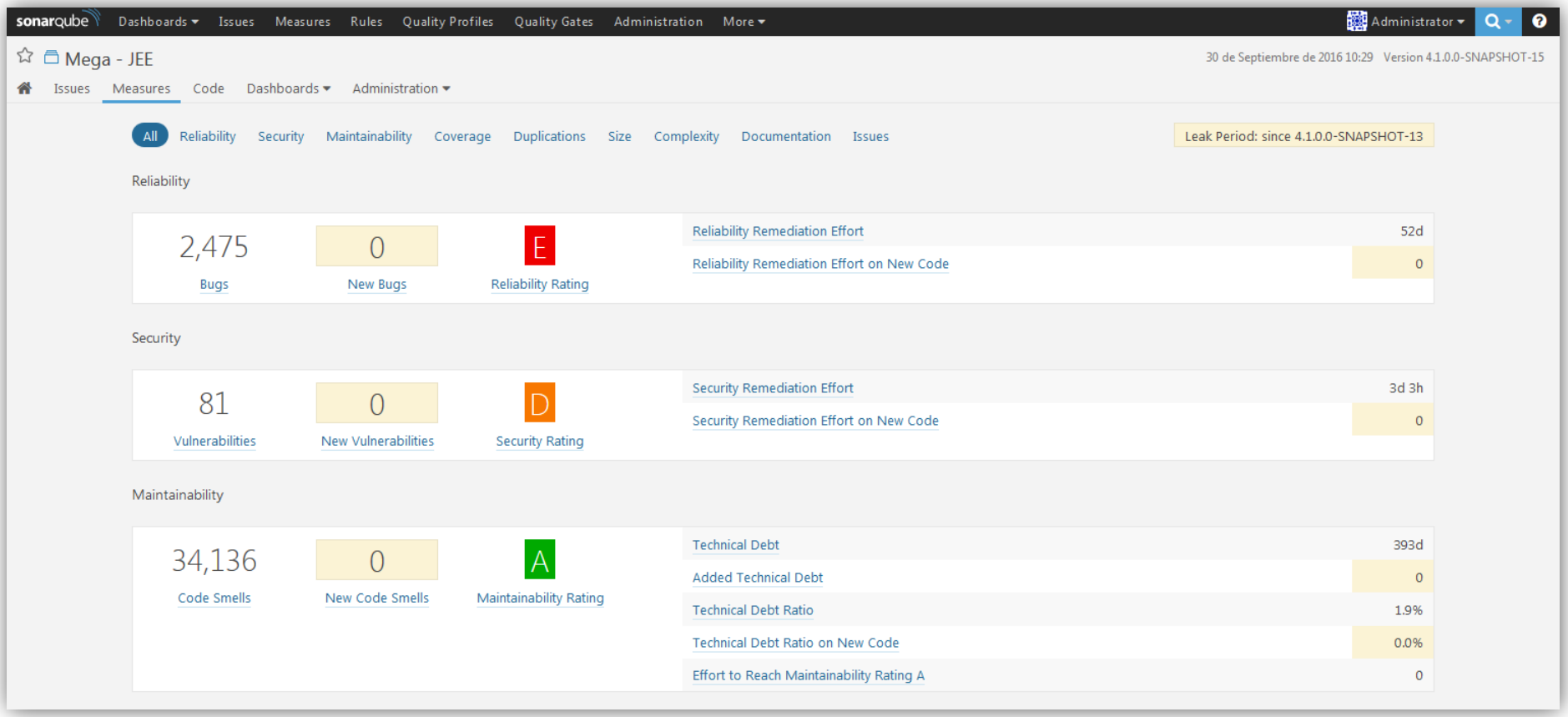
Continuous Integration



Continuous Integration



Continuous Integration



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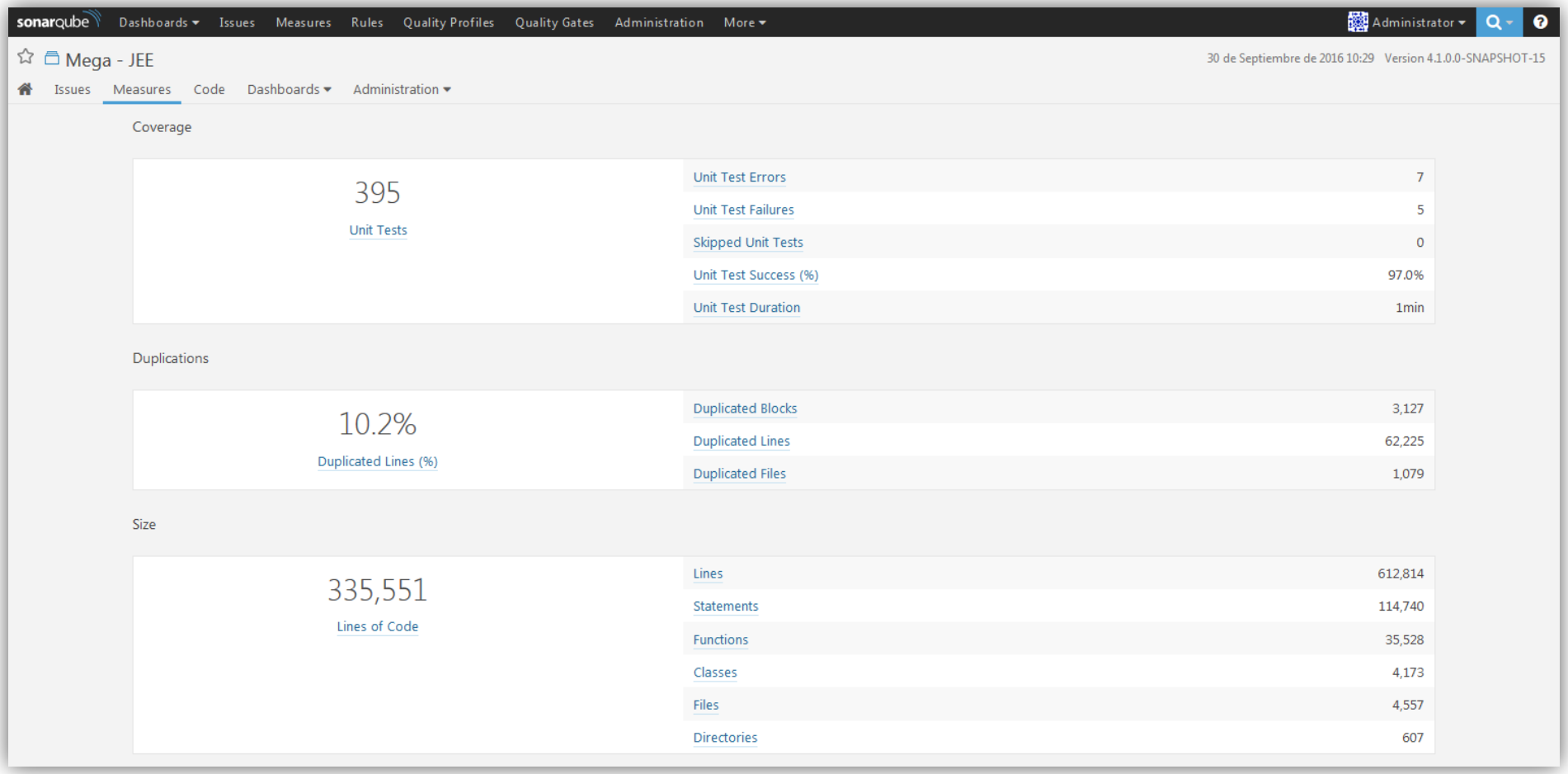

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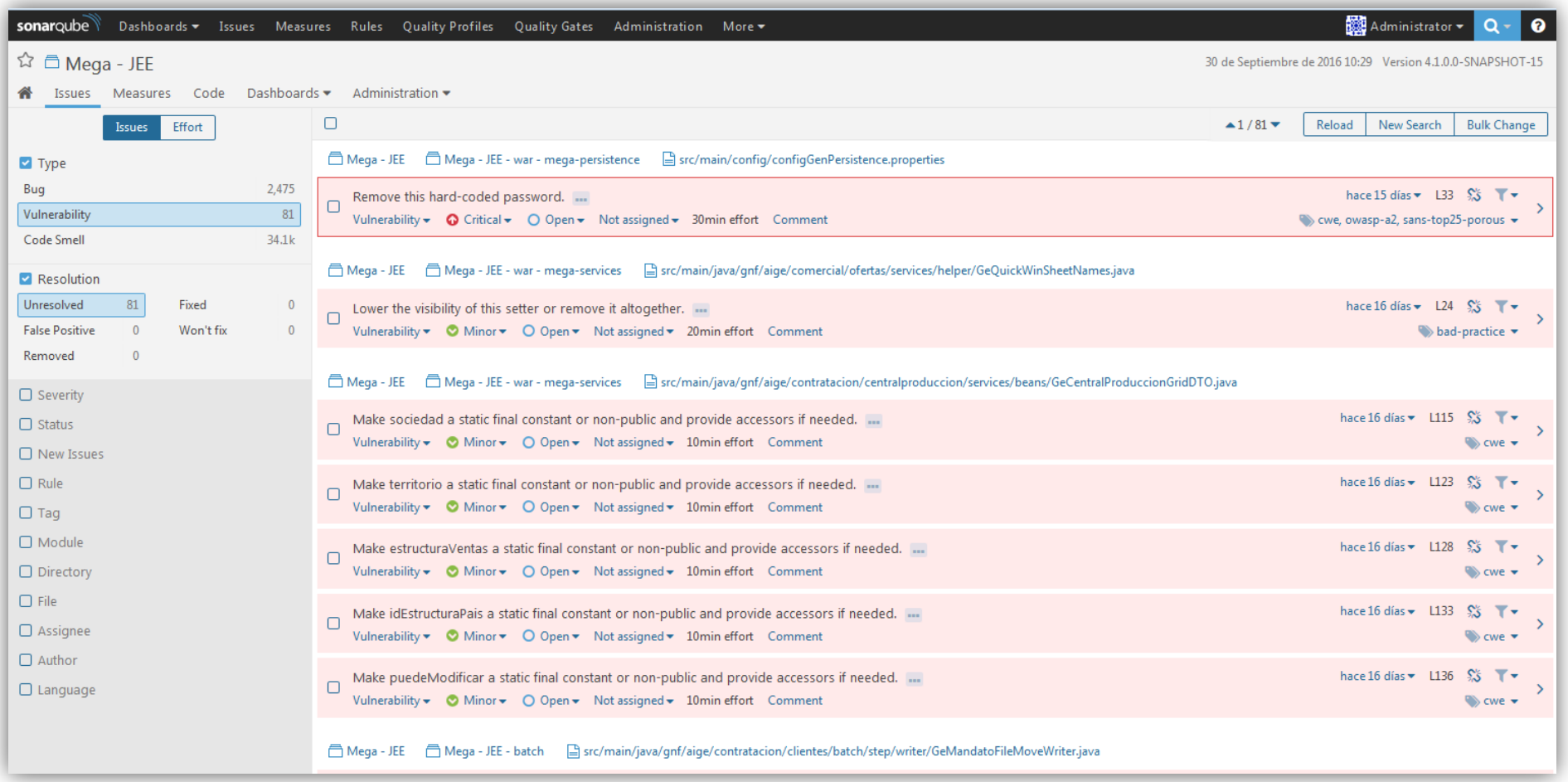
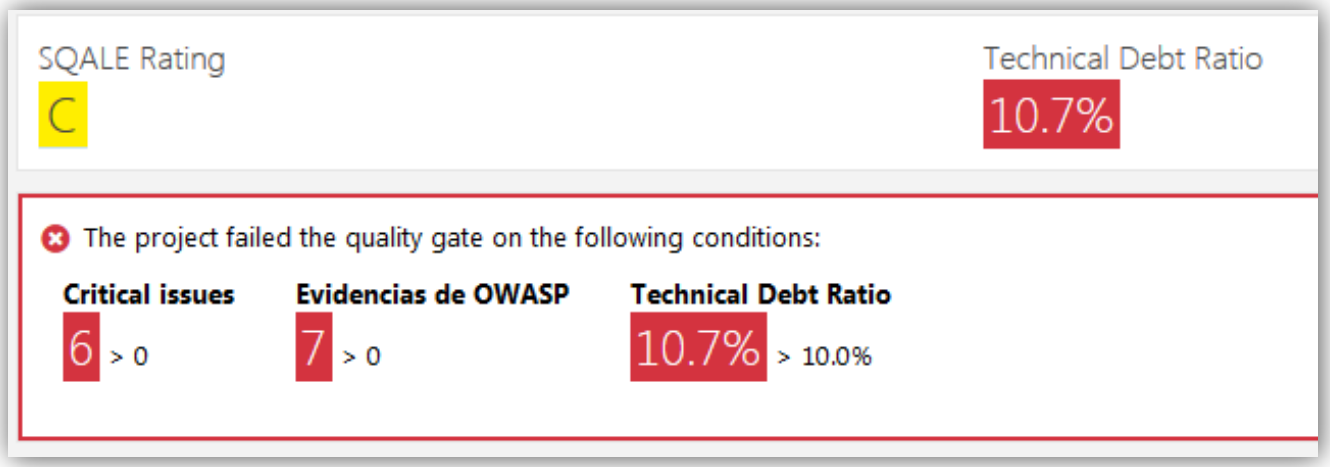


Continuous Integration



Continuous Integration

Name	Example source	Result
Conditionals Boundary	>	>=
Negate Conditionals	==	!=
Remove Conditionals	foo == bar	true
Math	+	-
Increments	foo++	foo--
Invert Negatives	-foo	foo
Inline Constant	static final FOO= 42	static final FOO = 43
Return Values	return true	return false
Void Method Call	System.out.println("foo")	
Non Void Method Call	long t = System.currentTimeMillis()	long t = 0
Constructor Call	Date d = new Date()	Date d = null;

Continuous Integration

Unit Tests Coverage			Unit Test Success		
67.2%			100.0%		
Line Coverage	Condition Coverage		Failures	Errors	Tests	Execution Time
71.4%	50.7%		0	0	291	52.4 sec
Integration Tests Coverage			Overall Coverage		
79.2%			80.1%		
Line Coverage	Condition Coverage		Line Coverage	Condition Coverage	
82.8%	65.1%		83.8%	65.7%	

Mutations Coverage	Killed mutations	Non killed mutations
71.6%	15 mutations killed by tests	2 survived mutations
536 total mutations	369 mutations killed by time outs	150 non covered mutations
384 detected mutations		


```
            }

            //Se rellenan los datos
            dto.setLogin(usuarioActivo.get(AdministracionConstantes.DA_USUARIO)); //cn
```

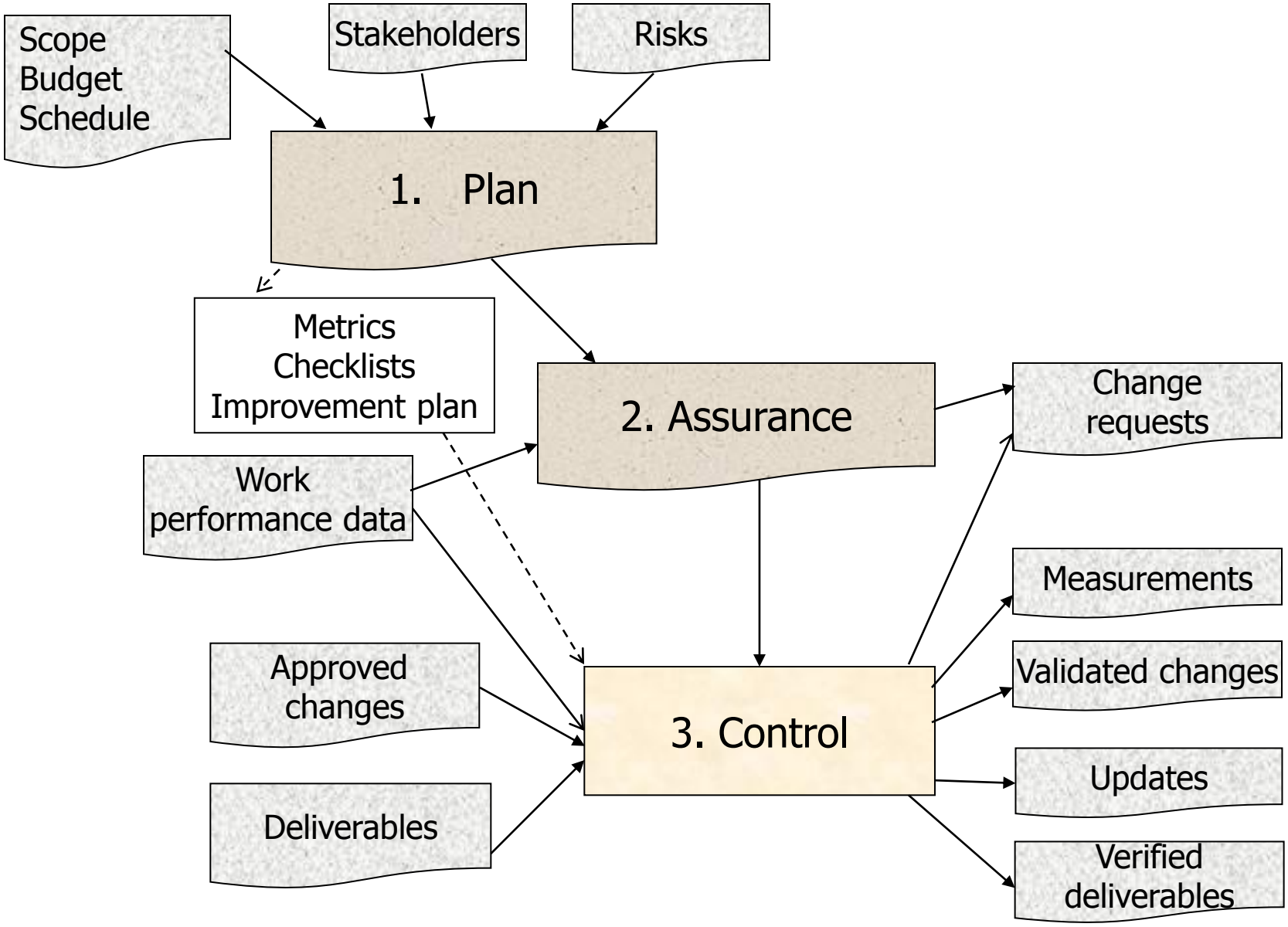
A method call has been removed without breaking the tests ··· hace 12 días ▾ L79

Info ▾ Abiertas ▾ Sin asignar ▾ Sin planificar ▾ Comentario No tags ▾

```
            dto.setNombre(usuarioActivo.get(AdministracionConstantes.DA_NOMBRE));
            dto.setApellidos(usuarioActivo.get(AdministracionConstantes.DA_APELLIDOS));
            dto.setEmail(usuarioActivo.get(AdministracionConstantes.DA_MAIL));

            return dto;
        }
```

Summarizing quality management



Lessons learned

- ✓ Cost-benefit analysis
- ✓ Process analysis
- ✓ Quality and grade
- ✓ Conformance cost
- ✓ Cost of defects
- ✓ Cost of quality (COQ)
- ✓ Nonconformance cost
- ✓ Standard deviation
- ✓ Cause and effect diagram
- ✓ Run chart
- ✓ Control chart
- ✓ Scatter diagram
- ✓ Flowchart
- ✓ Ishikawa diagram
- ✓ Pareto chart
- ✓ Fishbone diagram
- ✓ Accuracy and precision
- ✓ Out of control
- ✓ Control limits
- ✓ Specification limits
- ✓ Checklists
- ✓ Median
- ✓ Continuous improvement
- ✓ Metrics
- ✓ Quality management plan
- ✓ Process improvement plan
- ✓ 80/20 Rule
- ✓ Run of Seven Rule

HUMAN RESOURCES

Human resources management processes

Plan human resources management

Types of power

Team roles and responsibilities

Acquire project team

Develop project team

Leadership and motivation

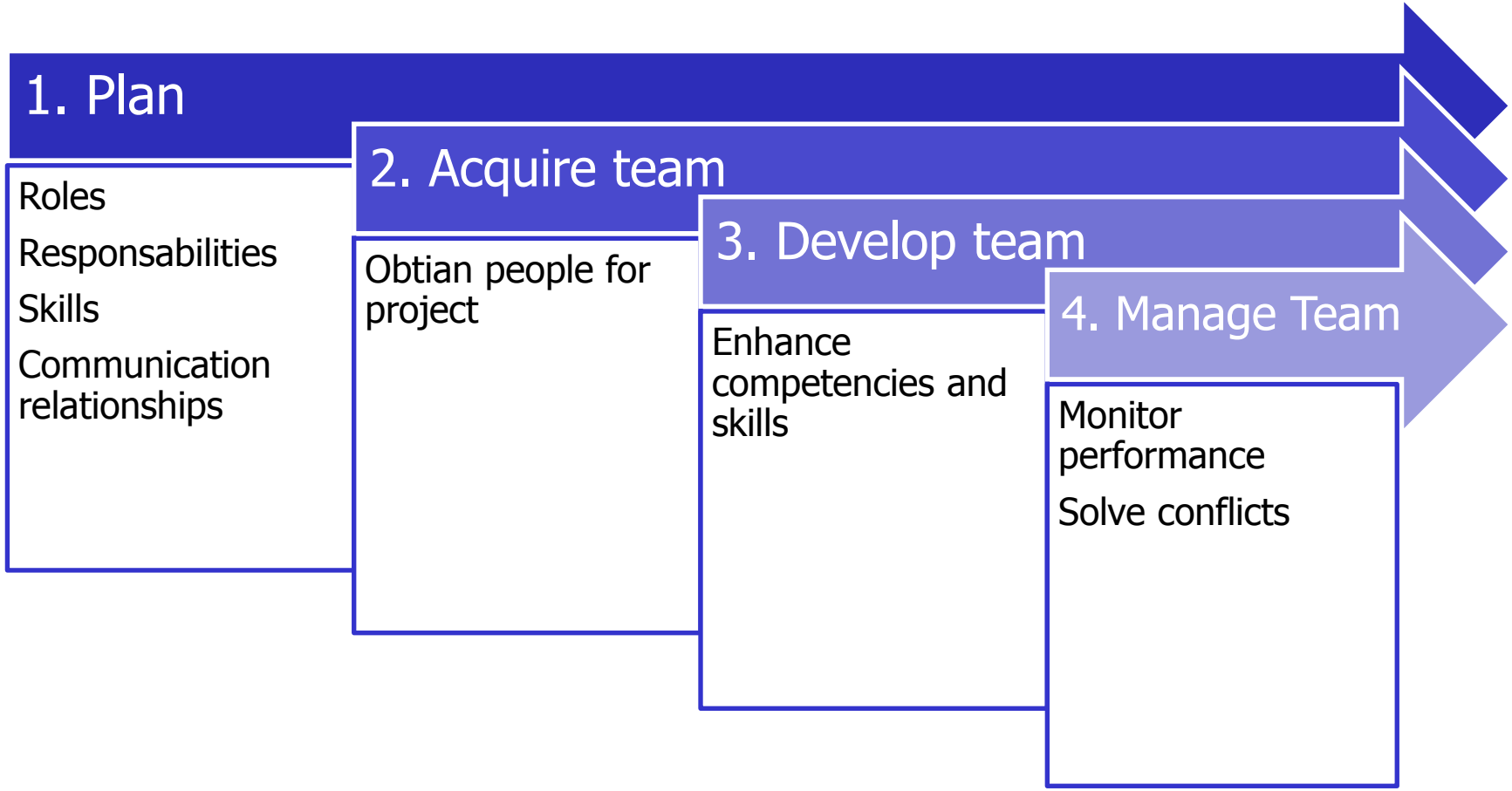
Manage project team

Conflict management

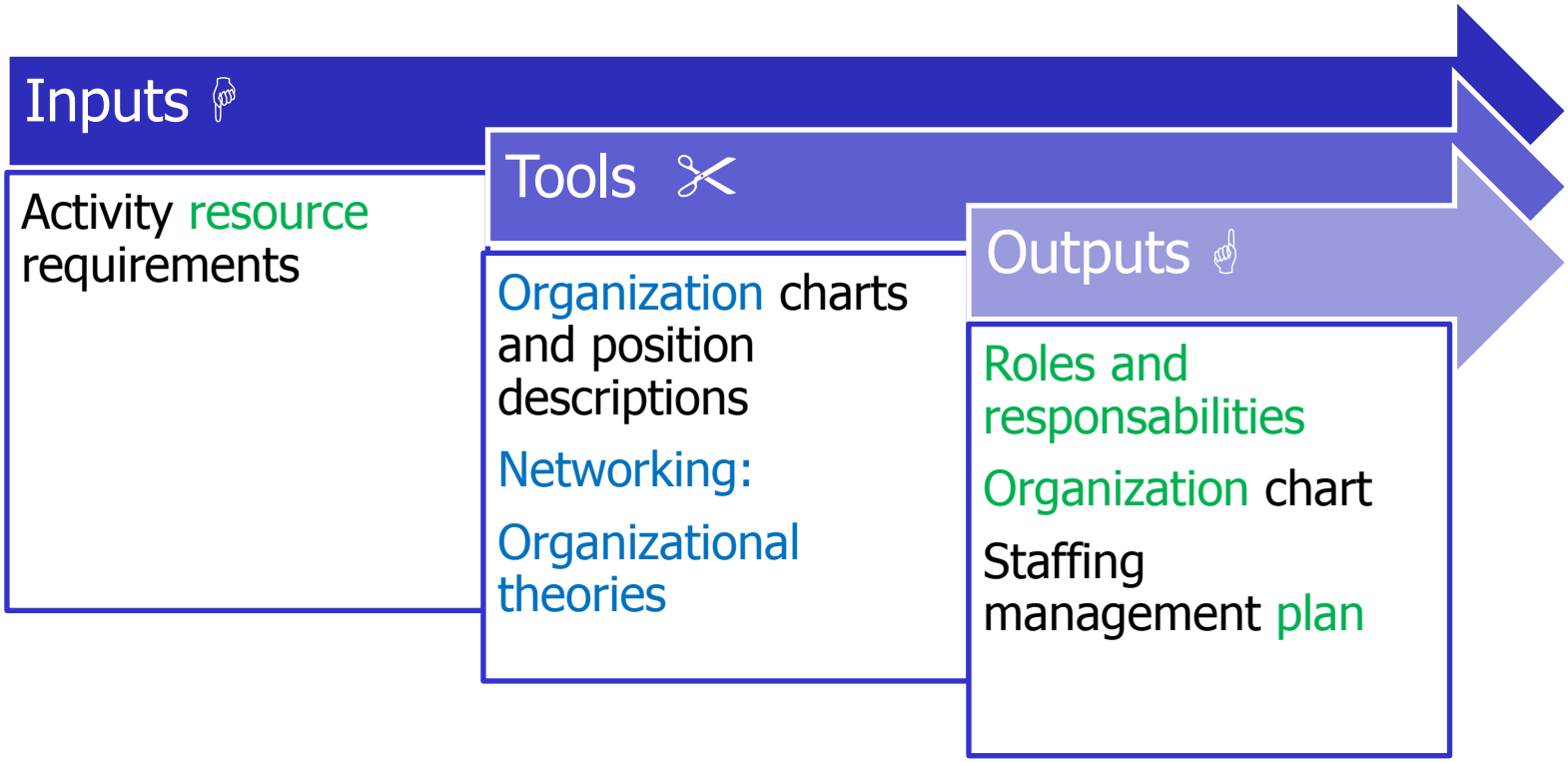
PM Process Groups

	Initiating	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		4		2	
Time		6		1	
Cost		3		1	
Quality		1	1	1	
Human Resources		Plan Human Resources	. Acquire team . Develop team . Manage team		
Communications		1	1	1	
Risks		5		1	
Procurements		1	1	1	1
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

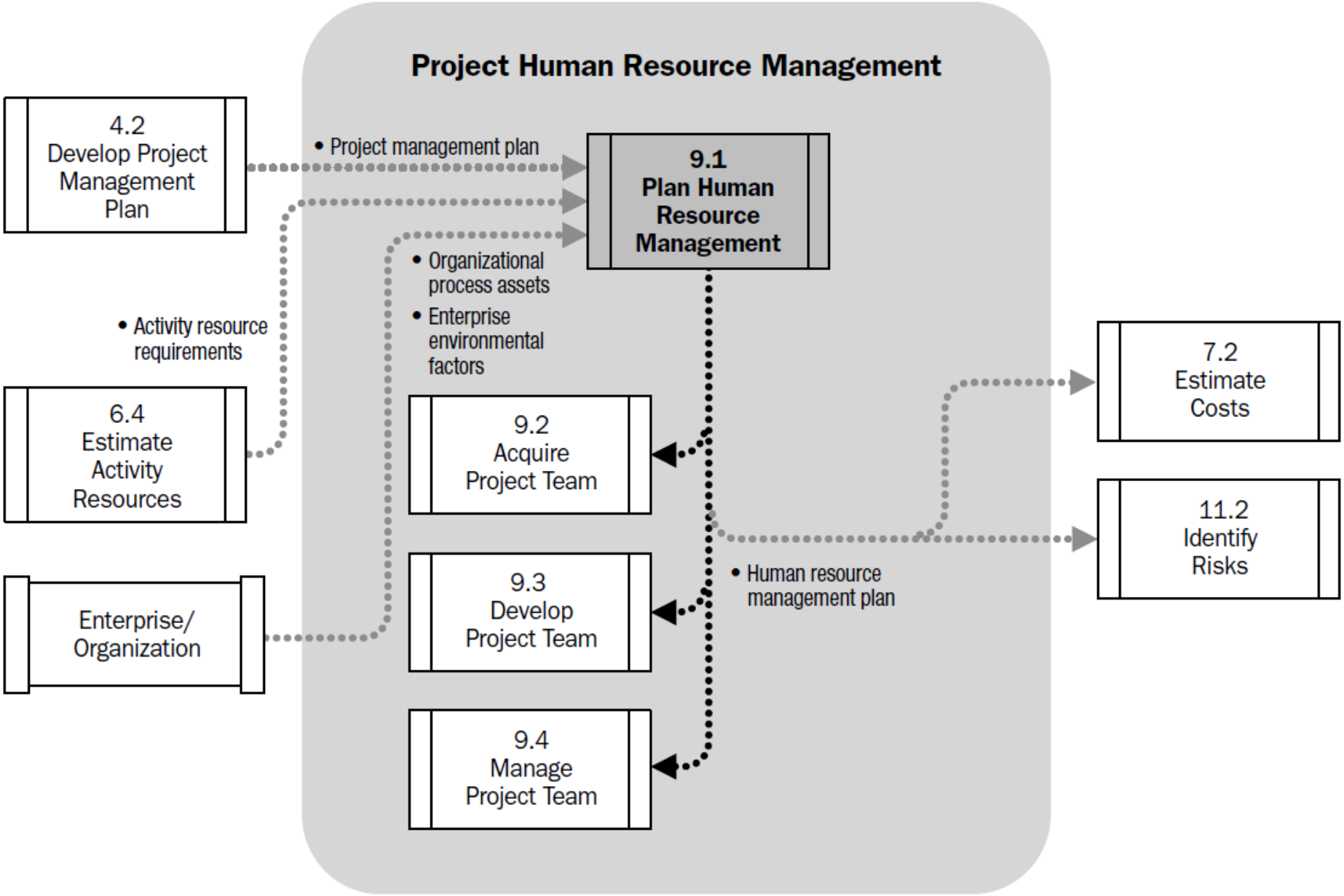
Plan human resource management



1. Plan HR management



1. Plan HR management



Plan HR management

- ✓ How and when is each person **brought on board**?
- ✓ What are their current capabilities and **training** needs?
- ✓ What will be their roles and responsibilities?
- ✓ What will be the **work packages assigned** to each team member?
- ✓ When should each person send the **reports**?
- ✓ To which **meetings** should each person attend?
- ✓ What will be the individual and team **incentive** plan?
- ✓ How will we **protect** the personnel from external contingencies?

- ✓ How and when will people be **released** from the project?

Types of power (Authority)

- **Formal** – Hierarchical position in the company
- **Rewards** – Authority to manage recompenses
- **Penalty** – Authority to manage punishment
- **Expert** – Based on knowledge and formation
- **Referred** – referred by a superior

Question

What is the best type of power?

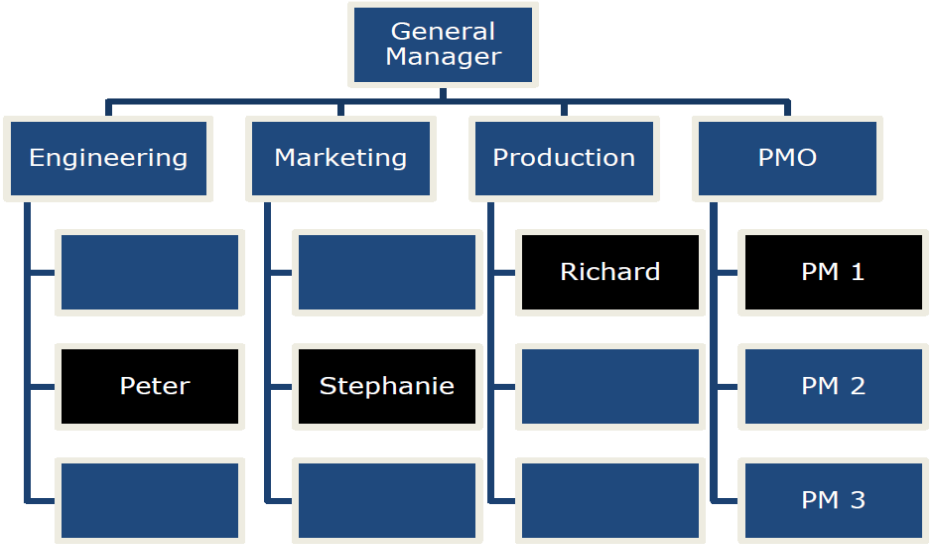
A. Expert
B. Reward
C. Formal
D. Penalty

Answer

1º - Expert and Reward
2º - Formal
WORST= Penalities

Plan HR management

Hierarchical diagram



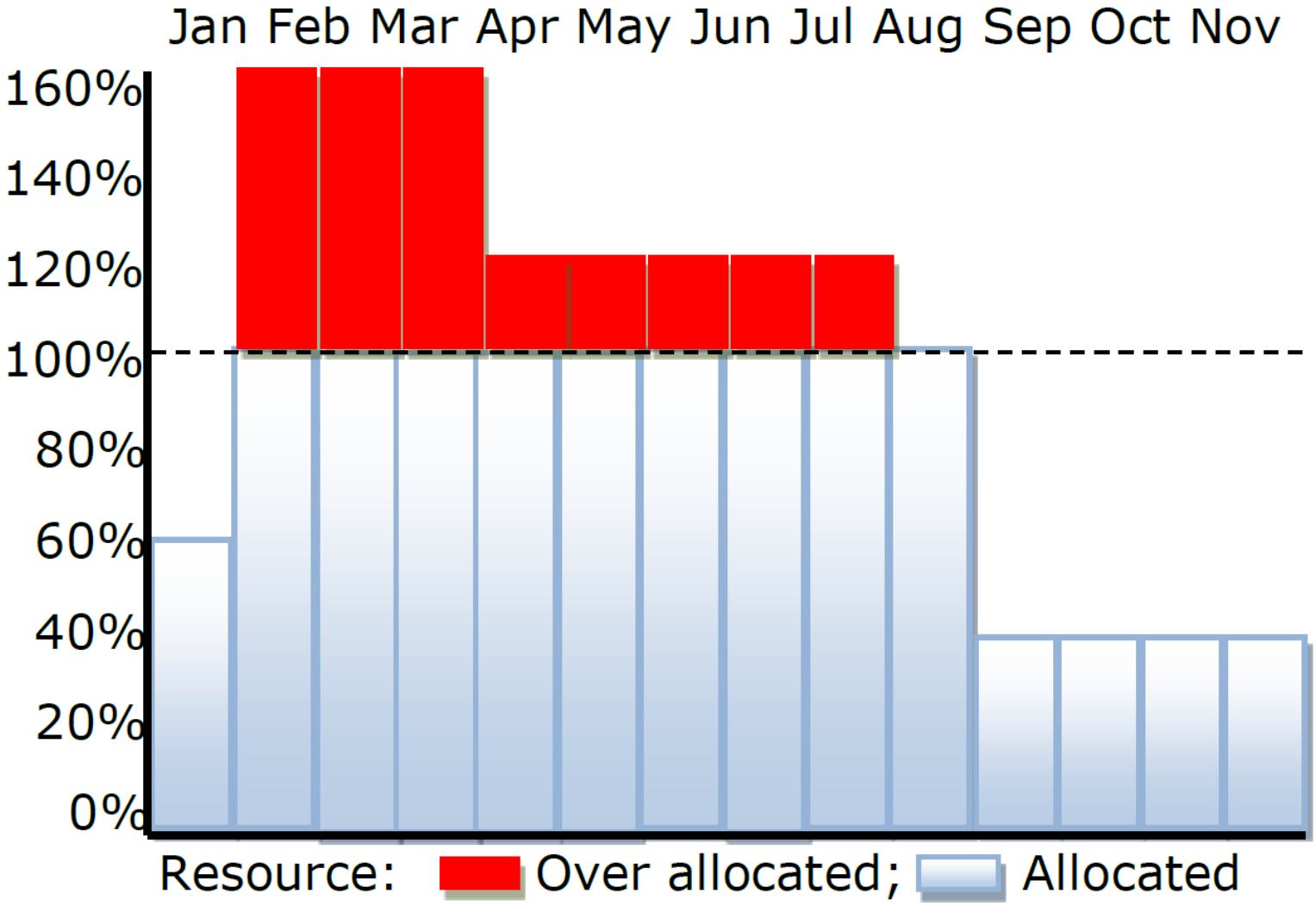
Role:
Authority:
Responsabily:
Skills:

RACI Matrix

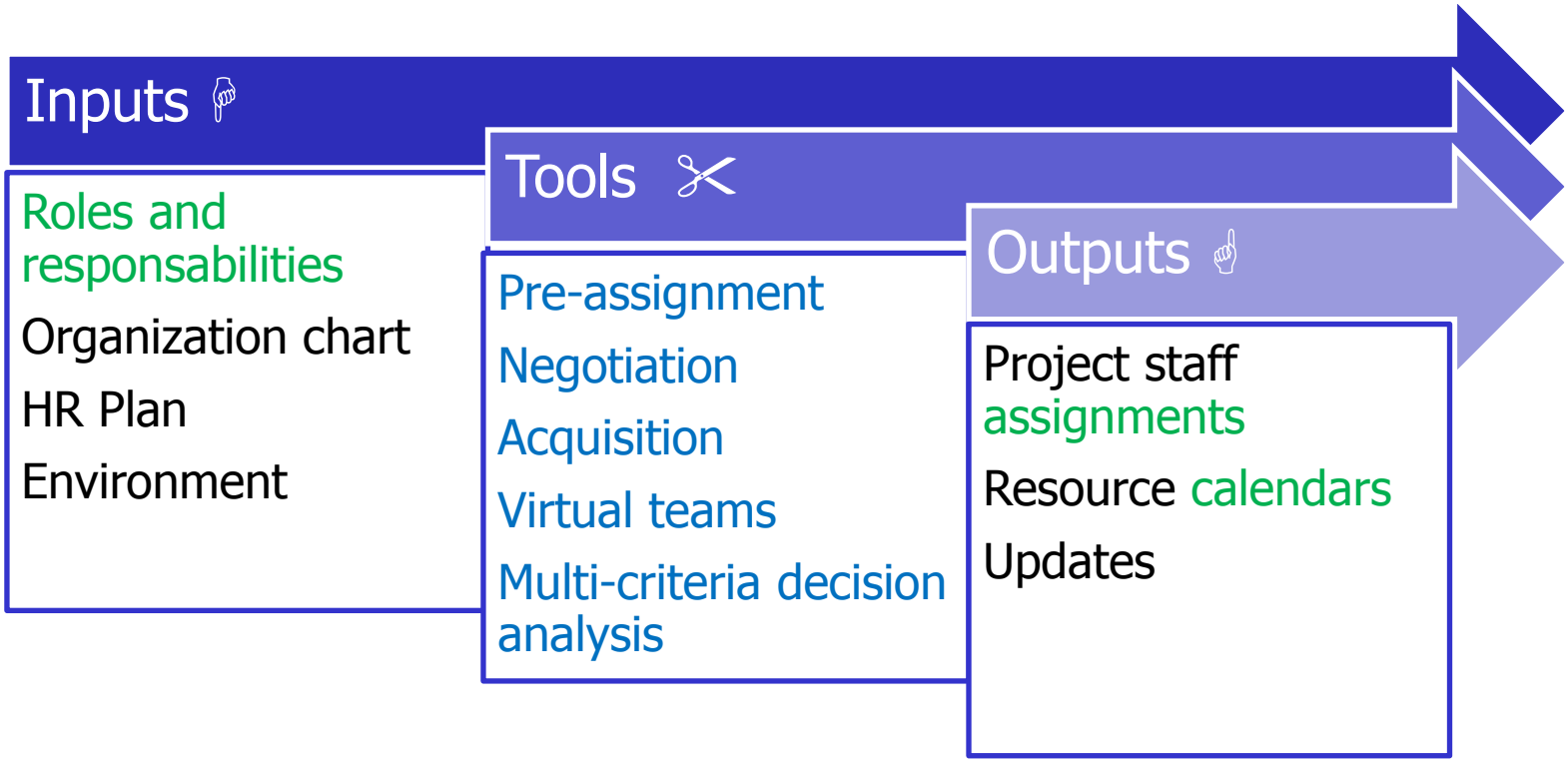
Activity	Peter	Stephanie	Richard
Information research	A	R	C
Market study	A	R	C
Cost benefit analysis	I	I	R

Notes:
R: Responsible
A: Accountable
C: Consulted
I: Informed

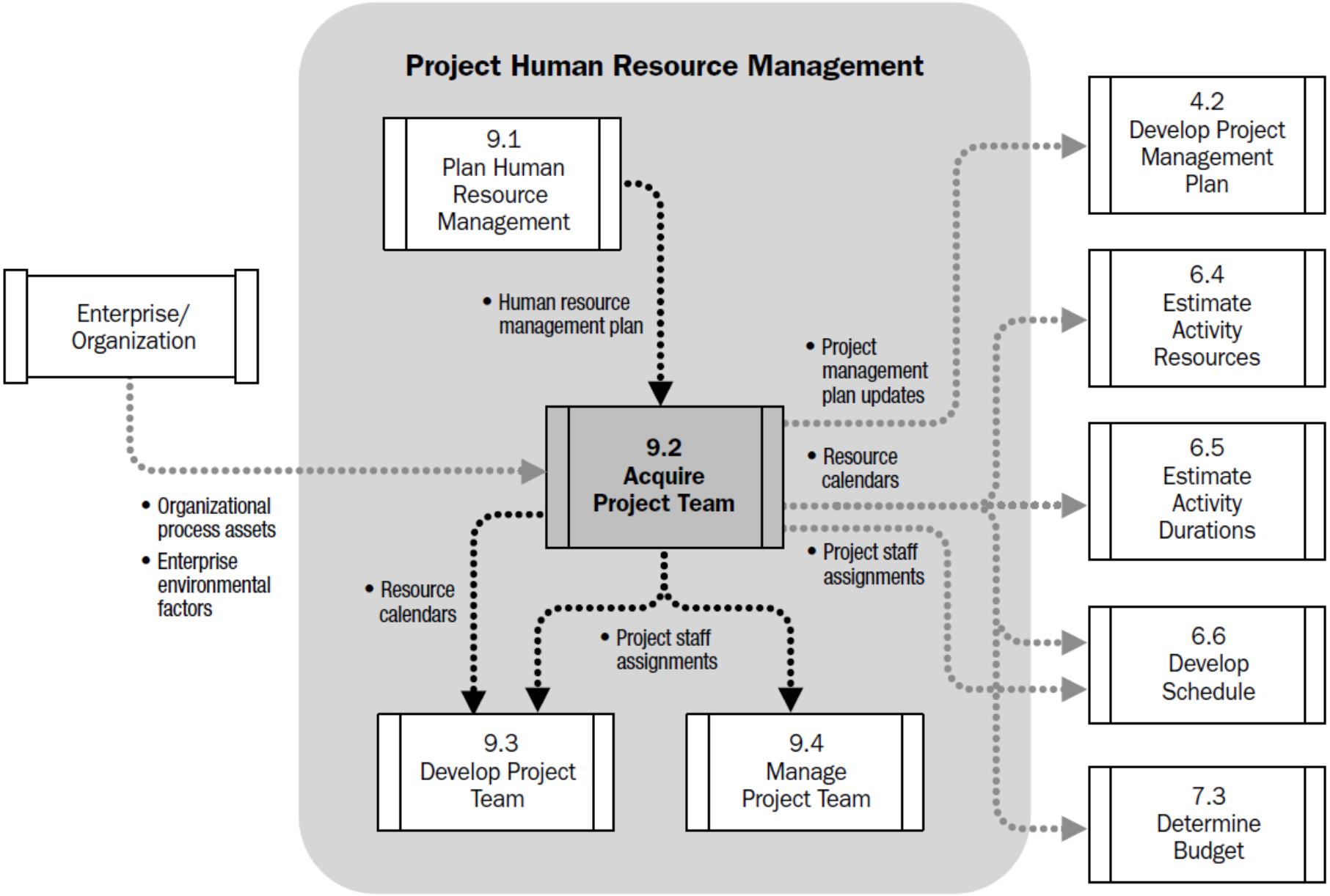
Resource Histogram



2. Acquire team



2. Acquire team



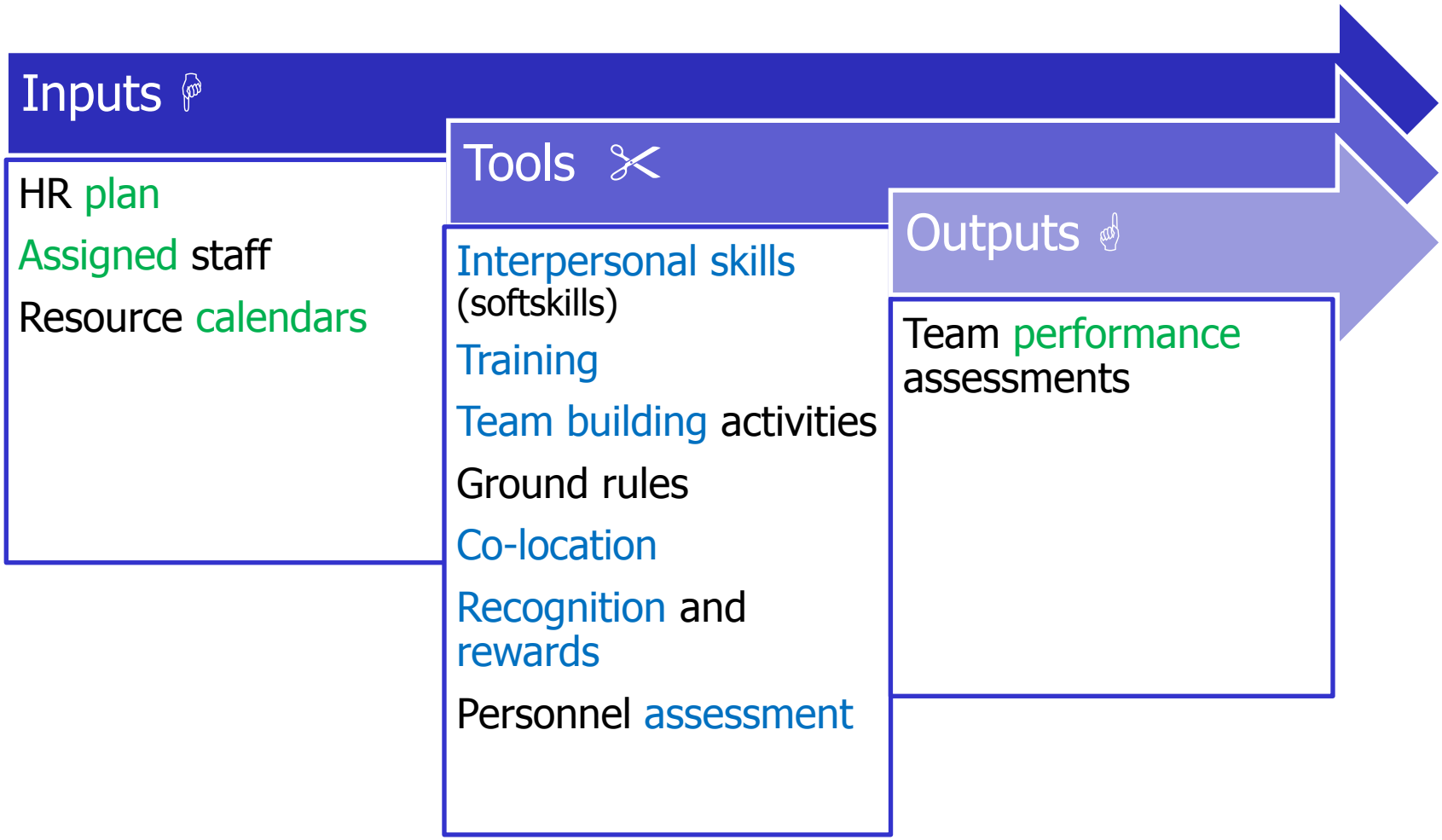
Acquire team - Actions

- ✓ Know which persons **previously** assigned
- ✓ **Negotiate** to obtain the best possible resources
- ✓ Know the **needs and priorities** of the organization
- ✓ **Hire** new workers (internal and external)
- ✓ Know the advantages and disadvantages of virtual teams

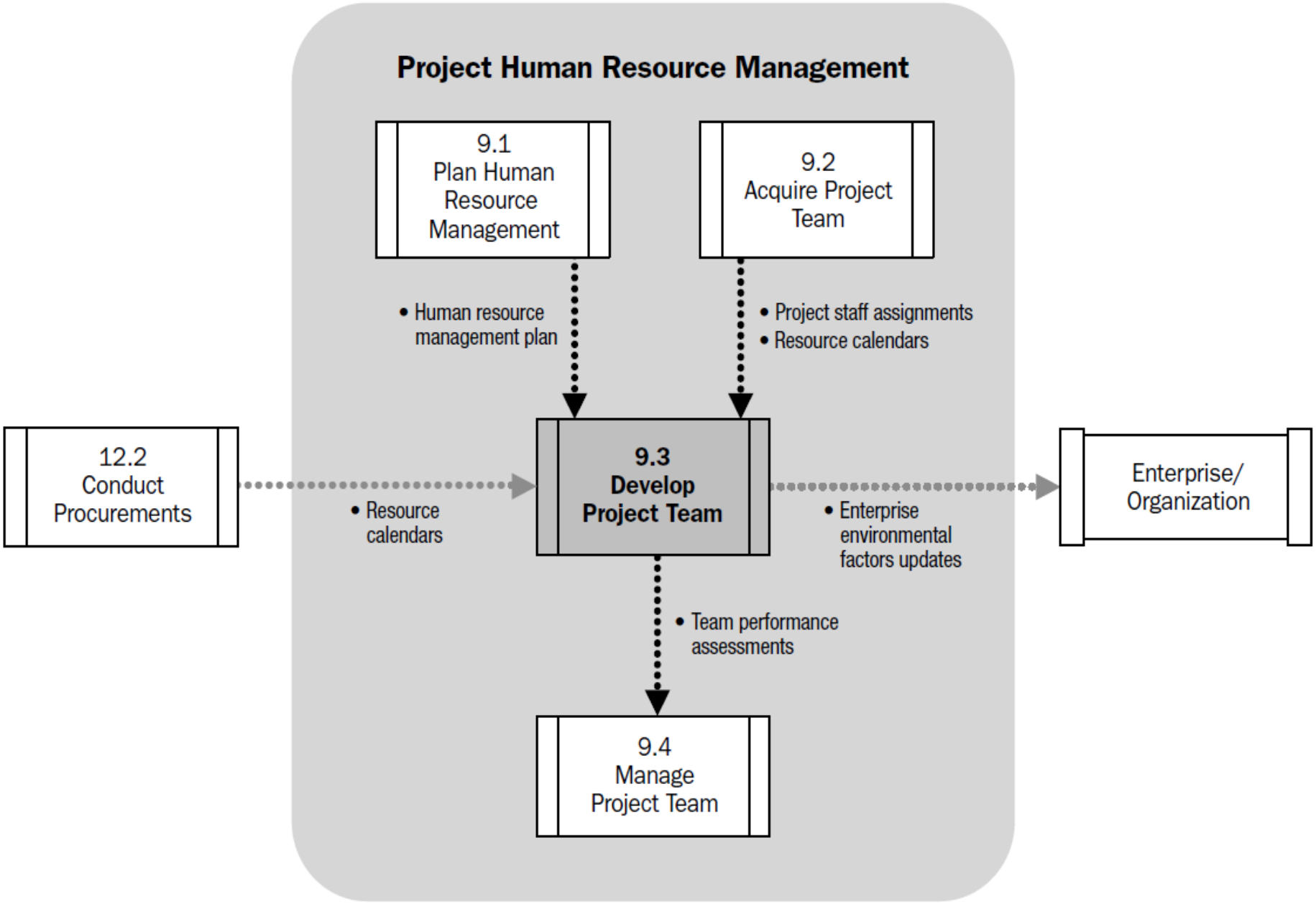
Do not trust in the "**Halo Effect**"

"because he was a great engineer, he will be a good PM"

3. Develop team



3. Develop team

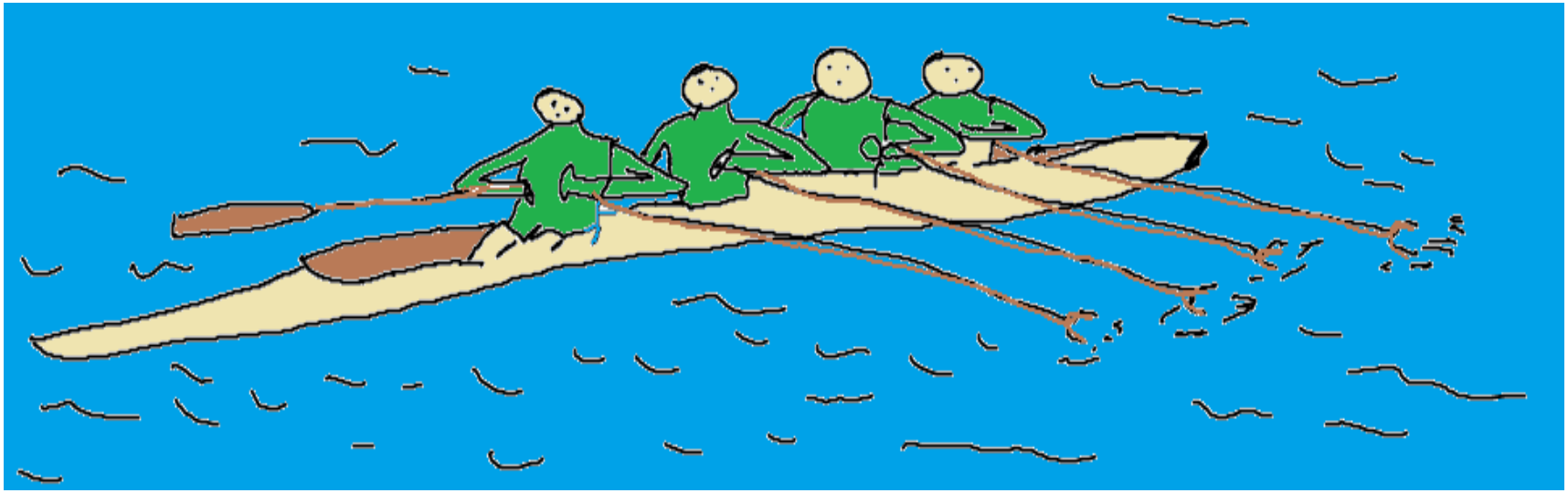


Develop team - Actions

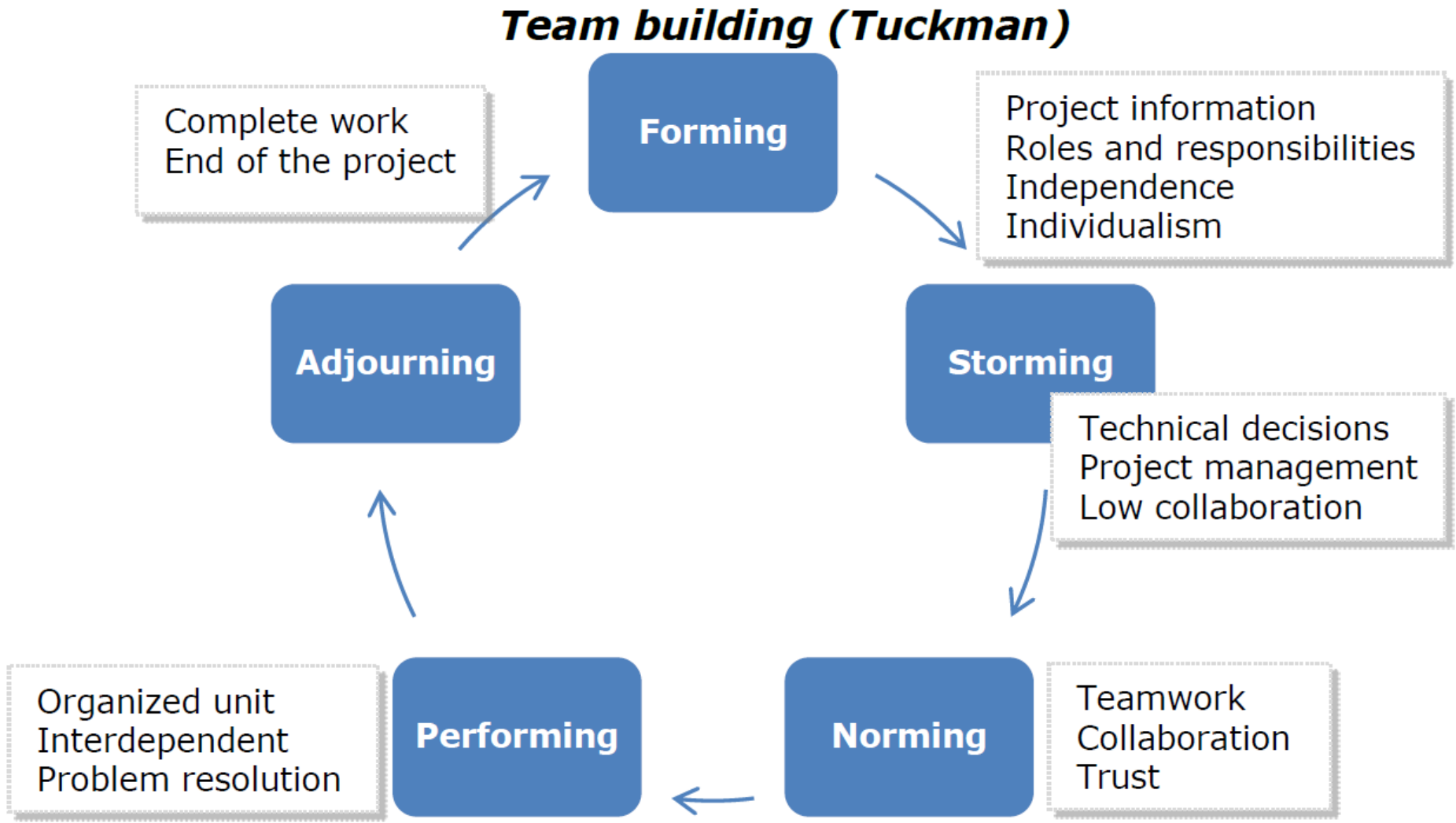
- ✓ Cohes**I**on
- ✓ Tea**M**work
- ✓ **P**articipation
- ✓ T**R**ust
- ✓ C**o**mpetencies
- ✓ Di**V**ersity
- ✓ Int**E**rrelations

Develop project team is more beneficial at the early stages, but it should be performed across all project phases

Team work



Team building stages - Tuckman



Leadership styles

Directing: says what to do

Coaching: gives instructions

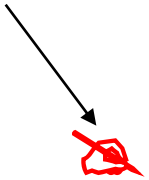
Supporting: provides assistance

Delegating: the employee decides on its own

Facilitating: coordinates with others

Autocratic: makes decisions without consulting

Consensus: team problem resolution

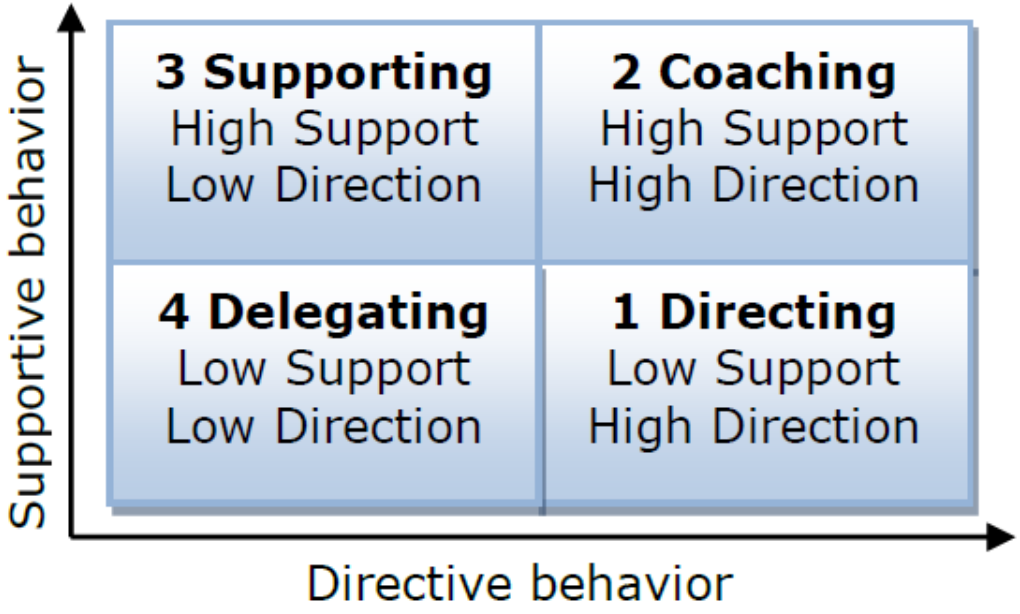


During project execution the PM has enough information to be able to reach decisions without consensus

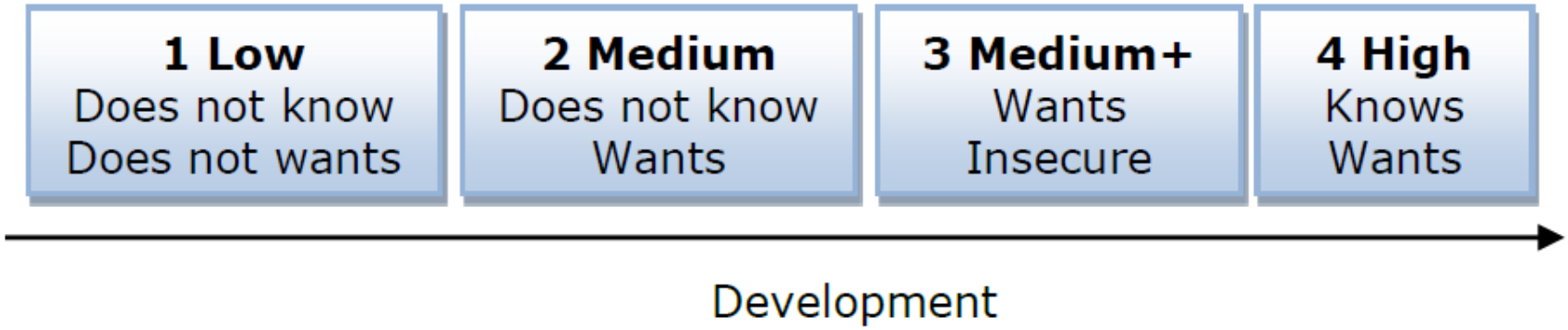
Each time there is a problem, he should not call a meeting to reach consensus

Situational Leadership (Hersey Blanchard)

Leadership styles



Levels of Development



Question

What leadership style is best at project initiation?
And during execution?

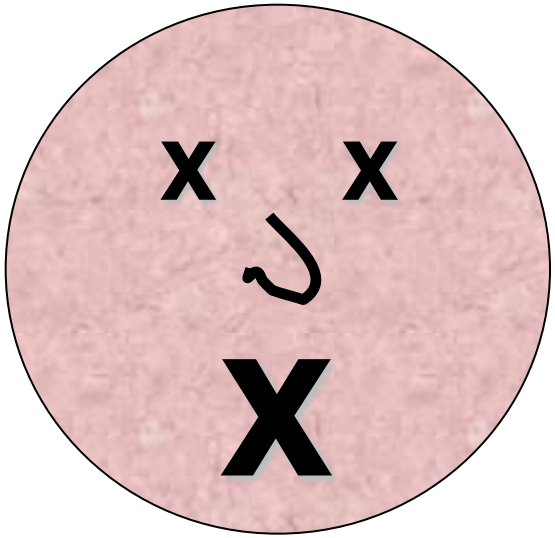
A. Directing
B. Coaching
C. Supporting
D. Facilitating

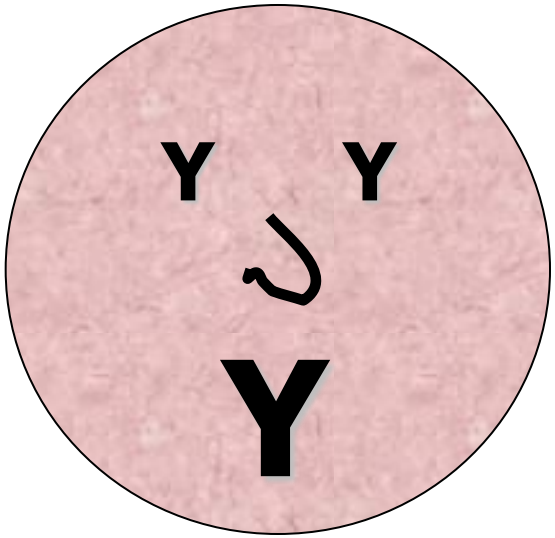
Answer:
Initiating = Directing
EXCECUTING = Coaching, Supporting, or Facilitating

Motivation – Mc Gregor

X and Y Theory

People belong to one of 2 categories





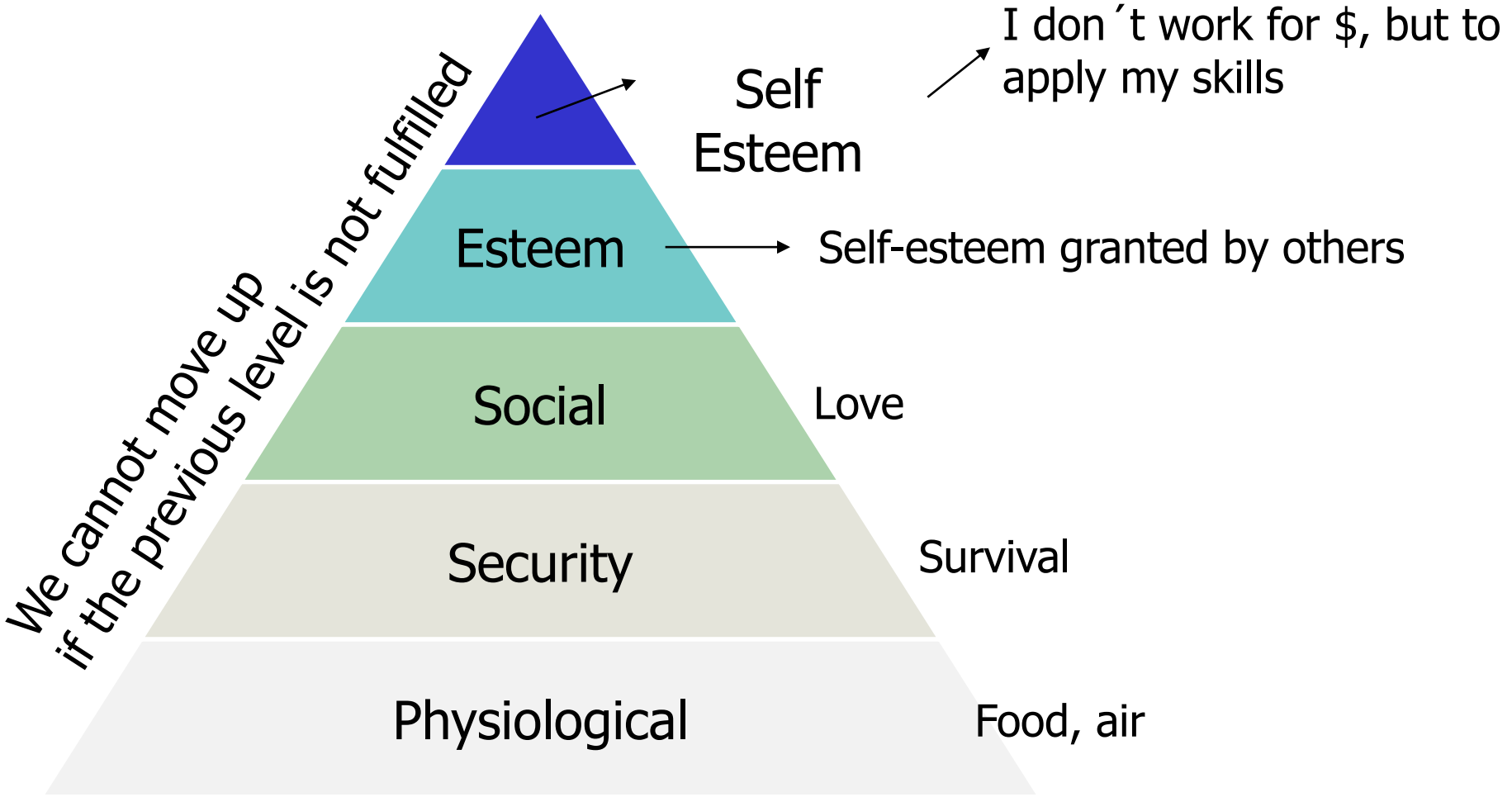
- Unable
- Avoid work
- Do not want responsibilities
- Must be controlled

+ Works without supervision
+ To undertake commitments and progress

MC GREGOR, Douglas. 1960. The Human Side of the Enterprise

Motivation – Maslow

Hierarchy of Needs



MASLOW, Abraham. 1954. Motivation and Personality

Motivation – Locke

Goal setting theory

The desire to achieve a goal is the basic source of motivation. Goals motivate and guide our acts and drive us to perform at our best. Goals can have various functions:

- Focus the attention and action on the task
- Mobilize the energy and effort
- Increase persistence
- Help in the elaboration of strategies

LOCKE, Edwin. 1969

Motivation – Herzberg

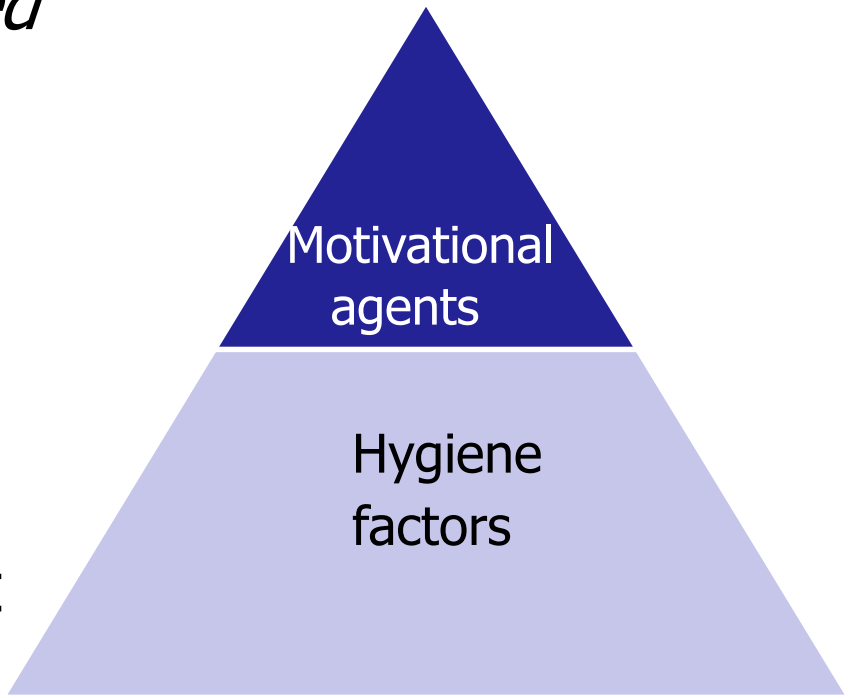
Hygiene factors

- salary, security, status, work conditions

If not covered, no motivation, but if covered, motivation is not improved

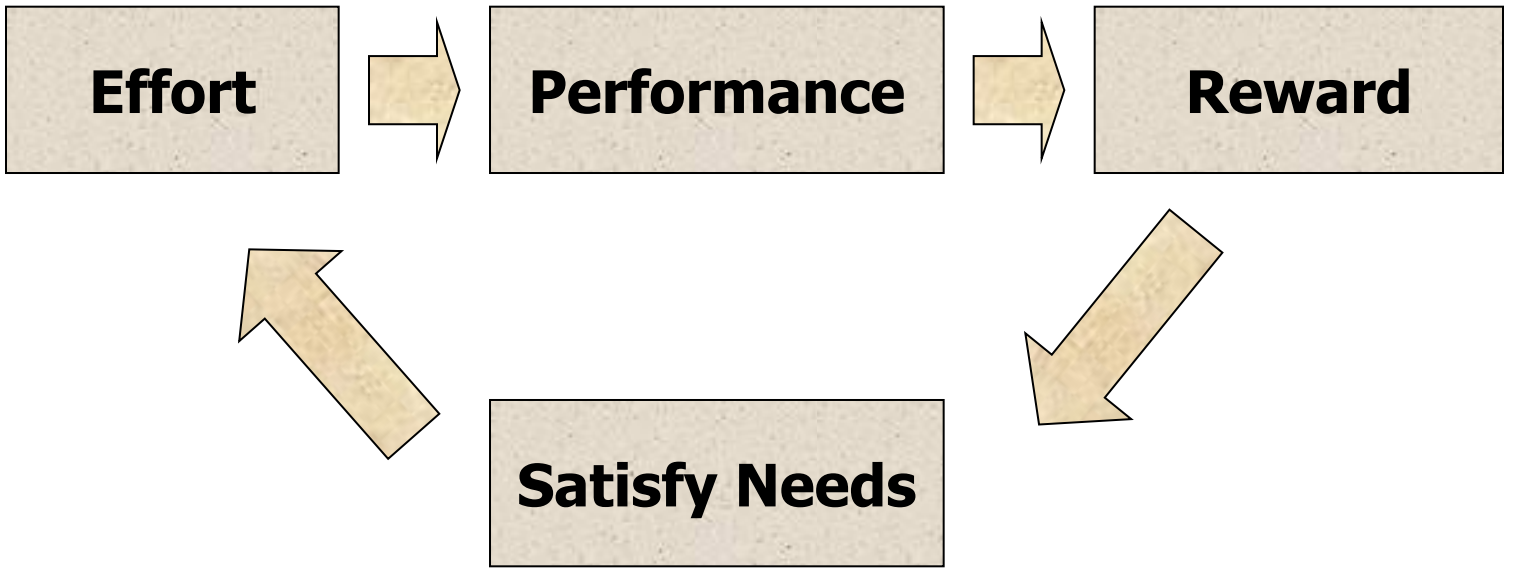
Motivational agents

Responsibility
Self-esteem
Professional development
Recognition



HERZBERG, Frederick. 1975. The motivation to work.

Expectancy Theory



Motivation = (Expectation from action results) x (value of the results)

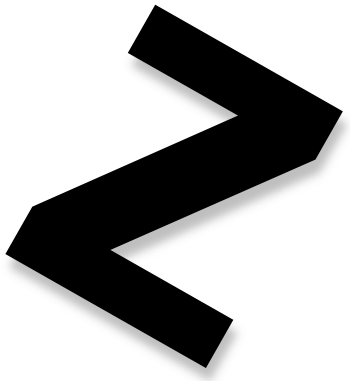
The worker will stay productive while the reward satisfies his needs; on the contrary, he will not be motivated to keep the efforts

VROOM, Victor H. 1964. Work and Motivation

Teoría Z – Ouchi (Japanese method)

There are 3 types of enterprises:

- ✓ A – American
- ✓ J – Japonese
- ✓ **Z**

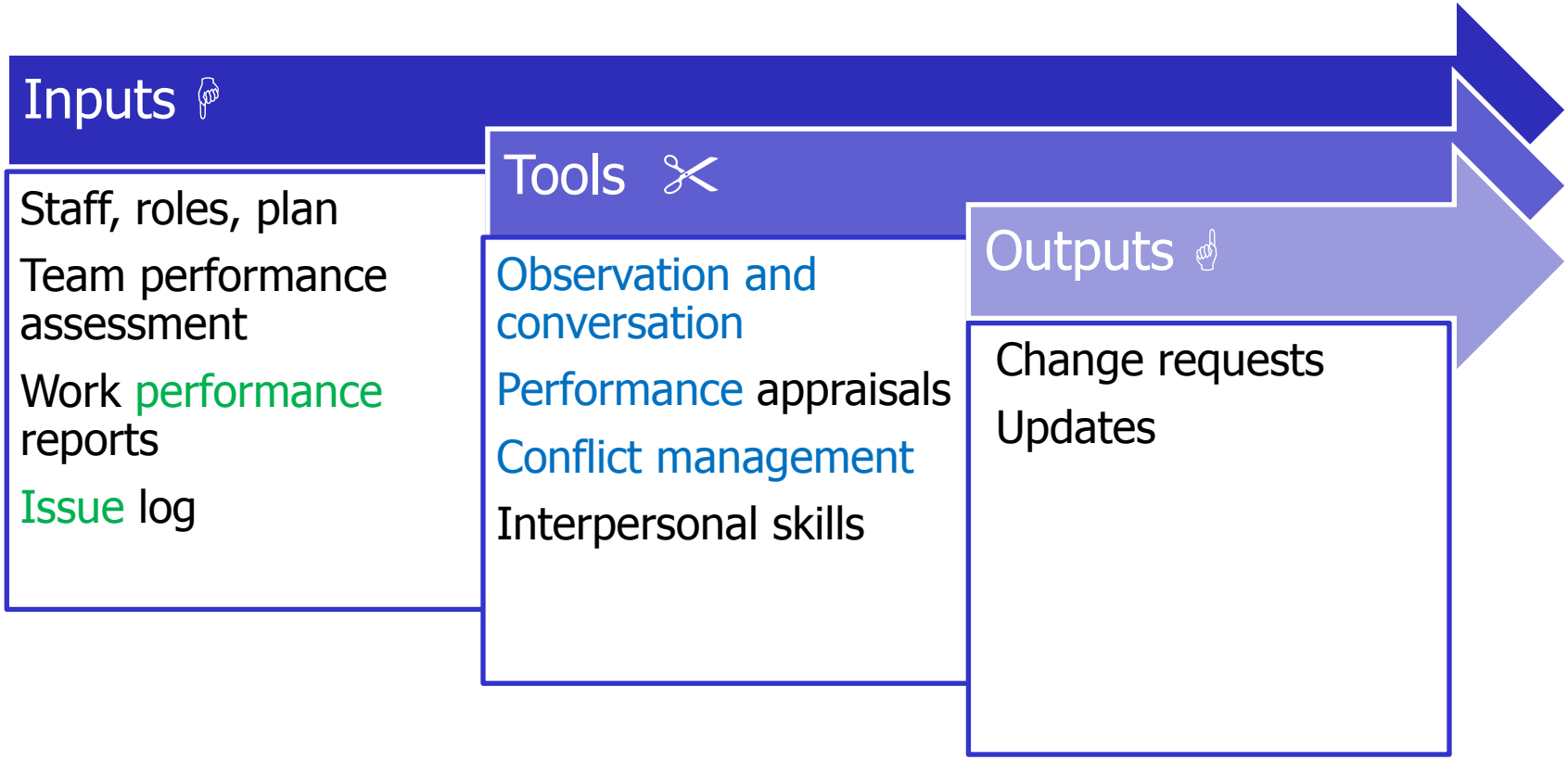


The success of Enterprise Z is based on:

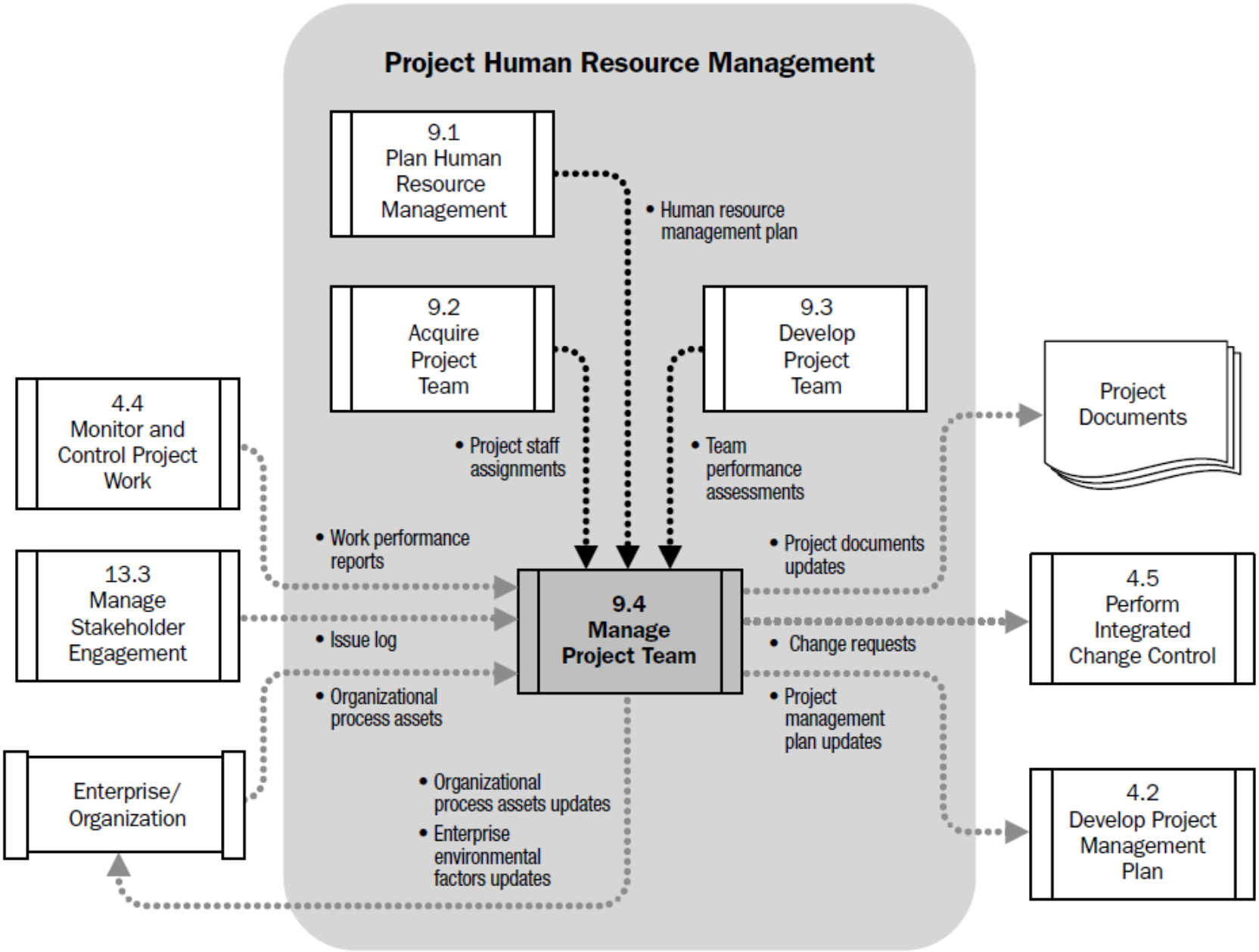
- **Trust**: you do not need to be on top of the employee
- **Close relationships**: good social relationship between boss-employee
- **Politeness**: adapt treatment to each employee

OUCHI, William. 1981.
Theory How American Business can meet the Japanese Challenge

4. Manage team



4. Manage team



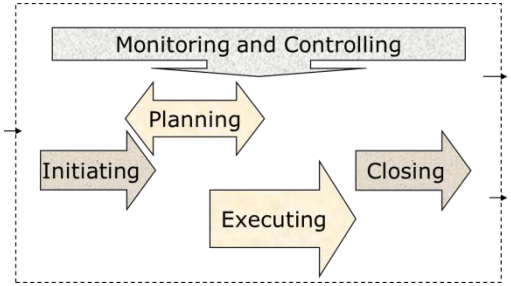
Issue Log

#	Issue	Date occurred	Involved	Resolution date proposed	Status	Resolution date	Resolution mode
13	incentive	2-3-07	Robert	5-4-07	Not solved		
27	technical	15-5-07	John/Maríy	15-8-07	OK	10-7-07	Mediator
…							
…							
…							

- Output of Manage Stakeholder Engagement process

Manage team - Actions

- ✓ Monitor the work team performance
- ✓ Feedback to the team
- ✓ Conflict and issue resolution
- ✓ Coordinate changes
- ✓ Keep in touch = observation and conversation



PEOPLE

PROCESSES

Manage

Excecute

✂ Conflict management

Causes: schedules, change of priorities, and lack of resources, etc.

- Conflict ⇒ ≠ opinions ⇒ ↑ **creativity** ⇒ Good !
- Well manage ⇒ ↑ **productivity**
- Address them **early** and in **private**
- Use a **direct** and constructive approach
- Last option ⇒ disciplinary actions

Question

What is the main source of conflict in projects ?

A. Schedule
B. Priorities
C. Costs
D. Personalities

Answer:
1º **Schedule**, 2º Priorities, 3º Resources,
4º Technicalities, 5º Administrative processes, 6º Costs
7º LAST - **Personality**

Question

What is the most convenient way of conflict resolution?

A. **Withdraw / Avoid**: step away from conflict
B. **Smooth / Accommodate**: emphasize on agreement areas rather than on differences
C. **Compromise / Reconcile**: each side should let go of something
D. **Force / Direct**: impose one position at the expense of others
E. **Collaborate**: seek different opinions to find commitment and consensus

Answer:
1º Collaborate = Conflict resolution (win-win)
2º Compromise or reconcile (lose-lose)
The worst: Force or withdraw

✂ Conflict management

Conflicts view points

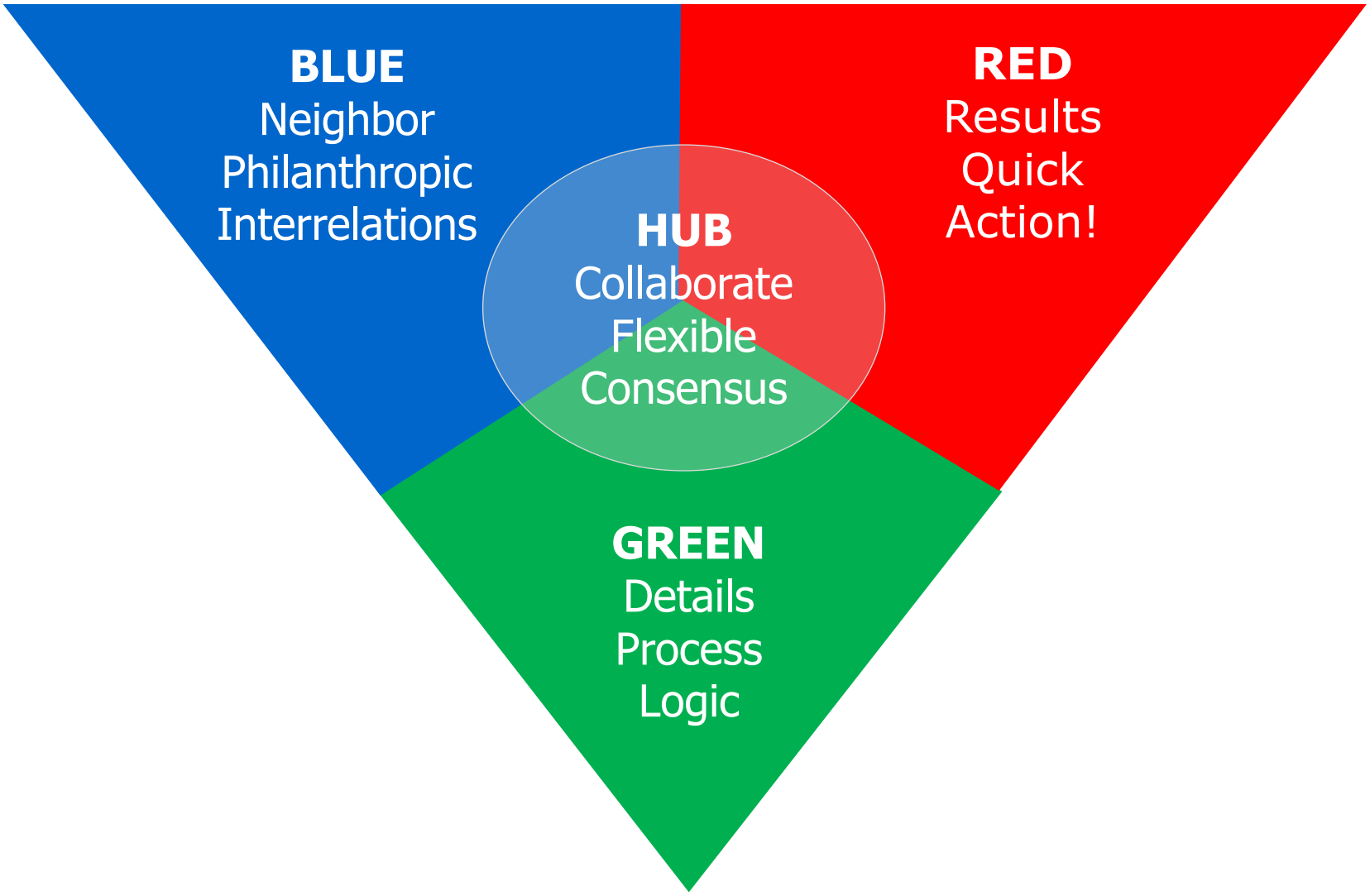
Old School	Modern Management
Cause of conflict: - Personality problems - Lack of leadership	Cause of conflict: - It is unavoidable - Organizational interrelations
Should be avoided	*Could be beneficial*
Resolution: - Physical separation of people - Intervention of upper management	Resolution: - Identify causes - Solve the problem among parties

✂ Conflict management

Conflict management **STEPS**:

1. Identify the problem root **cause**
2. **Analyze** the problem
3. Identify **alternative** solutions
4. Implement a **decision**
5. **Validate** if that decision solved the problem

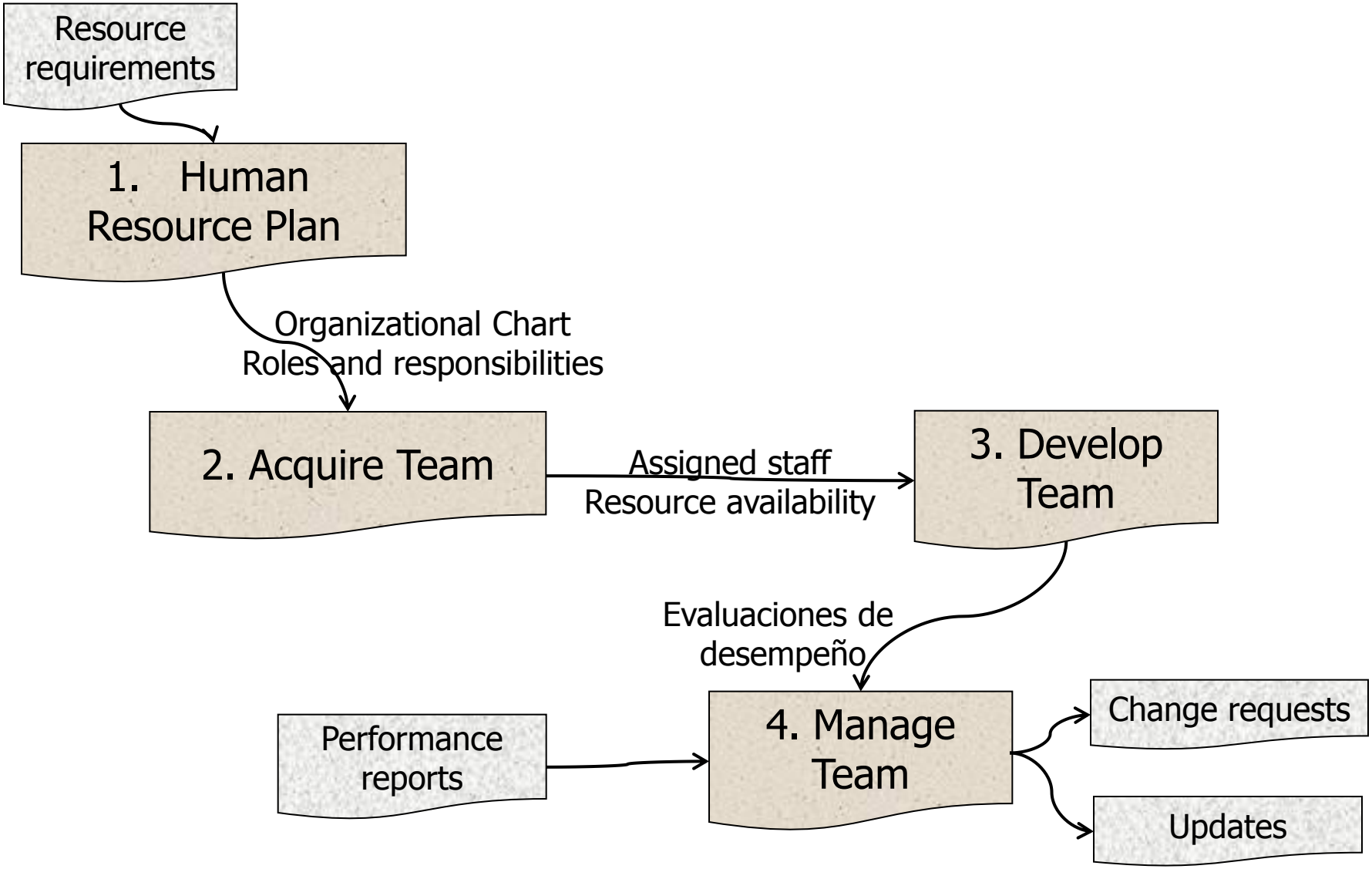
Conflict management – SDI®



Interpersonal skills

- Leadership
- Humility
- Effective listening
- Team building
- Motivation
- Communication
- Collaboration and knowledge sharing
- Influencing
- Managing conflict
- Decision making
- Political and cultural awareness
- Negotiation

Summarizing HR management



Lessons learned

- ✓ Co-location
- ✓ Team development according to Tuckman´s
- ✓ Conflict management techniques
- ✓ Expectancy theory
- ✓ Goal setting theory
- ✓ Ground rules
- ✓ Halo effect
- ✓ Herzberg theory
- ✓ Histogram
- ✓ Issues log
- ✓ Leadership styles
- ✓ Maslow hierarchy of needs
- ✓ Mc Gregor's X – Y theory
- ✓ Needs theory
- ✓ Ouchi's theory Z
- ✓ PM powers
- ✓ Recognition and rewards
- ✓ Roles and responsibilities
- ✓ SDI
- ✓ Roles and responsibilities matrix
- ✓ Situational leadership
- ✓ Sources of conflict
- ✓ Staffing management plan

COMUNICATIONS

Communication processes

Identify stakeholders

Plan communications

Basic communication models

Communication channels

Distribute information

Communication types

Performance reports

Manage stakeholders expectations

PM Process Groups

	Initiation	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		4		2	
Time		6		1	
Cost		3		1	
Quality		1	1	1	
Human Resources		1	3		
Communications		Plan Communications	Manage Communications	Control Communications	
Risks		5		1	
Procurement		1	1	1	1
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

Sender and Receiver's Responsibilities

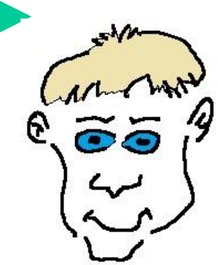
MESSAGE

Experience, education, culture

SENDER **RECEIVER**

Encodes → **Decodes**

Noise



Decodes ← **Encodes**

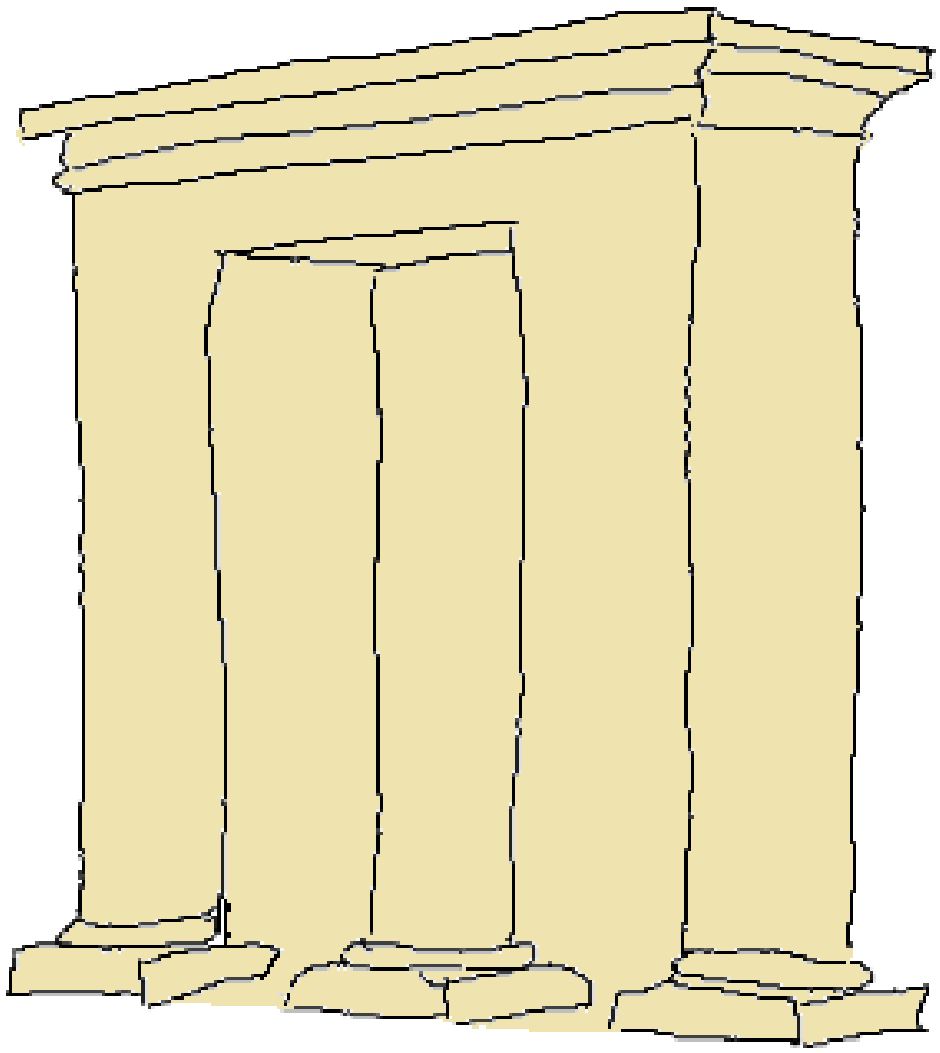
Feedback
Comments

Send a clear and complete info
Confirm that info was received

Ensure that all info was received and understood

Noise: bad encoding, distances, hostility, language, culture
Info. Blockers: that`s impossible, not feasible, too expensive, No!

How many columns there are?



Question

How much time a project manager dedicates to communications?

A) 50%
B) 75%
C) 90%
D) 100%

Answer:
90%

Question

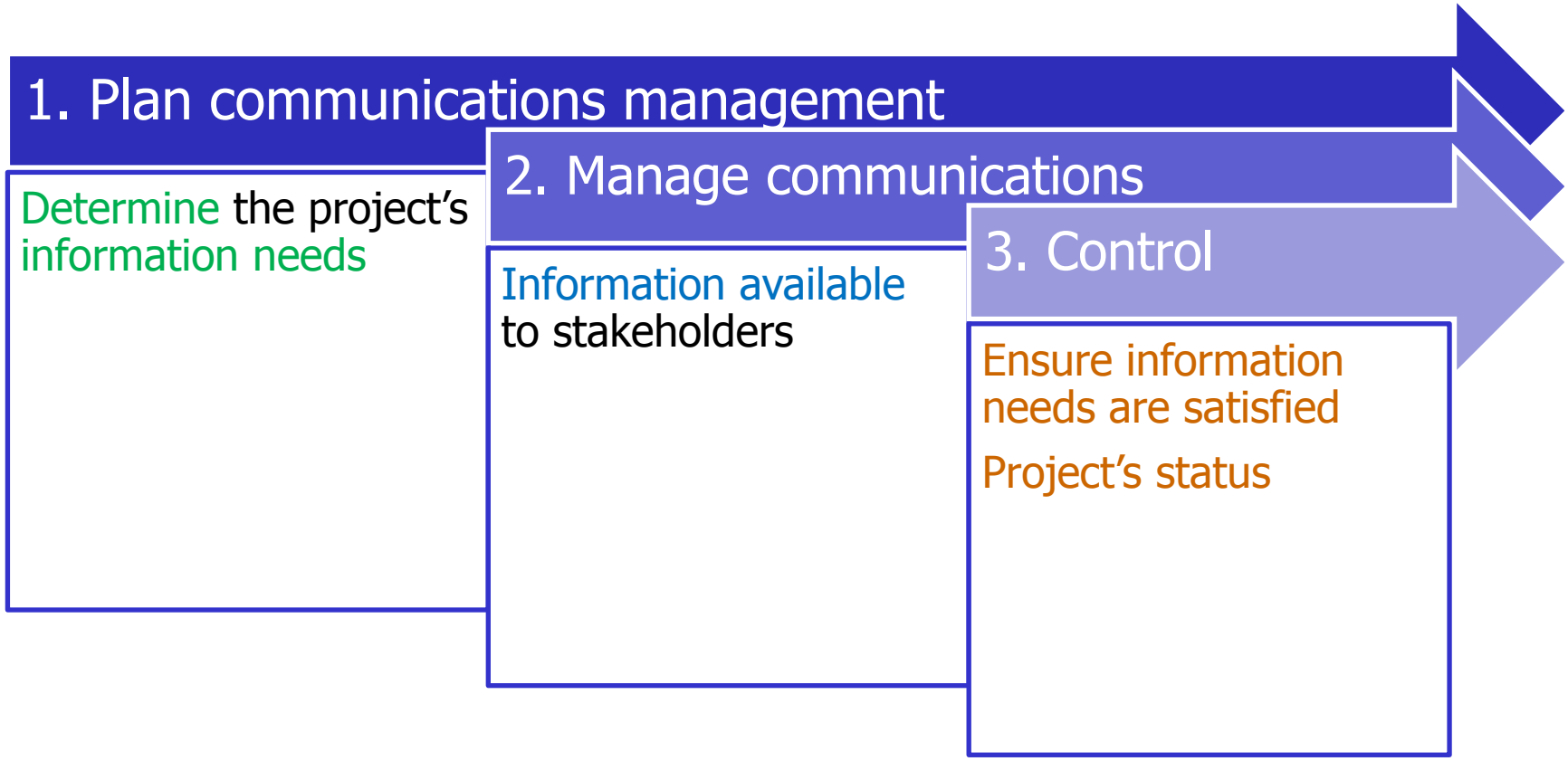
A good project manager possesses nonverbal communication abilities. For example, the paralinguistic (be aware of the tone of the voice) or the kinesis communication (interpret corporal and facial expressions).

What percentage of communications is non-verbal?

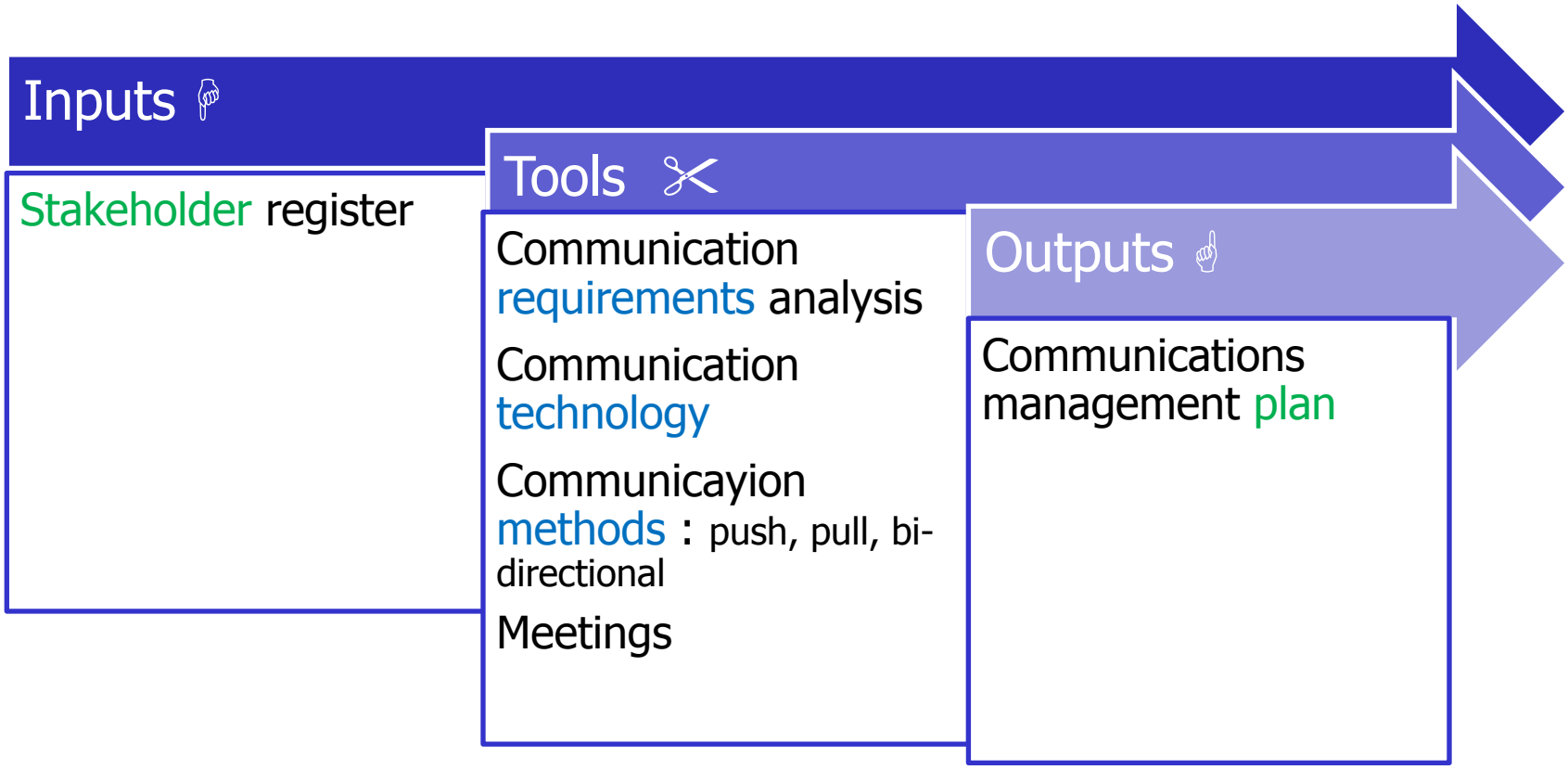
A) 5%
B) 20%
C) 60%
D) 90%

Answer:
60%

Communication management processes

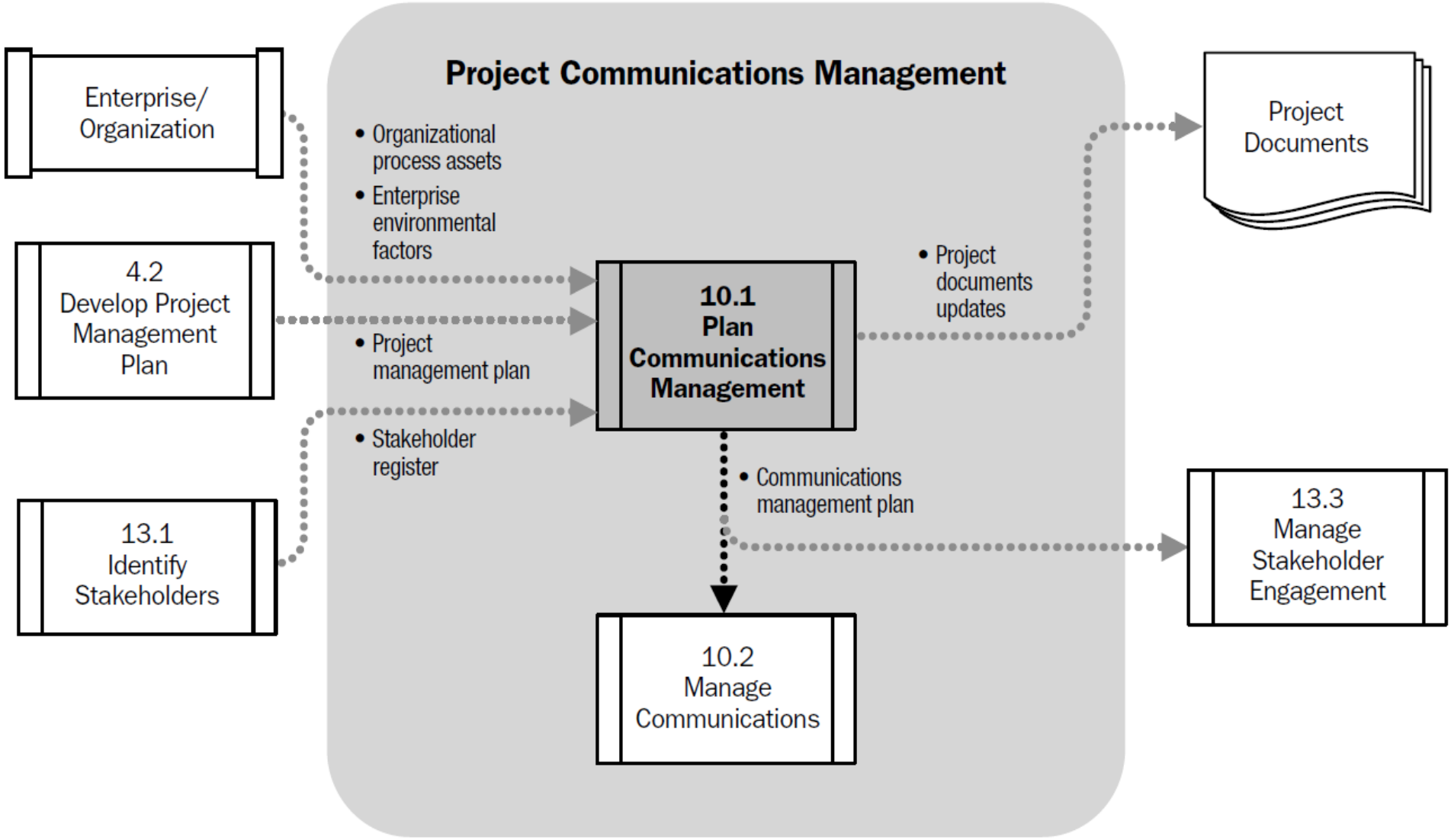


1. Plan communications



The WBS is an excellent communication tool

1. Plan communications



Plan communications

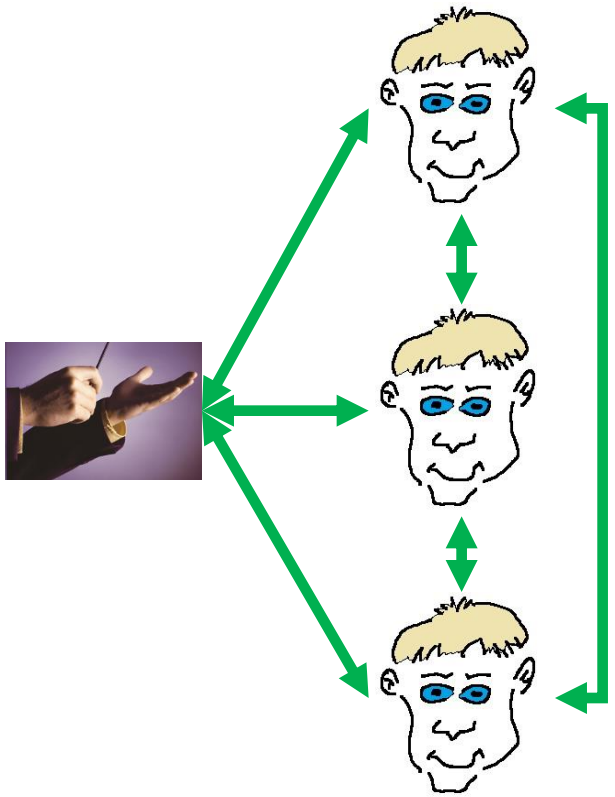
- ✓ What information do **stakeholders** need?
- ✓ **When** will they need it?
- ✓ How many **channels** are involved?
- ✓ **Who** communicates with whom?
- ✓ Who will **receive** the information?
- ✓ How we will **distribute** the information?
- ✓ **Who** will **distribute** it?
- ✓ What **technology** will we use?
- ✓ How **frequent** will the communication be?

Planning communications in an efficient way is being

PROACTIVE

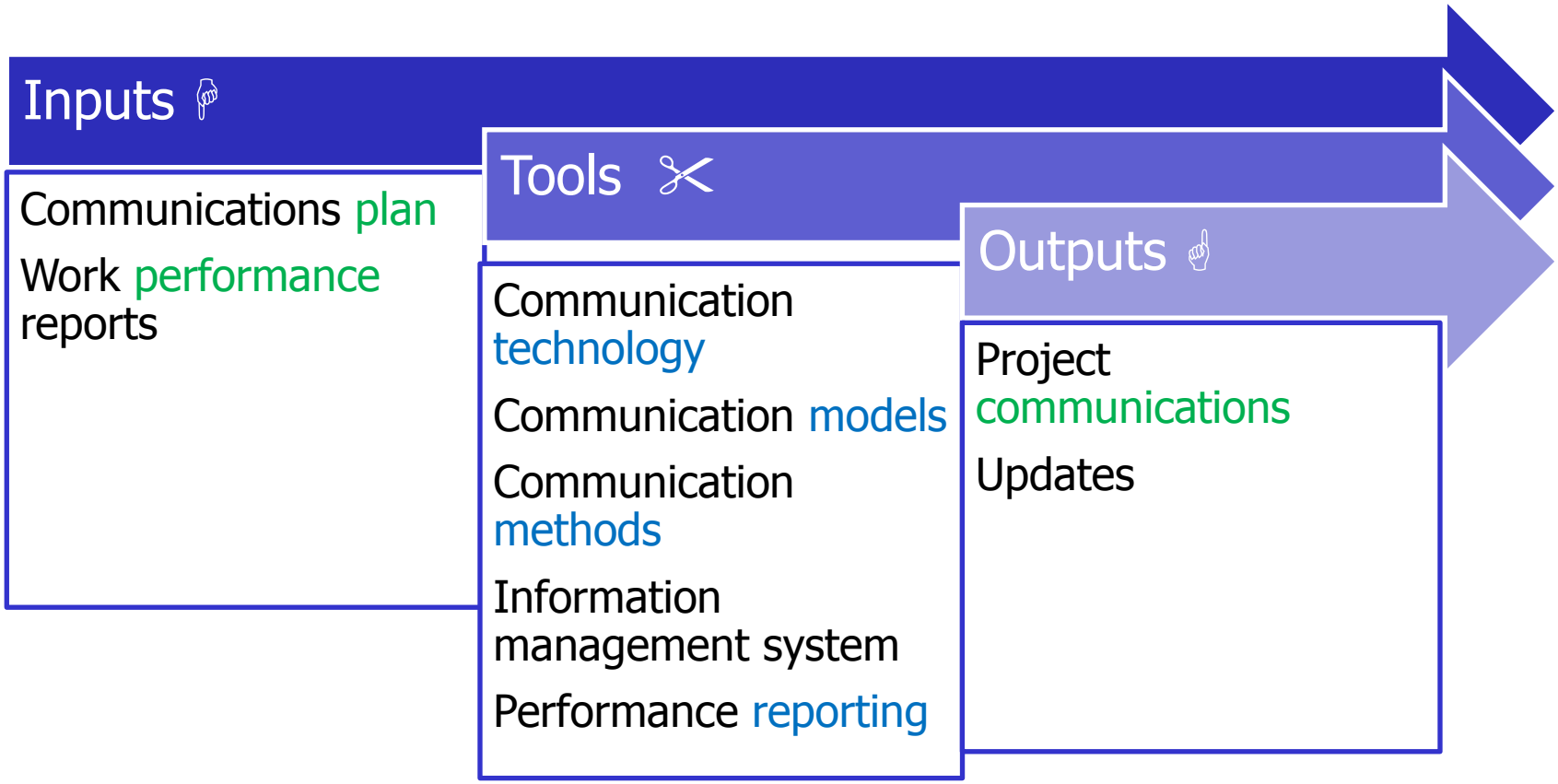
Requirements analysis

Channels = $\frac{N \times (N-1)}{2}$



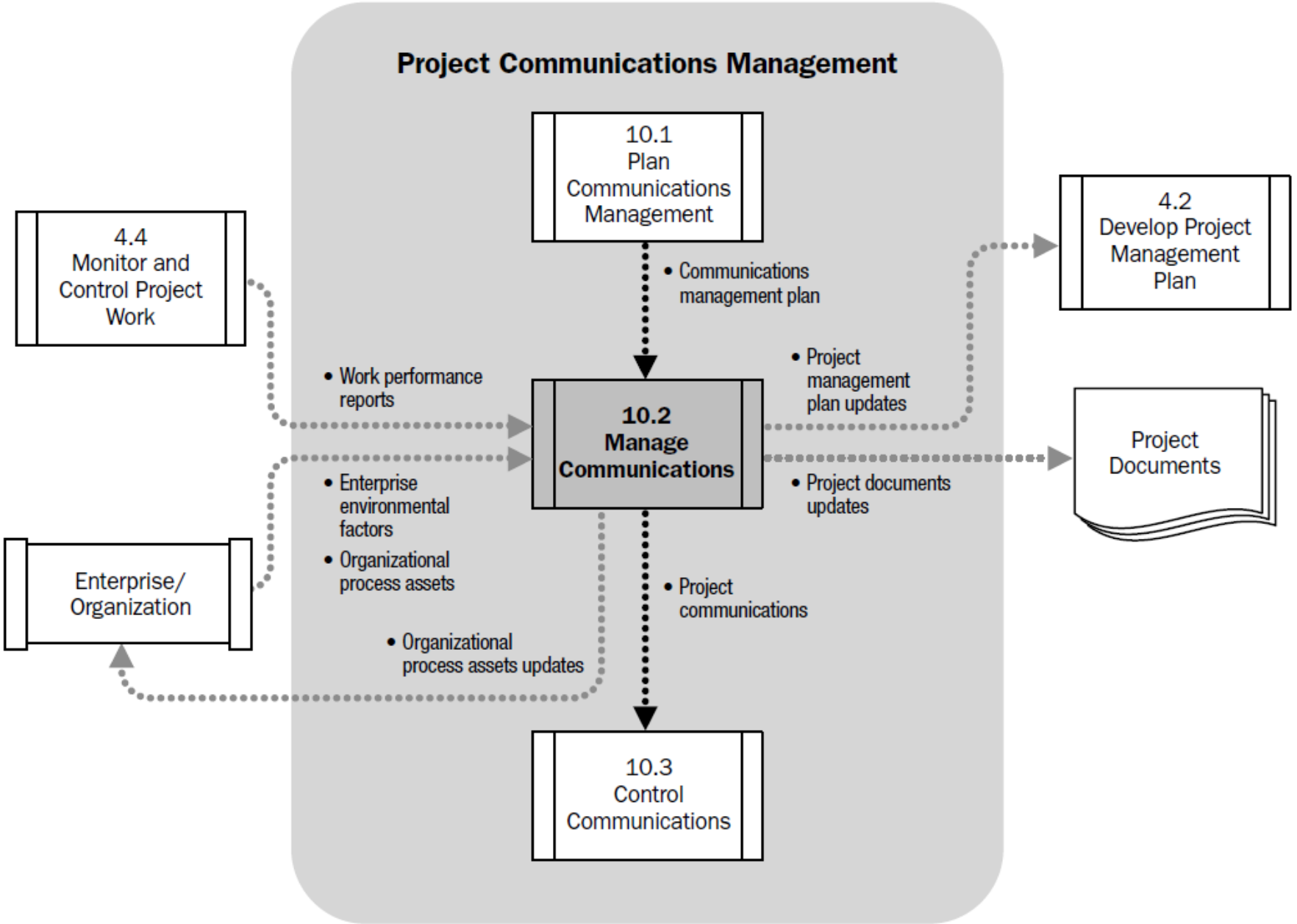
Count the number of arrows
4 persons = 6 arrows
= 6 channels

2. Manage communications



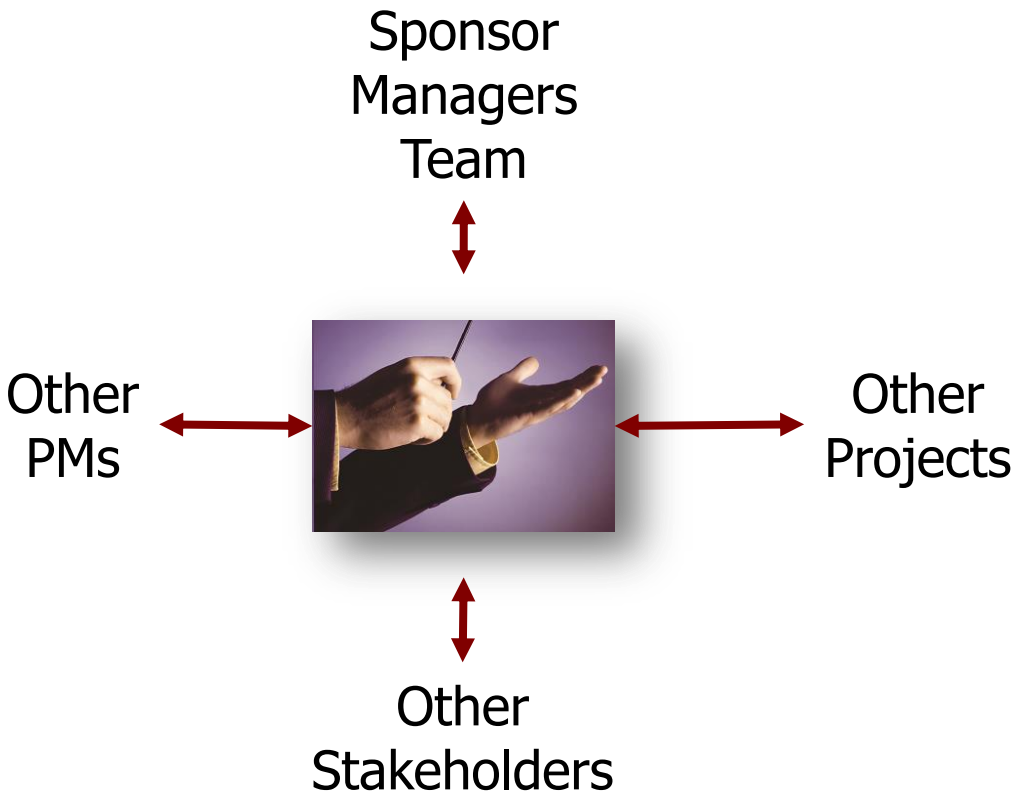
The WBS is a communication tool

2. Manage communications

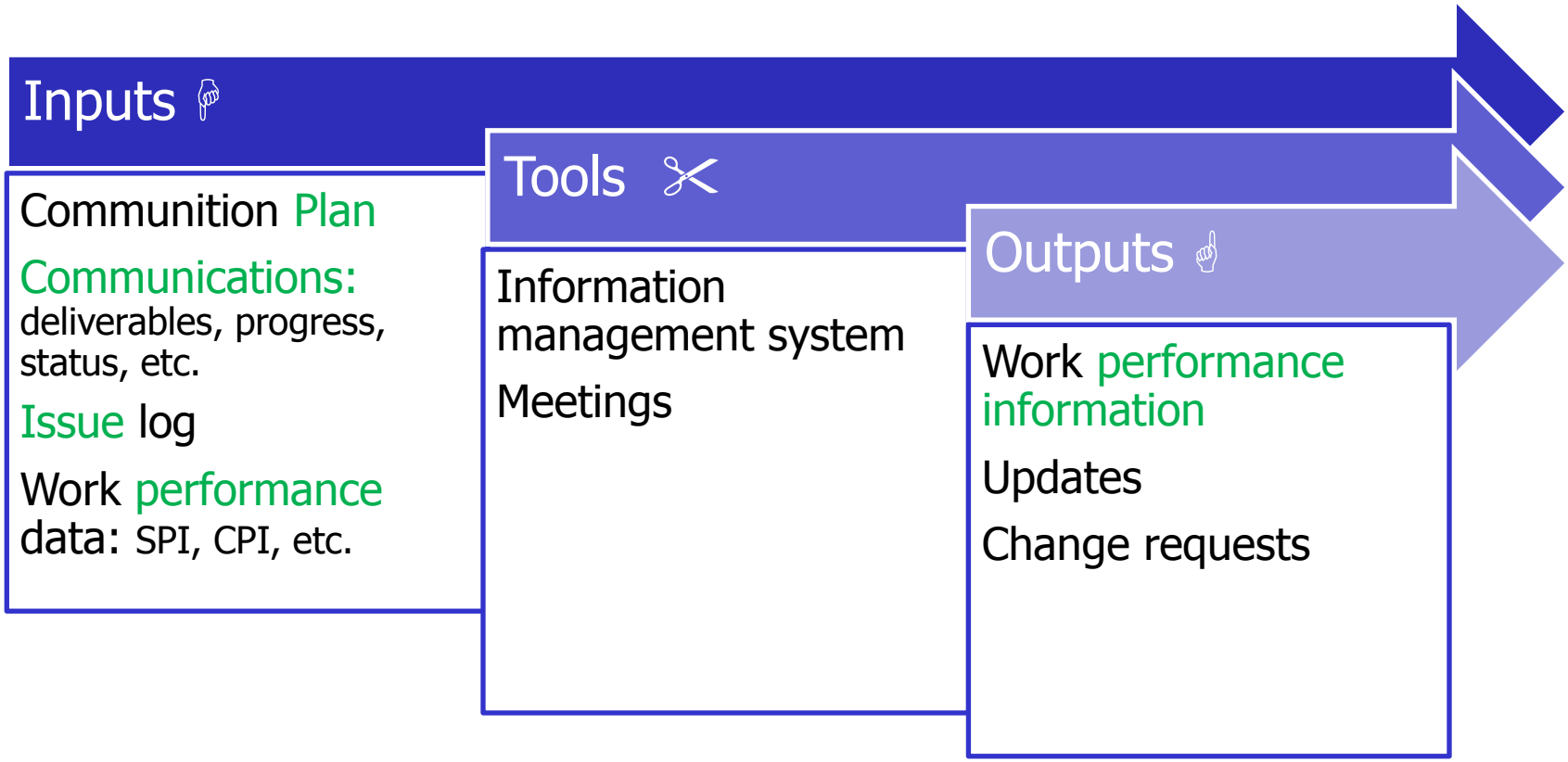


Dimensions of the communication

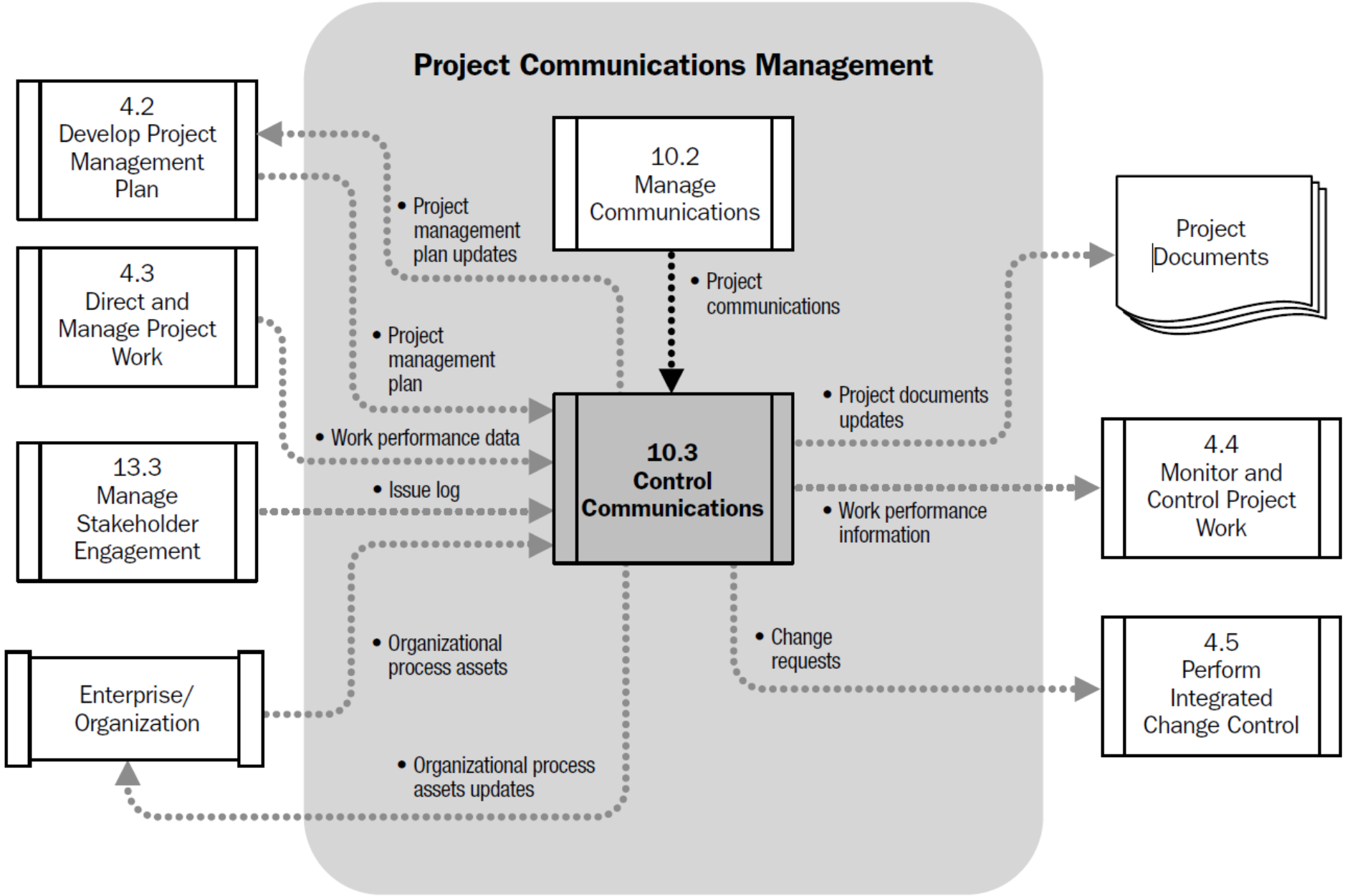
- ✓ Internal, External, Vertical, Horizontal
- ✓ Formal written, infomal written, formal verbal, informal verbal



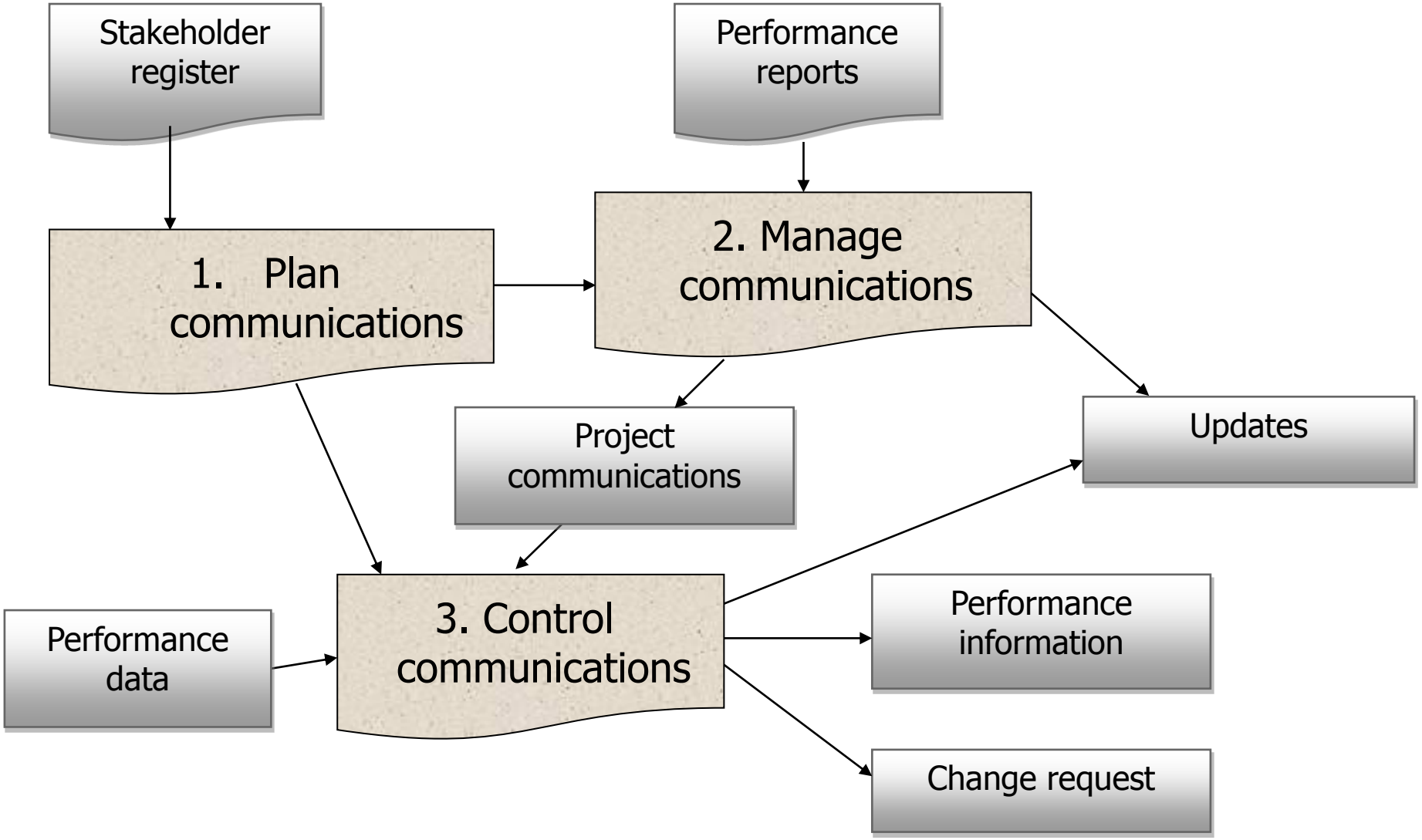
3. Control communications



3. Control communications



Summarizing communications mgt.



Lessons learned

- ✓ Communication channels
- ✓ Encoding
- ✓ Effective communication
- ✓ Formal and informal communication
- ✓ Verbal and written communication
- ✓ Non-verbal communication
- ✓ Decoding
- ✓ Communication types
- ✓ Distribute information
- ✓ Active listening
- ✓ Effective listening
- ✓ Distribution methods
- ✓ Para-linguistic
- ✓ Communications management plan
- ✓ Recommendations for effective meetings
- ✓ Noise

Risks

Risk management basic concepts

Plan risk management

Identify risks

Perform qualitative risk analysis

Perform quantitative risk analysis

Plan risk responses

Monitor and control risks

PM Process Groups

	Initiating	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		4		2	
Time		6		1	
Cost		3		1	
Quality		1	1	1	
HR		1	3		
Communications		1	1	1	
Risks		. Plan Risk . Identify Risks . Qualitative Analysis . Quantitative Analysis . Plan Responses		Control Risk	
Procurements		1	1	1	1
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

Risk management

- **Risk:** Uncertain event. if produced, affects in a negative or positive way the project objectives

- **Proactive Management** => improve the opportunities and reduce the threats

- **Known risks**

  Identify and analyze => processes

- **Unkown risks**

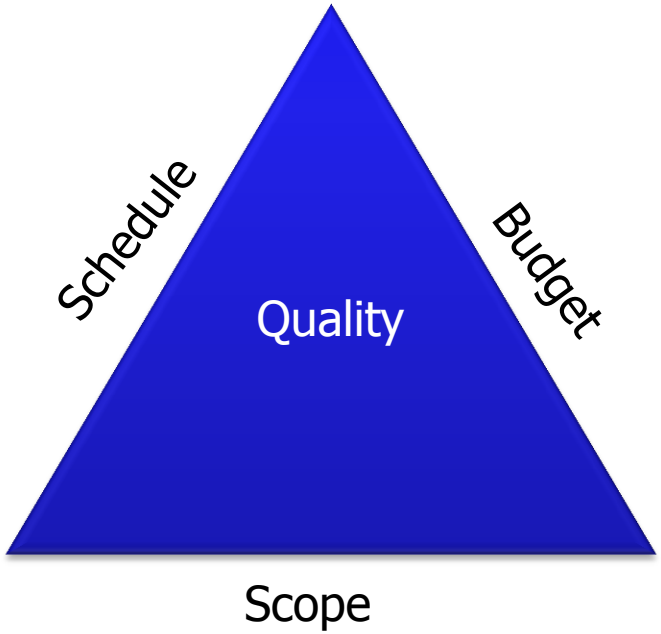
⇒ Cannot manage in a proactive manner

⇒ Assigne a general management reserve

Uncertainty = risk?

Probability?

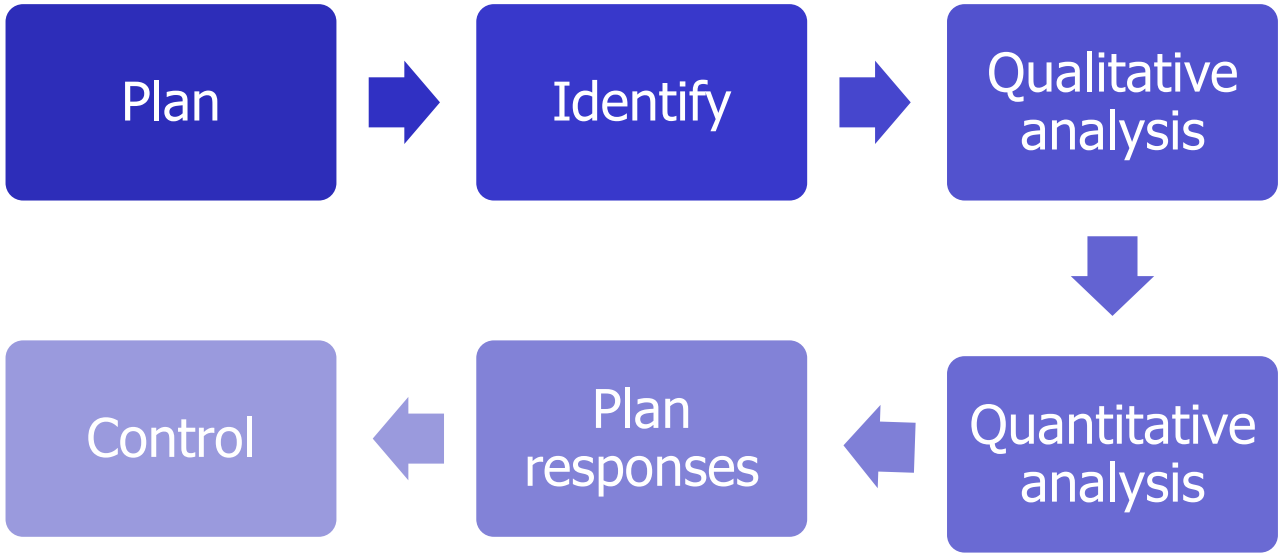
Impact?



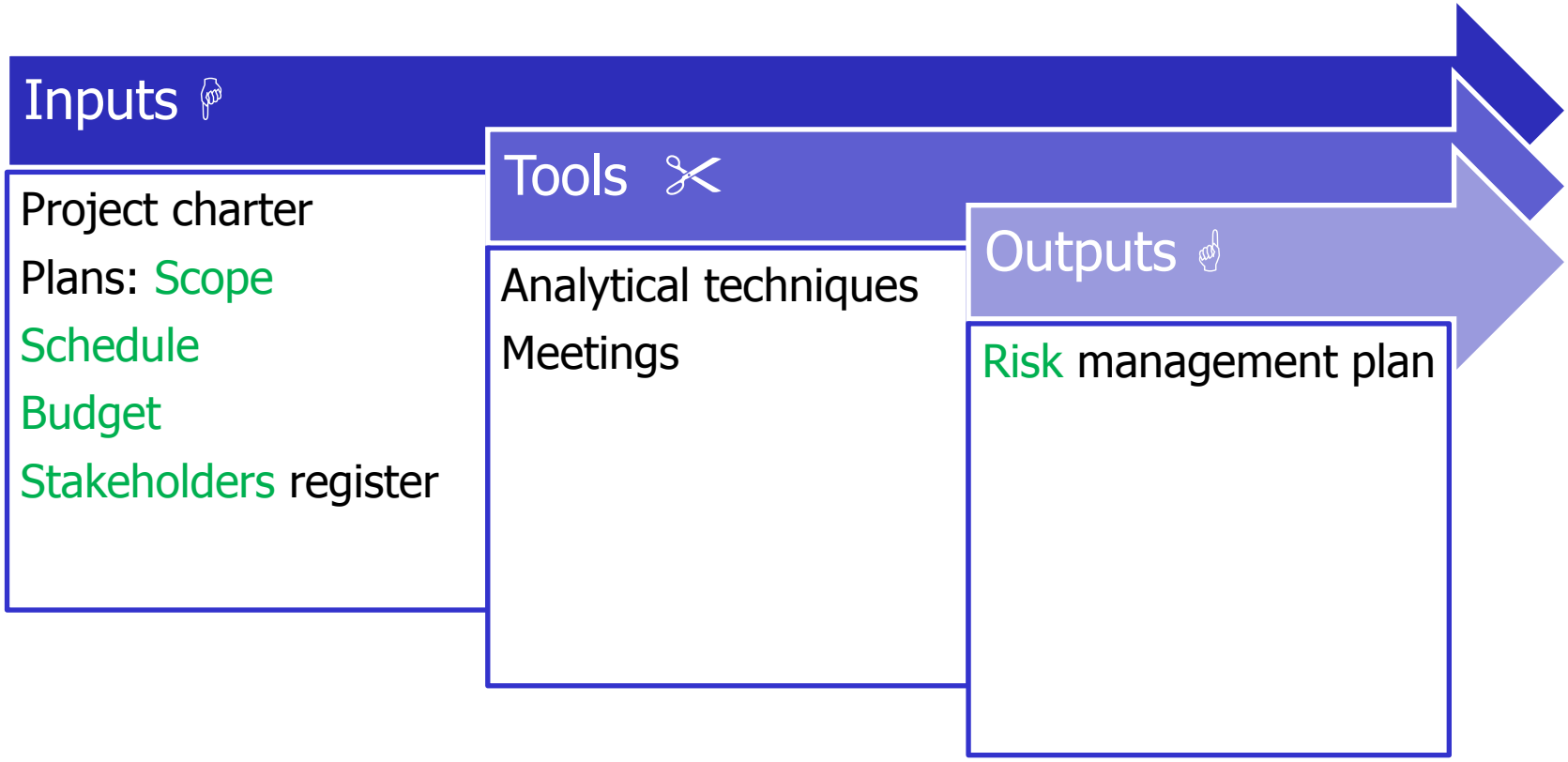
Expected monetary value = Probability x Impact

Attitude towards risk

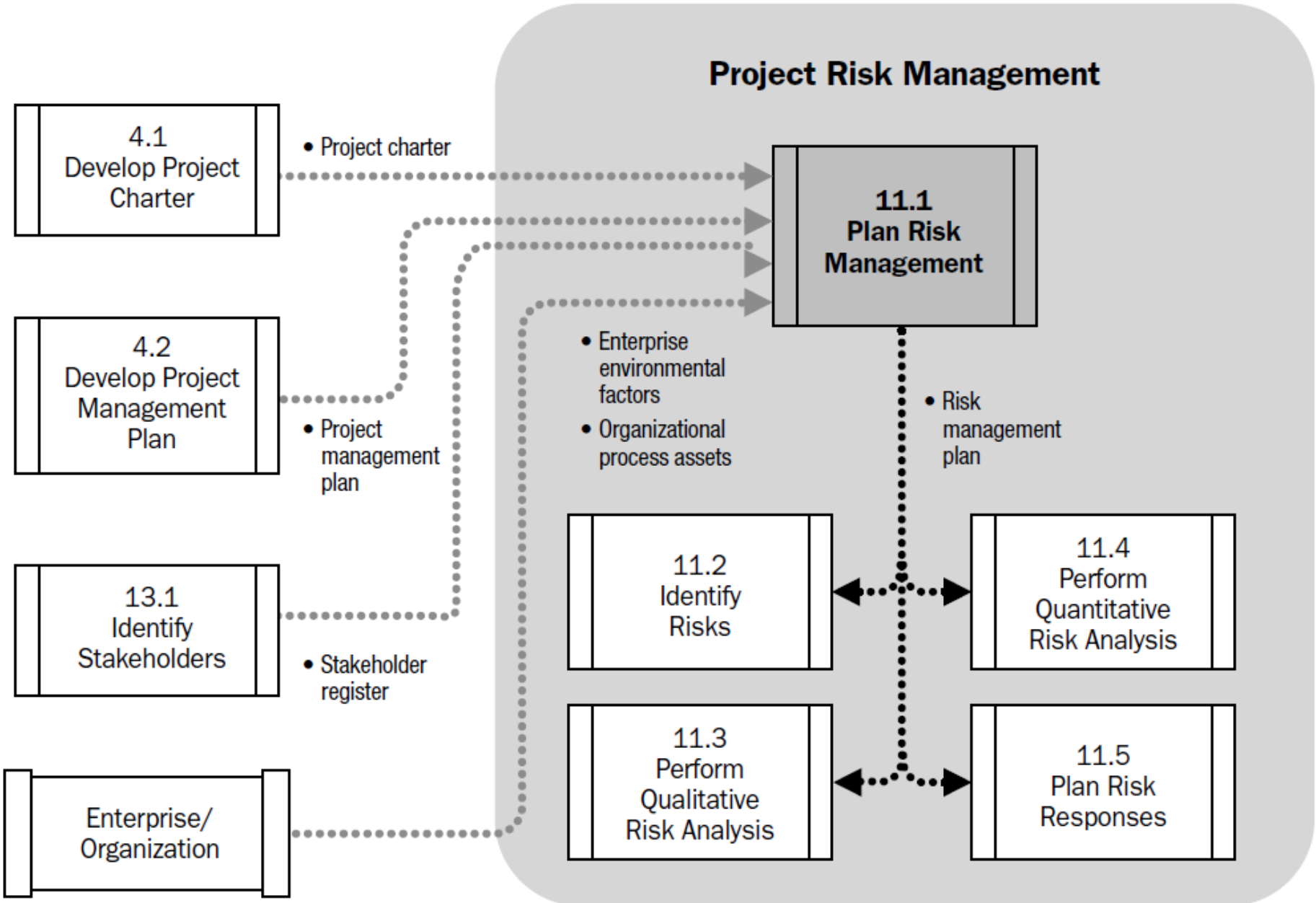
Processes


Plan
Identify
Qualitative analysis
Quantitative analysis
Plan responses
Control

1. Plan risk management

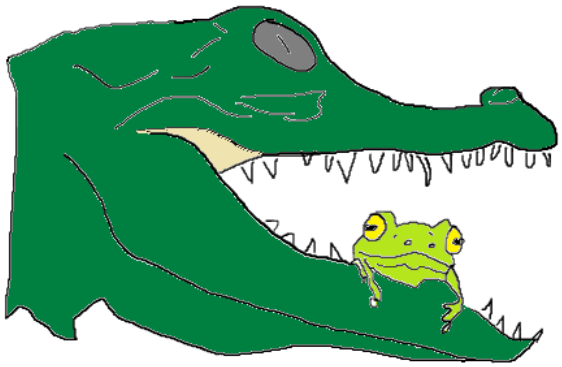


1. Plan risk management



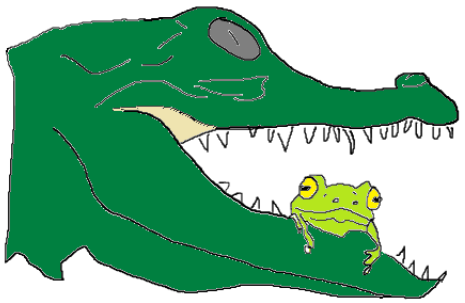
Plan risk management

- ✓ Who will identify the risks?
- ✓ When will the risks be identified?
- ✓ What scale will be used for the qualitative risk analysis?
- ✓ How will risks be prioritized?
- ✓ What tools will be used for the quantitative analysis?
- ✓ Which will be the strategies to implement each risk?
- ✓ How often will risk follow up be done?

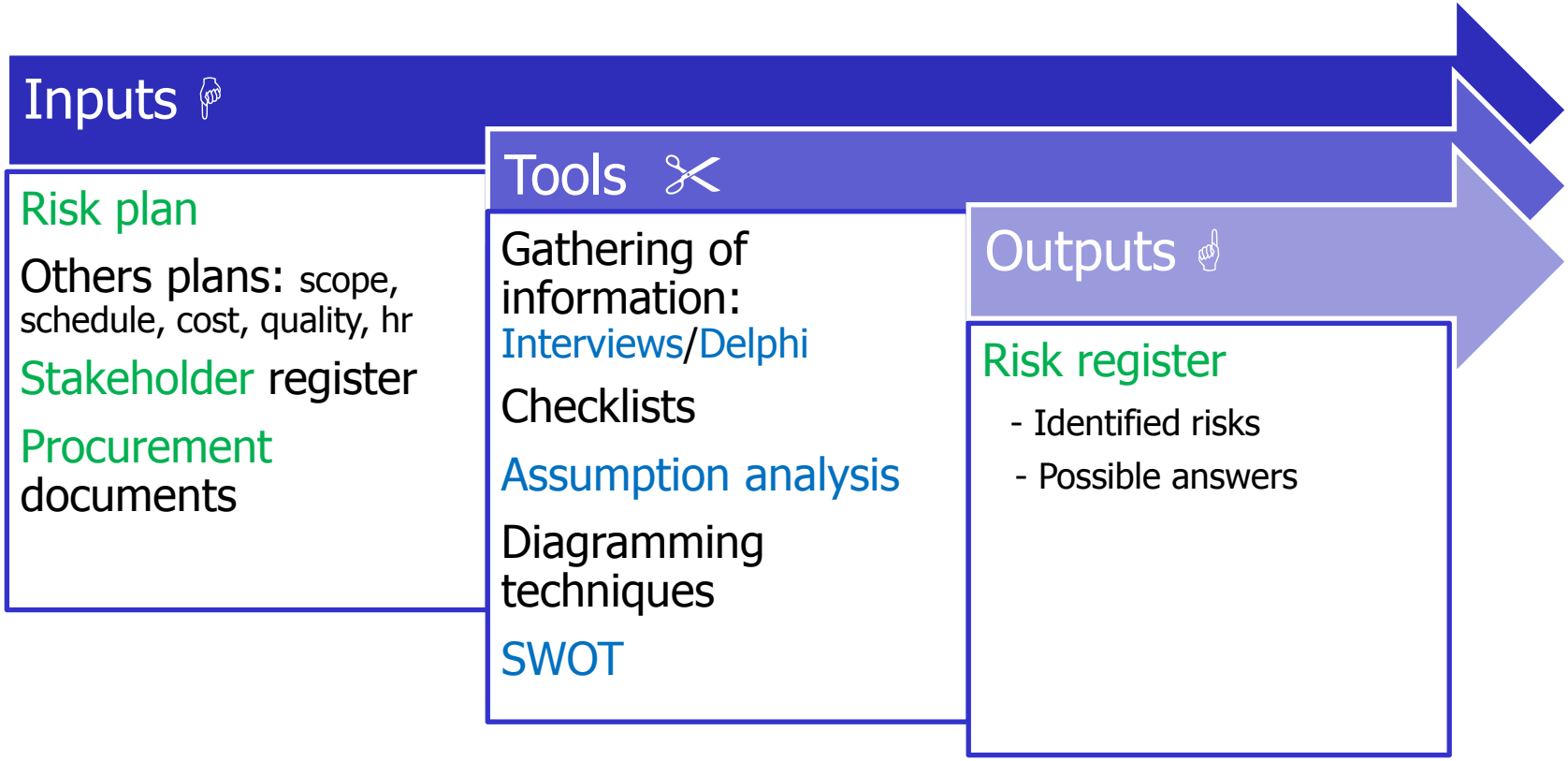


Risk management plan

- ✓ Methodology
- ✓ Roles and responsibilities of the risk management team
- ✓ Risk management budget
- ✓ Risk categories
- ✓ Frequency to perform the risk processes during the project life cycle
- ✓ Scales of probability and impact, and the risk matrix
- ✓ Risk tolerance of each stakeholder´s group
- ✓ Format of the reports



2. Identify risks



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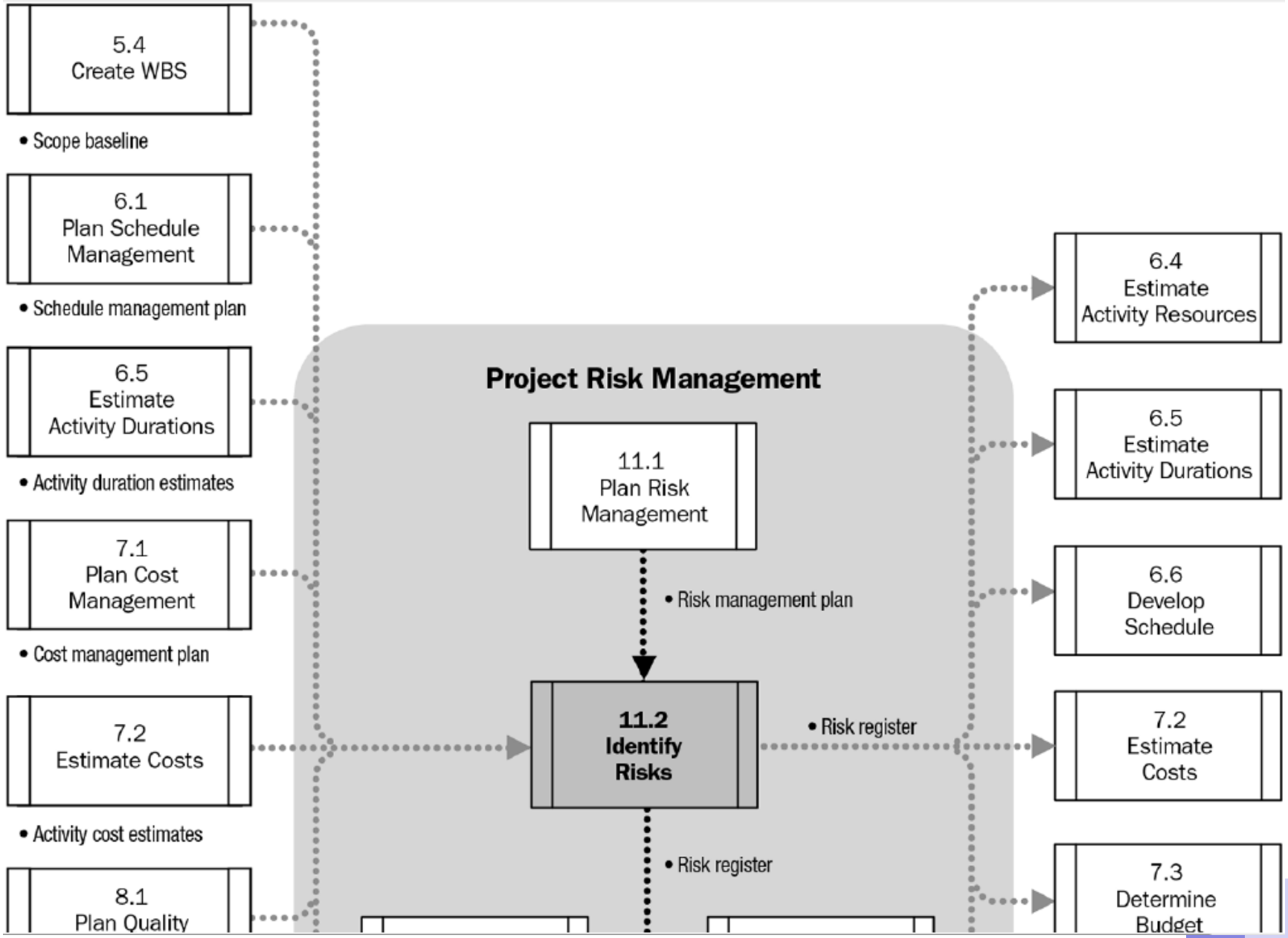
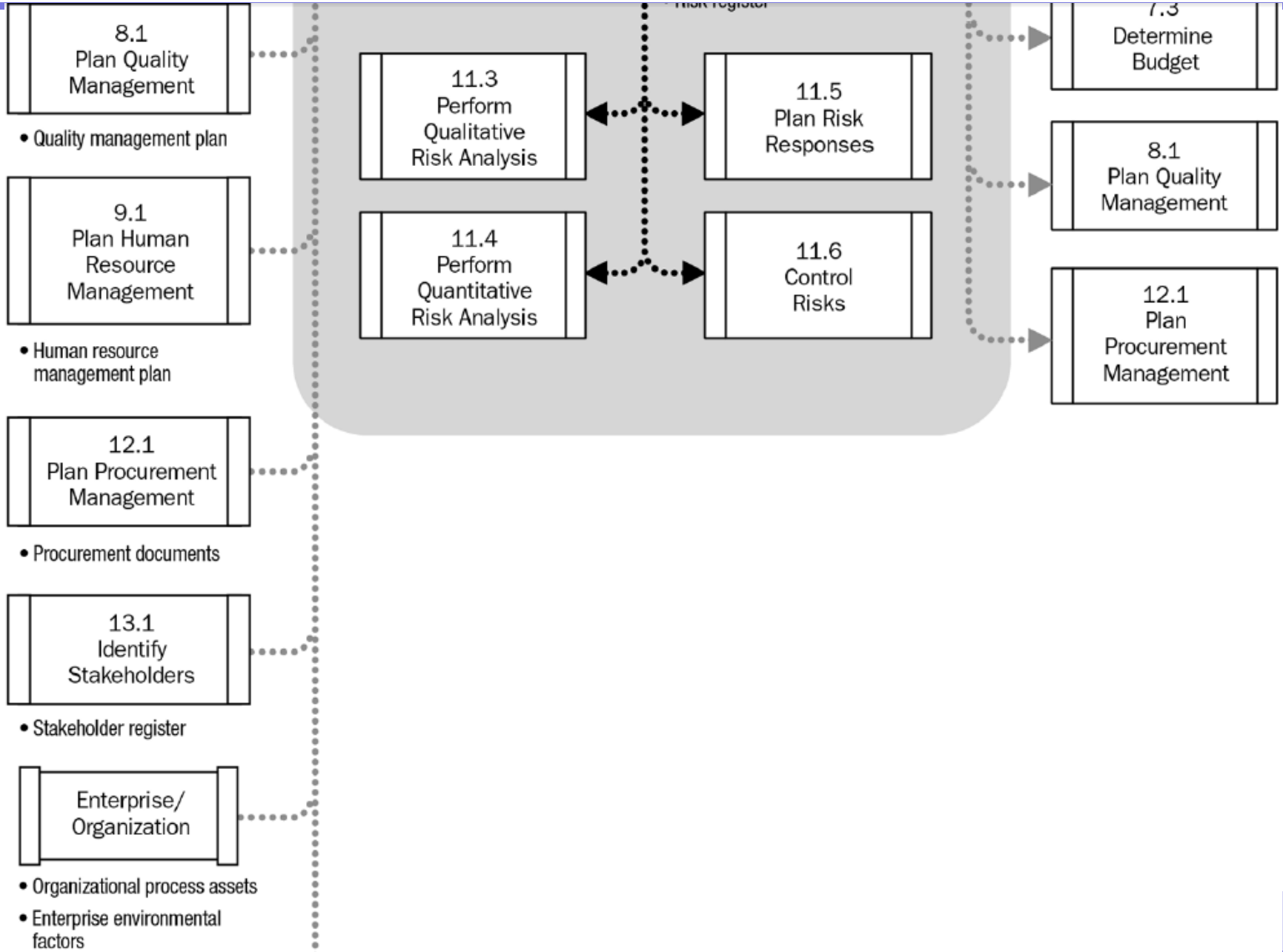


2. Identify risks



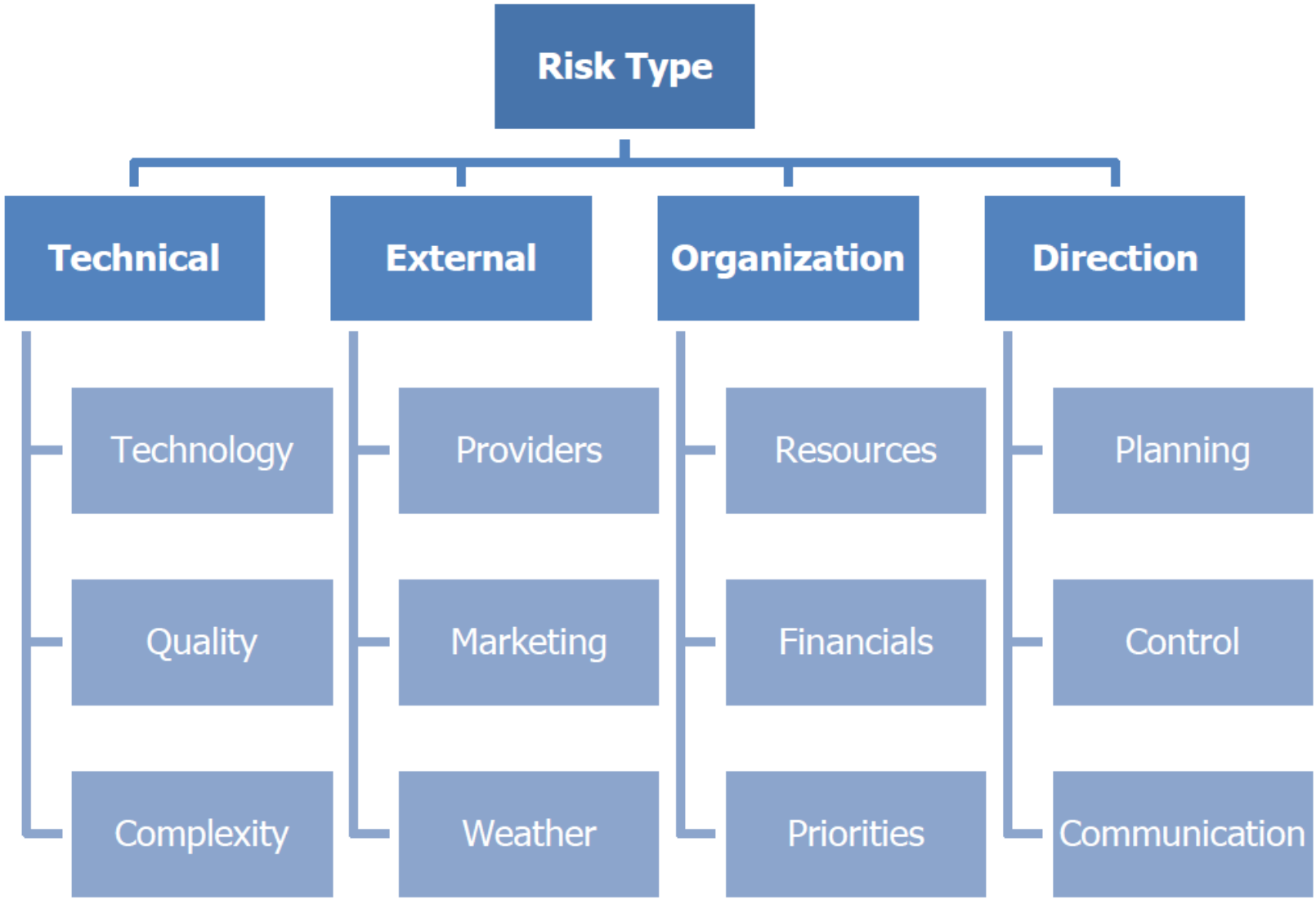
Checklists

Potential Risk	✓
Fire	
Storm	
Strike	
Non-compliance with quality	
Non-compliance with schedule	
Going over budget	
Lack of required raw material	
Lack of plan forecasted financing	
Lack of leadership to coordinate teams	
Change in regulations	
The contractor does not finish work on time	
The initial agenda is unreal	
Lack of resource training	
Lack of communication between the work team	
Inadequate quality controls	
Lack of technical support	

Risk categories by type

- ✓ ***Technical:*** new designs
- ✓ ***Direction:*** bad practices
- ✓ ***Organizational:*** internal conflicts
- ✓ ***External:*** outside the organization

Risk categories by type



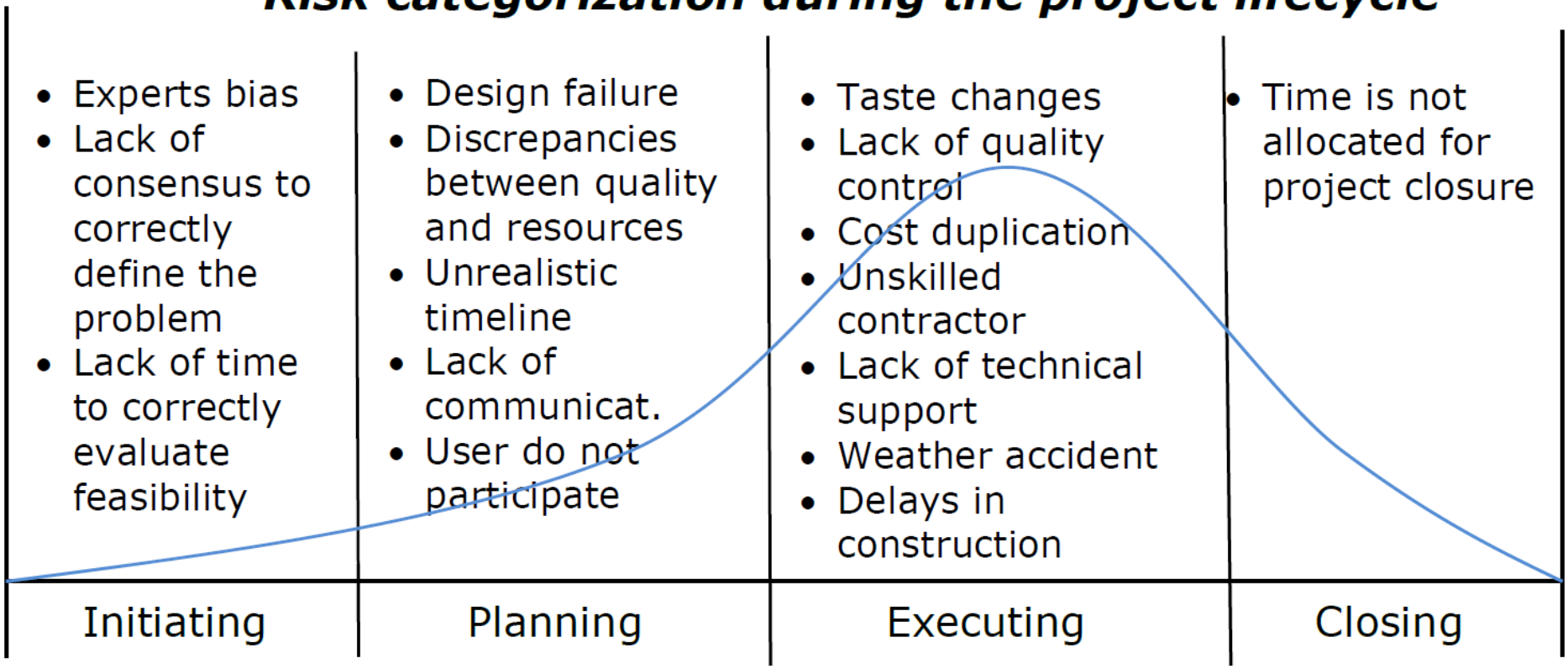
Risks

Risk categories by causes

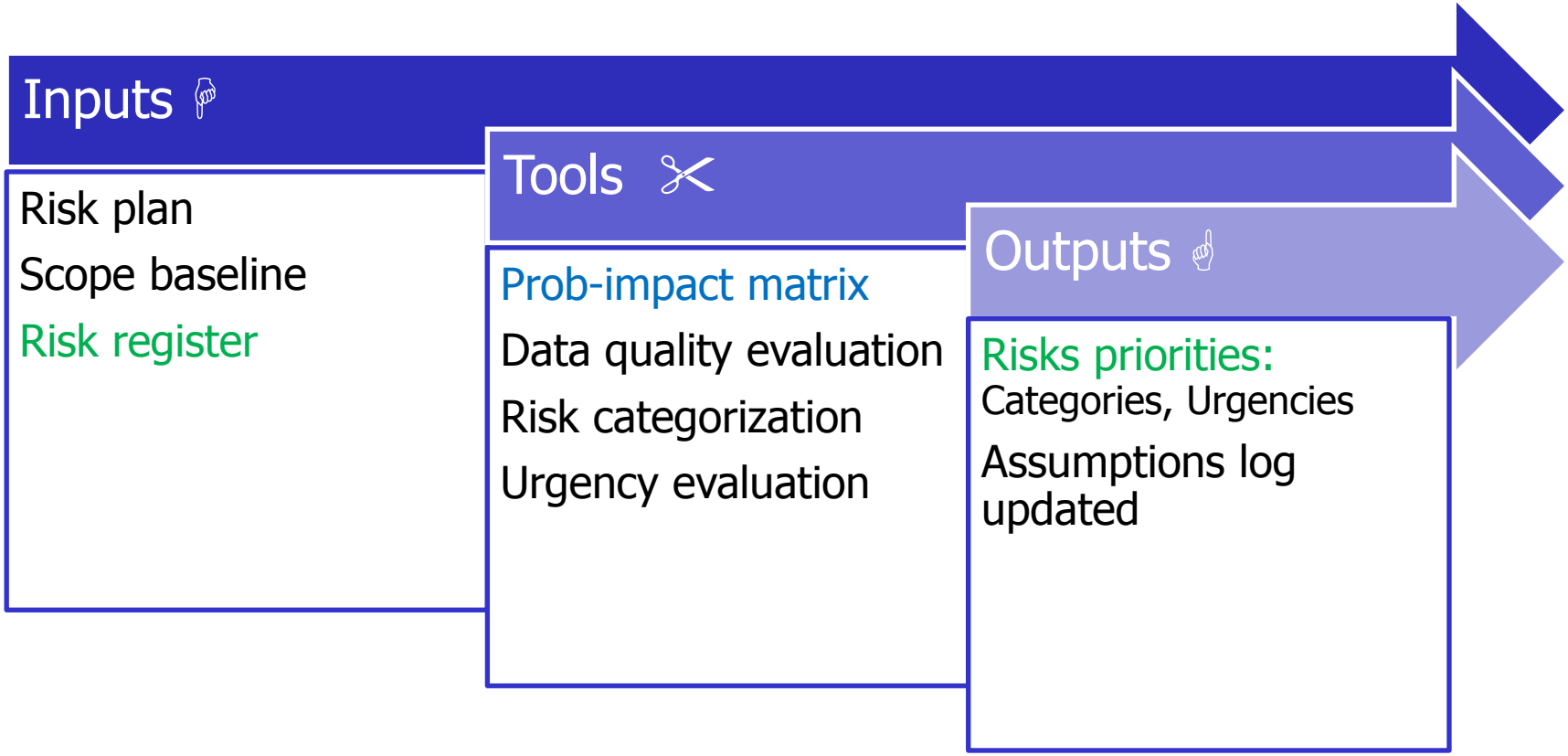
Political Cause				Economic Cause				Internal Cause (or by Project)				Natural Cause			Financial Cause		
Weak government	Public opinion	Legislation change	Wars	Decrease in demand	Competition	Inflation	Currency exchange	Bad planning	Lack of leadership	Lack of training	Lack of control	Bad weather	Fire	Earthquake	Lack of financing	Low margin	Low rotation

Risks

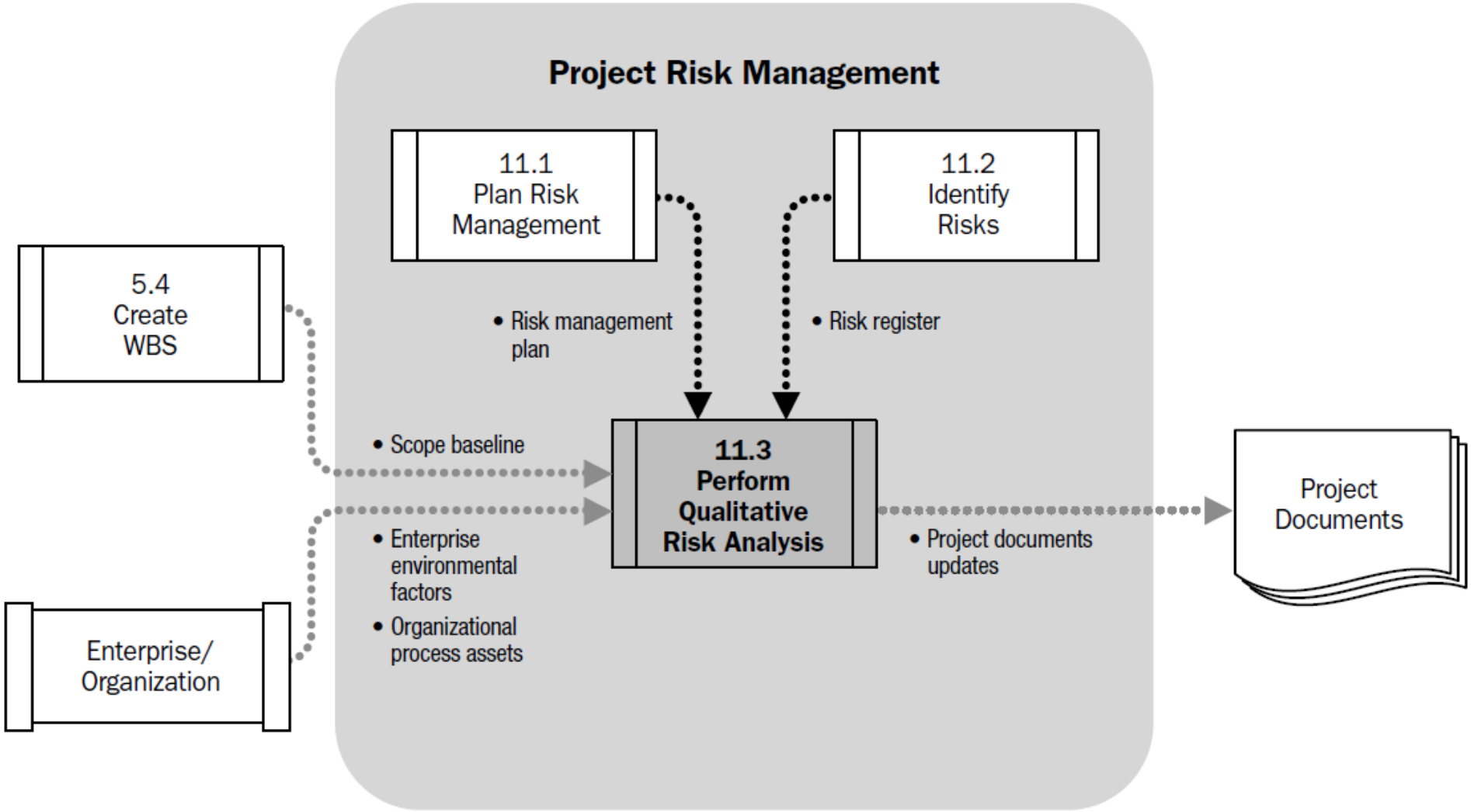
Risk categorization during the project lifecycle



3. Perform qualitative risk analysis



3. Perform qualitative risk analysis



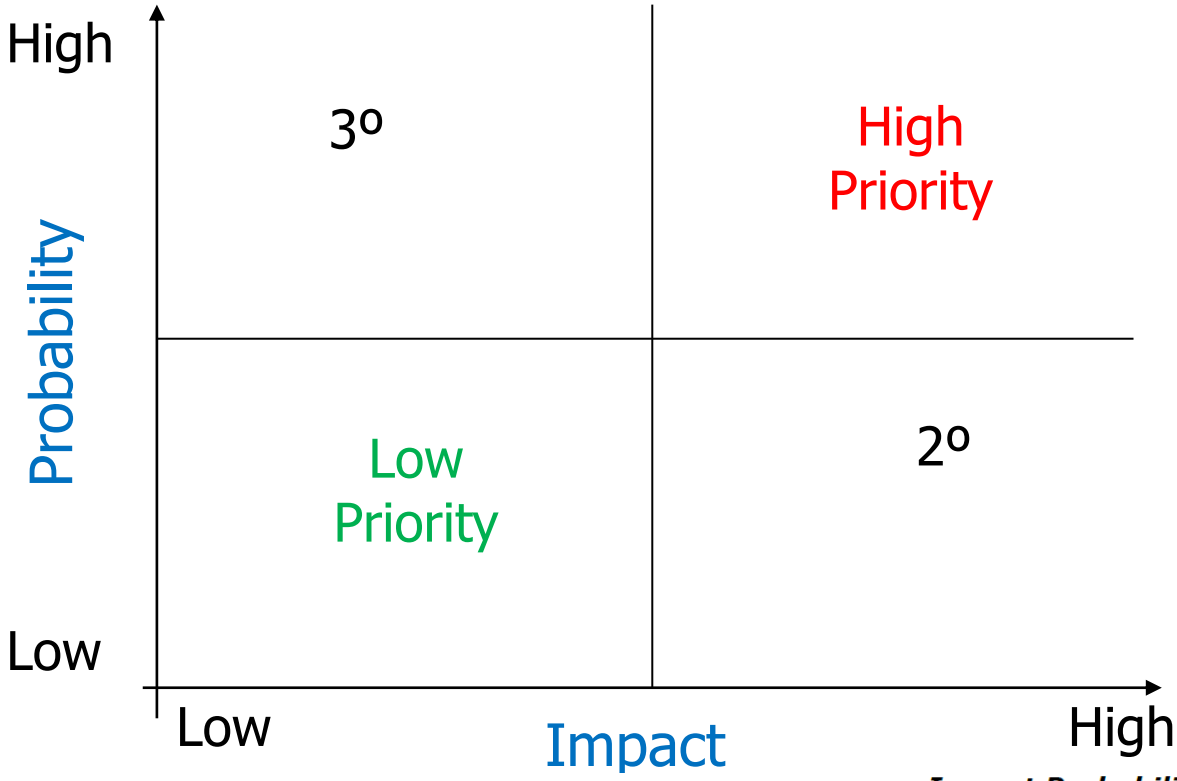
Impact

Defined Conditions for Impact Scales of a Risk on Major Project Objectives
(Examples are shown for negative impacts only)

Project Objective	Relative or numerical scales are shown				
	Very low /0.05	Low /0.10	Moderate /0.20	High /0.40	Very high /0.80
Cost	Insignificant cost increase	< 10% cost increase	10 – 20% cost increase	20 – 40% cost increase	> 40% cost increase
Time	Insignificant time increase	< 5% time increase	5 – 10% time increase	10 – 20% time increase	> 20% time increase
Scope	Scope decrease barely noticeable	Minor areas of scope affected	Major areas of scope affected	Scope reduction unacceptable to sponsor	Project end item is effectively useless
Quality	Quality degradation barely noticeable	Only very demanding applications are affected	Quality reduction requires sponsor approval	Quality reduction unacceptable to sponsor	Project end item is effectively useless

This table presents examples of risk impact definitions for four different project objectives. They should be tailored in the Risk Management Planning process to the individual project and to the organization's risk thresholds. Impact definitions can be developed for opportunities in a similar way.

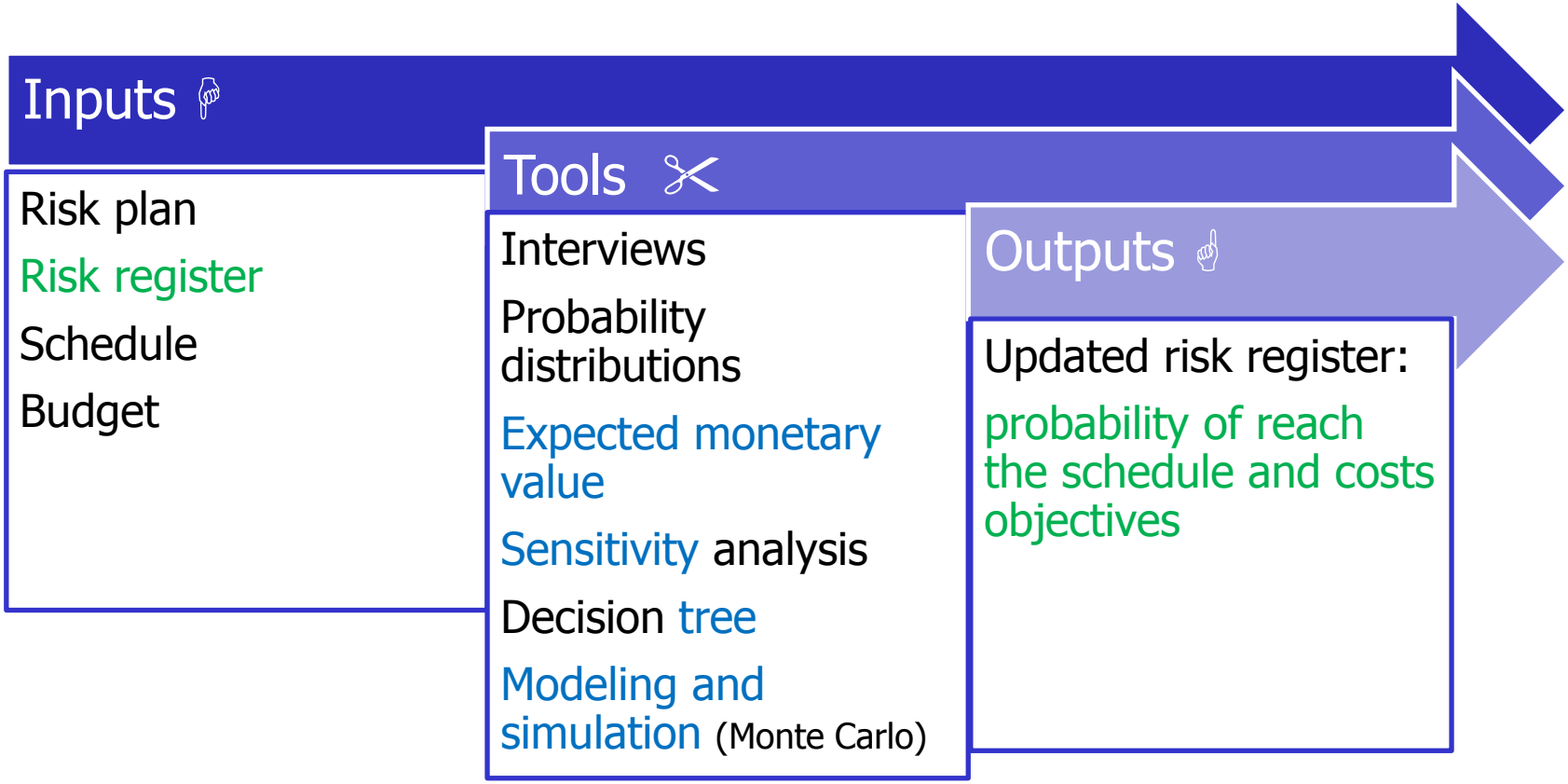
Qualitative analysis



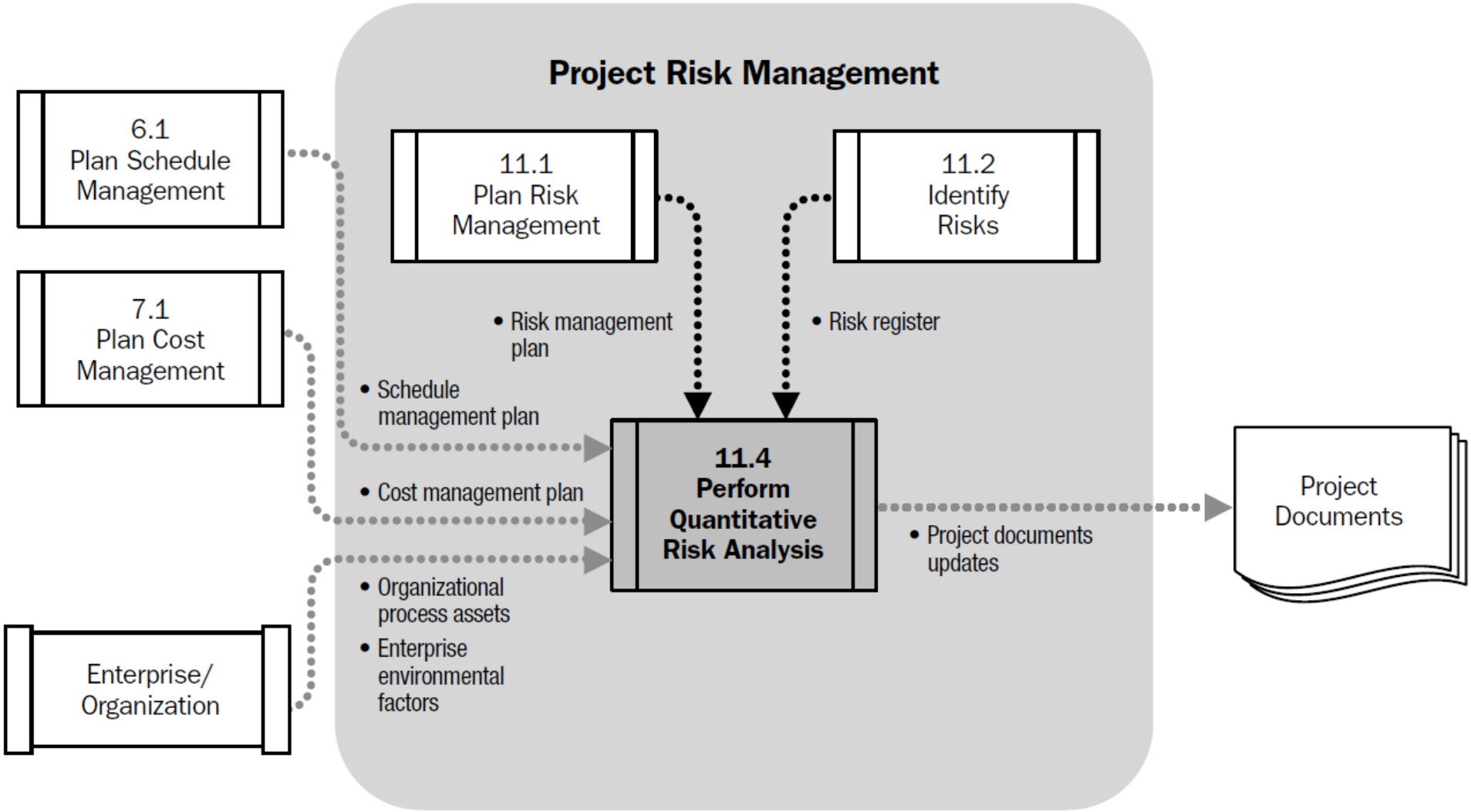
Impact Probability matrix

Impact / Probability	Very low 1	Low 2	Medium 3	High 5	Very high 10
Very low 1	1	2	3	5	10
Low 2	2	4	6	10	20
Medium 3	3	6	9	15	30
High 4	4	8	12	20	40
Very high 5	5	10	16	25	50

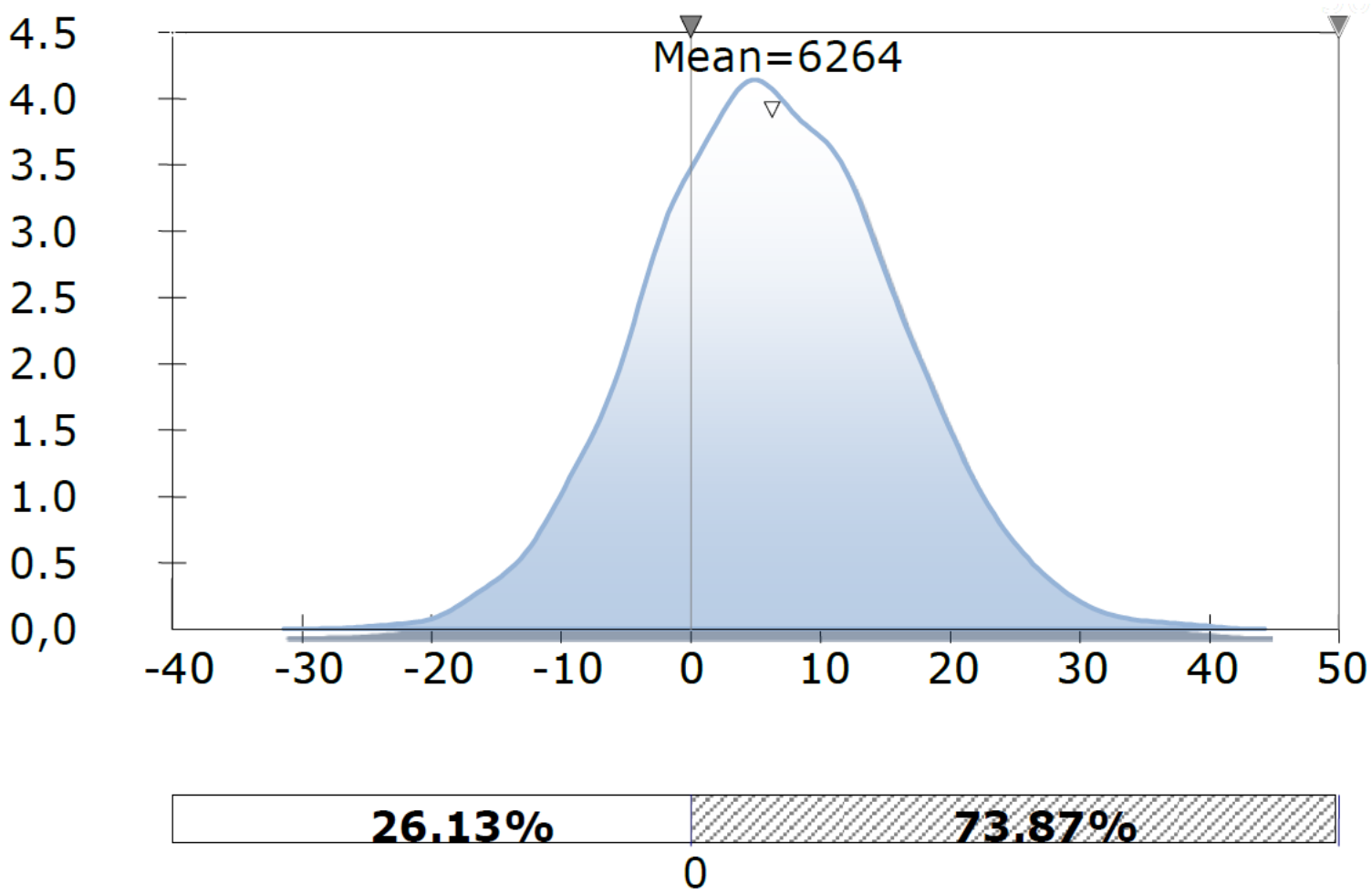
4. Perform quantitative risk analysis



4. Perform quantitative risk analysis



Dynamic risk analysis



Monte Carlo

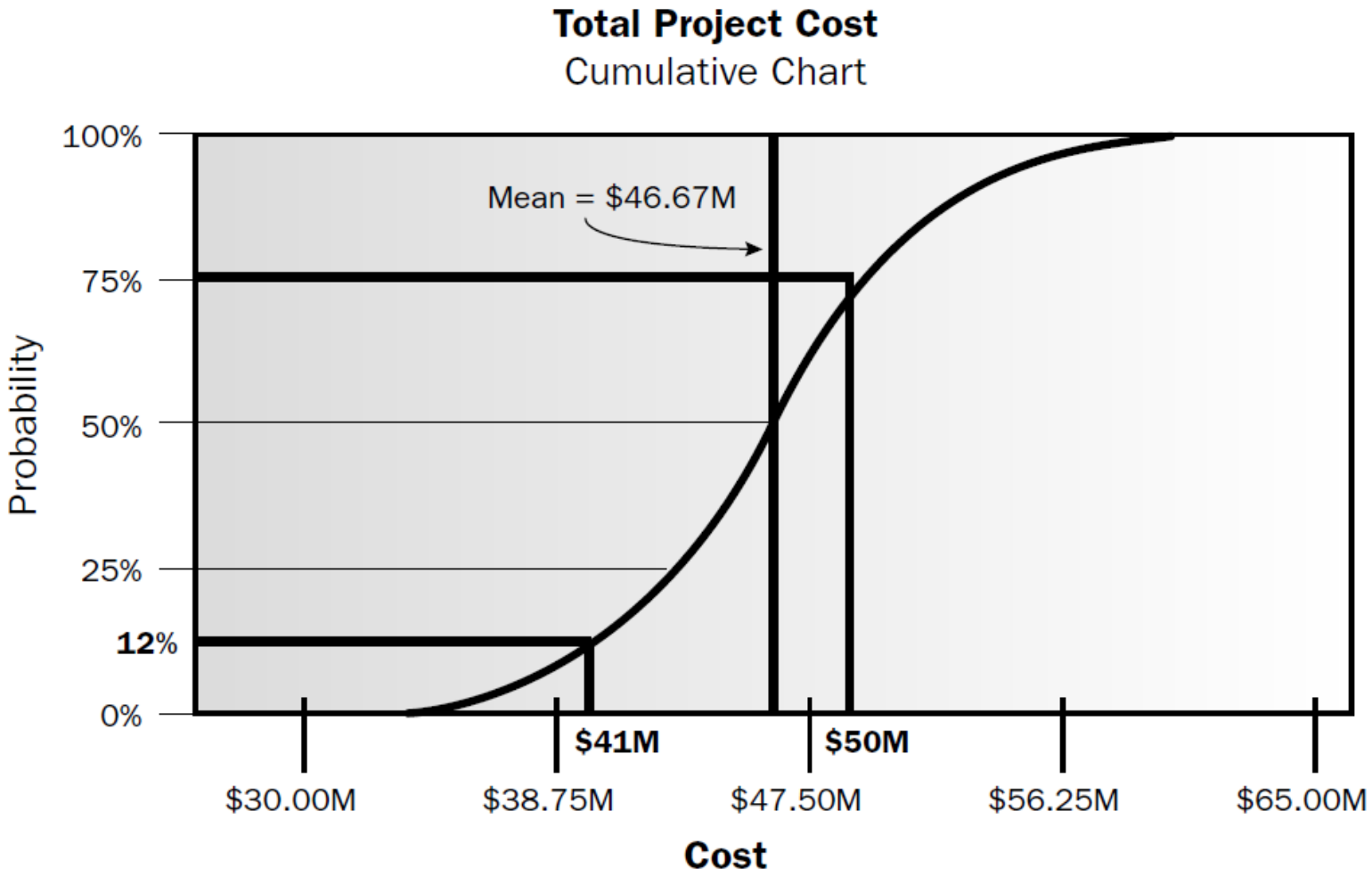
Cost risk simulation results

Range of Project Cost Estimates

WBS Element	Low	Most Likely	High
Design	$4M	$6M	$10M
Build	$16M	$20M	$35M
Test	$11M	$15M	$23M
Total Project	$31M	$41M	$68M

Interviewing relevant stakeholders helps determine the three-point estimates for each WBS element for triangular, beta or other distributions. In this example, the likelihood of completing the project at or below the most likely estimate of $41 million is relatively small as shown in the simulation results in Figure 11-17 (Cost Risk Simulation Results).

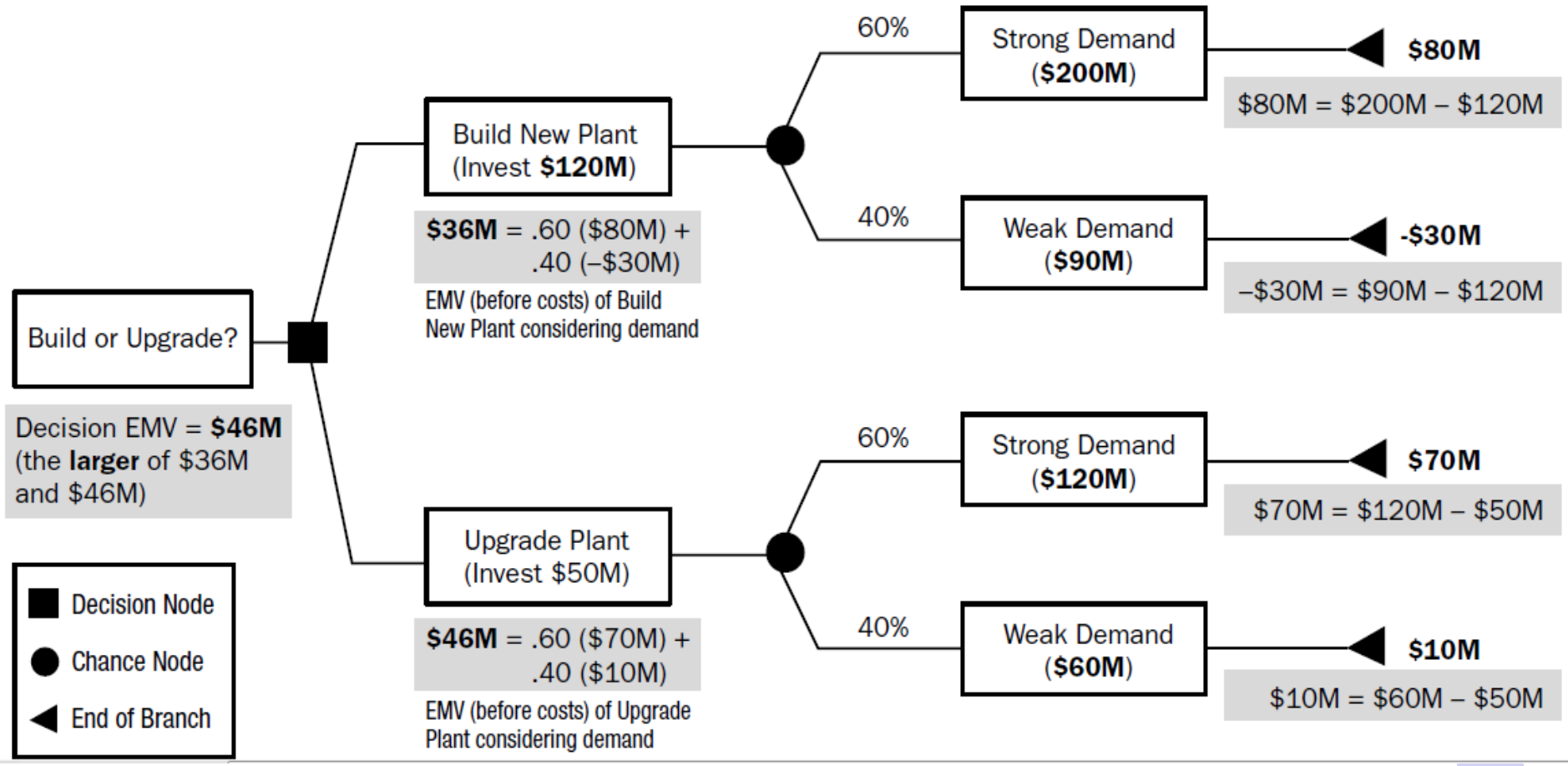
Cost risk simulation results



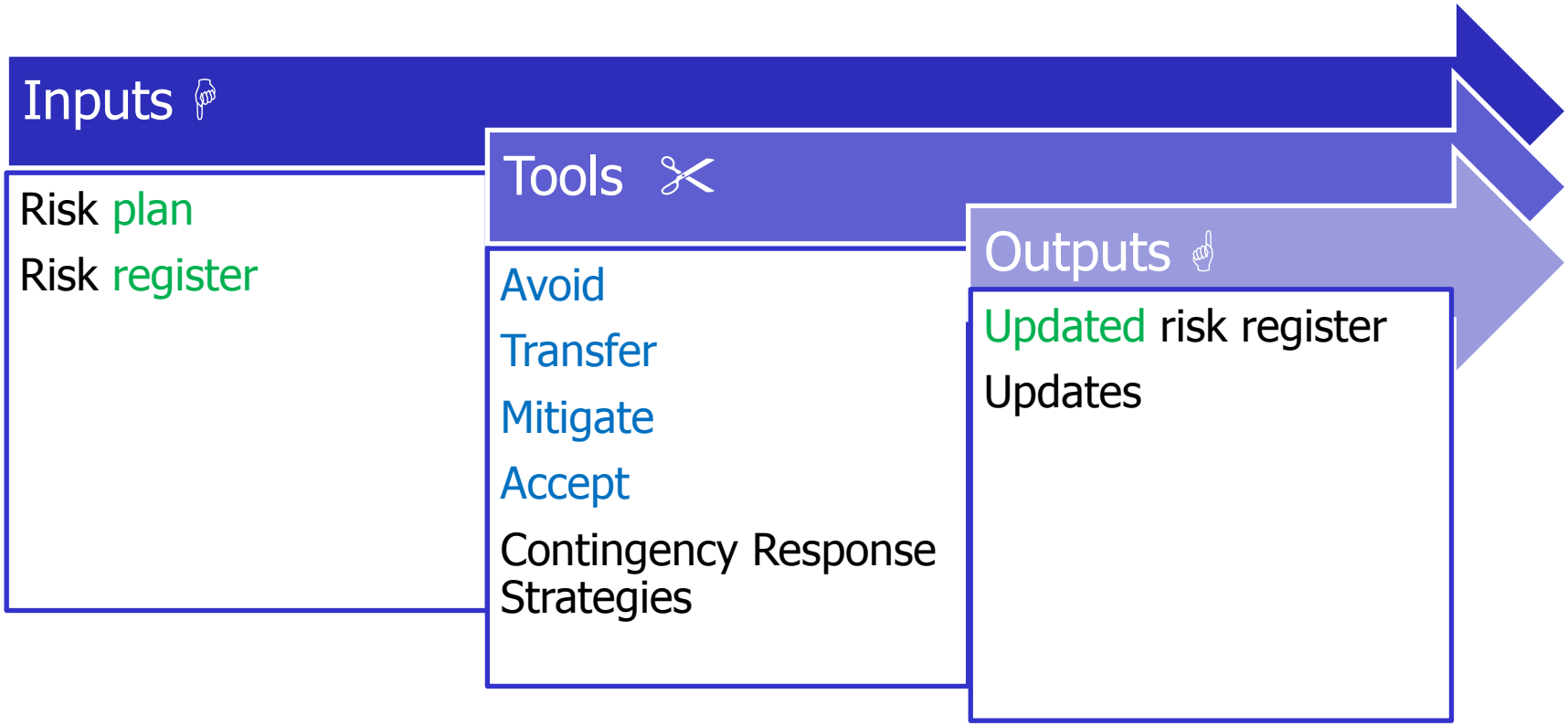
This cumulative distribution, assuming the data ranges in Figure 11-13 and triangular distributions, shows that the project is only 12 percent likely to meet the $41 million most likely cost estimate. If a conservative organization wants a 75% likelihood of success, a budget of $50 million (a contingency of nearly 22 % ($50M - $41M)/$41M)) is required.

Expected monetary value & Decision tree

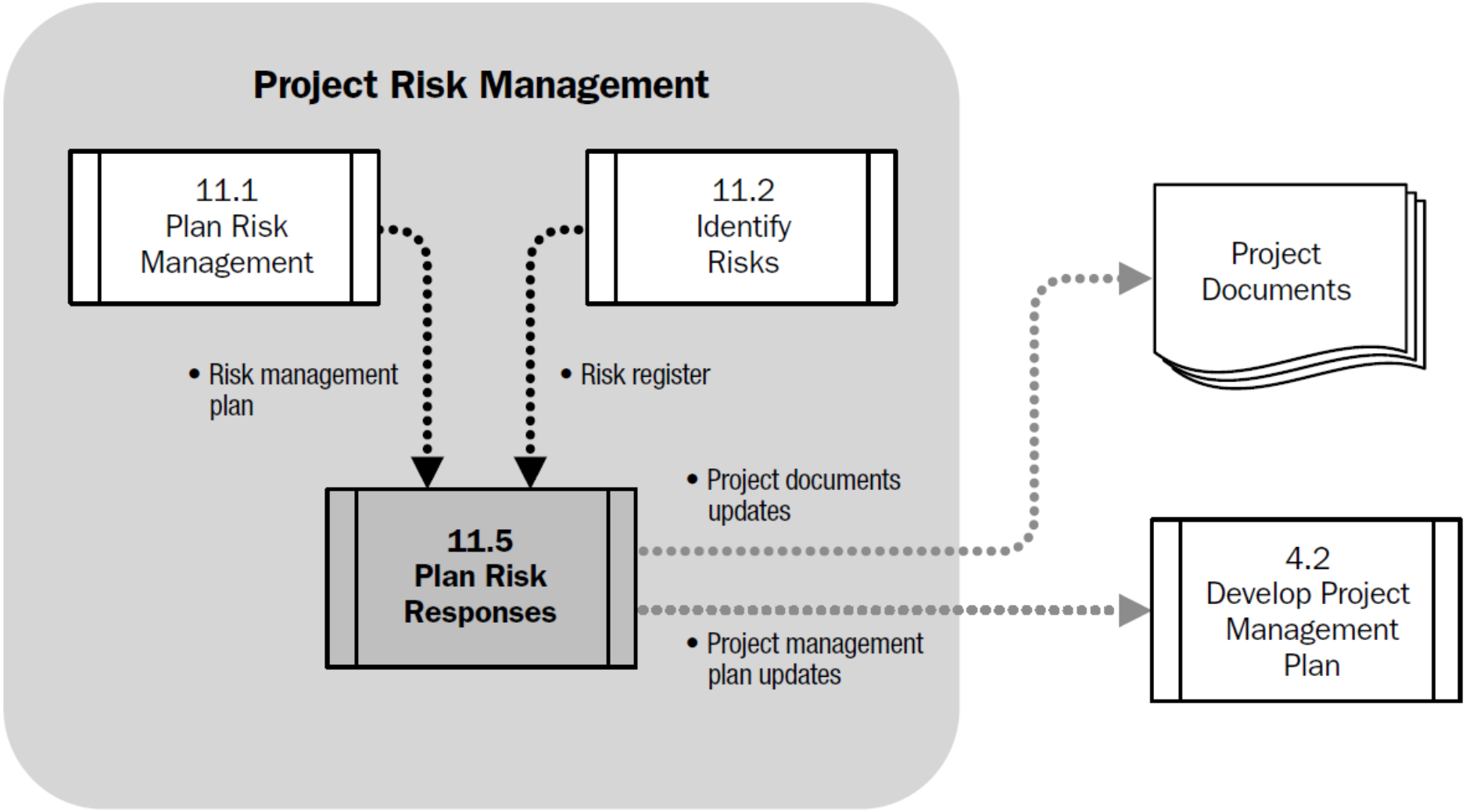
Decision Definition	Decision Node	Chance Node	Net Path Value
Decision to be Made	**Input:** Cost of Each Decision **Output:** Decision Made	**Input:** Scenario Probability, Reward if it Occurs **Output:** Expected Monetary Value (EMV)	**Computed:** Payoffs minus Costs along Path



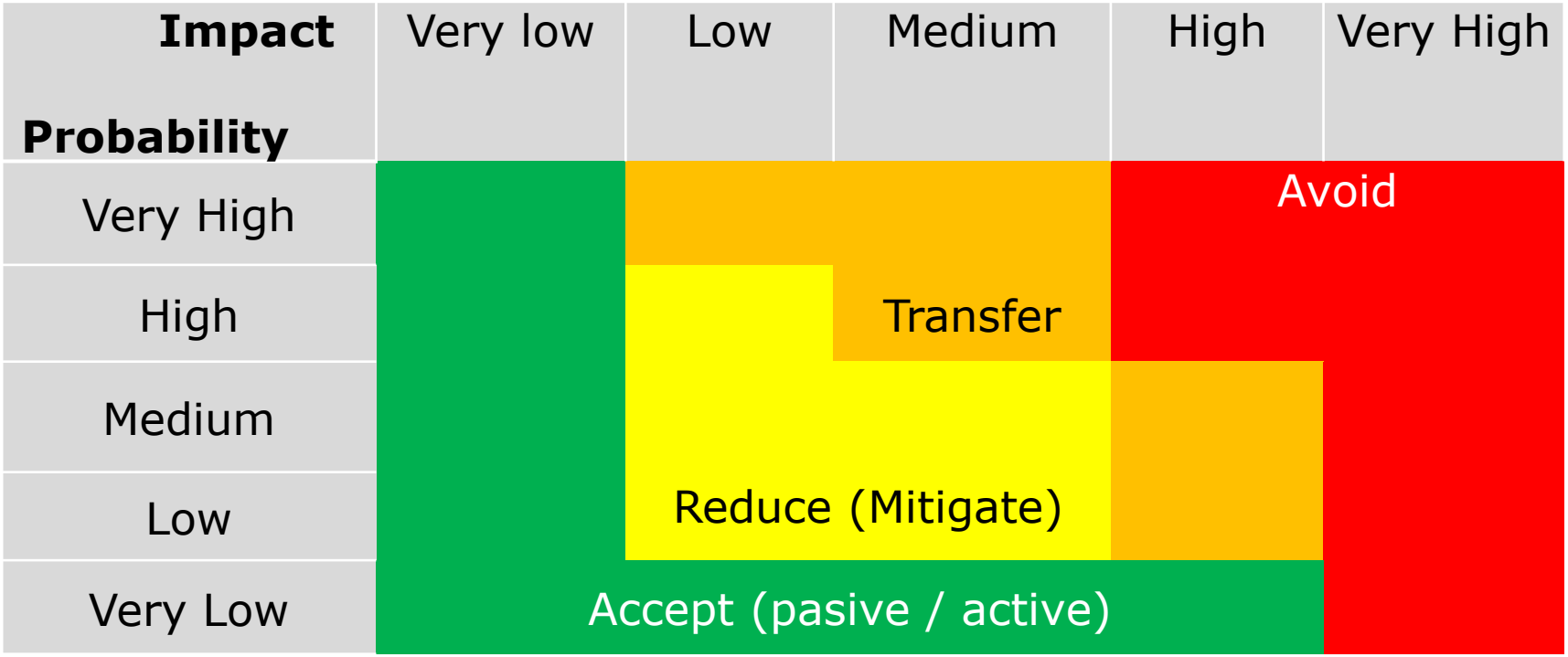
5. Plan risk response



5. Plan risk response



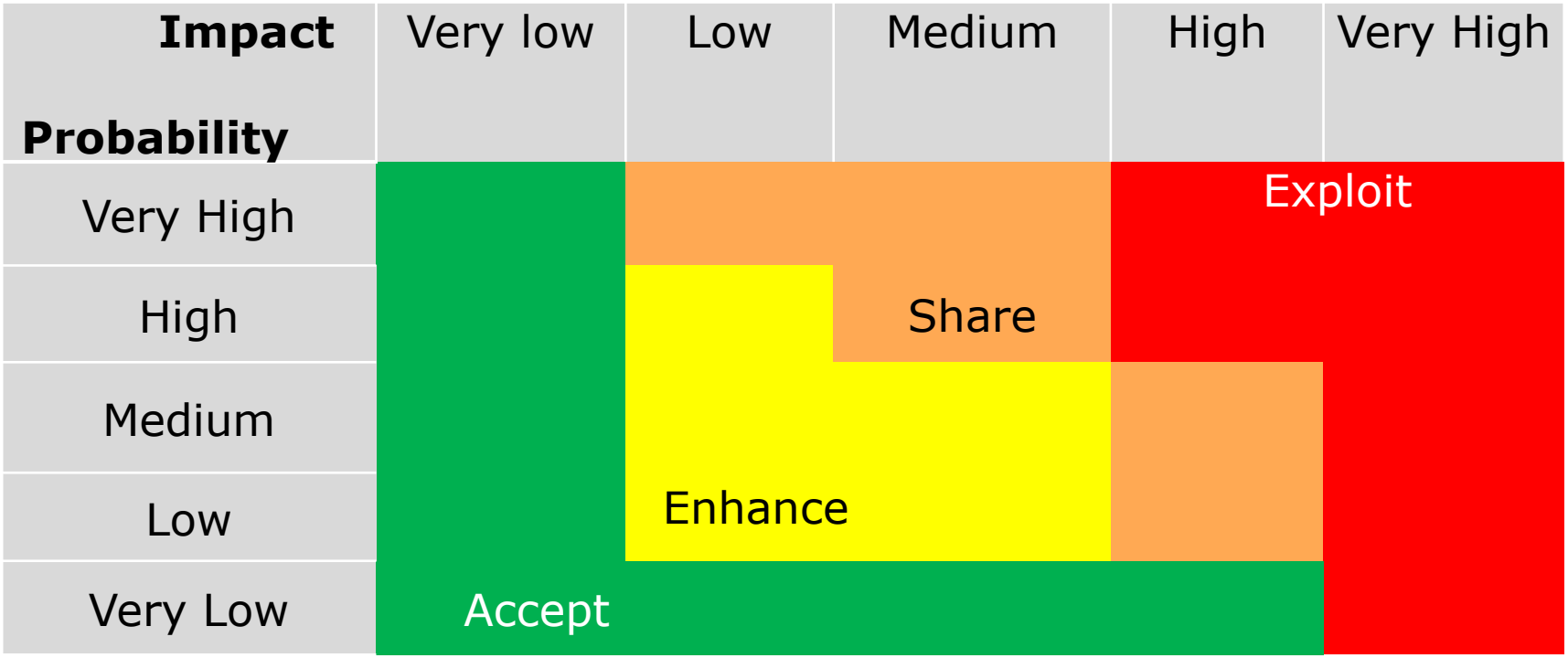
Risk matrix - strategy



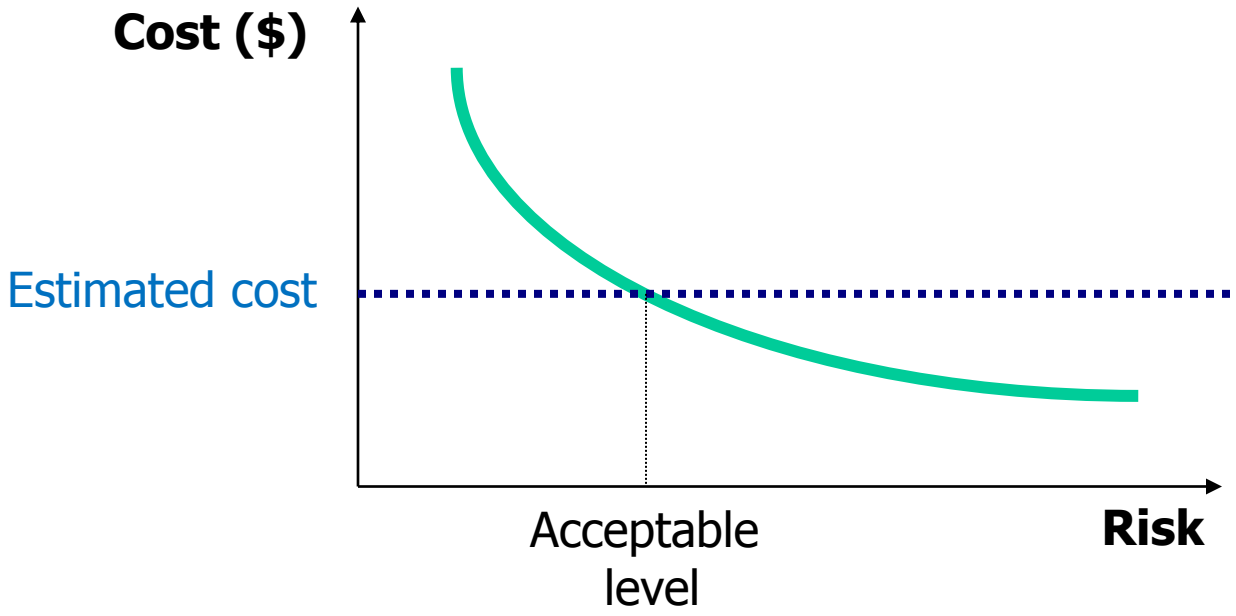
→ *Exercise*

Risk matrix - strategy

For Positive Risks



Residual and secondary risks



Residual risk: stays after having implemented the risk response.

Secondary risk: is the one that originates as a direct consequence of the implementation of risk responses

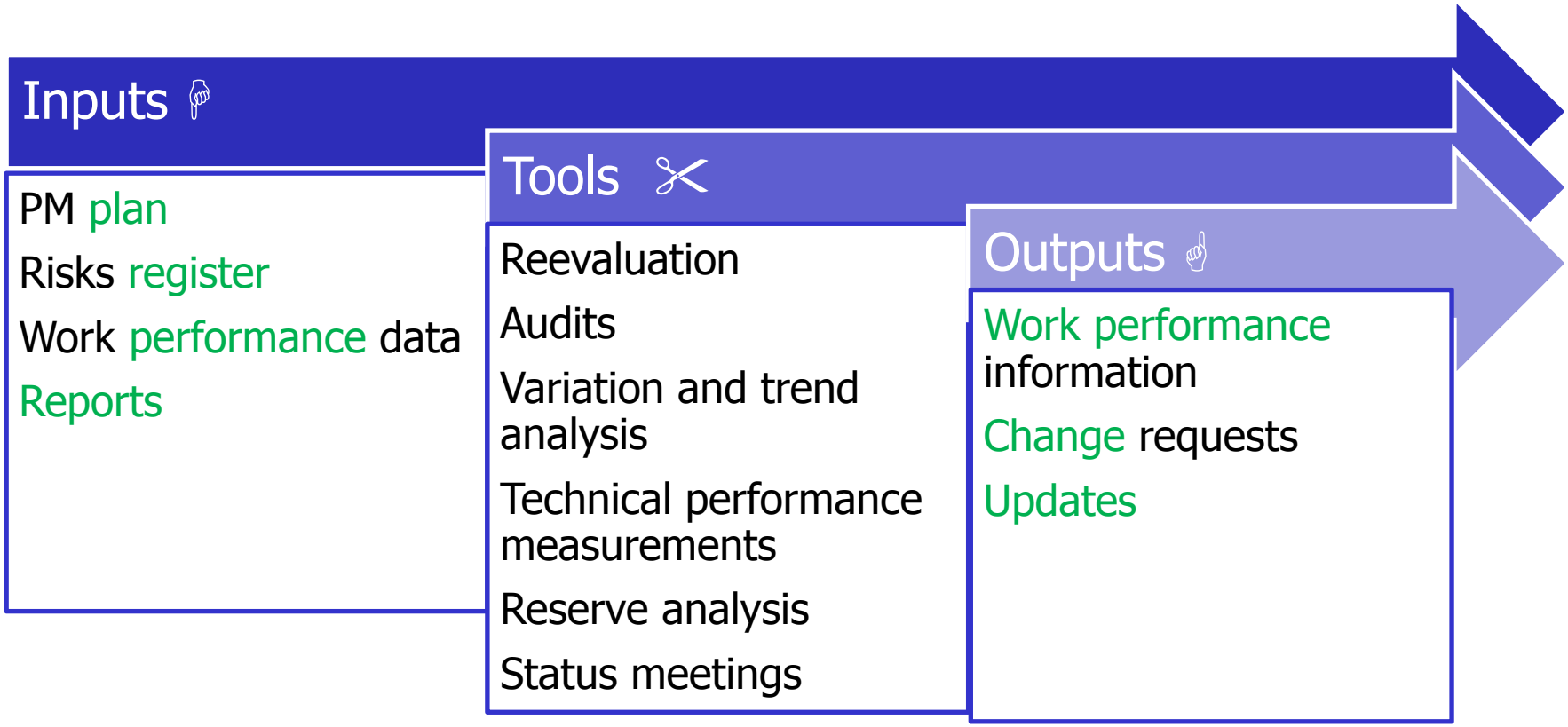
How to react?

Symptoms: event that indicates some difficulty in the project. Example: delays.

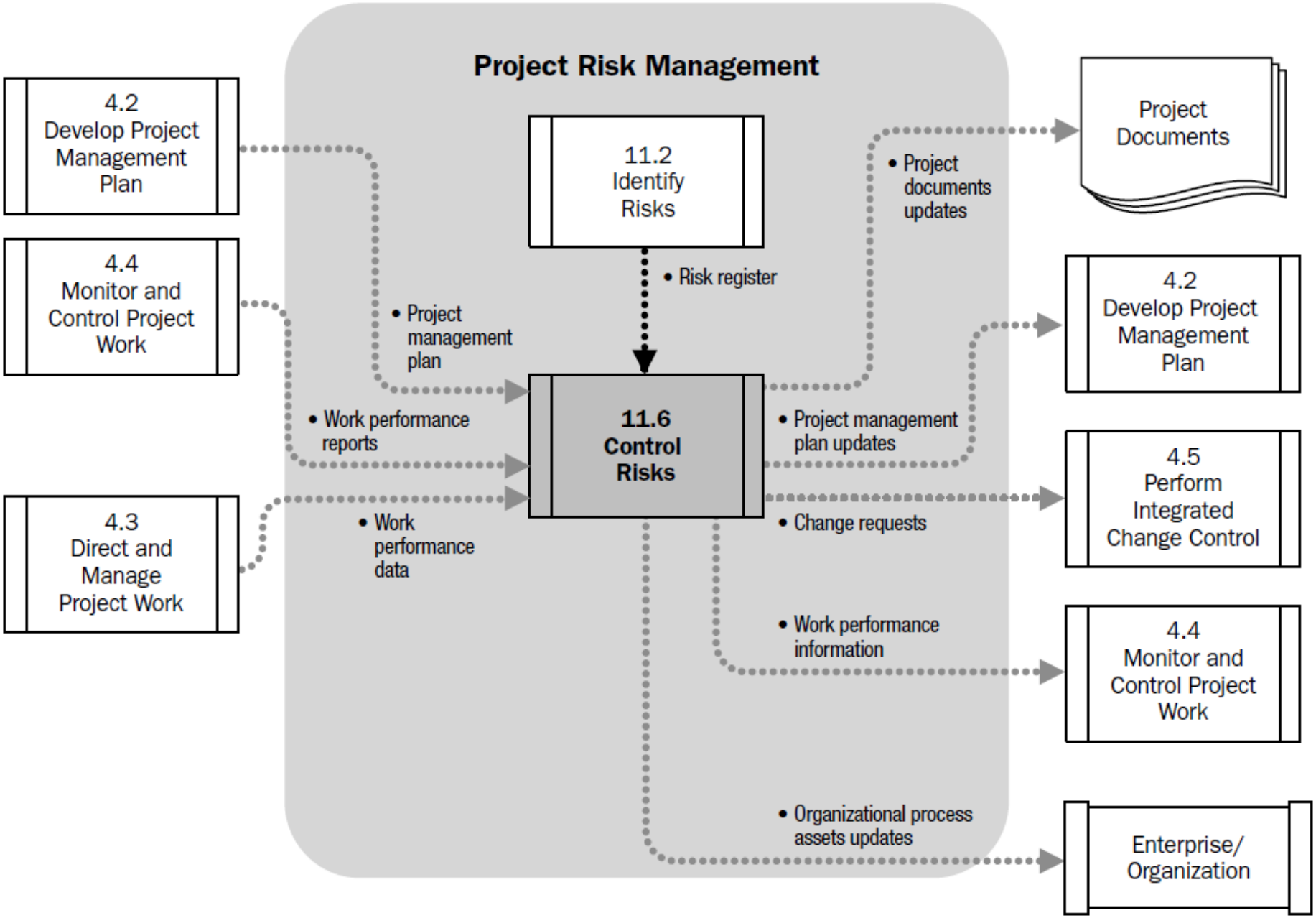
Triggers: when the variables overcome the acceptable level (threshold), risk response plans are implemented to alleviate the impact. For example, if the schedule performance index is less than .8 you decide to fast tracking.

Always include a risk **custodian** or **owner** for each action that is decided to be implemented as a risk response.

6. Control risks



6. Control risks



Questions

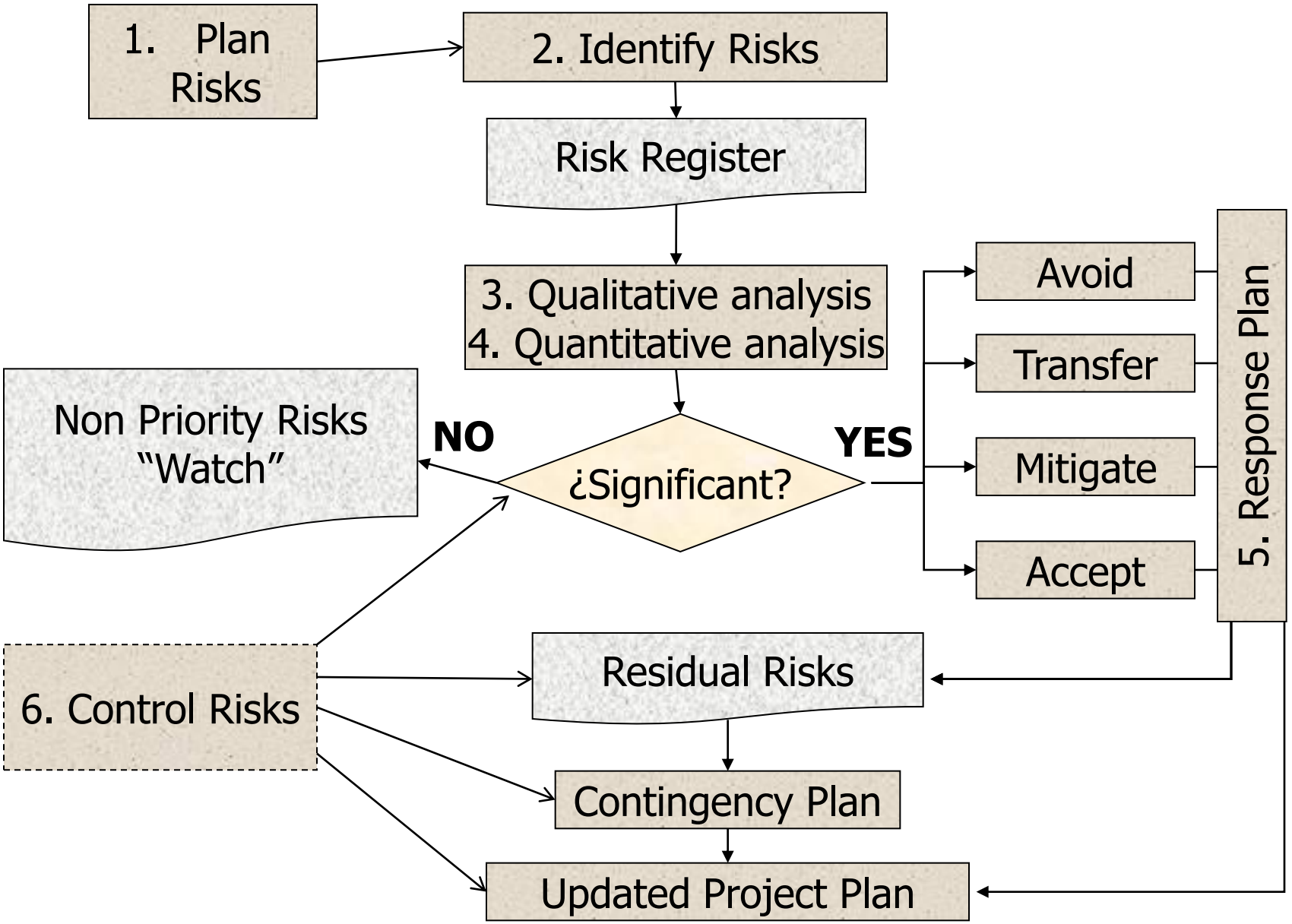
What needs to get done with non-priority or non-critical risks?

Answer:
- Include in a watch list
- Review in a periodic basis

What is the most important thing in a project meeting?

Answer:
- Identify and analyze risks

Summarizing risk management ...



Lessons learned

- ✓ Accept
- ✓ Avoid
- ✓ Contingency reserves
- ✓ Decision tree
- ✓ Expected monetary value
- ✓ Exploit
- ✓ Impact probability matrix
- ✓ Improve
- ✓ Mitigate
- ✓ Monte Carlo
- ✓ Non-priority risks
- ✓ Probability and impact
- ✓ Reserve analysis
- ✓ Residual risk
- ✓ Response strategies
- ✓ Risk categories
- ✓ Risk owner
- ✓ Risk register
- ✓ Secondary risks
- ✓ Share
- ✓ Tolerance
- ✓ Transfer
- ✓ Triggers
- ✓ Uncertainty

PROCUREMENT

PM's role in procurement

Procurement processes

Plan procurements

Make or buy analysis

Types of contracts

Administer procurements

Close procurements

PM Process Groups

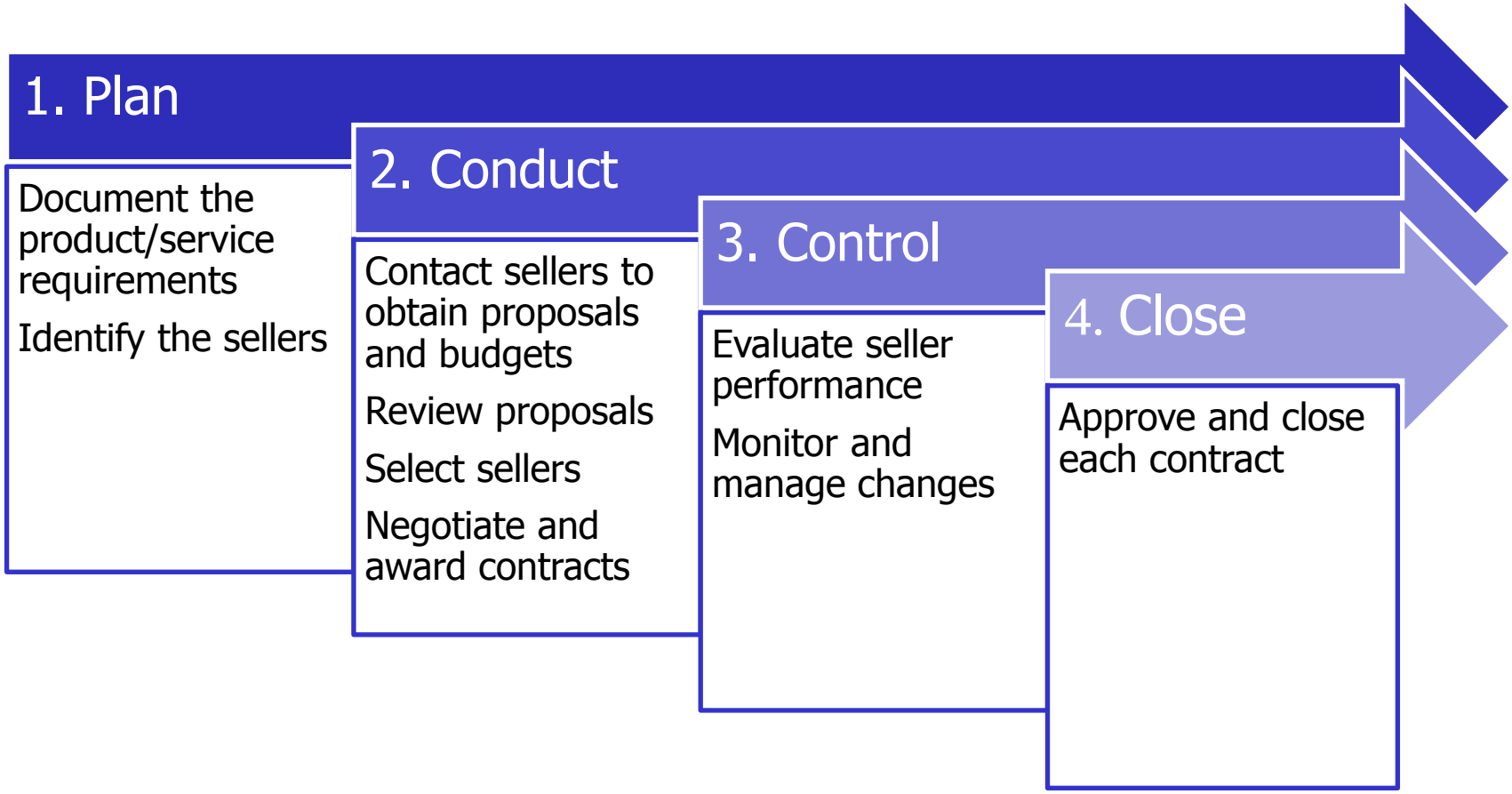
	Initiating	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		4		2	
Time		6		1	
Cost		3		1	
Quality		1	1	1	
Human Resources		1	3		
Communications		1	1	1	
Risks		5		1	
Procurement		Plan procurements	Conduct procurements	Control procurements	Close procurements
Stakeholders	1	1	1	1	
TOTAL	**2**	**24**	**8**	**11**	**2**

PM's main roles in procurement mngt

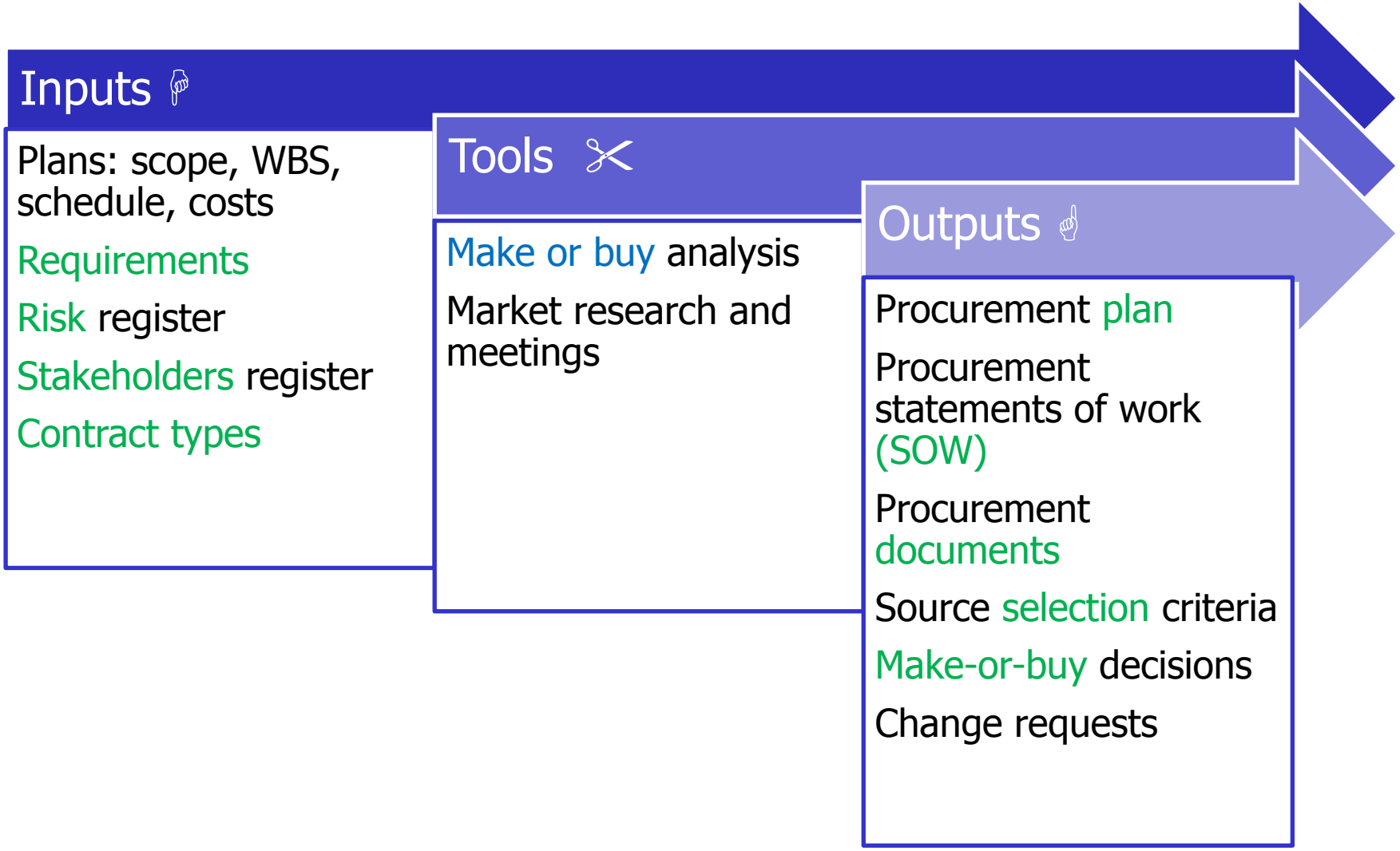
- ✓ **Collaborate** in contract creation and review
- ✓ Ensure all **requirements**
- ✓ Include in the project schedule time for contracting
- ✓ Incorporate **risk** mitigation
- ✓ Understand all **contract terms**
- ✓ Participate in the contract negotiation to take care of the relation with the **seller**
- ✓ Administer the contract and its **changes**

The PM should be assigned before the contract is signed => ↓ Risks

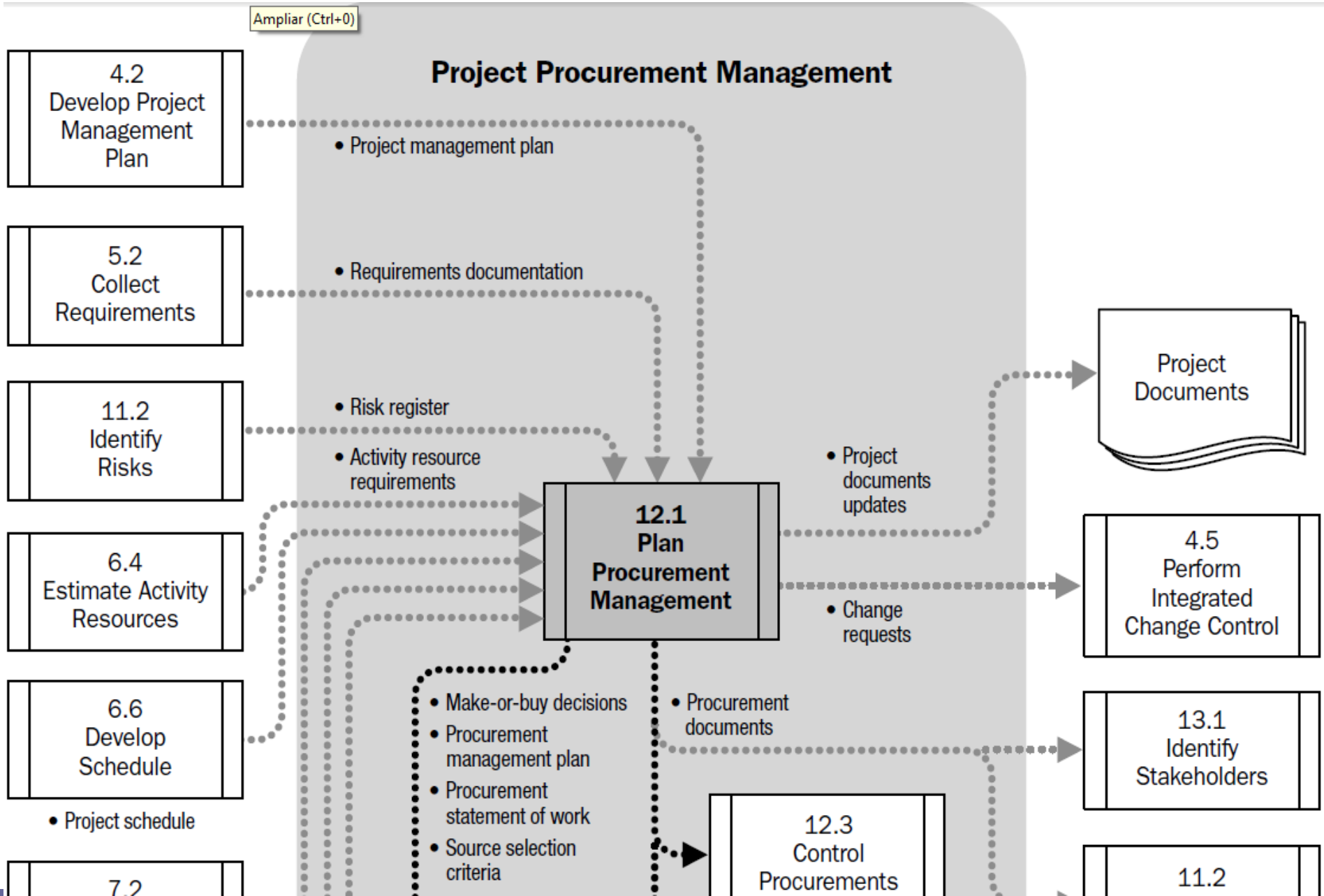
Procurement mngt processes



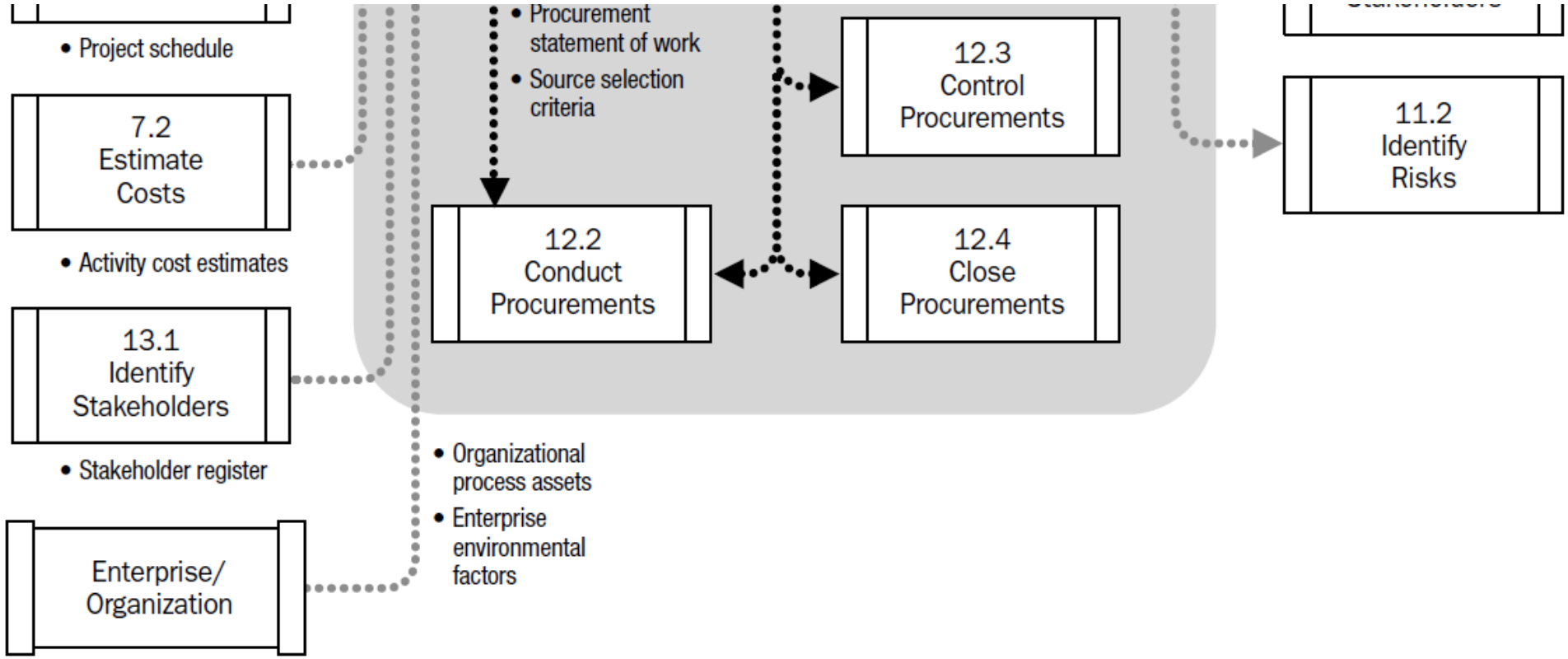
1. Plan procurement mngt



1. Plan procurement mngt



1. Plan procurement mngt



Contract types

- **Fixed-price or lump-sum**

Fixed-price (FP)
Fixed-price-incentive-fee (FPIF)
Fixed-price economic price adjustment (FP-EPA)

- **Cost-reimbursement** (CR)

Cost-plus-fixed-fee (CPFF)
Cost-plus-incentive-fee (CPIF)
Cost-plus-award-fee (CPAF)
Cost-plus-percentage of cost (CPPC)

- **Time and materials** (T&M)

They have a variable component (e.g.: amount of hours), plus a fixed component (e.g.: hourly rate)

Question

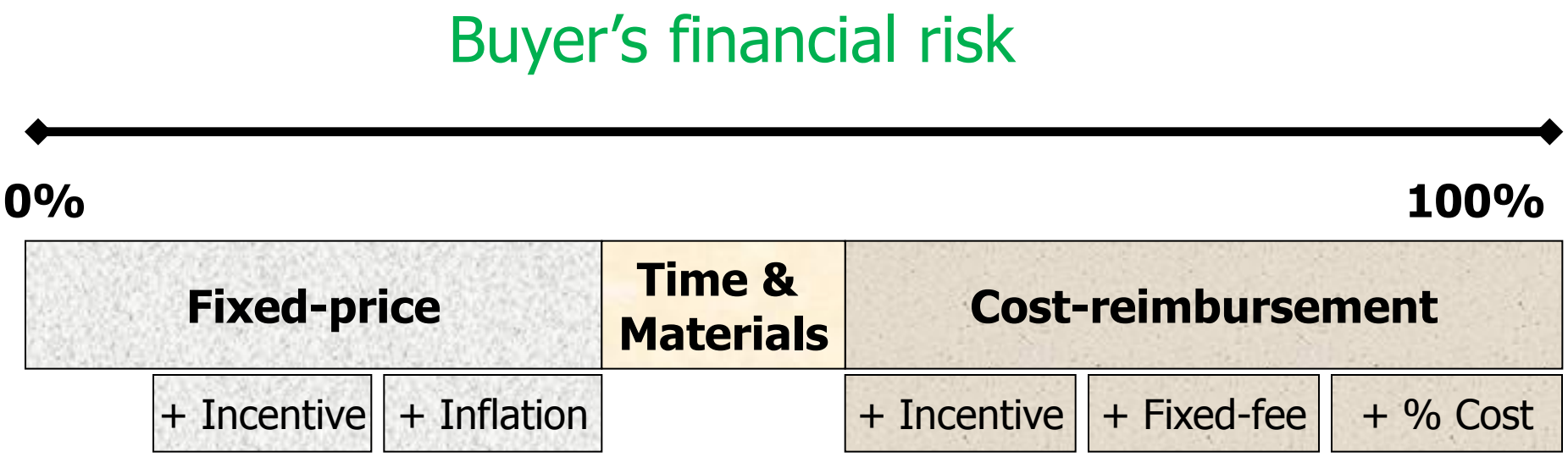
What is the riskier contract?

A. Cost-plus-percentage of cost
B. Cost-plus-fixed-fee
C. Time and materials
D. Fixed-price

Answer

A) From the buyer's point of view, the contract: cost-plus-percentage of cost

Risk of each contract type



Question

In a cost-reimbursement contract, you estimate a cost of $200,000 and a fee of $30,000. If the vendor spends less, we split the savings 50% for each one. If the final cost is $160,000, how much will the buyer end up paying?

A) $160.000
B) $190.000
C) $200.000
D) $210.000

Answer

D) $160.000 + $30.000 + 50% x $40.000 = $210.000

✂ Make or buy analysis

Influencing factors to MAKE

- ✓ Lack of **quality** or trust in providers
- ✓ **Know-how** or experience to produce the input
- ✓ Maintain the plant's minimum **utilization** level
- ✓ Maintain **control** over the production process
- ✓ Take care of **confidentiality** topics

Influencing factors to BUY

- ✓ **Specialization**
- ✓ **Economies** of scale
- ✓ The vendor is the **license** owner

Question

A computer's leasing is $240 per month, including maintenance. A new computer costs $2,000 and requires monthly maintenance for $40. How many months do you need in order to be indifferent to buy, instead of leasing?

A) 5
B) 10
C) 15
D) 20

Answer = 10

$$\frac{\$2.000}{X} + \$40 \text{ /month} = \$240 \text{ /month}$$

Procurement documents

Request for information (RFI): request for information about the sellers and the products they offer.

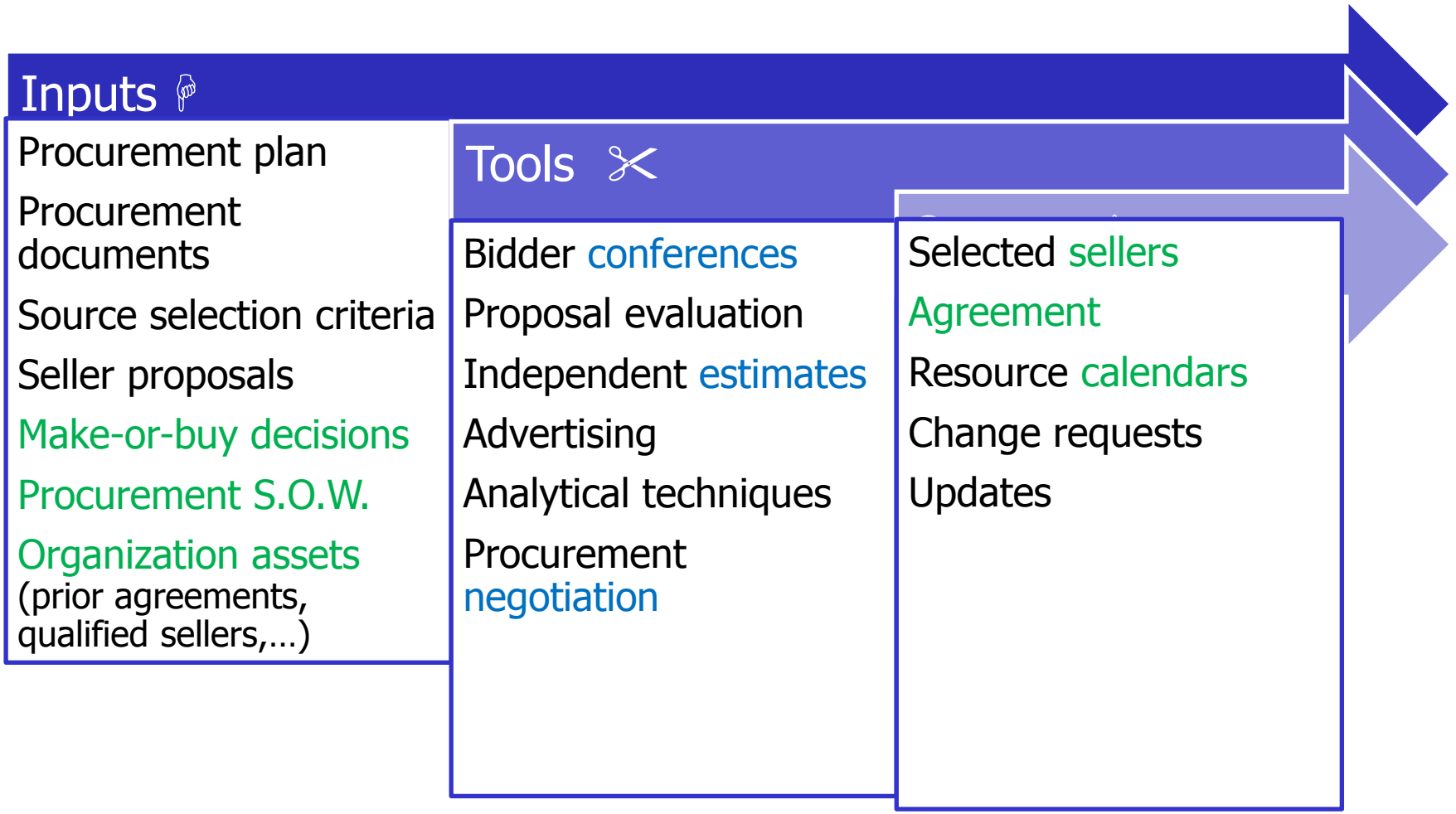
Invitation for bid (IFB): we present a general price for the whole proposal.

Request for proposal (RFP): we don´t just analyze the price, but the technical proposal and the abilities of the sellers are usually very important.

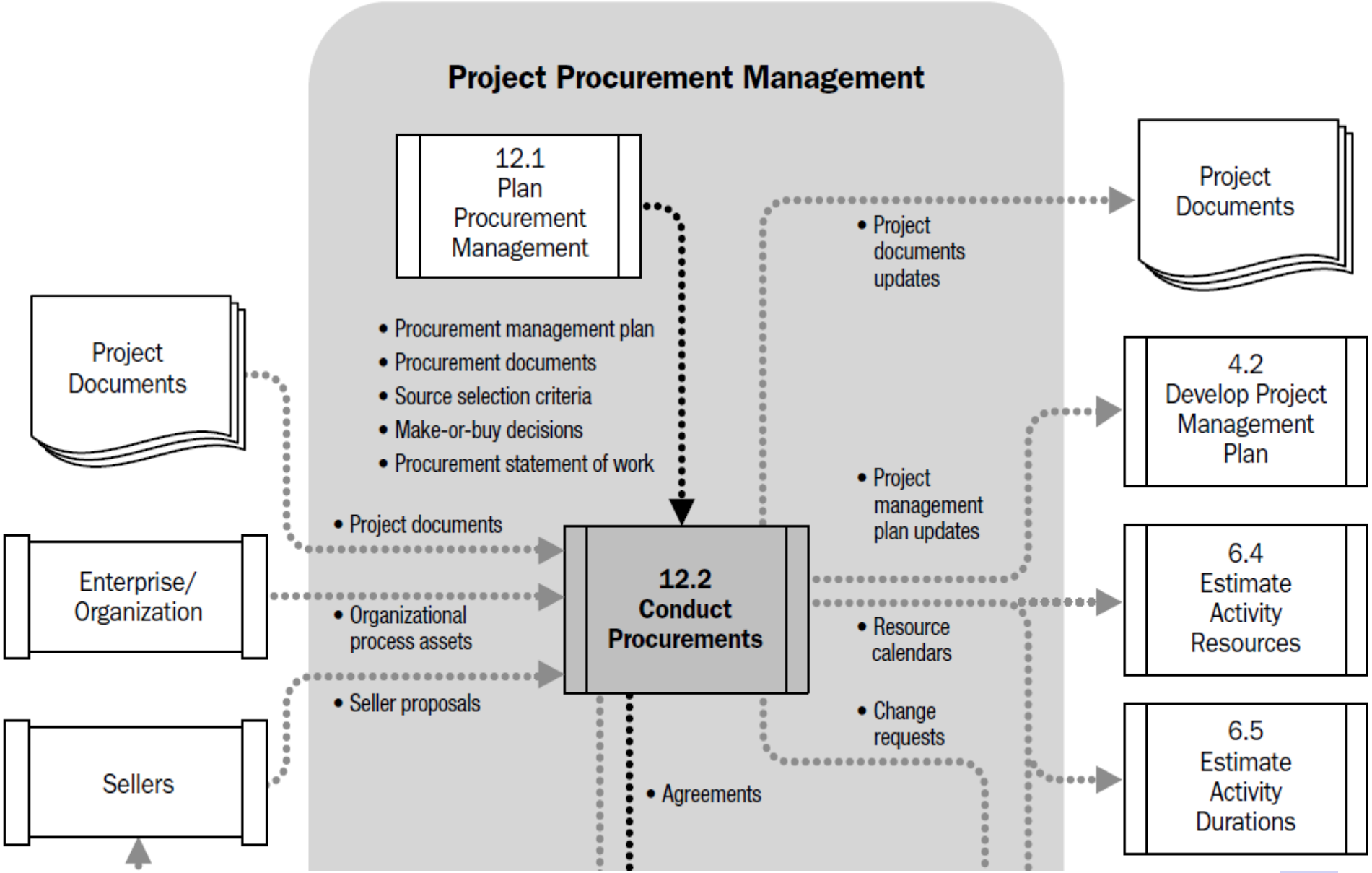
Request for quotation (RFQ): we present itemized prices for the project.

"A preliminary contract model is usually included in the procurement documents"

2. Conduct procurements



2. Conduct procurements



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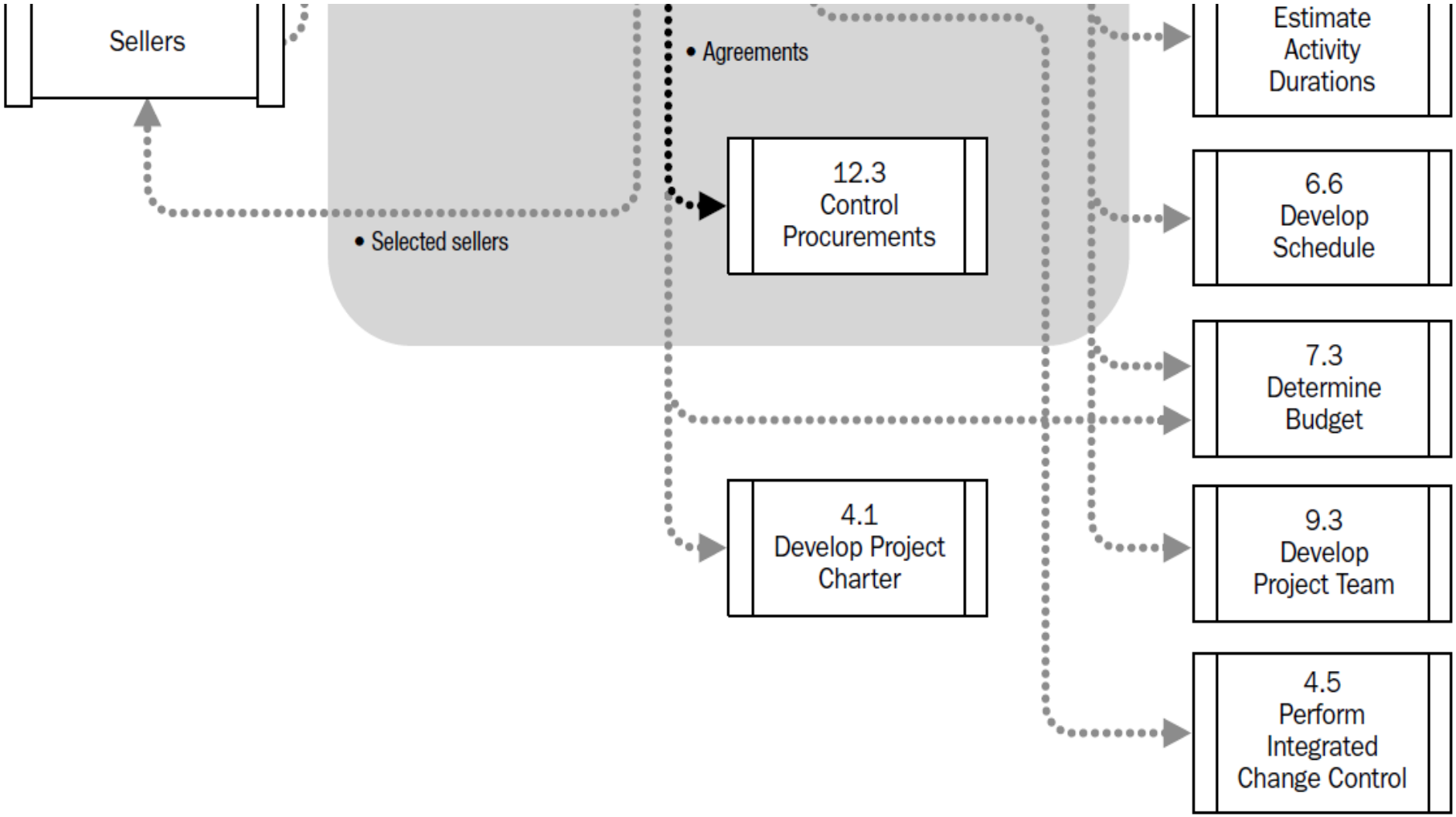
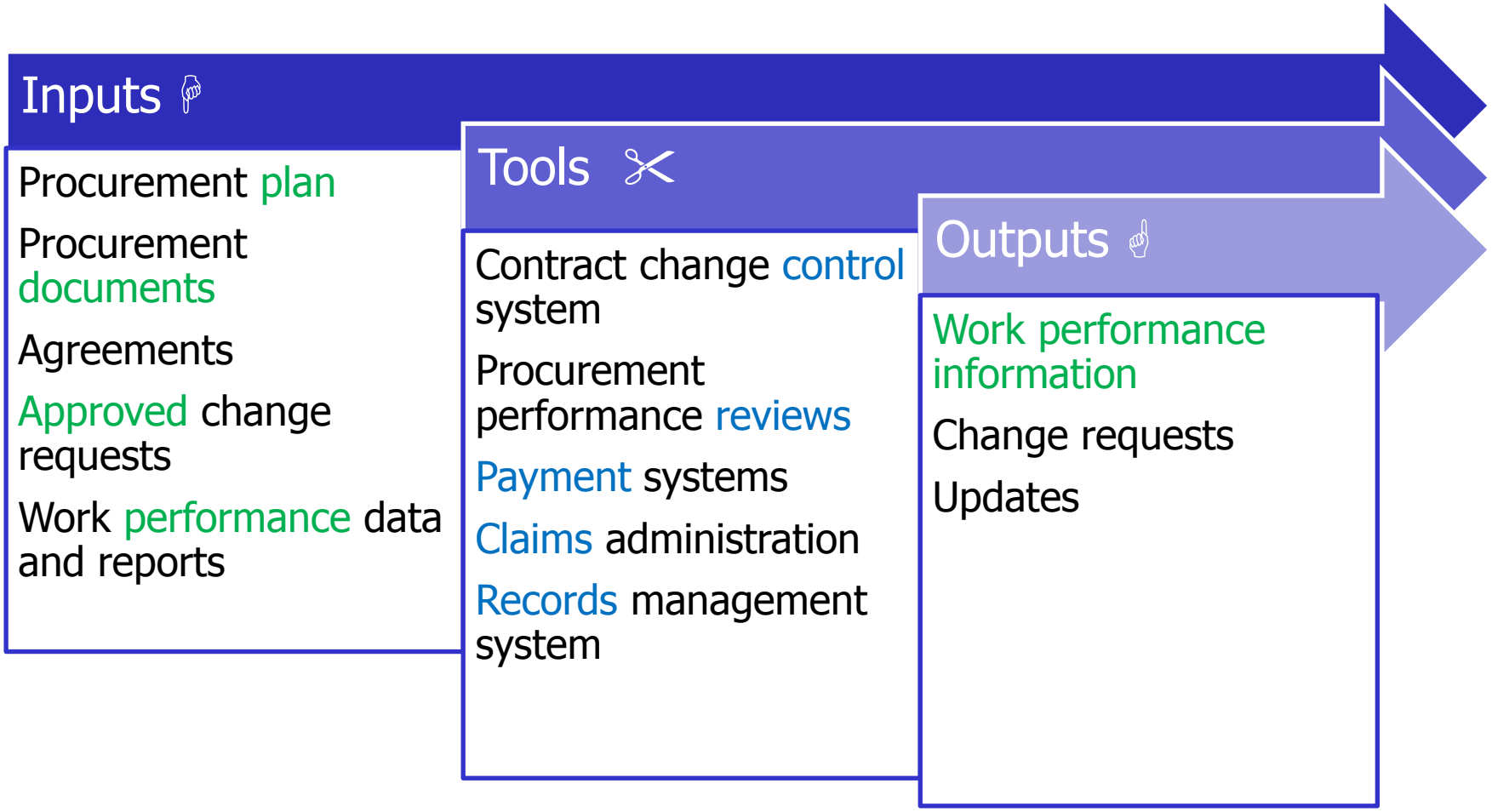


Proposal evaluation techniques

Weighted system

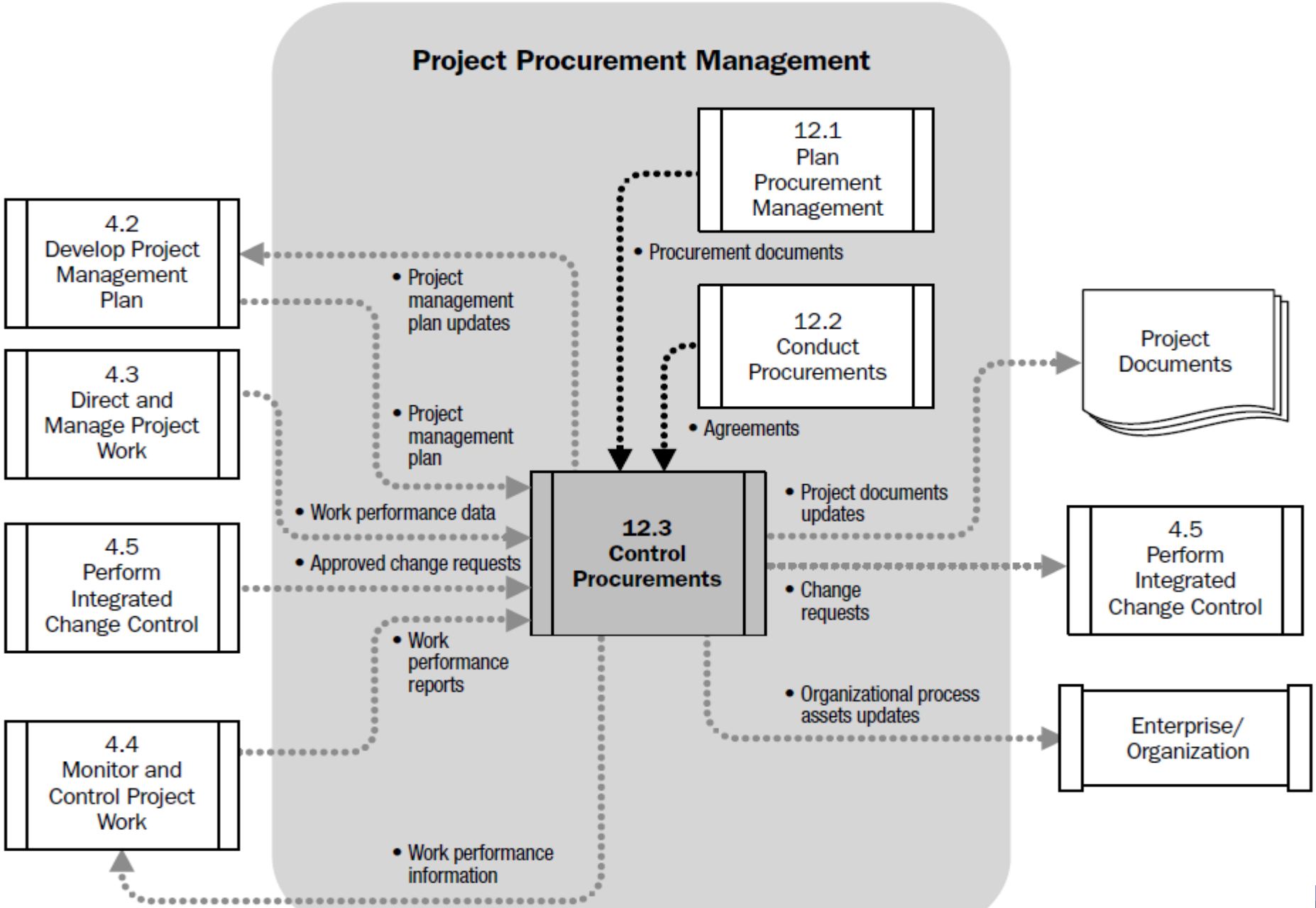
		Provider 1		Provider 2		Provider 3	
CRITERIA	Weight	Rating	Score	Rating	Score	Rating	Score
1. Cost	20%	4	0.8	5	1	7	1.4
2. Delivery time	15%	8	1.2	7	1.05	4	0.6
3. Functionality	25%	4	1	5	1.25	9	2.25
4. Maintenance	10%	6	0.6	6	0.6	4	0.4
5. Compatibility	10%	8	0.8	6	0.6	4	0.4
6. Warranty	20%	6	1.2	6	1.2	6	1.2
TOTAL	100%		5.6		5.7		**6.25**

3. Control procurements



The contract administrator is the only one who can make changes to it

3. Control procurements



Question

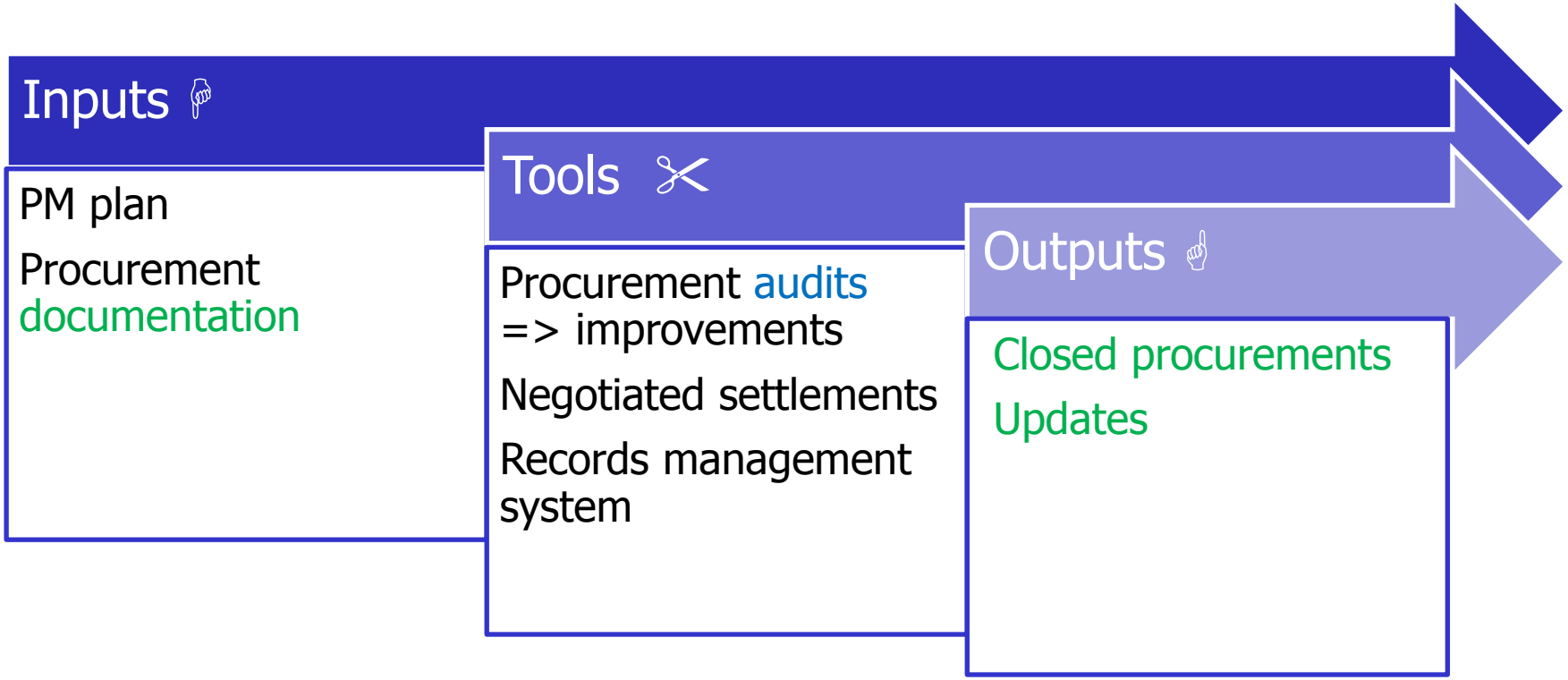
Company A gets in a contract with Company B for a tunnel construction. Afterwards, Company B sub-contracts Company C to perform the tasks. If Company A requests Company C that they stop the tunnel's progress, what should Company C do?

A. Stop all progress activities, as requested by A
B. Continue with the activities until B informs them otherwise
C. Request A that they put the request in writing
D. Change their contractual relation with B

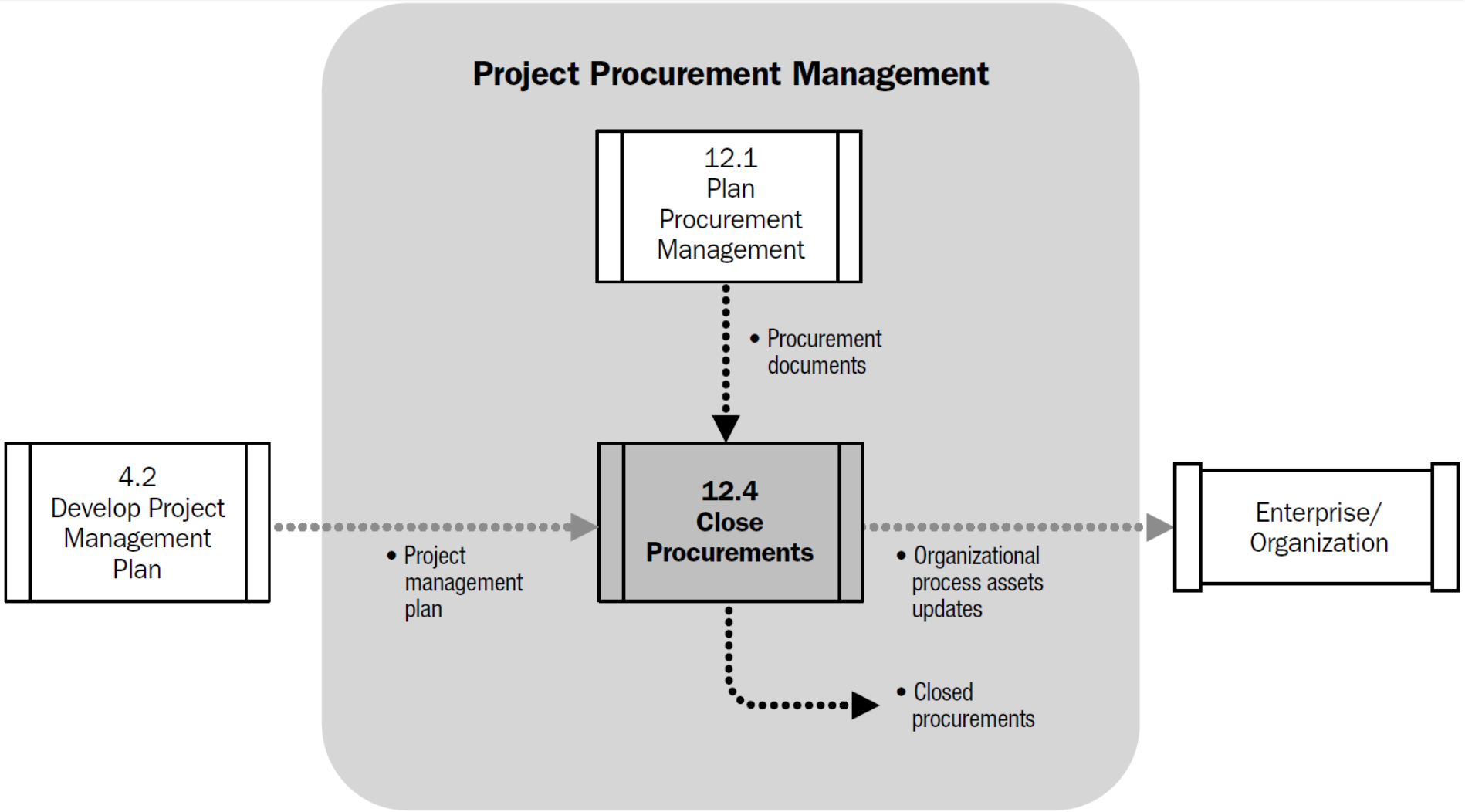
Answer: B

Generally, there is no contractual relation between A and C. A should inform B and then could inform C.

4. Close Procurements



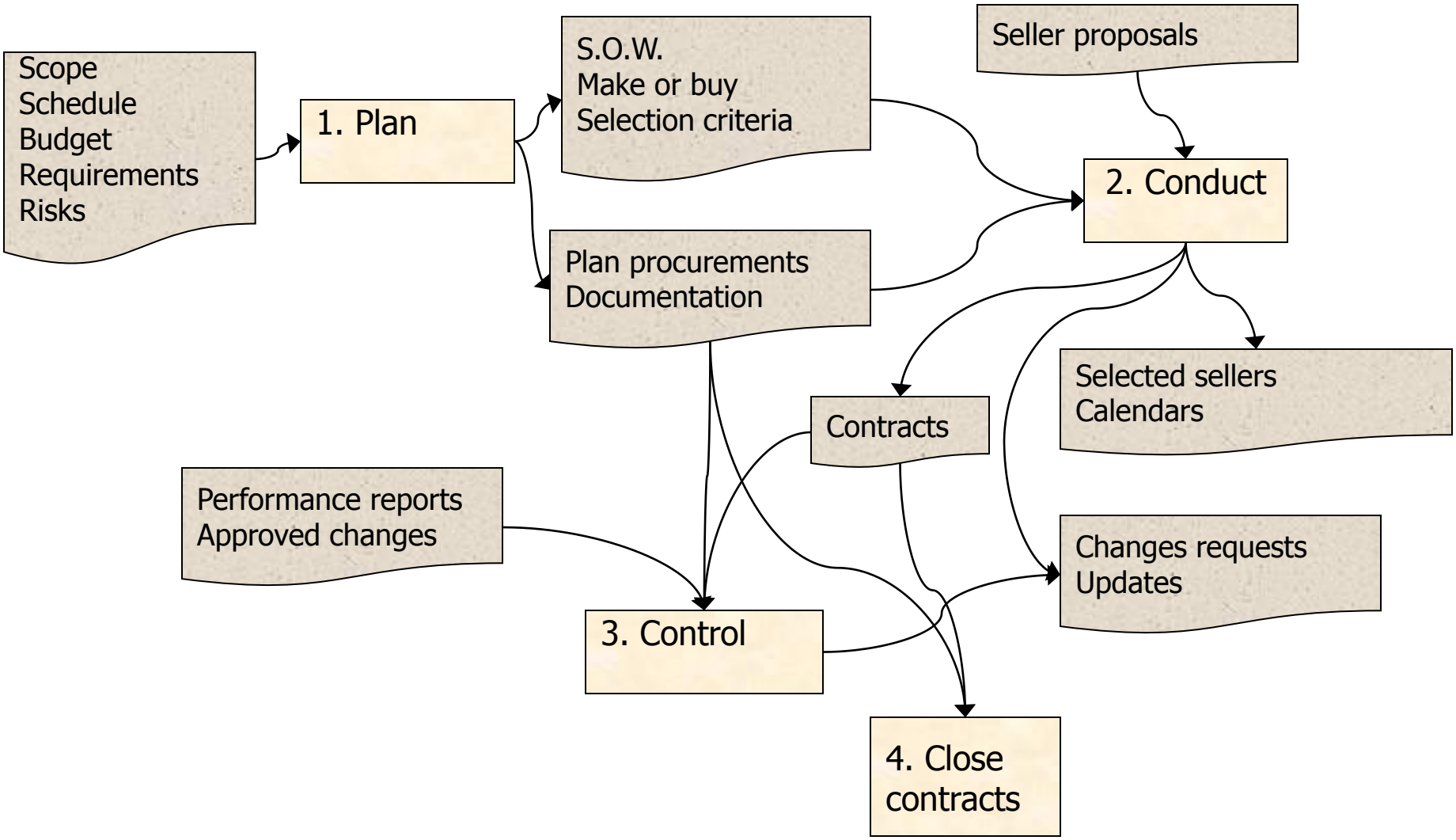
4. Close Procurements



External closure survey

Client: Eli Corp. Project Manager:			Start date: January 6th End date: November 12th		
Project	Bad	Poor	Good	Very Good	Excellent
Objectives					
Dead-lines					
Report					
Presentation					
Usefulness					
Team	Bad	Poor	Good	Very Good	Excellent
Marcel Pim					
Jerry Guire					
General Opinion Positive: Negative:					

Summarizing procurements management ...



Lessons learned

- ✓ Close procurements
- ✓ Bidder conferences
- ✓ Cost-plus-fixed-fee
- ✓ Cost-plus-incentive
- ✓ Cost-plus-percentage of costs
- ✓ Cost-reimbursement
- ✓ Evaluation criteria
- ✓ Make-or-buy
- ✓ Invitation for bid (IFB)
- ✓ Purchase order
- ✓ Time and materials
- ✓ Fixed-price
- ✓ Fixed-price economic price adjustment
- ✓ Fixed-price- incentive-fee
- ✓ PM's role in procurements
- ✓ Request for proposal (RFP)
- ✓ Request for quotation (RFQ)
- ✓ Contract breach

Stakeholders

Identify stakeholders

Plan strategies to manage stakeholders

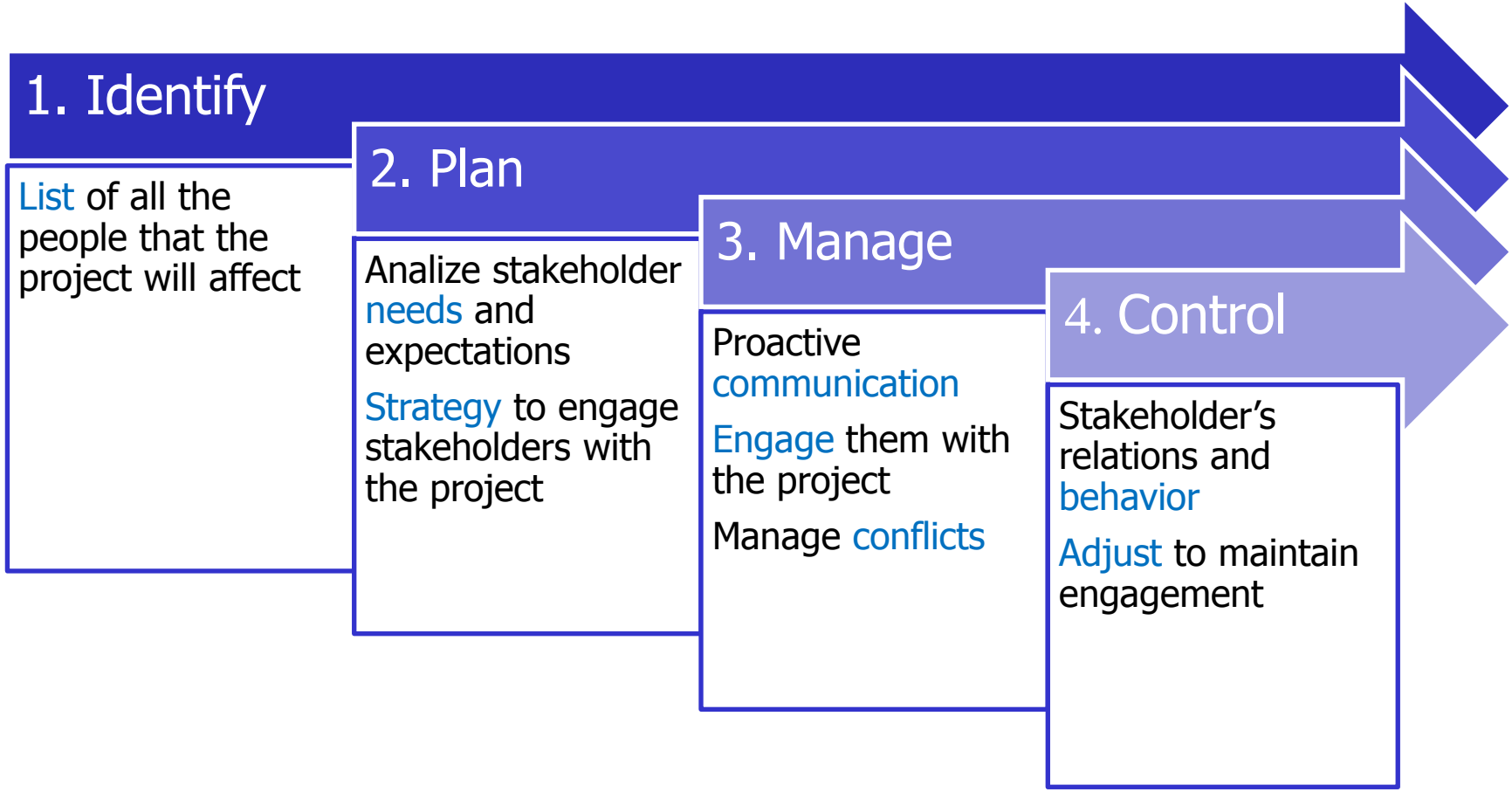
Manage stakeholder participation and commitment to the project

Control stakeholder participation throughout the project life cycle

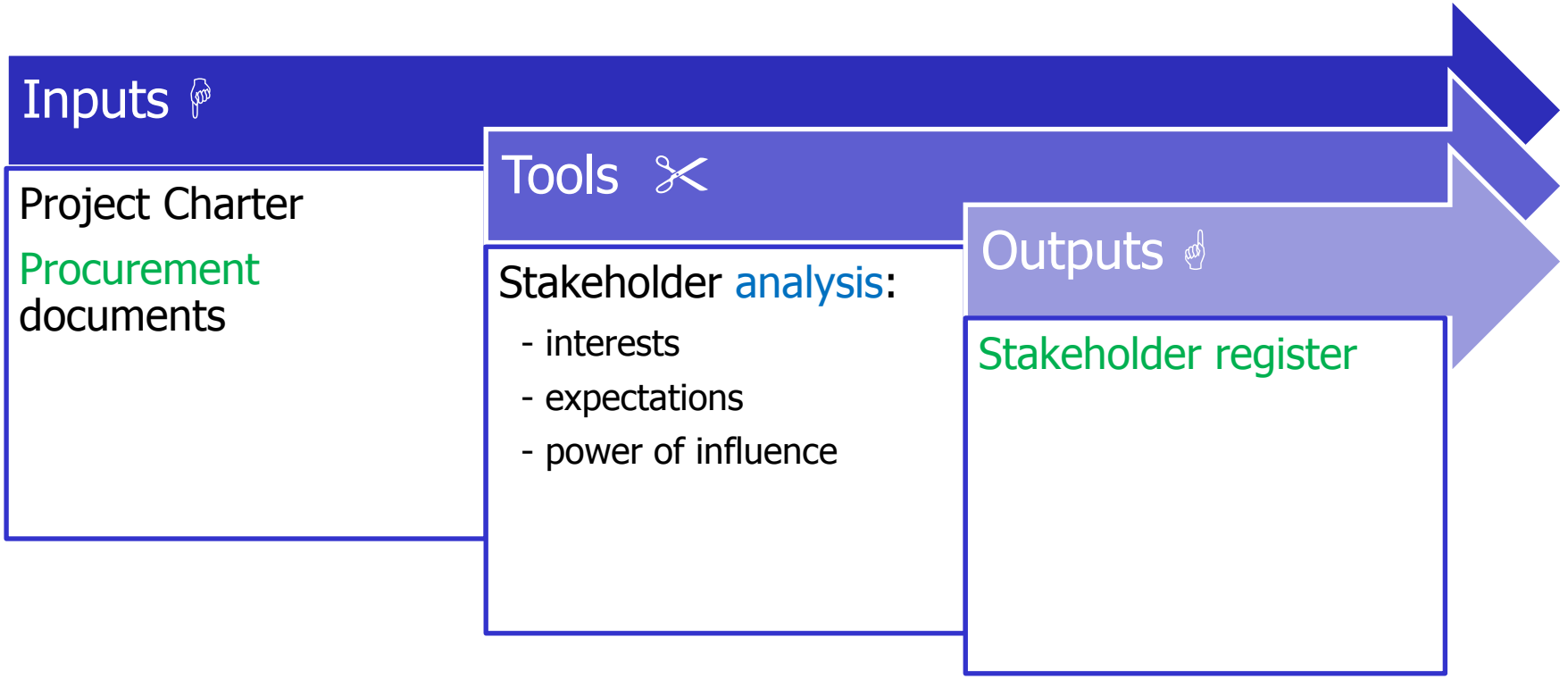
PM Process Groups

	Initiating	Planning	Executing	Controlling	Closing
Integration	1	1	1	2	1
Scope		4		2	
Time		6		1	
Cost		3		1	
Quality		1	1	1	
Human Resources		1	3		
Communications		1	1	1	
Risks		5		1	
Procurement		1	1	1	1
Stakeholders	Identify Stakeholders	Plan Stakeholders	Manage Stakeholders	Control Stakeholders	
TOTAL	**2**	**24**	**8**	**11**	**2**

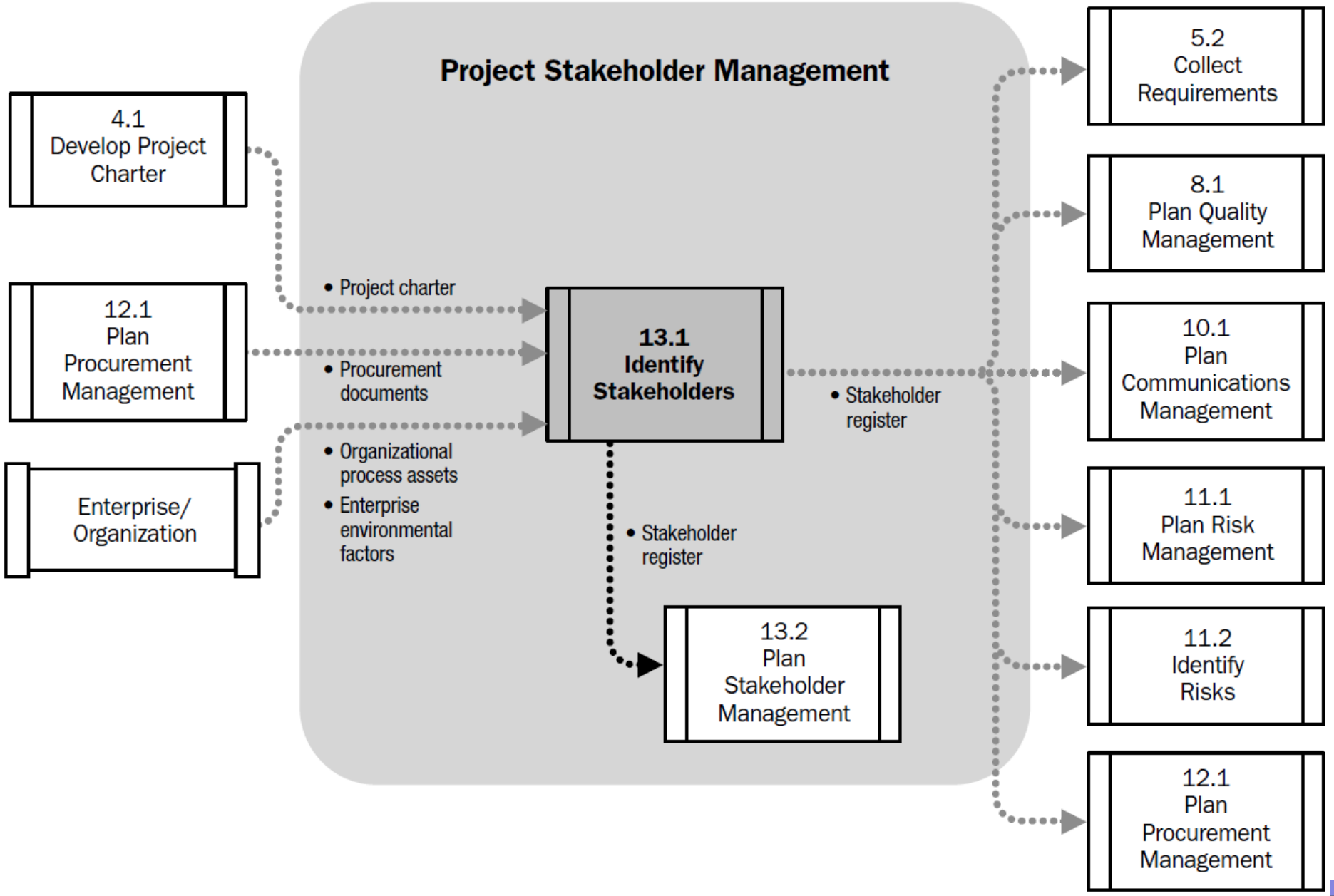
Stakeholders Processes



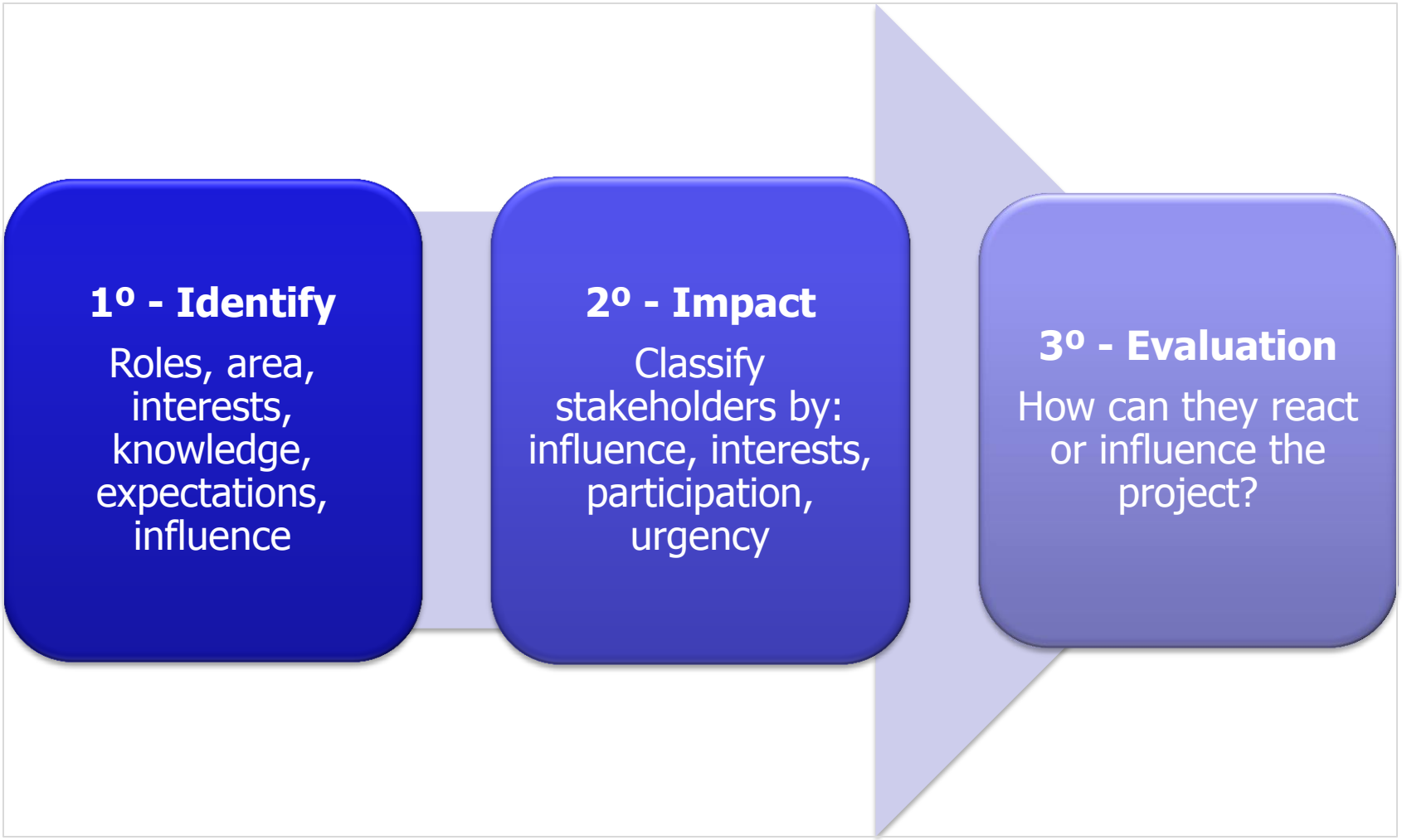
1. Identify stakeholders



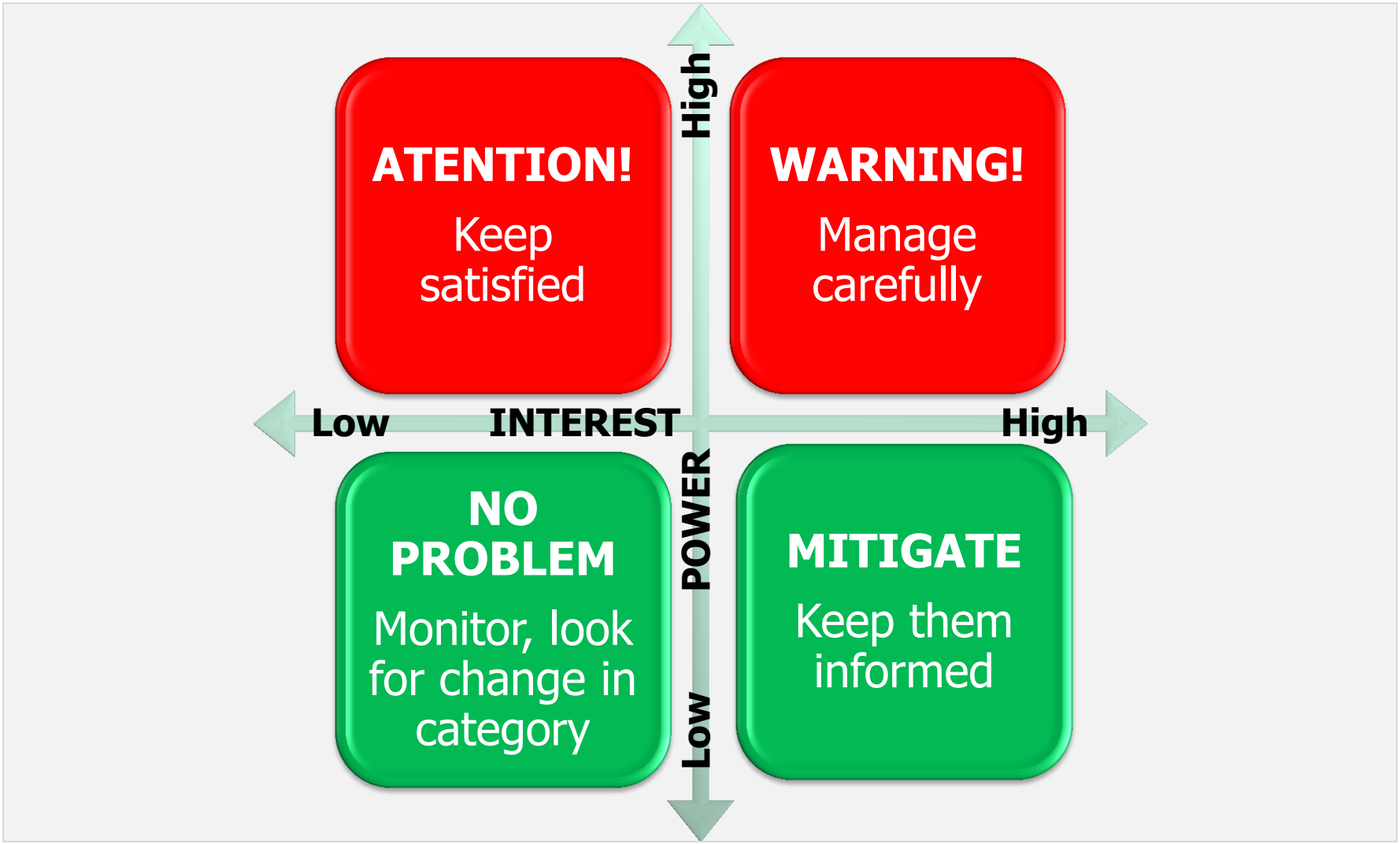
1. Identify stakeholders



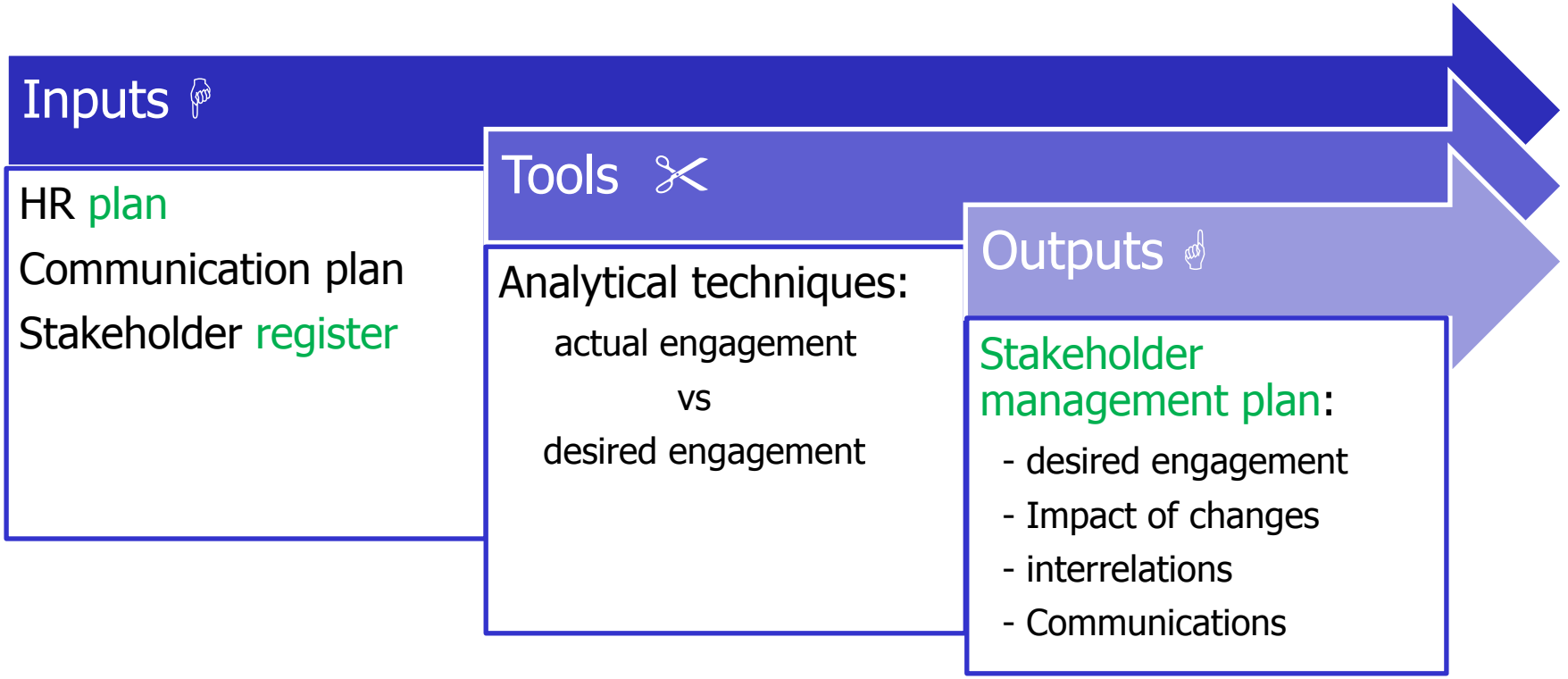
Steps for stakeholder analysis



Power-Interest Matrix



2. Plan stakeholder management



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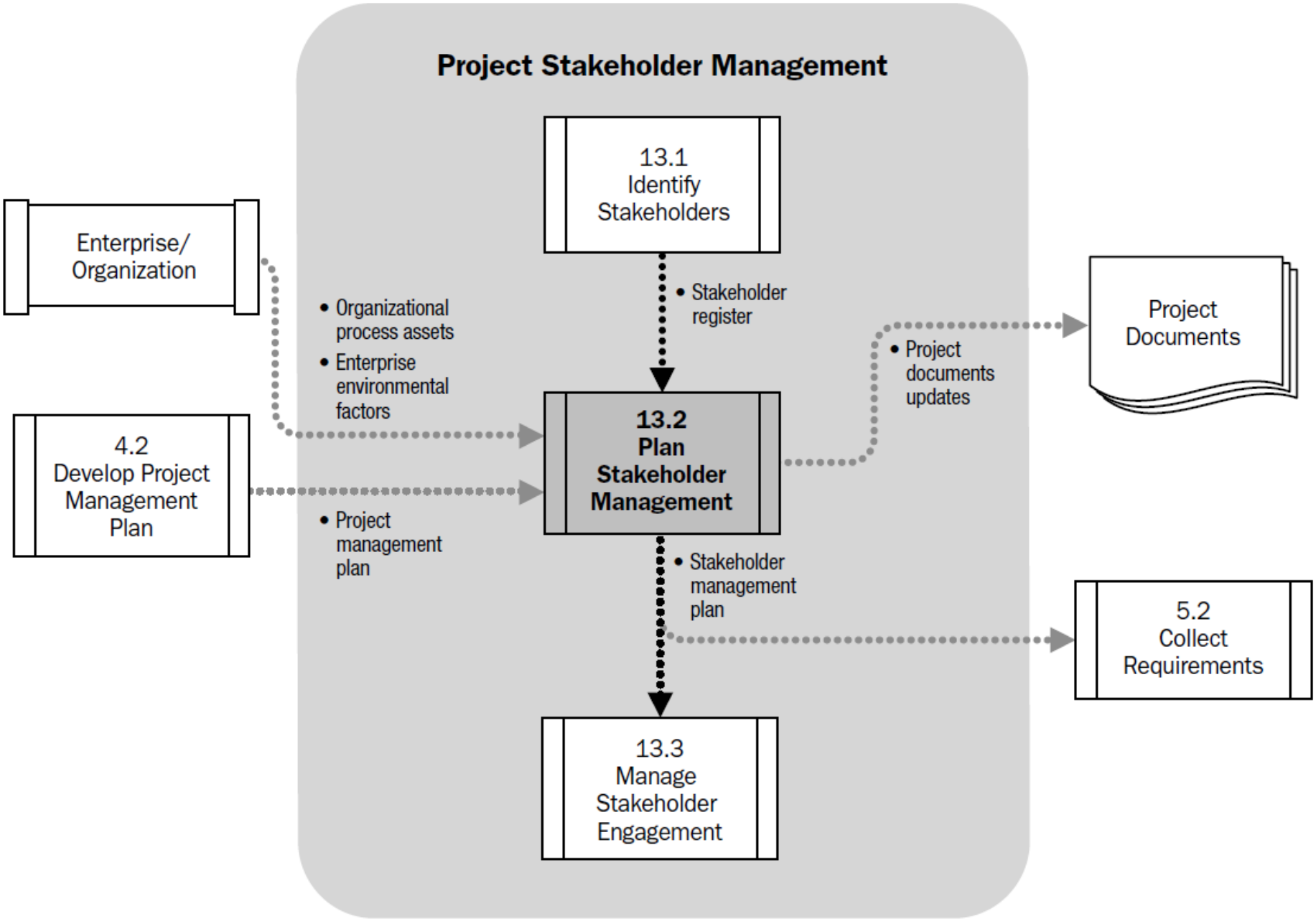
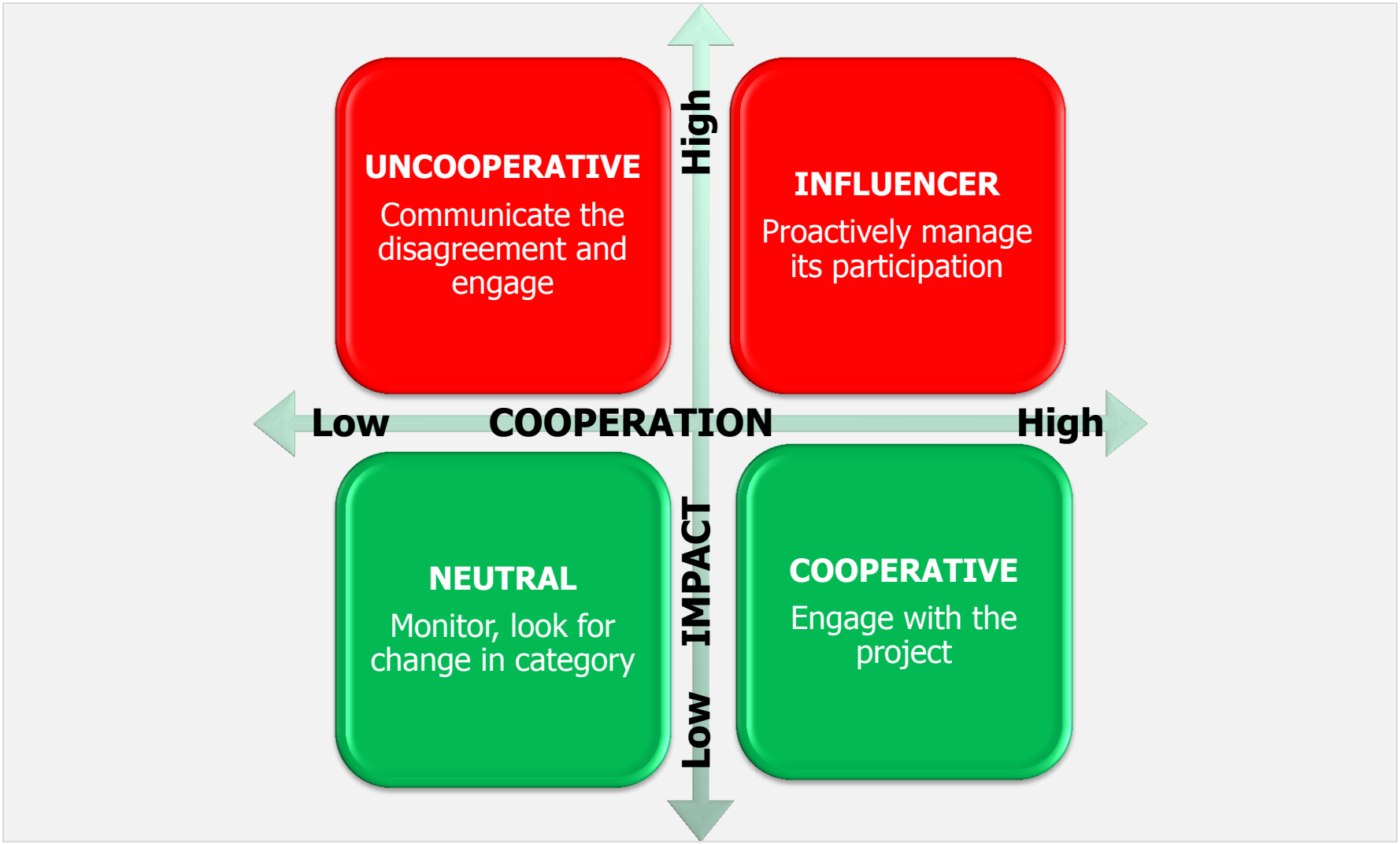
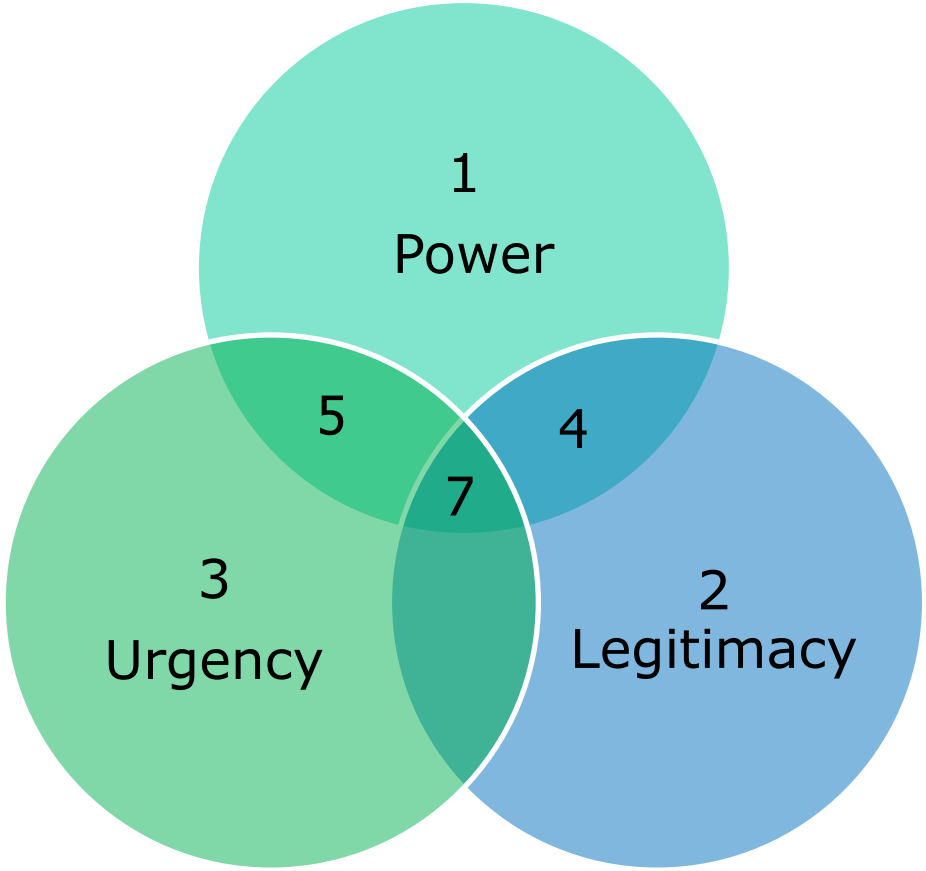


Strategy based on Cooperation – Impact



The preponderance model

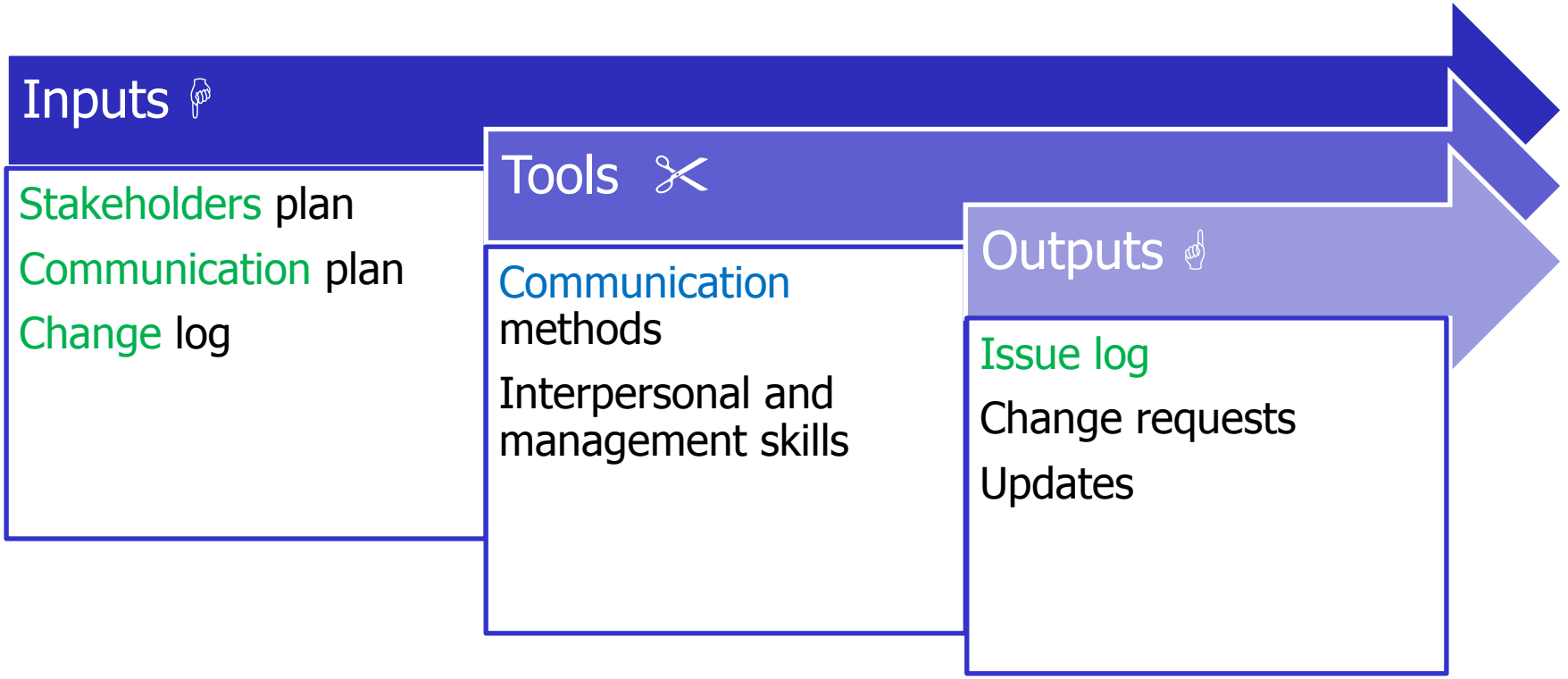


Categories / Priority

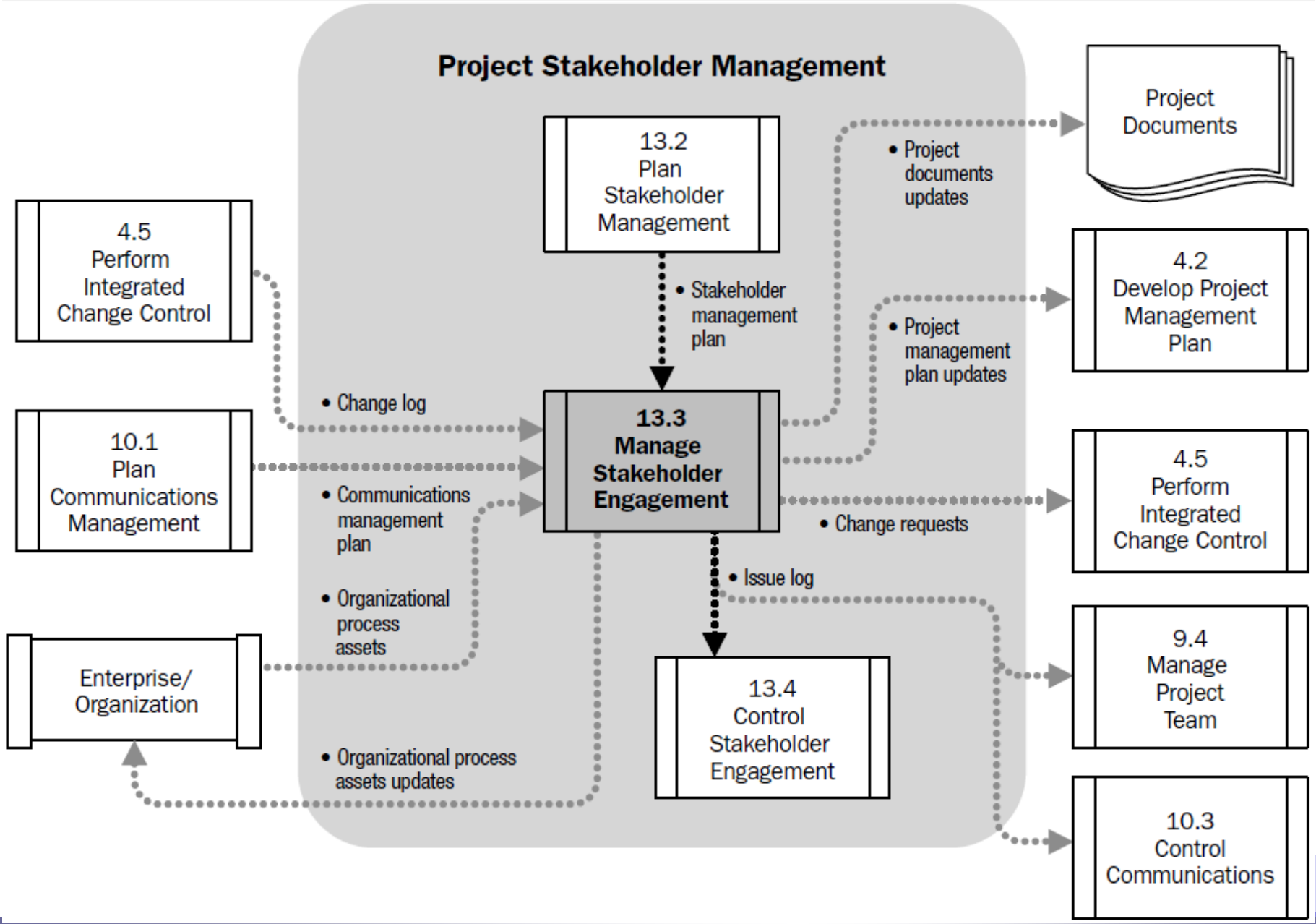
1: Latent - low
2: Discretionary - low
3: Demanding - low
4: Dominant - medium
5: Dangerous - medium
6: Dependent - medium
7: Core - high

Source: Ronald K. Mitchell, Bradley R. Agle, Donna J. Wood (1997). Toward a Theory of Stakeholder Identification and Salience.

3. Manage stakeholder engagement



3. Manage stakeholder engagement



Manage stakeholder engagement

George is convinced that the scope that was cut by the organization should be part of the project. Therefore, he will keep pushing them to include what he wants on the project.

PM: *George, I know you want to add other deliverables to the project. The Sponsor has already assigned the funds and formally signed the definitive scope. Unfortunately, there is no way back and is not possible to modify the scope. I will appreciate that you stop pushing for your request and that you join the rest of the team.*

Manage stakeholder engagement

Betty, Operations Manager, is furious because project Z will use a big part of her best human resources, which will delay her projects execution.

PM: *We have taken into consideration the impact that project Z will have on your projects. As you know, this project is strategic for the company and we need your best resources. To mitigate the impact, I will request your resources two months in advance and we will keep you informed about the project progress in order to release the resources as soon as possible.*

Manage stakeholder engagement

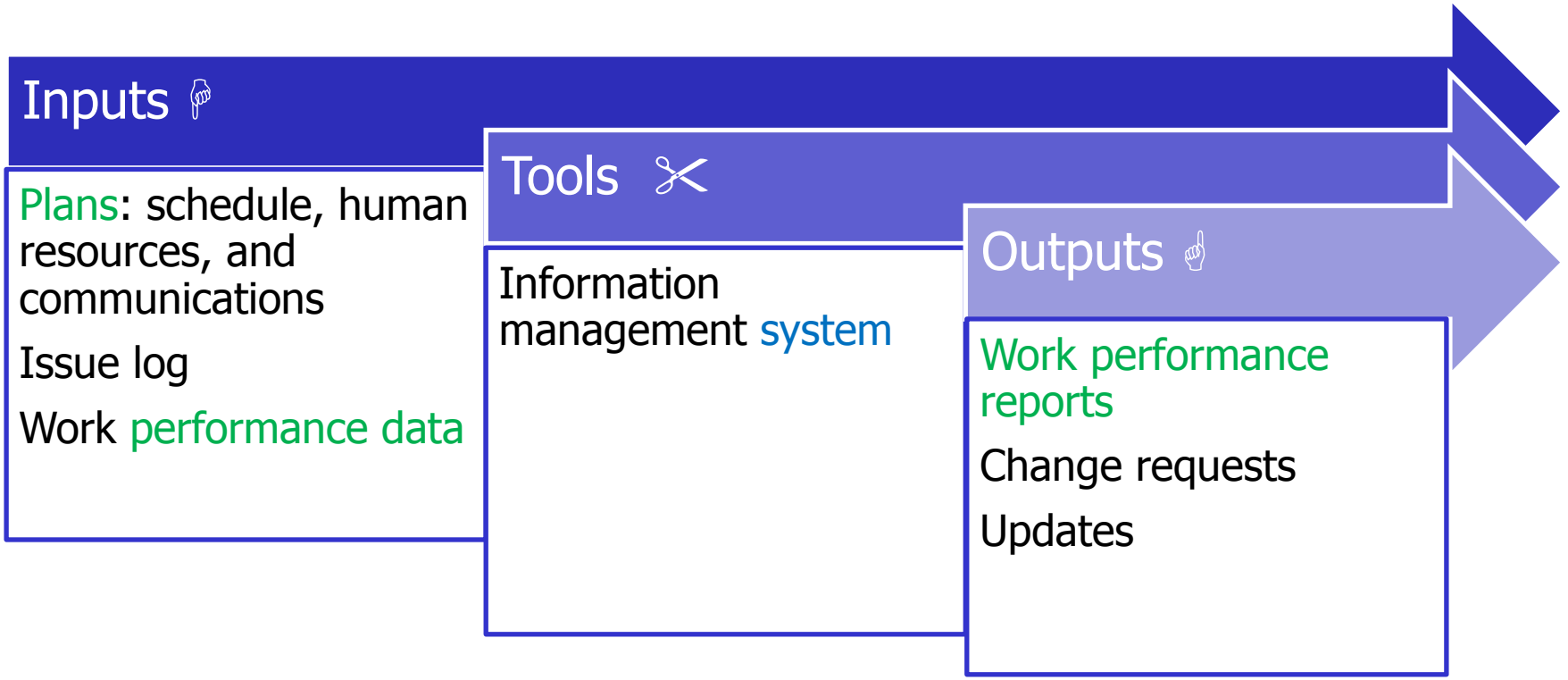
How must be the PM ?

Answer:

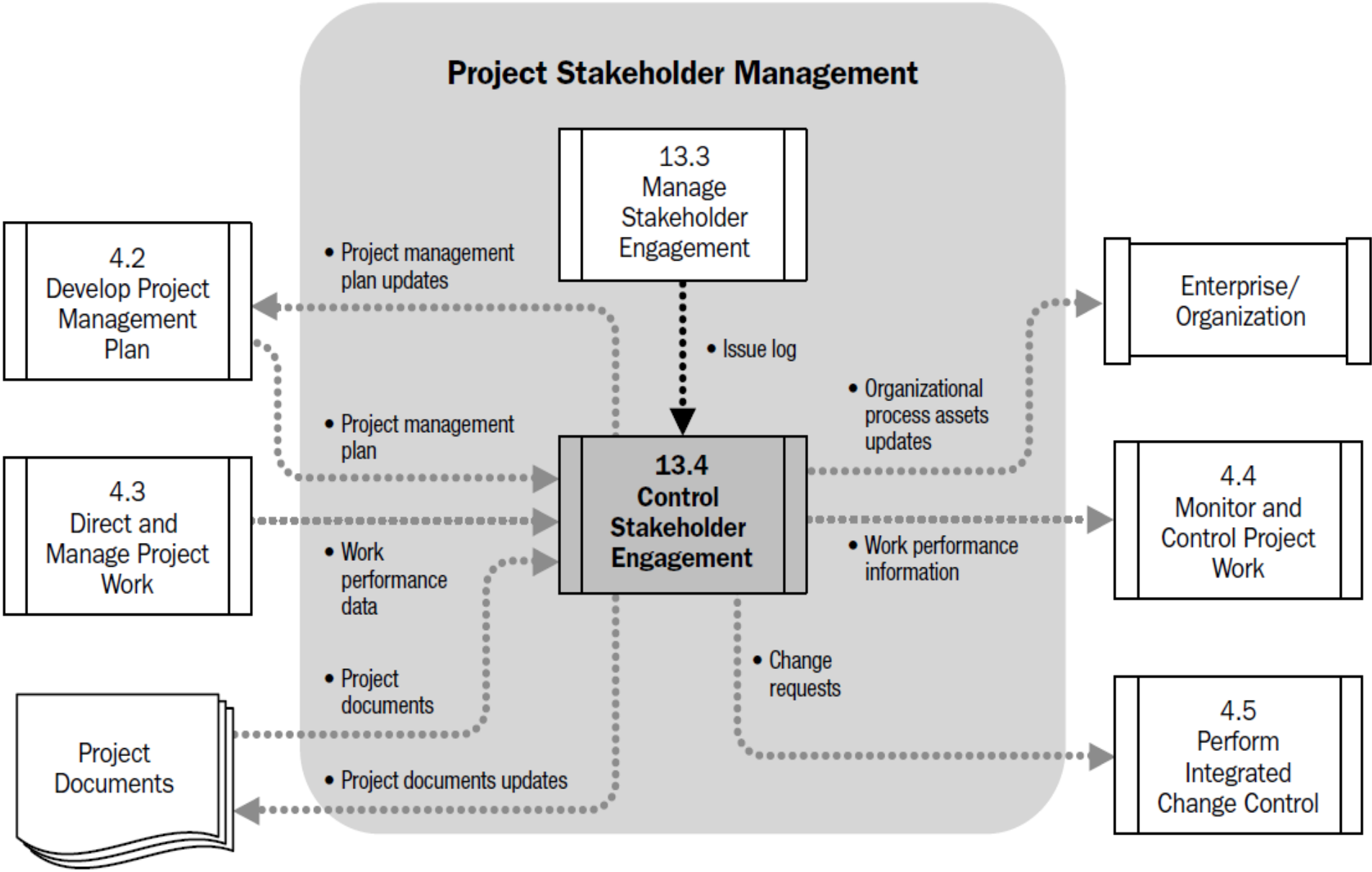
PROACTIVE

- Take into consideration the **stakeholders' needs**, even if he knows that they have no solutions
- Keep a **fluid communication** with the stakeholders and keep the **communication channels open**.

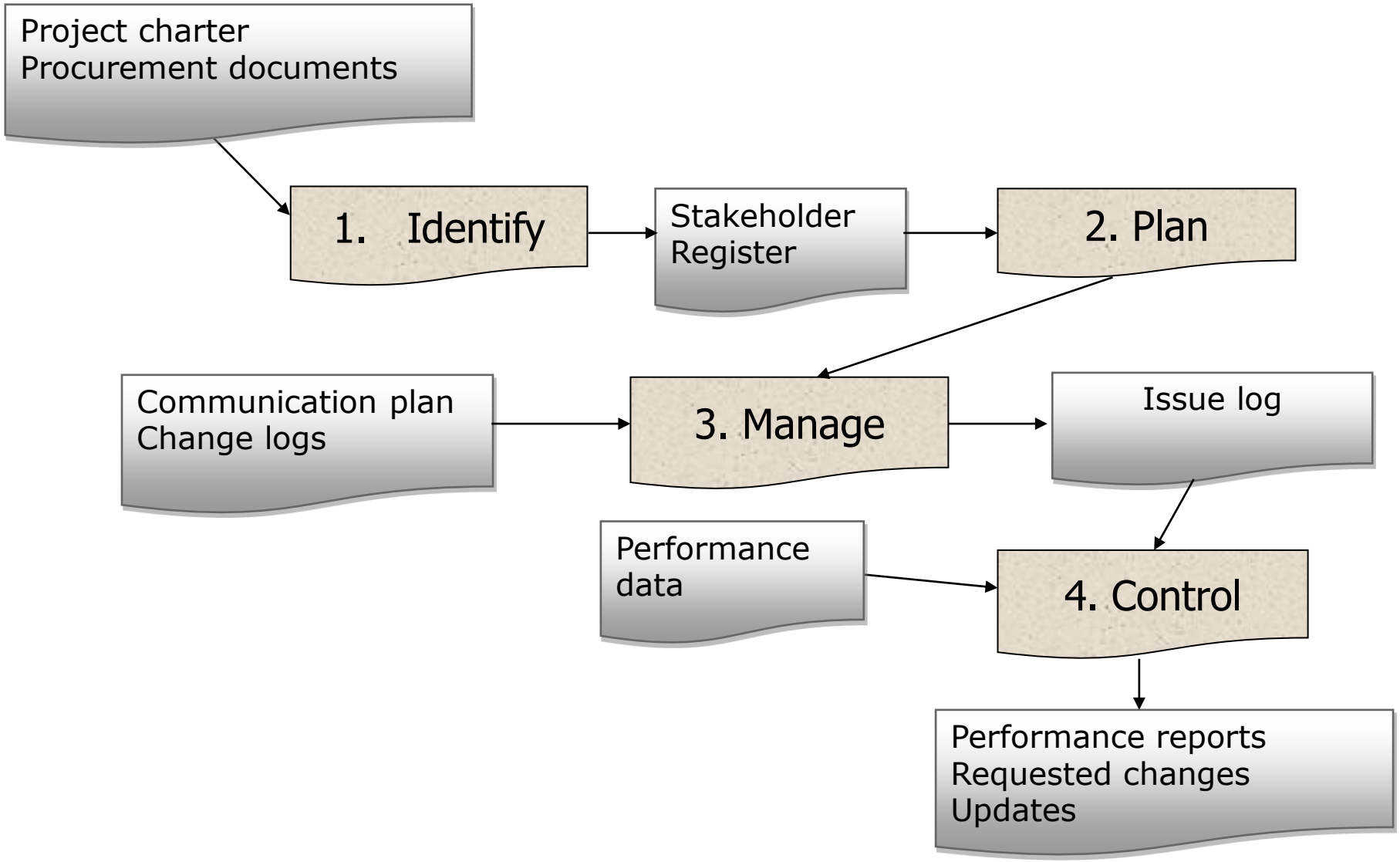
4. Control stakeholder engagement



4. Control stakeholder engagement



Summarizing stakeholder management



Lessons learned

- ✓ Actual vs. desired engagement
- ✓ Stakeholders
- ✓ Cooperation/Impact matrix
- ✓ Power/Interest matrix
- ✓ Stakeholder engagement
- ✓ Steps for the stakeholder analysis
- ✓ Stakeholder management plan
- ✓ Stakeholder register
- ✓ Information management system

PROFESSIONAL CONDUCT

Code of Professional Conduct

Responsibility

Respect

Fairness

Honesty

PROFESSIONAL CONDUCT

RESPONSABILITY

Responsibility is our duty to take ownership for the decisions we make or fail to make, the actions we take or fail to take, and the consequences that result.

PROFESSIONAL CONDUCT

RESPECT

Respect is our duty to show a high regard for ourselves, others, and the resources entrusted to us. Resources entrusted to us may include people, money, reputation, the safety of others, and natural or environmental resources.

An environment of respect engenders trust, confidence, and performance excellence by fostering mutual cooperation—an environment where diverse perspectives and views are encouraged and valued.

PROFESSIONAL CONDUCT

FAIRNESS

Fairness is our duty to make decisions and act impartially and objectively. Our conduct must be free from competing self-interest, prejudice, and favoritism.

PROFESSIONAL CONDUCT

HONESTY

Honesty is our duty to understand the truth and act in a truthful manner both in our communications and in our conduct.

PROFESSIONAL CONDUCT

Values	Mandatory	Aspirational
Respon-sibility	Respect the law Report illegal Disciplinary sanctions	Common good Fulfill commitments Correct mistakes immediately Protecting confidentiality
Respect	Good faith Do not take advantage of anyone Do not be abusive Property Rights	Respect other customs Accept other points of view Do not criticize on their backs Professionalism
Fairness	Disclose conflicts of interest Do not participate if there is conflict of interest Avoid nepotism and bribery Not discriminate Apply rules without favoritism	Transparency Impartiality and objectivity Equal access to information Equal opportunities
Honesty	Do not cheat Honest behavior	Understanding the truth Sincerity Accurate information Promises of good faith Promote a safe environment

Project Manager Conduct

The PM must:

- ✓ Act with integrity and professional ethics
- ✓ Be within the law and ethical standards
- ✓ Contribute to the development of the profession
- ✓ Improve its professional competencies
- ✓ Promote interaction between project stakeholders
- ✓ Do things correctly
- ✓ Follow the correct processes

Lessons learned

- ✓ Code of conduct
- ✓ Collaborate with the profession
- ✓ Put the project's interest ahead of individuals
- ✓ Share lessons learned
- ✓ Confidentiality
- ✓ Conflict of interests
- ✓ Professional ethics
- ✓ Do the correct thing
- ✓ Follow the correct processes
- ✓ Responsibility
- ✓ Respect
- ✓ Honesty
- ✓ Fairness

Project Management: Challenges ?

- ✓ Unclear objectives
- ✓ Unrealistic schedules
- ✓ Over-committed resources
- ✓ Unclear or changing priorities
- ✓ Poor communication
- ✓ Unclear organizational relationships

THANK YOU !!!

José Alberto Garcia Coria

PMP, ITIL, COBIT, Lean IT, Agile Scrum

Linkendin