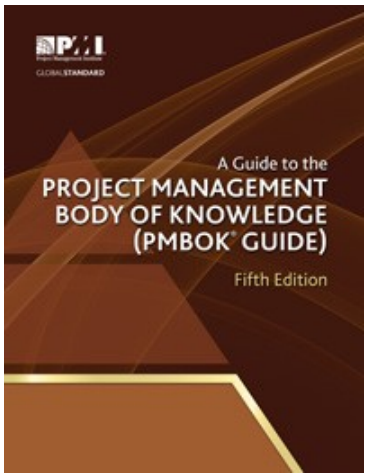
Project Management



CISSP®

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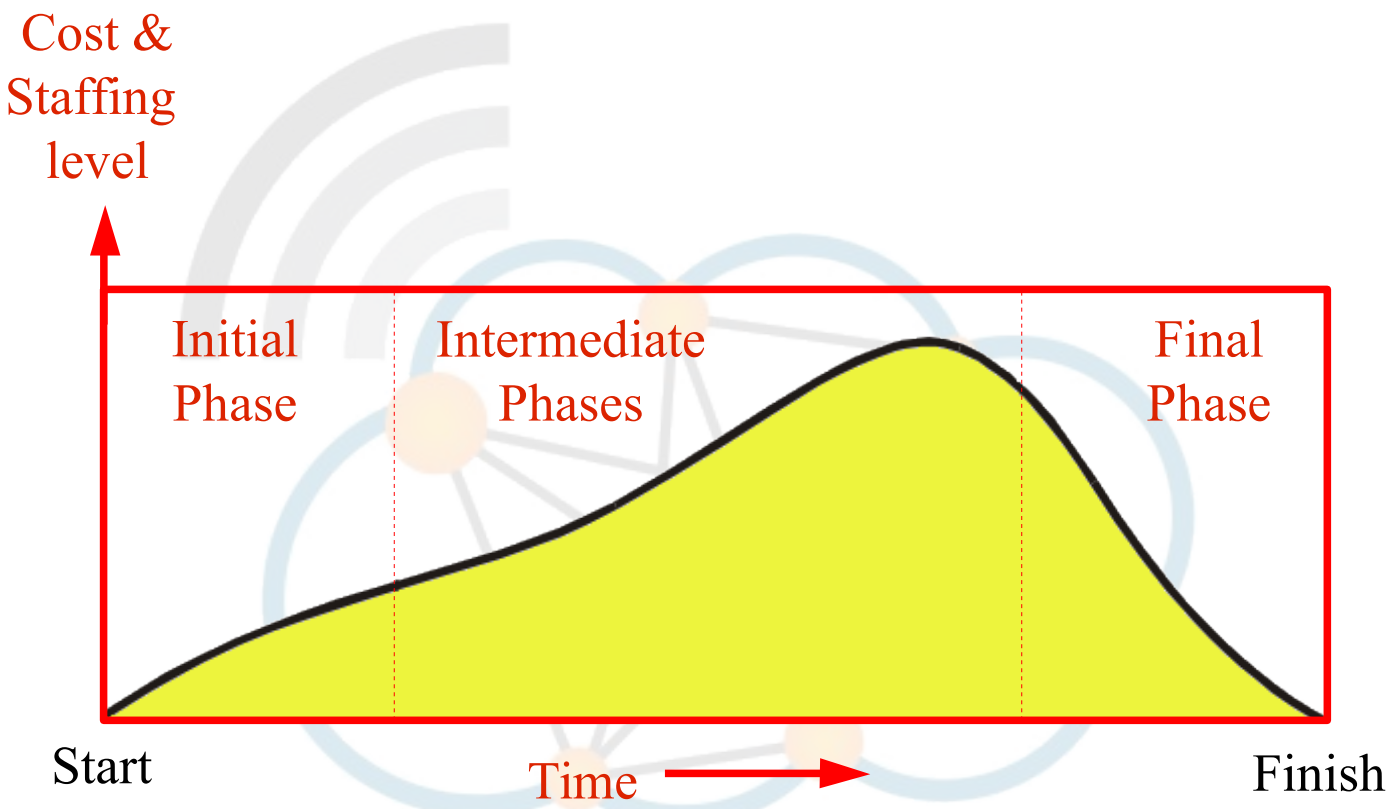
PRINCE2®

PMI®
Project Management Institute

Project Management

- Project Management
  - Project management is the discipline of planning, organising, motivating, and controlling resources to achieve specific goals.
- What is a Project
  - A project is a temporary group activity designed to produce a unique product, service or result.
- A project is:
  - Temporary.
  - Unique.
  - Managed.

Project lifecycle



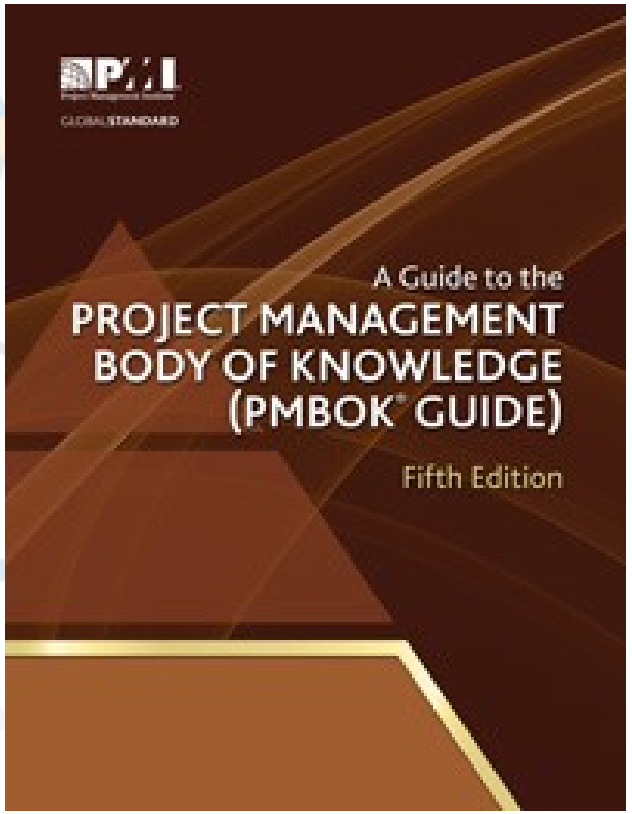
Project Management Institute (PMI)

- Project Management Institute
  - World's largest not-for-profit membership association for the project management profession.
  - > 700,000 members.
  - Project Management Professional (PMP) credential.
- PMI methodology is contained in the Project Management Body of Knowledge (PMBOK).
  - Project management processes:
    - Initiating.
    - Planning.
    - Executing.
    - Monitoring and Control.
    - Closing.

Project Management Institute

Project Management Institute (PMI)

- Project management knowledge draws on ten areas:
  - Integration Management.
  - Scope Management.
  - Time Management.
  - Cost Management.
  - Quality Management.
  - Human Resource Management.
  - Communications Management.
  - Risk Management.
  - Procurement Management.
  - Stakeholders Management.



PRoject IN Controlled Environments

- PRoject IN Controlled Environments (PRINCE) v2 is a project management methodology.
- Developed by the UK government agency Office of Government Commerce (OGC) and is used extensively within the UK government as the de facto project management standard for its public projects.
- The methodology encompasses project:
  - Management.
  - Control.
  - Organisation.

PRINCE2 Principles and Themes

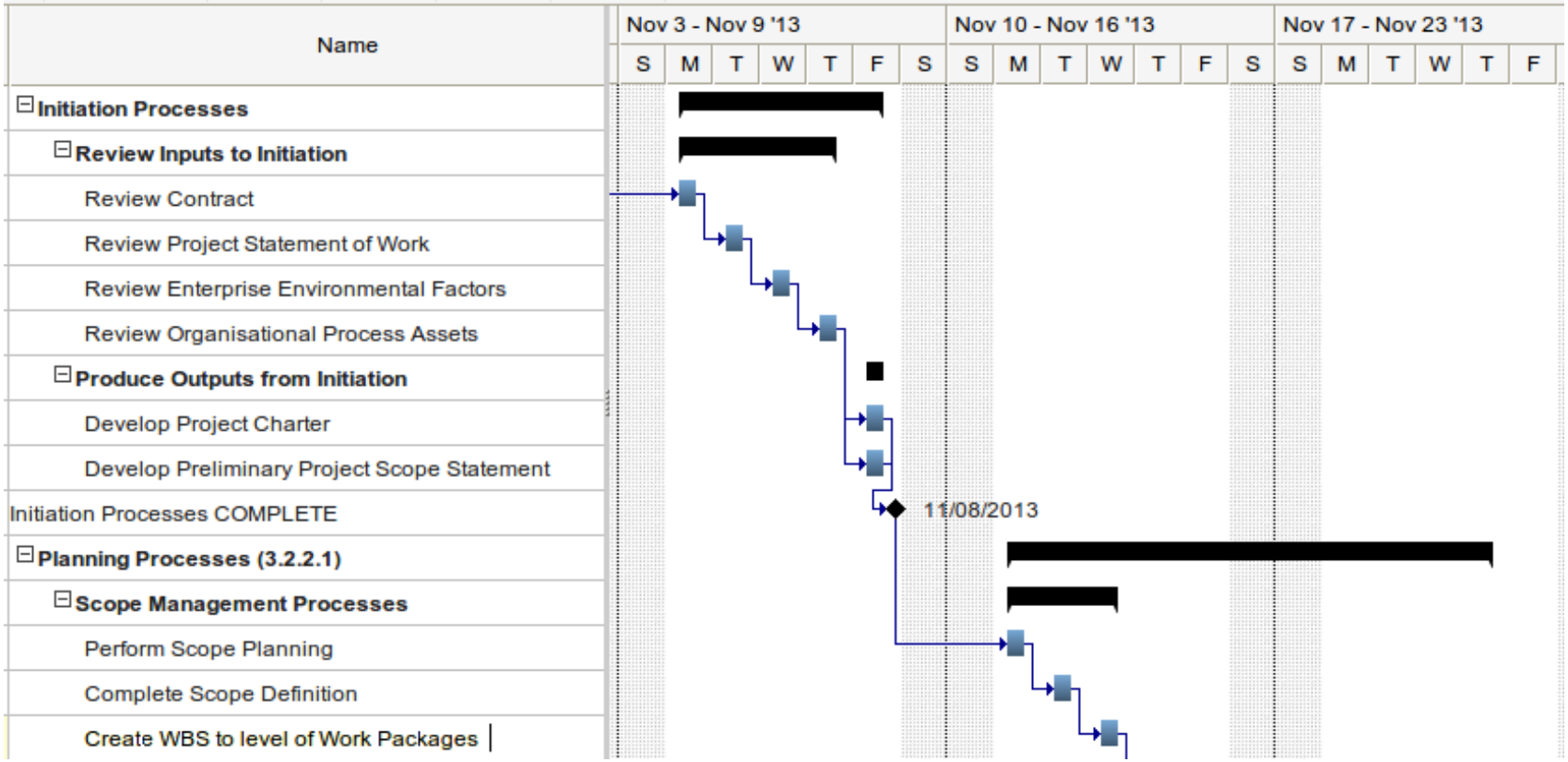
- **Seven principles**:
  - Continued business justification.
  - Learn from experience.
  - Defined roles and responsibilities.
  - Manage by stages.
  - Manage by exception.
  - Focus on products.
  - Tailored to suit the project environment.
- **Seven themes**:
  - Business case.
  - Organisation.
  - Quality.
  - Plans.
  - Risk.
  - Change.

PRINCE2 Processes

- Starting up a project (SU).
- Initiating a project (IP).
- Directing a project (DP).
- Managing stage boundaries (SB).
- Managing product delivery (MP).
- Closing a project (CP).

Project Management Tools

- Gantt chart.



Project Management Tools

- Planner http://winplanner.sourceforge.net
- Project Libre http://www.projectlibre.org
- Microsoft Project http://office.microsoft.com/project
- Open Workbench http://www.itdesign.de/en/ppm/open-workbench
- dotProject http://www.dotproject.net
- Gantter http://www.gantter.com

- Planner GNU/Linux install:

```
CEDAT:~ $ sudo apt-get install planner

CEDAT:~ $ sudo yum install planner
```

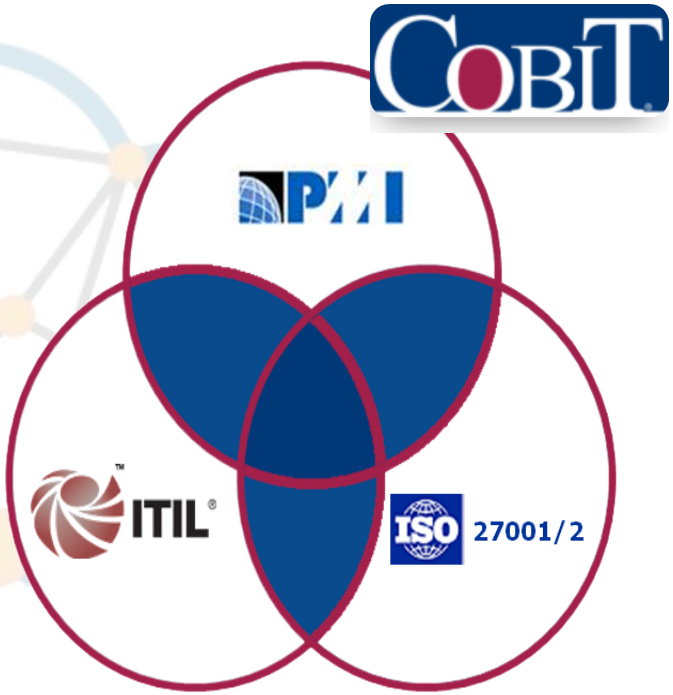
Control Objectives for Information & related Technology (CobiT)

ISACA®
Trust in, and value from, information systems

IT GOVERNANCE INSTITUTE®

- CobiT is a framework for IT management.
- Information Systems Audit and Control Association (ISACA), and the IT Governance Institute (ITGI).
- CobiT provides managers, auditors, and IT users with a set of generally accepted measures, indicators, processes and best practices to develop IT governance and control in a company.

CobiT IT Governance



Project Management Office (PMO)

- Department within a business that defines and maintains standards for project management.
- Achieve benefits from standardising and following project management policies, processes and methods.
- Source for guidance, documentation, and metrics related to the practices involved in managing and implementing projects within the organisation.

Project Management Office (PMO)

- Involved in project-related tasks and follow up on project activities through completion.
- Report on project activities, problems and requirements to executive management.
- Project management principles, practices and processes on methodology such as PMBOK or PRINCE2.

PMO Types

- **Project repository**:
  - Organisations that empower distributed, business-centric project ownership, or enterprises with weak central governance.
  - PMO simply serves as a source of information on project methodology and standards.
  - Project managers continue to report to, and are funded by, their respective business areas.

PMO Types

- **Project coach model**:
  - Willingness to share some project management practices across business functions and uses the PMO to coordinate the communication.
  - PMO in this model is a permanent structure with staff and has some supervisory responsibility for all projects.

PMO Types

- **Enterprise PMO**:
  - Assumes a governance process that involves the PMO in all projects, regardless of size, allowing it to assess scope, allocate resources and verify time, budget, risk and impact assumptions before the project is undertaken.

PMO Roles

- **Programme Manager**:
  - Manages several related projects.
  - Has oversight of the purpose and status of all projects in a Programme and can use this oversight to support project-level activity.

PMO Roles

- **Project Manager**:
  - Responsibility for the planning, execution and closing of a project.
  - Manage the implementation of the needs of the client and bridge the gap between the production team and the client.
  - Full responsibility and the level of authority required to complete a project.
  - A Project Manager requires these three characteristics:
    - Knowledge.
    - Performance.
    - Personal.

Project Manager qualities

- Meets cost, schedule, technical, and mission objectives.
- Attains high levels of satisfaction and perception of project success from:
  - Client.
  - Sponsor.
  - Users.
  - Team.

PMBOK - Initiation

Initiation	**Review Inputs to Initiation** Review Contract Review Project Statement of Work Review Enterprise Environmental Factors Review Organisational Process Assets **Produce Outputs from Initiation** Develop Project Charter Develop Preliminary Project Scope Statement

- Project Charter.
- Project Manager.
- Description of all assumptions and constraints.

Project Charter

- Authorises the start of a project.
- Provides the Project Manager with the authority to apply organisational resources to project activities.
- Its purpose is to:
  - Assist management:
    - What the project will deliver.
    - It's business justification.
    - High level estimation of the time, cost, and resources.
  - Commitment by management.
  - The charter document should be relatively brief, averaging around 3 to 5 pages.

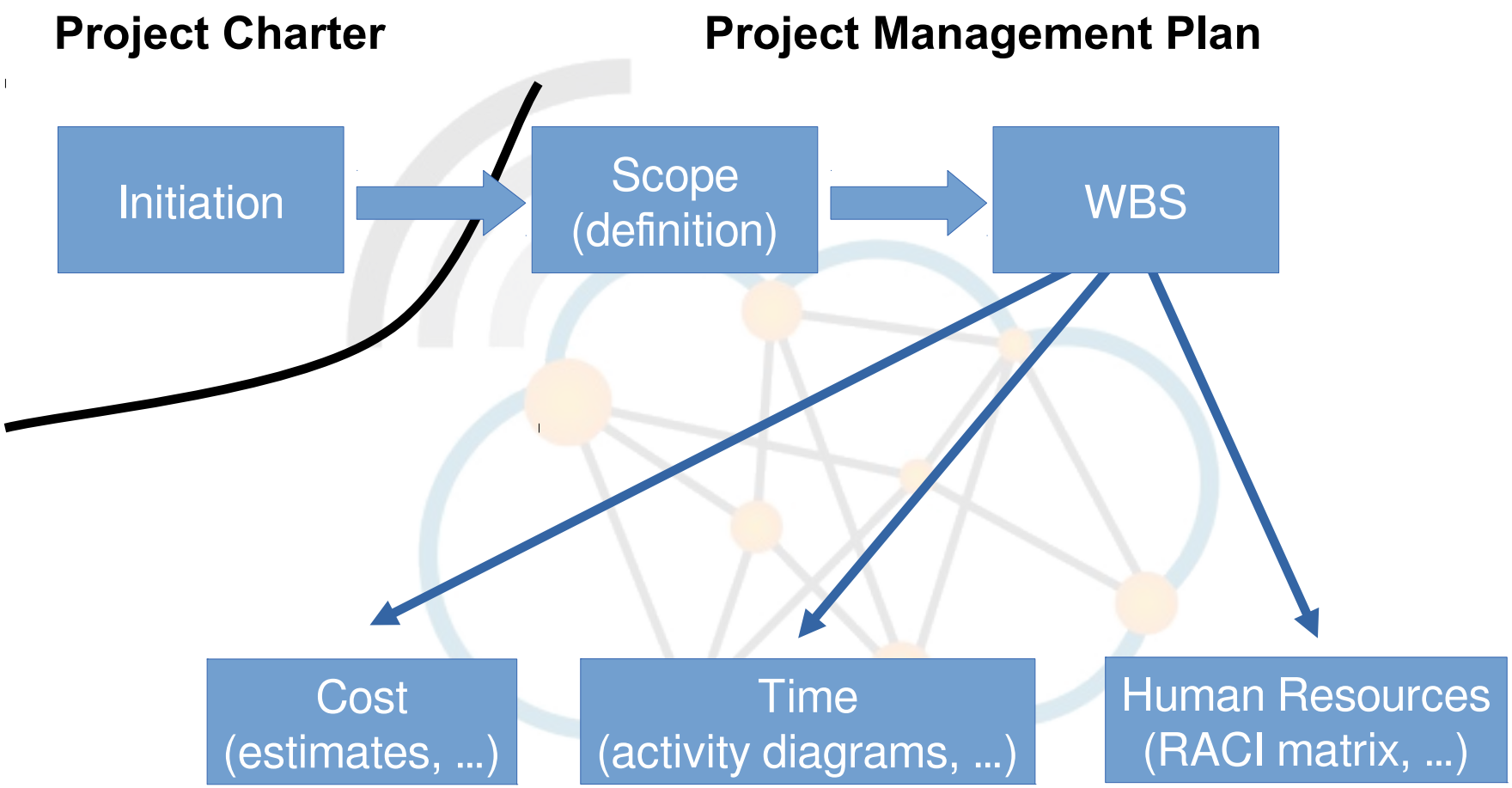
Project Scope

- Project Scope statement should:
  - Address the project and deliverable requirements.
  - Product requirements.
  - Project boundaries.
  - Acceptance methods.
  - Plan for scope control.

PMBOK - Planning

Planning	**Scope Management Processes** Perform Scope Planning Complete Scope Definition Create WBS to level of Work Packages **Activity Planning** Define Activities Determine Activity Sequence Define Activity Resource Estimates Define Activity Duration Estimates **Cost Planning** Develop cost estimates Develop cost budget Complete Quality Plan Complete Human Resource Plan Complete Communications Plan **Risk Management Processes** Establish Risk Management Plan Perform Initial Risk Identification Establish Qualitative Risk Analysis Process Establish Quantitative Risk Analysis Process Create Risk Response Planning Process **Procurement Management Processes** Plan purchases and acquisitions Plan project contracting Complete Schedule Development

Project Management Processes (Initiation)



- Also to consider: Quality, Risk, Communication, Procurement, Integration.

Scope Breakdown Structure

- Hardware in Data Centres
  - Cork Internet eXchange (CIX)
    - Contact NOC in Cork Internet eXchange
- Servers
  - Remove blanking panels from cabinet
  - Install Server Rails
  - Install Servers on rails
  - Connect Ethernet cables to rack switch
  - Connect dual power leads to A and B power legs
- Access
  - Confirm access from outside CIX to server

Note the noun phrases on the top levels (scope breakdown) and the activities on the lower levels.

Create a Work Breakdown Structure

- **Input**:
  - Project Scope Statement.
  - Requirements documentation.
  - Organisational process assets.
- **Output**:
  - Work Breakdown Structure (WBS).
  - WBS Dictionary.
  - Scope baseline.
  - Project document updates.
- **Tools and Techniques**:
  - Decomposition.

The Work Breakdown Structure (WBS)

- Used as a basis for a number of processes in particular to produce the subsidiary plans of the Project Plan.
- The WBS is a ***deliverable-oriented hierarchy*** of decomposed project components that organises and defines the total scope of the project.
- The WBS is a representation of the detailed project scope statement that specifies the work to be accomplished by the project.

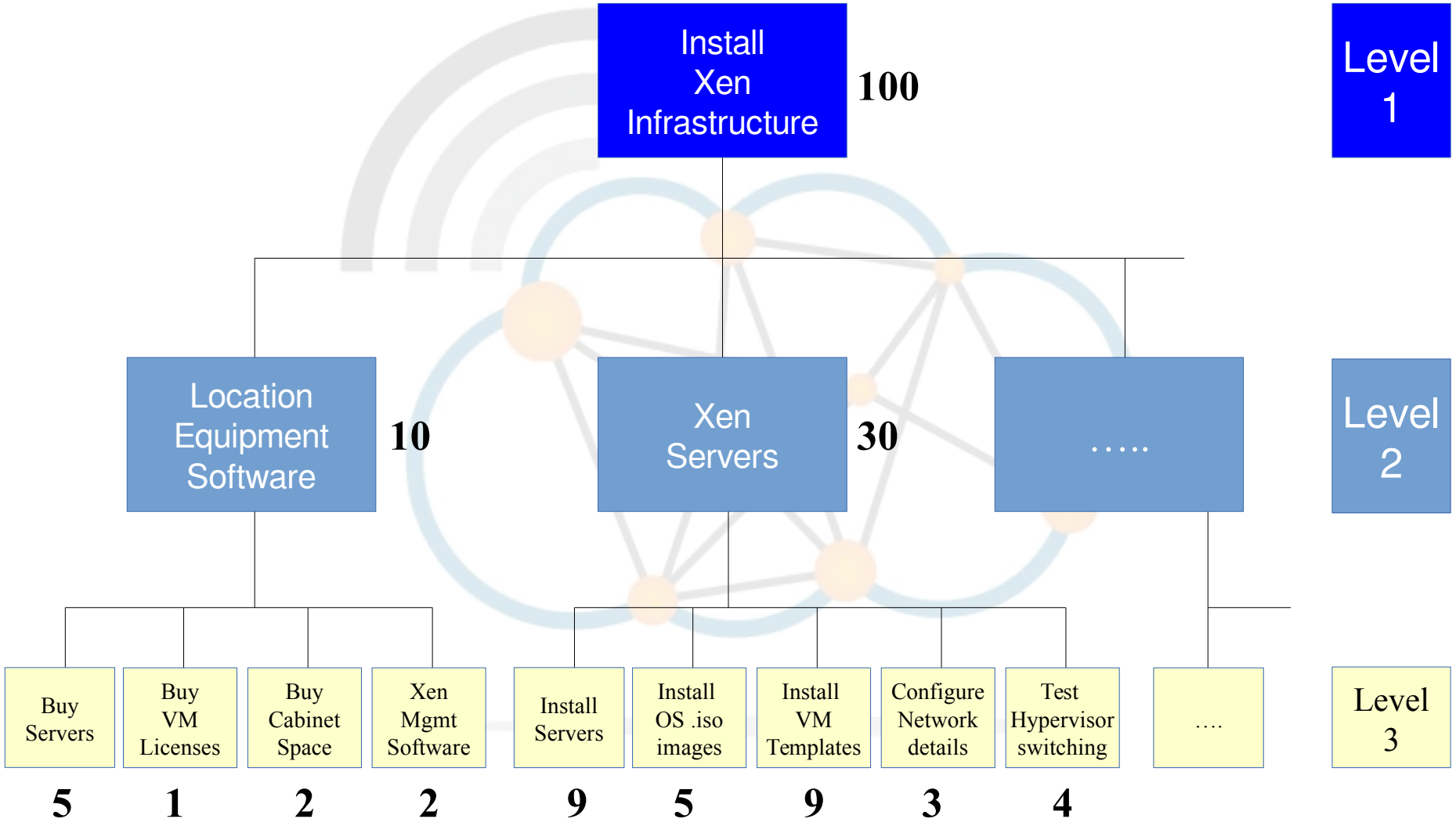
The Work Breakdown Structure (WBS)

- The elements comprising the WBS assist the stakeholders in viewing the end product of the project.
- The work at the lowest-level WBS component is estimated, scheduled, and tracked.
- A WBS is neither a project plan, a schedule, nor a chronological listing. It specifies what will be done, not how or when.
- A WBS is not an organisational hierarchy, although it may be used when assigning responsibilities.

The Dictionary of the WBS

- A WBS dictionary is a companion document to the WBS that describes each WBS element.
- For each WBS element, the WBS dictionary includes a statement of work, a list of associated activities, and a list of milestones.
- Other information can include the responsible organisation, start and end dates, resources required, an estimate of cost, charge number, contract information, quality requirements, and technical references.
- WBS elements should be cross referenced as appropriate.

Example WBS subset



Validate the WBS

- All major elements been identified at top level?
- Decomposed into measurable components?
- Lower level(s) items necessary? All inclusive?
- Would stakeholders agree WBS is satisfactory?
- Can elements be scheduled, budgeted, and assigned to a unit that will accept responsibility?
- Too much or too little visibility and control ?
- Can status reports be generated at all levels ?

Example WBS

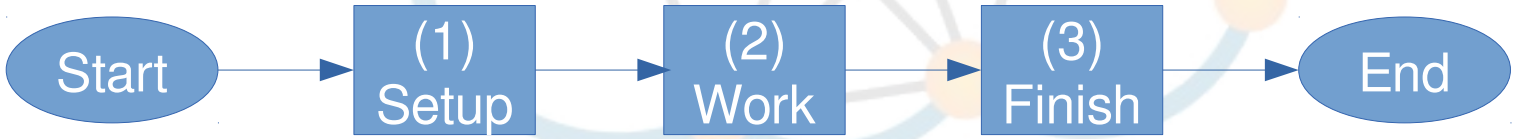
- **Install Xen infrastructure**
  - **Prepare Location, Equipment and Software**
    - Buy Servers
    - Buy Licenses for VMs
    - Buy space in Data Centres
    - Get Xen Management Software
  - **Prepare Servers**
    - Install XenServer
    - Install OS .iso images
    - Install VM Templates
    - Configure network details
    - Test image switching between Hypervisors
  - **Install hardware in Data Centres**
    - Arrange time in each Data Centre
    - Install hardware in the racks in Data Centre
    - Confirm access to servers from outside
  - **Access and Manage**
    - Access Servers using Xen Management
    - Install VMs as required
    - Confirm services

Developing the WBS

- Divide the total work of the project into major groups...
- ...then subdivide these groups into tasks...
- ...then divide these tasks into sub-tasks.
- Subtasks should be small enough to permit adequate control and visibility.
- Starting at the top level with 100 units (100%) subdivide to the elements down the WBS such tat 100 units exist at each level.
- But avoid excess bureaucracy.

Activity planning

- Activity on node network format:
  - Arrows show precedence relationships.
  - Nodes show activities.
- 3 types of precedence relationships:
  - Activity on node 1 — successor but no predecessor.
  - Activity on node 2 — predecessor and successor.
  - Activity on node 3 — predecessor but no successor.

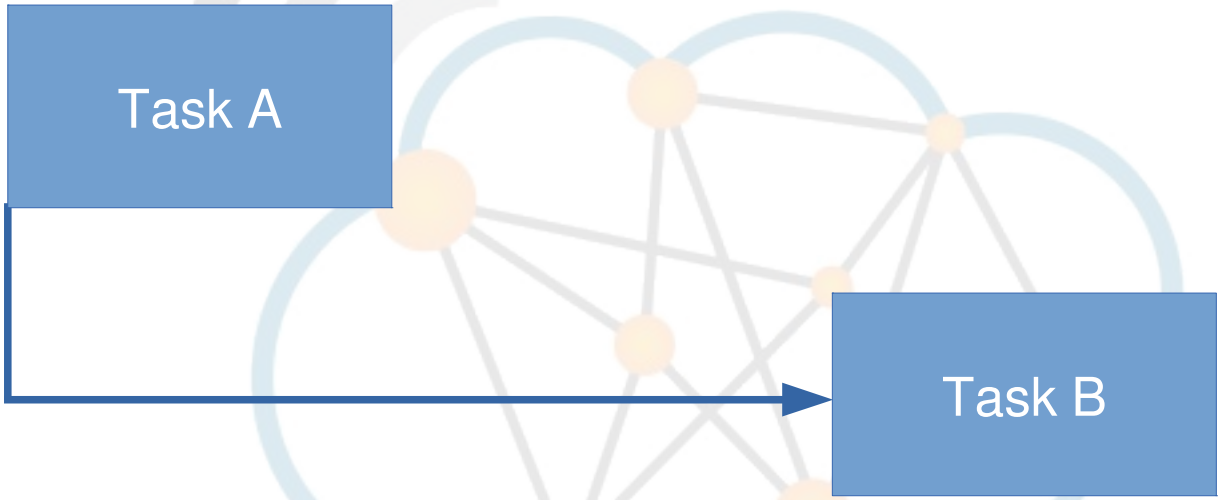


Precedence Relationships - Finish to Start

- The “from” activity Task A must finish before the “to” activity Task B can start.

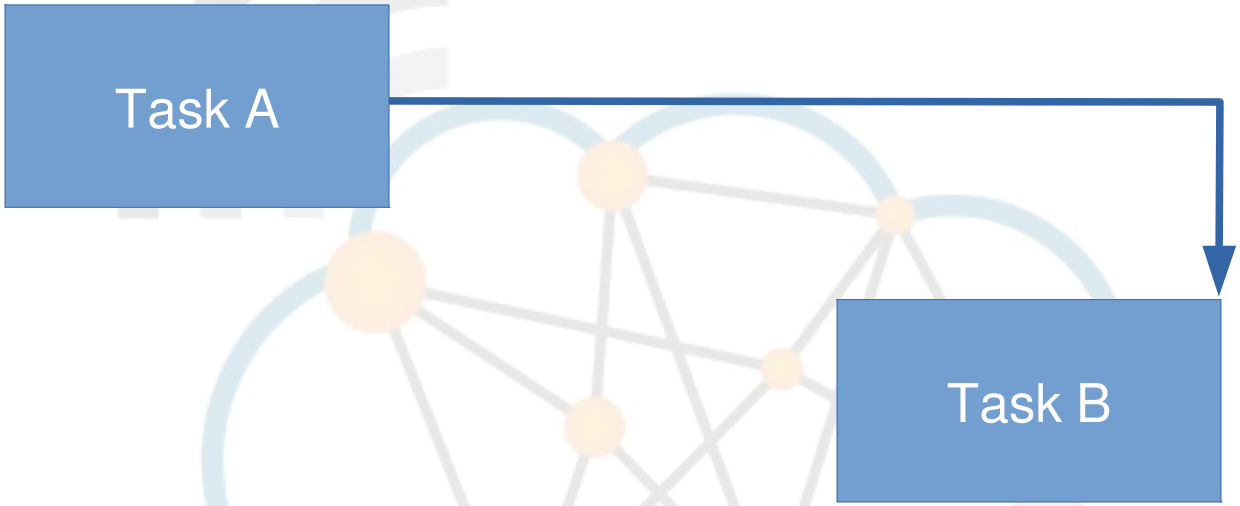
Precedence Relationships - Start to Start

- Tasks A and B may start at the same time, but the successor (B) cannot start until the predecessor (A) begins.



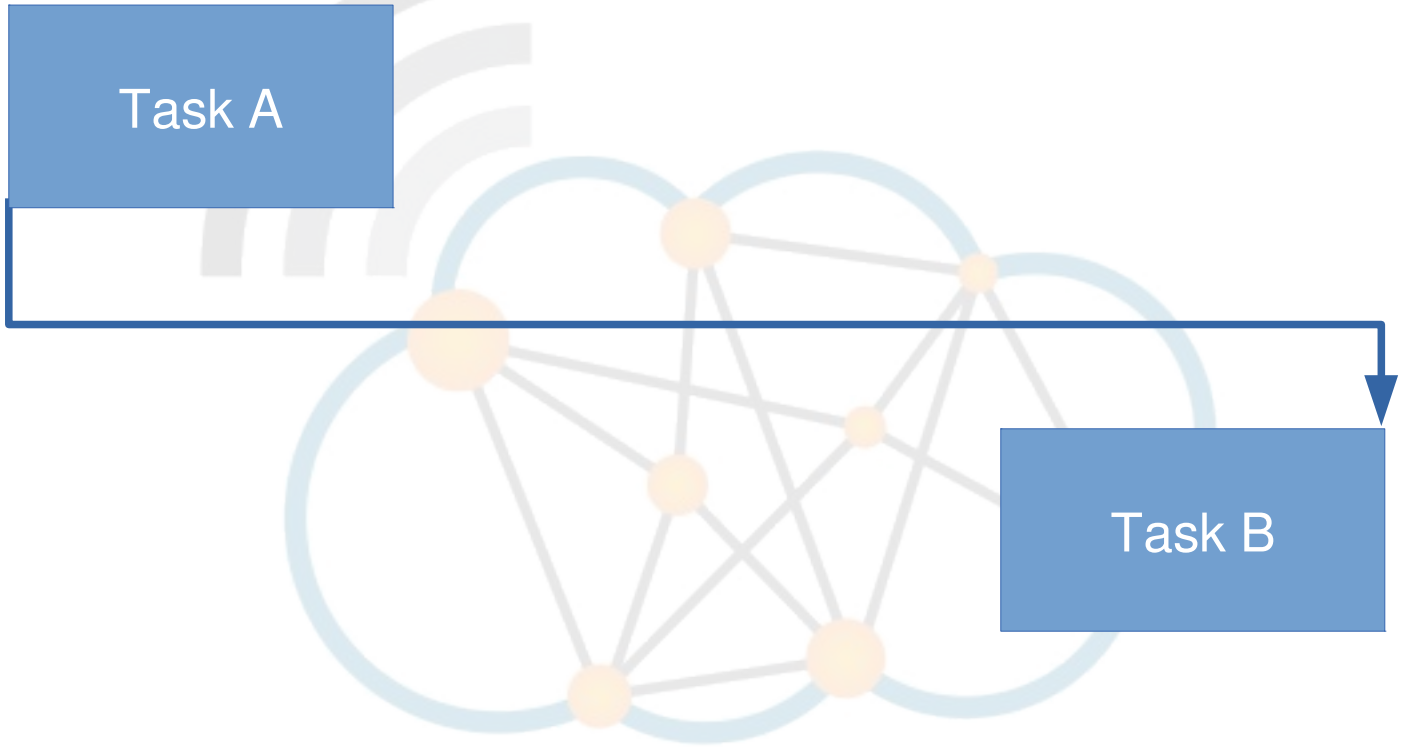
- The direction of the arrow defines which task is the predecessor and which is the successor.

Precedence Relationships - Finish to Finish



- Tasks A and B may end at the same time, but the successor (B) cannot finish until the predecessor (A) finishes.

Precedence Relationships - Start to Finish



- Task A must start before Task B can finish (seldom used).

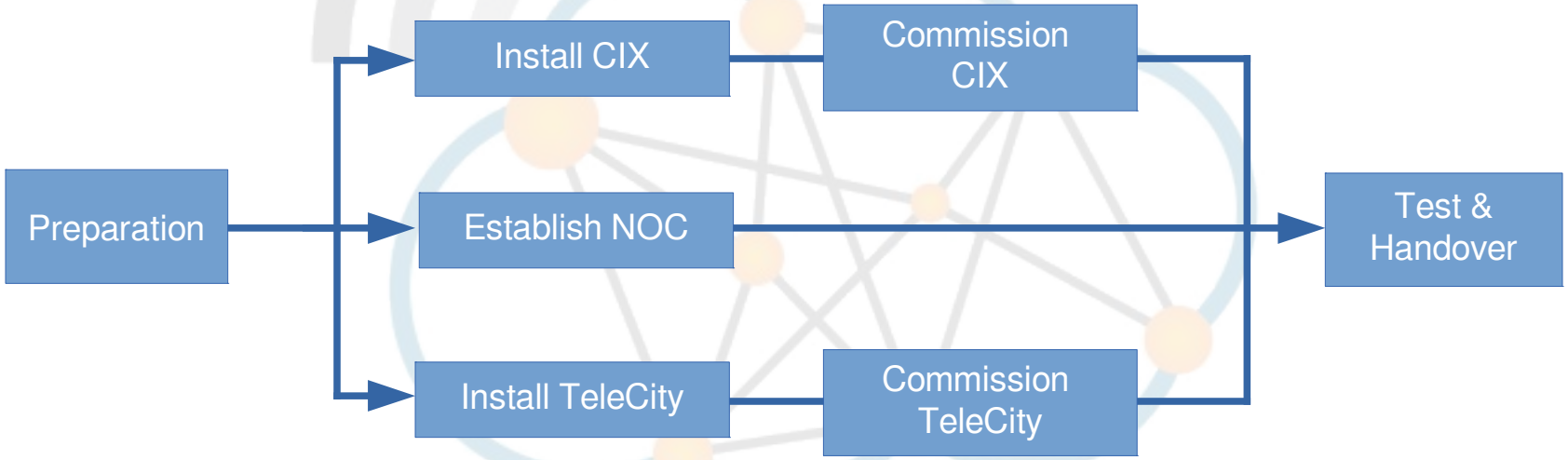
PDM Example: Diverging-Converging Activities

Diverging Activities

Single predecessor with multiple successors.

Converging Activities

Multiple predecessors with single successor.

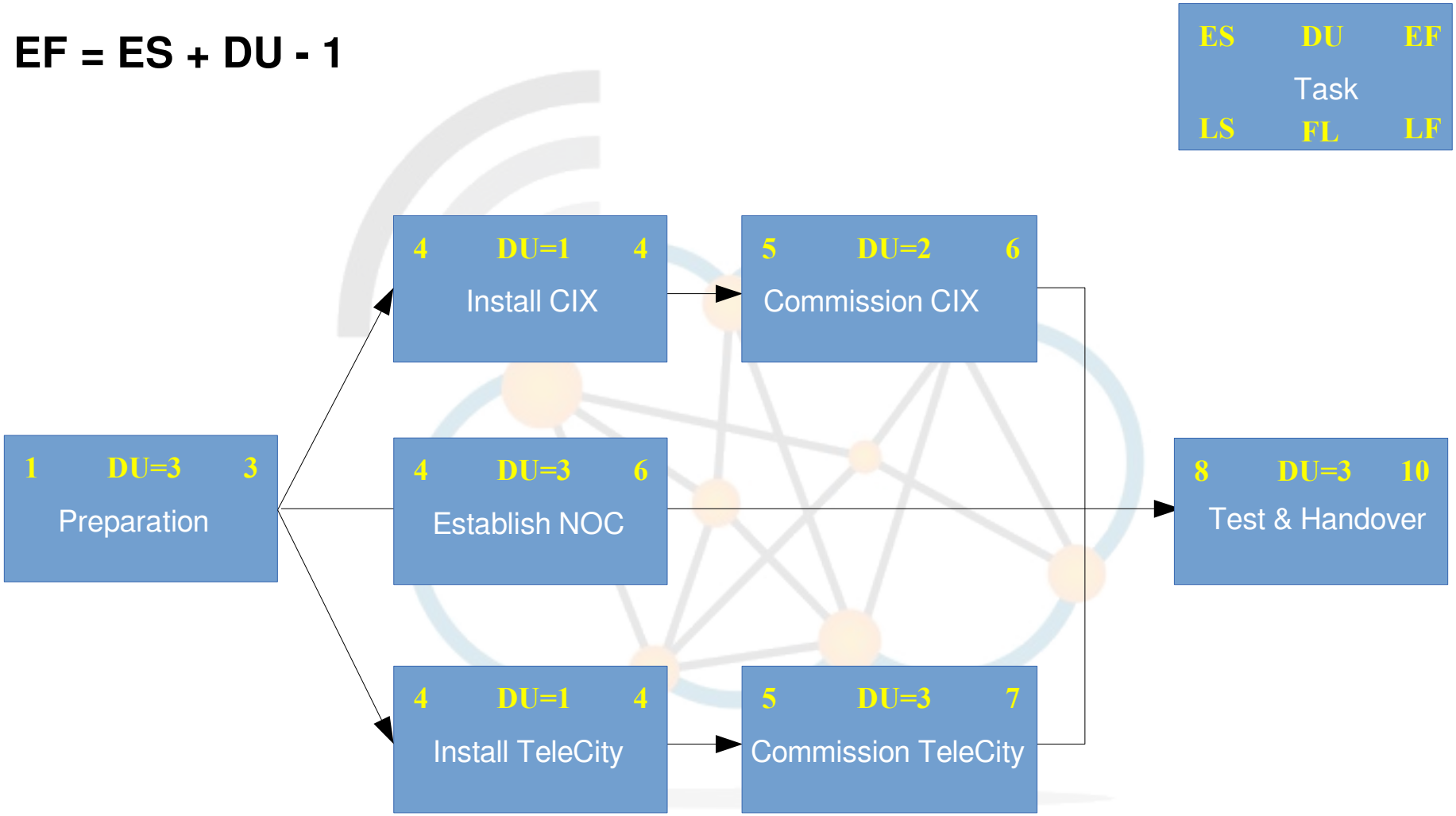


Forward pass definitions

- Early Start Date (**ES**)
  - Earliest possible point in time an activity can start, based on the network logic and any schedule constraints.
- Duration (**DU**)
  - Number of work periods, excluding holidays or other non-working periods, required to complete the activity; expressed as workdays or work-weeks
- Early Finish Date (**EF**)
  - Earliest possible time the activity can finish
- Forward Pass (**FP**)
  - Starting at the beginning (left) of the network develop early start and early finish dates for each task, progressing to end (right-most box) of the network.

Program Evaluation and Review Technique (PERT) Tool – Forward pass

EF = ES + DU - 1



Forward Pass calculation

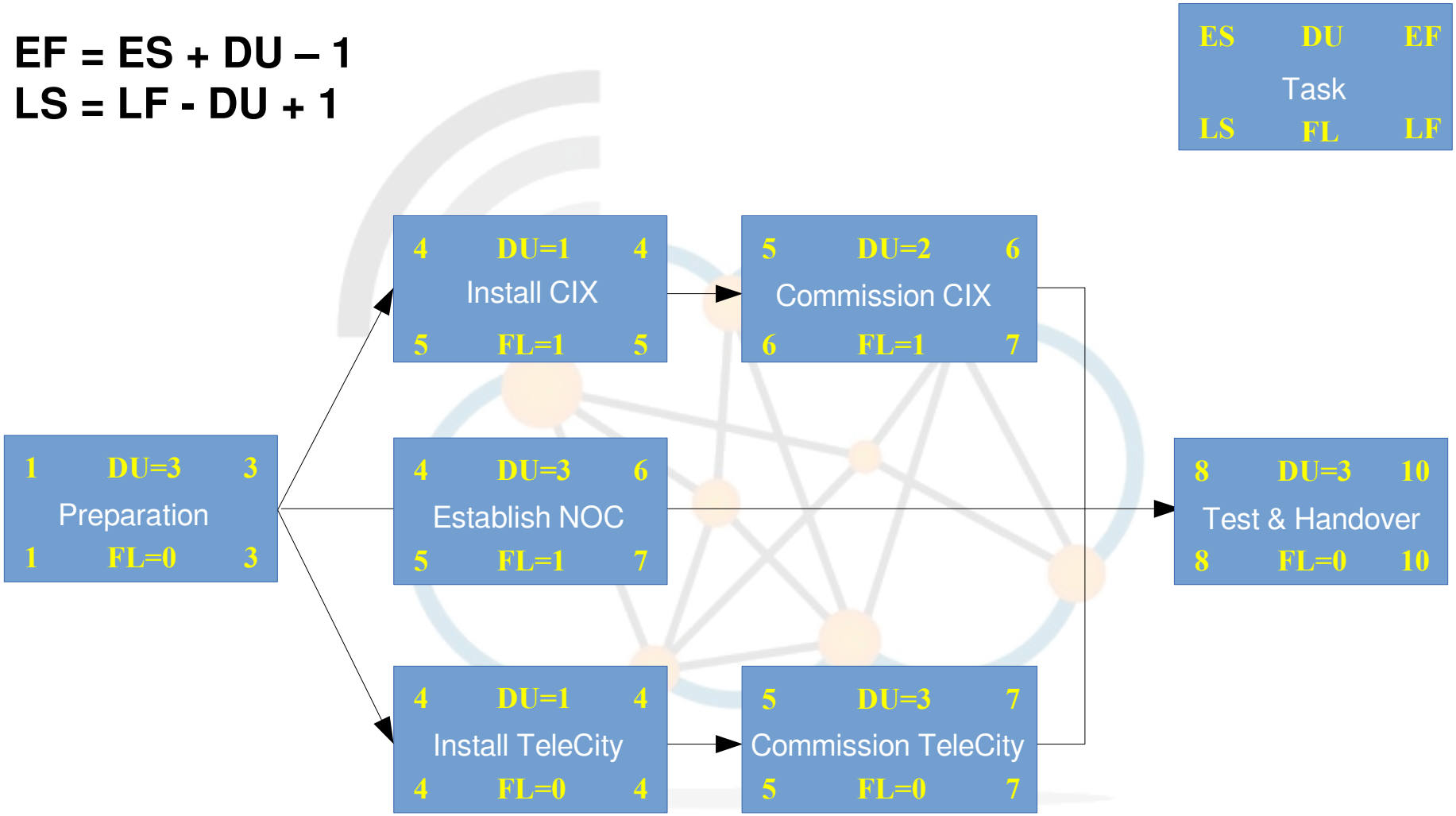
Forward pass calculation			
Name	**Duration**	**ES**	**EF**
Preparation	3	1	3
Install CIX	1	4	4
Establish NOC	3	4	6
Install TeleCity	1	4	4
Commission CIX	2	5	6
Commission TeleCity	3	5	7
Test & Handover	3	8	10

Backward pass definitions

- Late Start Date (**LS**)
  - Latest point in time that an activity may begin without delaying that activity's successor.
  - If the activity is on the critical path, the project end date will be affected.
- Float or Slack (**FL**)
  - Latest point in time a task may be delayed from its earliest start date without delaying the project finish date.
- Late Finish (**LF**)
  - Latest point in time a task may be completed without delaying that activity's successor If the activity is on the critical path, the project end date will be affected.
- Backward Pass (**BP**)
  - Calculate late start and late finish dates by starting at project completion, using finish times and working backwards.

PERT Tool - Backward pass calculation

EF = ES + DU – 1
LS = LF - DU + 1

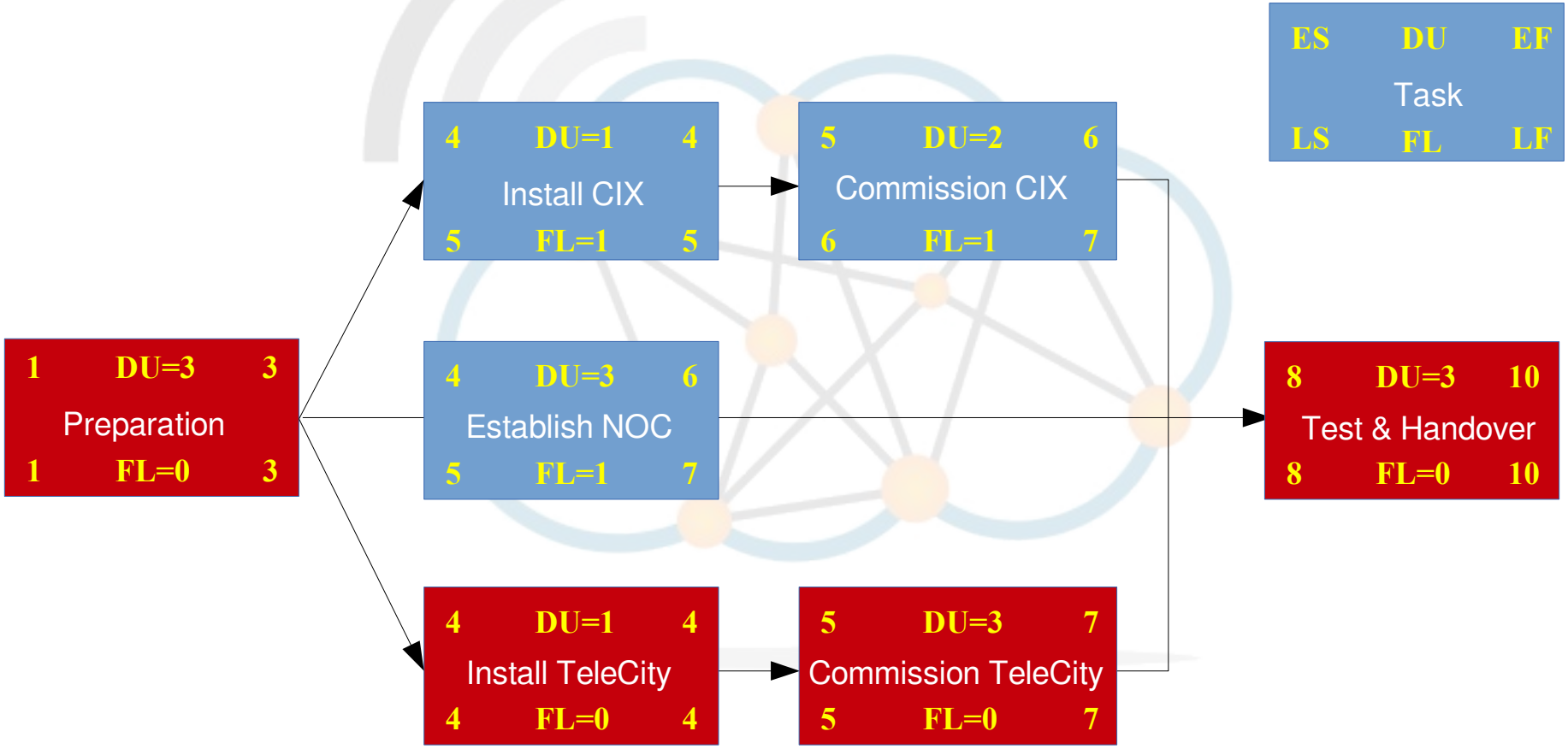


Forward and backward pass calculation

Forward and backward pass calculation						
Name	**Duration**	**ES**	**EF**	**LS**	**LF**	**FL**
Preparation	3	1	3	1	3	0
Install CIX	1	4	4	5	5	1
Establish NOC	3	4	6	5	7	1
Install TeleCity	1	4	4	4	4	0
Commission CIX	2	5	6	6	7	1
Commission TeleCity	3	5	7	5	7	0
Test & Handover	3	8	10	8	10	0

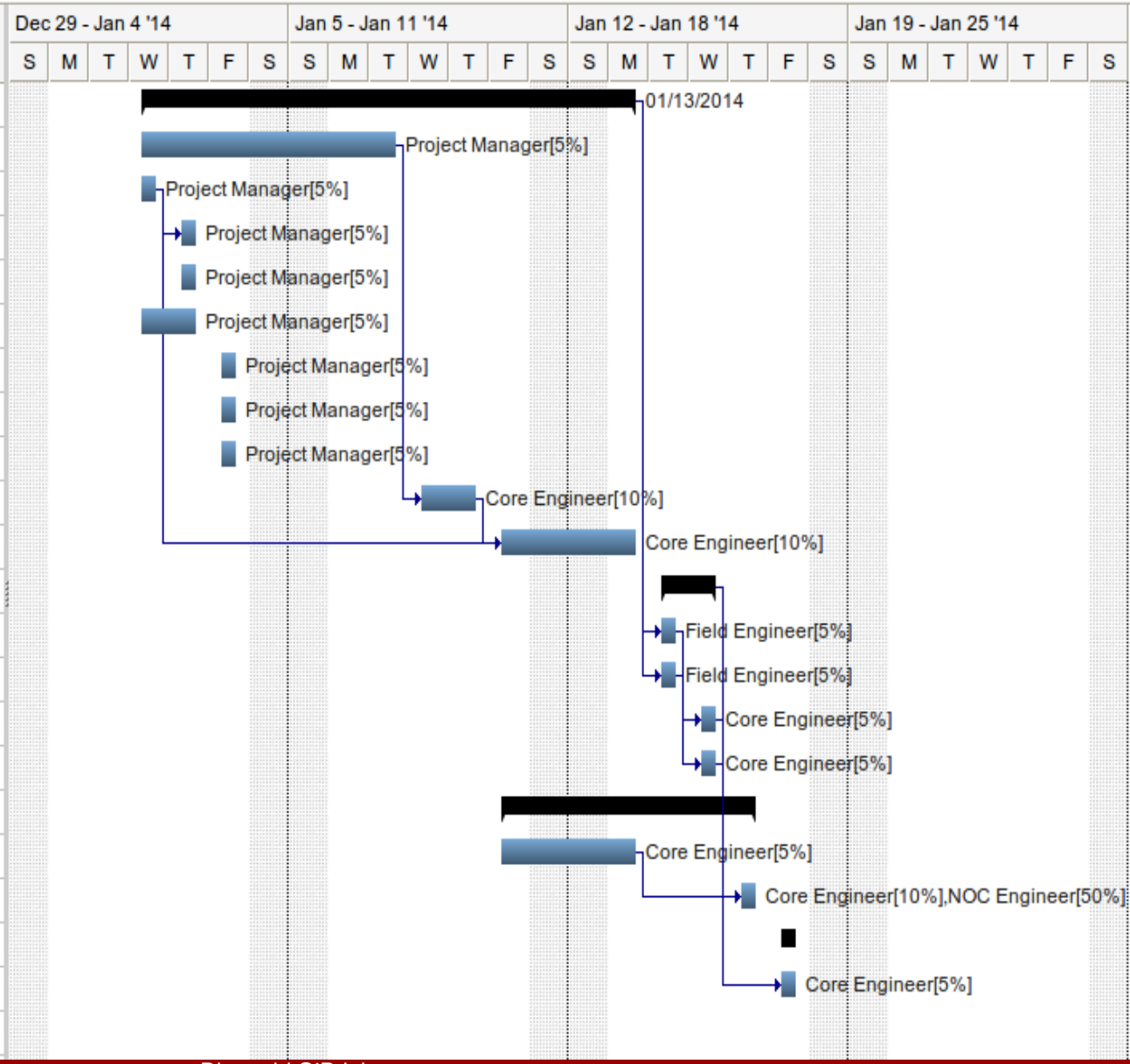
Critical Path

- The Critical Path is the longest possible continuous pathway taken from the initial event to the terminal event.



Scheduling on Gantt chart

	Name
1	**Preparation**
2	Purchase HP Proliant Servers
3	Acquire Win 7 Licenses
4	Purchase Win 7 Server Support from Microsoft
5	Purchase Xen Hypervisor support from Citrix
6	Purchase Cabinet space CIX
7	Purchase Cabinet space TeleCity
8	Purchase Cross-connect CIX
9	Purchase Cross-connect TeleCity
10	Install Xen Hypervisor in Servers
11	Install VMs on Hypervisor
12	**Install Equipment at Data Centres**
13	Install Server at CIX
14	Install Server at TeleCity
15	Commission CIX Server
16	Commission TeleCity Server
17	**Establish NOC**
18	Install Management software
19	Train NOC Engineers
20	**Test and Handover**
21	Confirm VMs are accessable

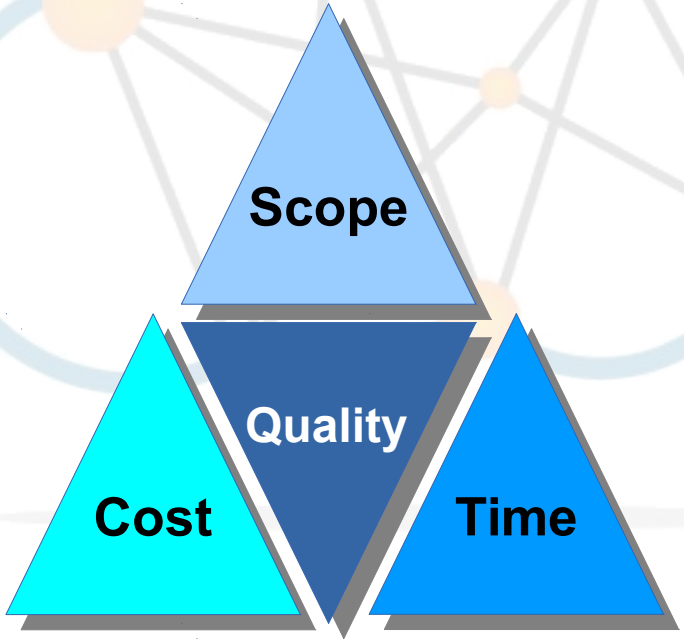


Costs, Budget planning

Xen Infrastructure project									
Budget Estimate									
ID	Description	Quantity	Unit Cost	Initial Cost	Recurring Cost/month	Recurring Cost/Year	Total Cost/Yr 1	Total Cost/Yr 2	Total Cost/Yr 3
001	HP Proliant Server	2	€2,500	€5,000			€5,000		
002	Windows Server 7 License	5	€140	€700		€700	€700	€735	€772
003	Data Centre CIX ½ Cabinet	1		€300	€550	€6,600	€6,900	€6,930	€7,277
004	Data Centre CIX ½ Power	1			€35	€420	€420	€441	€463
005	Data Centre CIX ½ Cross-connect	1		€225	€25	€300	€525	€315	€331
006	Data Centre TeleCity ½ Cabinet	1		€500	€750	€9,000	€9,500	€9,450	€9,923
007	Data Centre TeleCity ½ Power	1			€35	€420	€420	€441	€463
008	Data Centre TeleCity ½ Cross-connect	1		€500	€50	€600	€1,100	€630	€662
009	Installation costs (Engineer/day) – CIX	2	€350	€700			€700		
010	Installation costs (Engineer/day) – TeleCity	2	€350	€700			€700		
011	Service costs (Engineer/day)	0.25	€350	€88	€2,661	€31,938	€31,938	€33,534	€35,211
012	HP Support Contract	2	€225			€450	€450	€473	€496
	Assumption: Cost increases at 5%/year						**€58,353**	**€52,949**	**€55,596**

Quality Planning

- Triple constraint
  - The Triple Constraints are the key attributes that must be handled effectively for successful completion and closure of any project to a high quality. A change in any constraint impacts the other constraints.



Responsible, Accountable, Consulted, Informed (RACI) Matrix

- **Responsible**
  - Those who do the work to achieve the task.
  - There is at least one role with a participation type of responsible, although others can be delegated to assist in the work required.
- **Accountable** (also approver or final approving authority)
  - The one ultimately answerable for the correct and thorough completion of the deliverable or task, and the one who delegates the work to those responsible.
  - In other words, an accountable must sign off (approve) on work that responsible provides.
  - There must be only one accountable specified for each task or deliverable.
- **Consulted**
  - Those whose opinions are sought, typically subject matter experts.
  - Two-way communication.
- **Informed**
  - Those who are kept up-to-date on progress, often only on completion of the task or deliverable.
  - One-way communication.

Human Resource Planning

- **Responsible, Accountable, Consulted, Informed (RACI) Matrix**

	Project Sponsor	Project Manager	Logistics Manager	Project Engineer	Engineering Team	Service Manager
Prepare Location, Equipment and Software						
Buy Servers	A	R	R			
Buy Licenses for VMs	A	R	R			
Buy space in Data Centres	A	R	R			
Get Xen Management Software		A		R	C	C
Prepare Servers						
Install XenServer	I	A		R		
Install OS .iso images	I	A		R		
Install VM Templates	I	A		R		
Configure network details	I	A		R		
Test image switching between Hypervisors	I	A		R	C	
Install hardware in Data Centres						
Arrange time in each Data Centre	I	A	R			
Install hardware in the racks in Data Centre	I	A		R		
Confirm access to servers from outside	I	A		R	C	
Access and Manage						
Access Servers using Xen Management	I	A		R	C	I
Install VMs as required	I	A		R	C	I
Confirm services	I	A		R	C	I

Communications planning

- Communication is a key function of the Project Manager.
- Changes to project items, progress reports, and budget adjustments are on-going and communication on these within the project team to keep things on track as well as regular briefing of stakeholders are necessary to ensure a successful, high-quality outcome of the project.
- Communication also involves the creation, collection, distribution, storage, retrievial, and the disposition of project information.
- Establishing the expectations around communication supports a positive attitude to the project as a whole.

Risk Management

- Identify Risks.
- Perform Qualitative/Quantitative Risk Analysis.
- Plan Risk Responses.

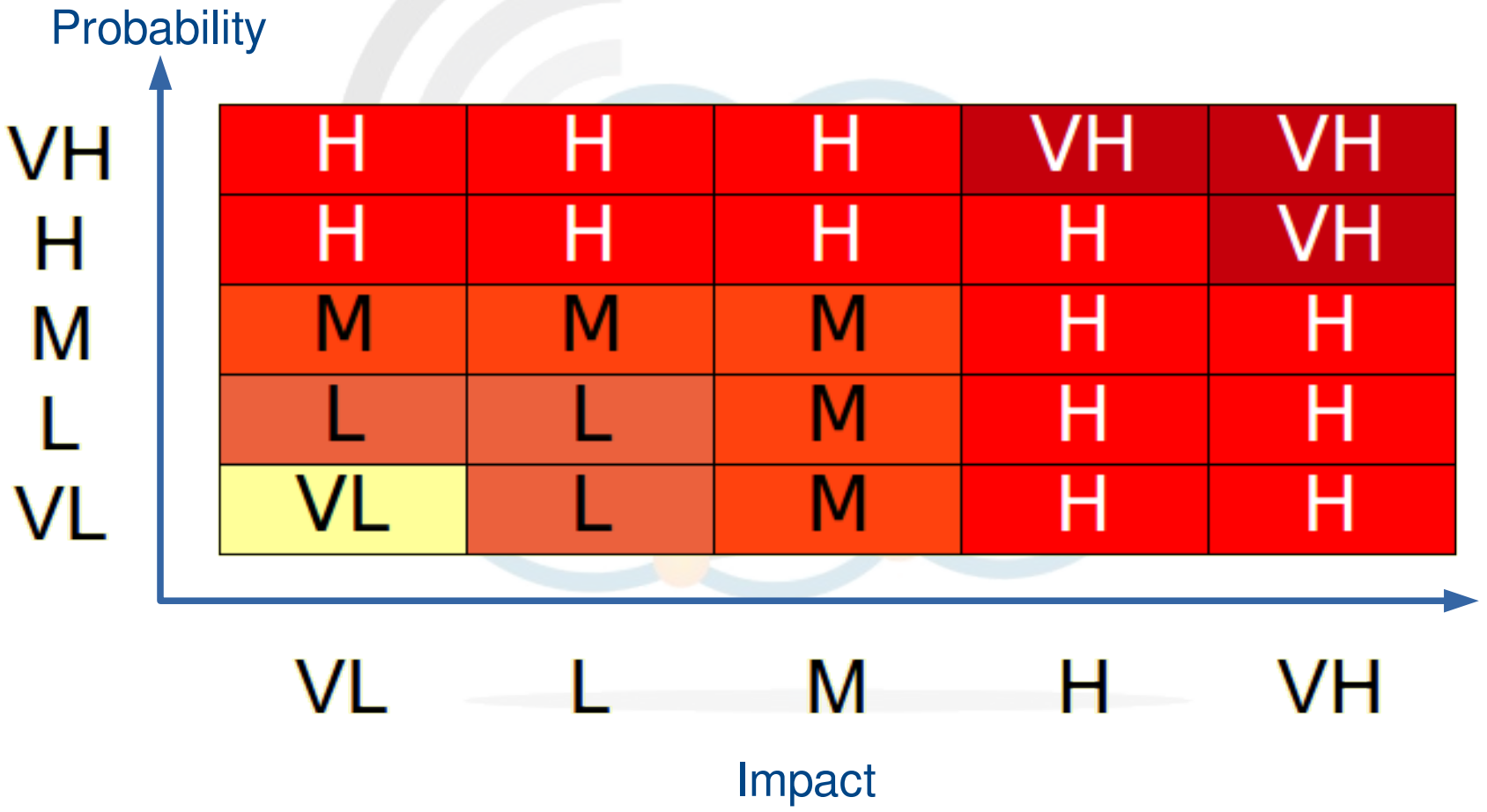
< Project title > RISK LOG

Summary			Description					Preventative Actions			Contingency Actions		
ID	Date Raised	Raised By	Description of Risk	Description of Impact	Probability Rating	Impact Rating	Priority Rating	Preventative Actions	Action Resource	Action Date	Contingency Actions	Action Resource	Action Date

VL = 'Very Low'
L = 'Low'
M = 'Medium'
H = 'High'
VH = 'Very High'

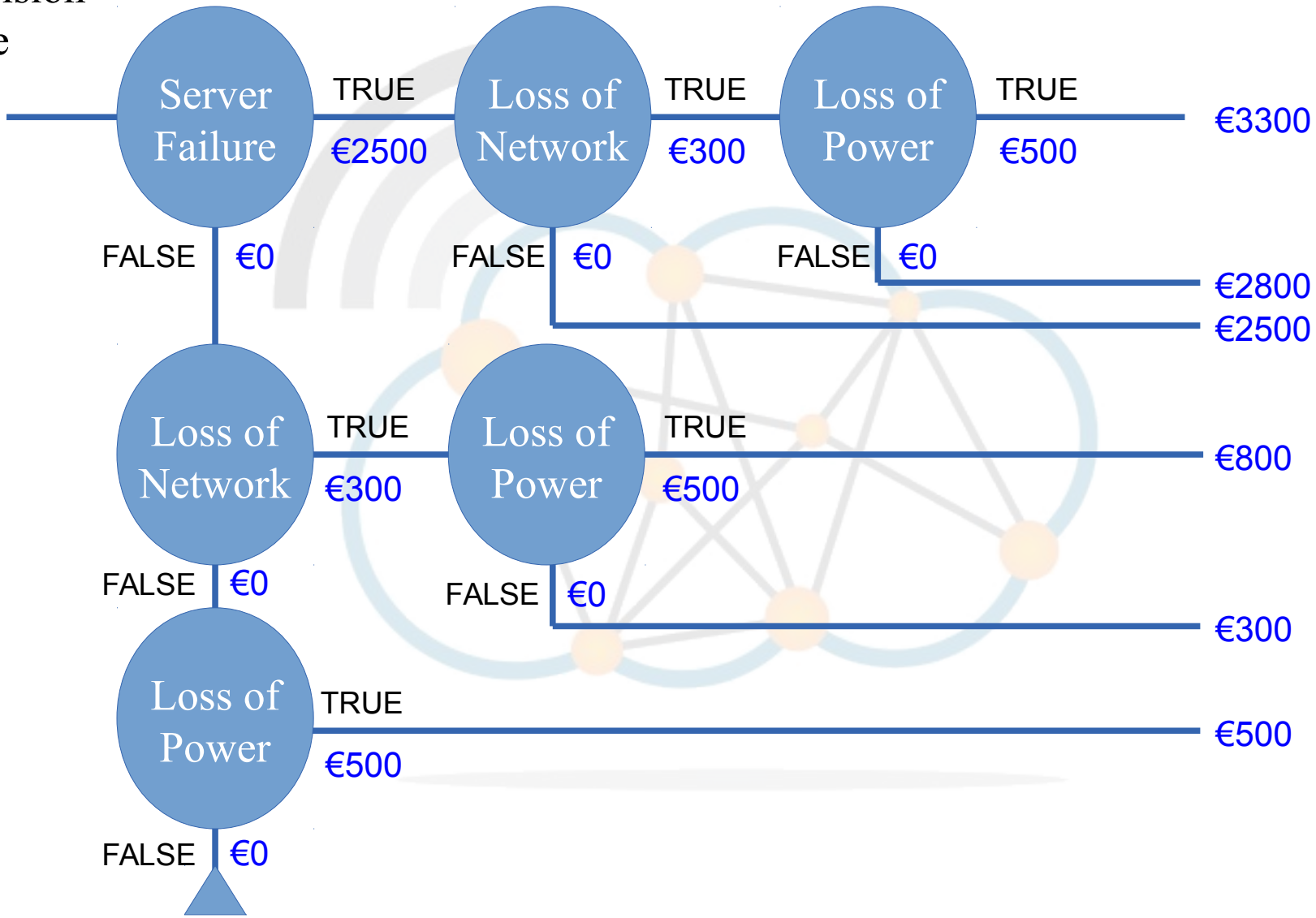
Qualitative Risk Analysis

Probability and Impact Matrix tool



Quantitative Risk Analysis

Decision Tree



PMBOK - Execution

Execution	Direct and Manage Project Execution Perform Quality Assurance Acquire, develop and manage Project Team Distribute Information Manager stakeholder expectations

Issue log

- Issue log or register.

< Project title >										ISSUE LOG
Summary			Issue Description			Issue Resolution				
ID	Date Raised	Raised By	Description of Issue	Impact	Priority	Action	Owner	Outcome	Date for Resolution	Resolved Date

VL = 'Very Low'
L = 'Low'
M = 'Medium'
H = 'High'
VH = 'Very High'

PMBOK – Monitoring and Controlling

- Change control.

Monitoring & Controlling	Monitor and control project work Perform integrated change control Verify and control scope Control schedule Control costs Perform quality control Report performance Monitor and control risks Administer procurements

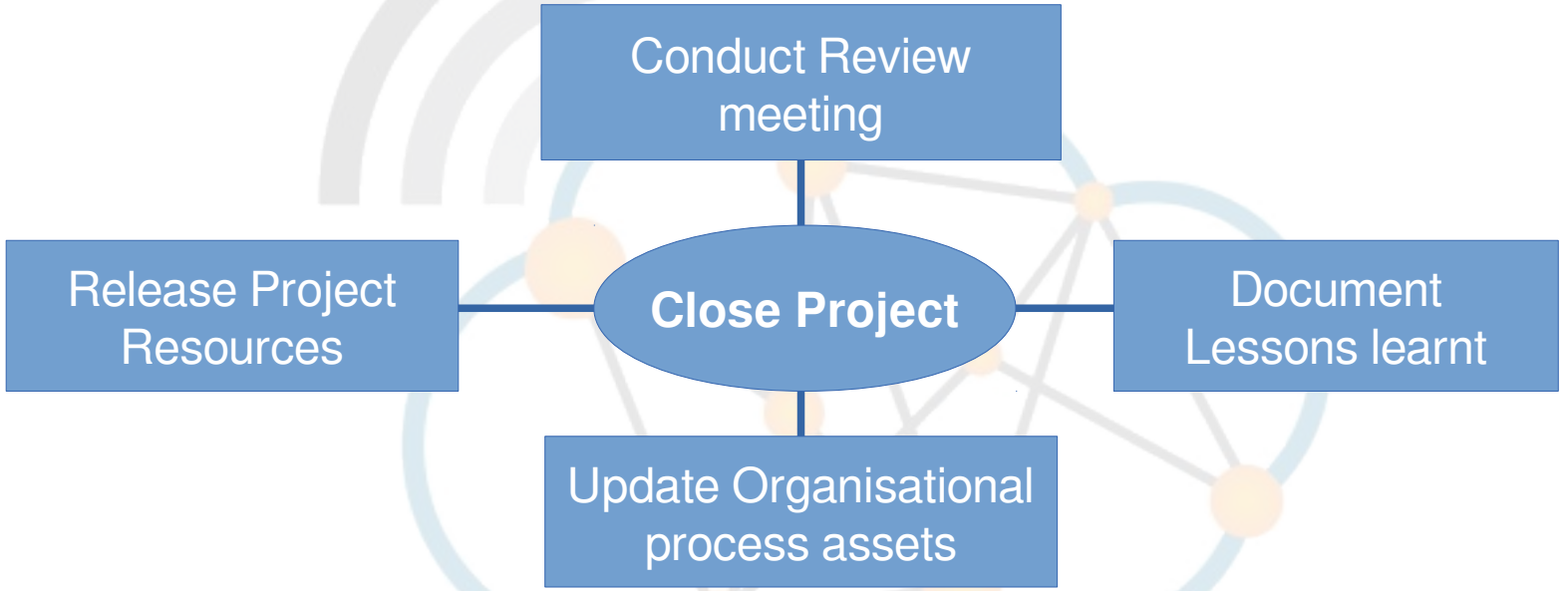
Change control

Change Request	
Project:	**Date:**
Change Requestor:	**Change No:**
Change Category (Check all that apply): □ Schedule □ Cost □ Scope □ Requirements/Deliverables □ Testing/Quality □ Resources	
Does this Change Affect (Check all that apply): □ Corrective Action □ Preventative Action □ Defect Repair □ Updates □ Other	
Describe the Change Being Requested:	
Describe the Reason for the Change:	
Describe all Alternatives Considered:	
Describe any Technical Changes Required to Implement this Change:	
Describe Risks to be Considered for this Change:	
Estimate Resources and Costs Needed to Implement this Change:	
Describe the Implications to Quality:	
Disposition: □ Approve □ Reject □ Defer	
Justification of Approval, Rejection, or Deferral:	

Change Board Approval:		
Name	**Signature**	**Date**

PMBOK - Closing

Closing	Close Project Complete Contract Closure



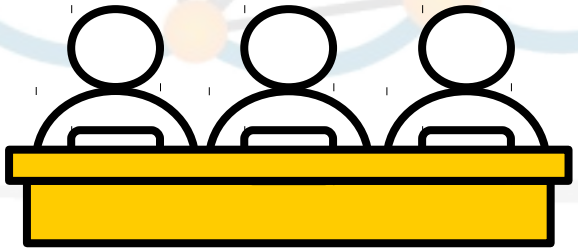
- Outputs:
  - Final Product.
  - Service or Result Transition.
  - Organisational Process Assets Update.

Mapping PM Process Groups to Knowledge areas

PM Process Groups / Knowledge Area Processes	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring & Controlling Process Group	Closing Process Group
Project Management Integration	Develop Project Charter Develop Prelim Project Scope Statement	Develop Project Management Plan	Direct and Manage Project Execution	Monitor and Control Project Work Integrated Change Control	Close Project
Project Scope Management		Scope Planning Scope Definition Create WBS		Scope Verification Scope Control	
Project Time Management		Activity Definition & Sequencing Resource Estimating Duration Estimating Schedule Development		Schedule Control	
Project Cost Management		Cost Estimating Cost Budgeting		Cost Control	
Project Quality Management		Quality Planning	Perform Quality Assurance	Perform Quality Control	
Project HR Management		Human Resources Planning	Acquire Project Team Develop Project Team	Manage Project Team	
Project Communications Management		Communications Planning	Information Distribution	Performance Reporting Manage Stakeholders	
Project Risk Management		Risk Management Planning Risk Identification Qualitative / Quantitative Risk Analysis Risk Response Planning		Risk Monitoring and Control	
Project Procurement Management		Plan Purchases and Acquisitions Plan Contracting	Request Seller Responses Select Sellers	Contract Administration	Contract Closure
Stakeholder Management	Identify stakeholders	Create Stakeholder Management Plan	Manage Stakeholder Engagement	Control Stakeholder Engagenent	

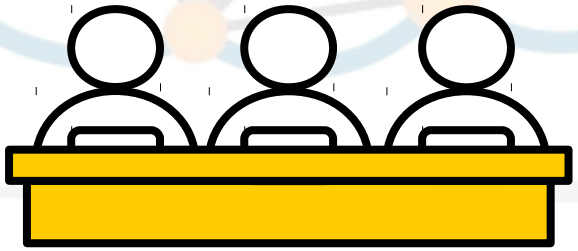
Project Management – Group Exercise

- You are the project team for the rollout of a WiFi network in the Makerere Area. It involves the installation of:
  - Cabling
  - 50 Access Points (AP)
  - 10 AP Controllers
  - Authentication, Authorisation and Accounting (AAA) Server
  - Internet Gateway Router.



Project Management – Group Exercise

- Assign roles within your group to produce a Project Plan as follows:
  - Project Charter
  - WBS
  - PERT
    - Forward pass
    - Backward pass
  - Determine the Critical Path
  - Cost, Budget plan
  - Gantt Chart Scheduler
  - RACI Matrix



Thank you