Project Management

Project Planning

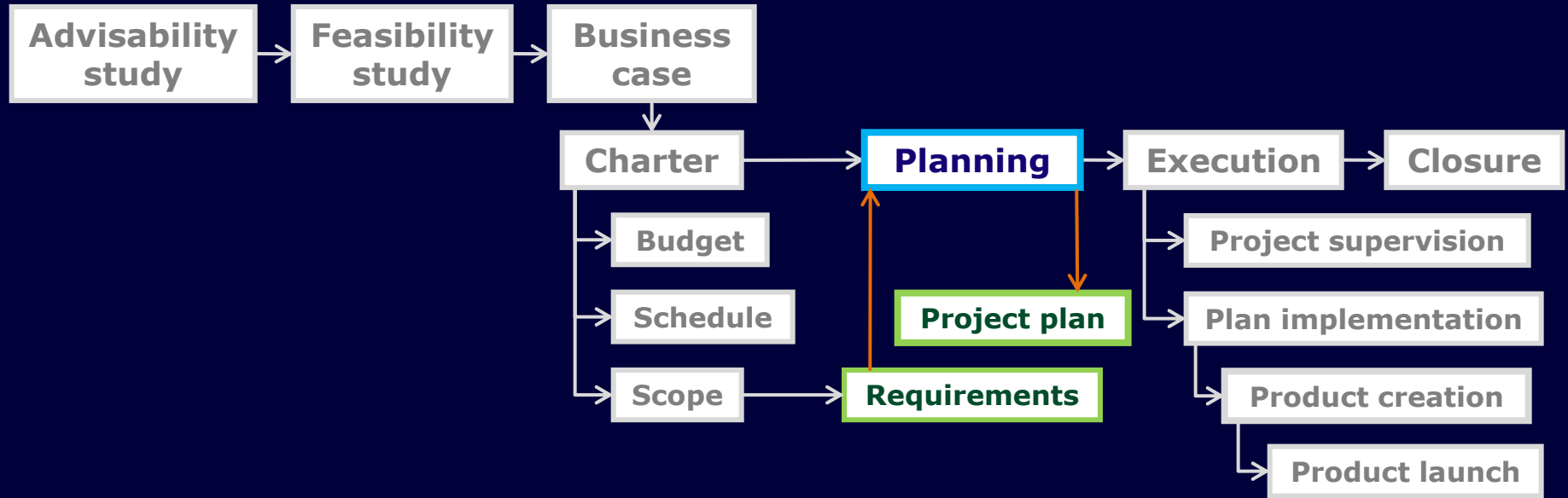### Overview
WBS, Tasks, Network diagram
Resources, Scheduling

neil@minkley.fr

Project life cycle detailed summary

Advisability study → Feasibility study → Business case

Business case → Charter

Charter → Planning → Execution → Closure

Charter → Budget
Charter → Schedule
Charter → Scope

Scope → Requirements
Requirements → Planning
Planning → Project plan
Project plan → Execution

Execution → Project supervision
Execution → Plan implementation
Plan implementation → Product creation
Product creation → Product launch

Plan implementation → Project team
Plan implementation → Contractors

Product creation → (bottom section)

Requirements → Design
Design → Content creation
Design → Software coding
Content creation → Integration
Software coding → Integration
Integration → Testing & Acceptance
Testing & Acceptance → Deployment

Requirements specification > Planning

```
┌─────────────┐   ┌─────────────┐   ┌─────────────┐
│ Advisability│ → │ Feasibility │ → │  Business   │
│    study    │   │    study    │   │    case     │
└─────────────┘   └─────────────┘   └─────────────┘
                                           │
                                           ↓
                  ┌─────────────┐   ┌─────────────┐   ┌─────────────┐   ┌─────────────┐
                  │   Charter   │ → │  Planning   │ → │  Execution  │ → │   Closure   │
                  └─────────────┘   └─────────────┘   └─────────────┘   └─────────────┘
                         │                 │   ↑              │
                         ↓     ┌─────────────┐                ↓
                  ┌─────────┐  │   Budget    │        ┌──────────────────┐
                  │ Budget  │  └─────────────┘        │ Project supervision │
                         ↓         ↓                  └──────────────────┘
                  ┌─────────┐  ┌─────────────┐        ┌──────────────────────┐
                  │Schedule │  │ Project plan│        │ Plan implementation  │
                  └─────────┘  └─────────────┘        └──────────────────────┘
                         ↓         ↑                           │
                  ┌─────────┐  ┌─────────────┐        ┌──────────────────┐
                  │  Scope  │ →│ Requirements│        │ Product creation │
                  └─────────┘  └─────────────┘        └──────────────────┘
                                                              │
                                                      ┌──────────────────┐
                                                      │  Product launch  │
                                                      └──────────────────┘
```

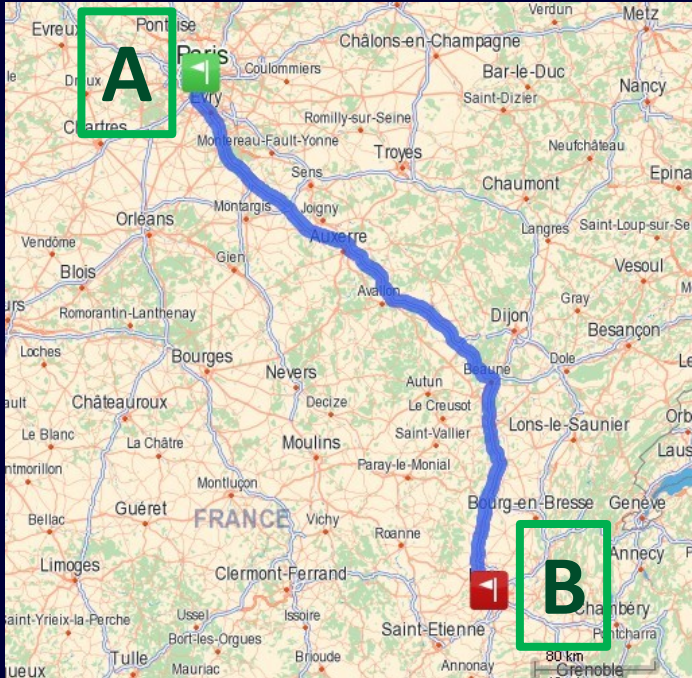# Project: getting from A to B
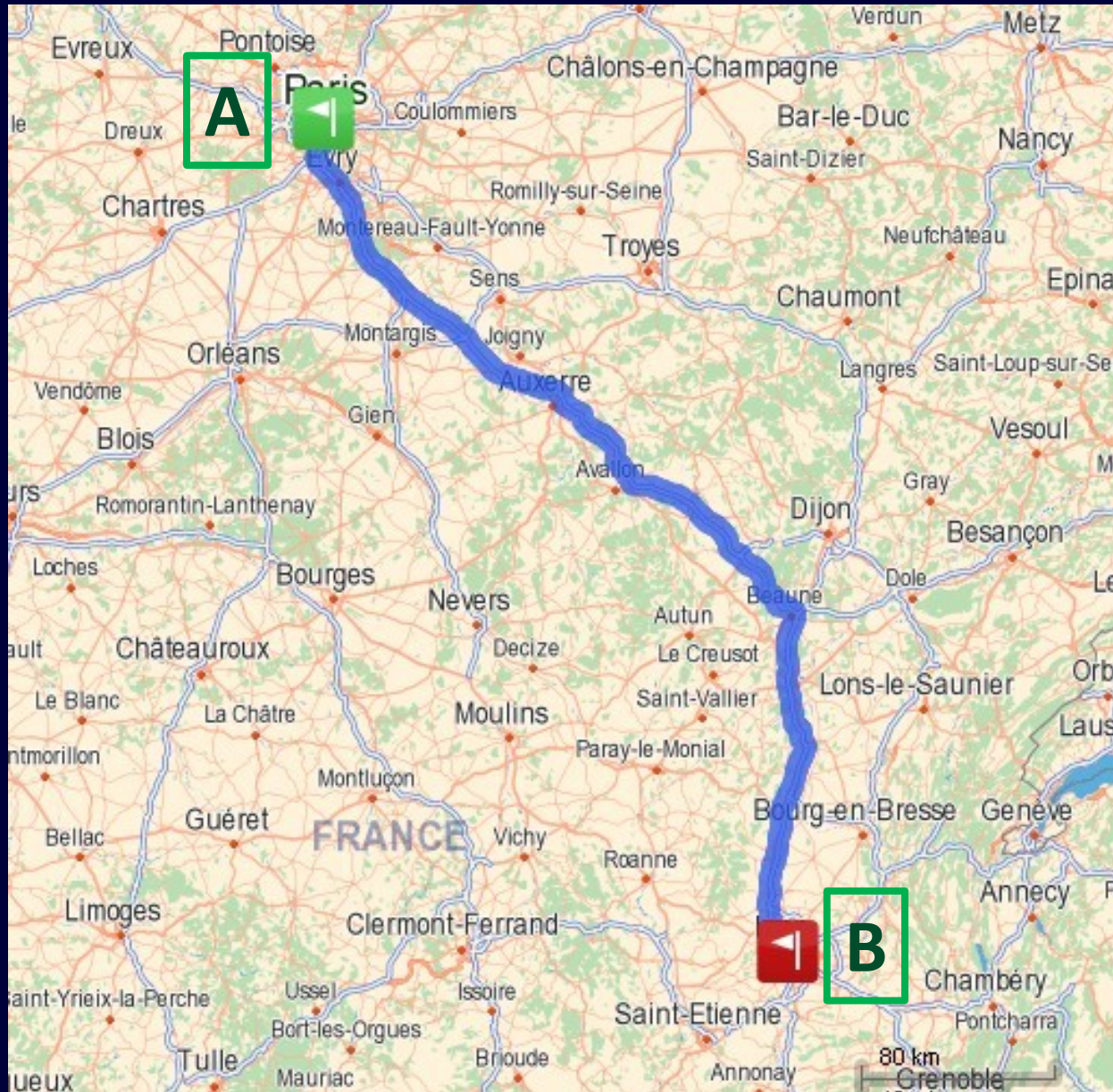
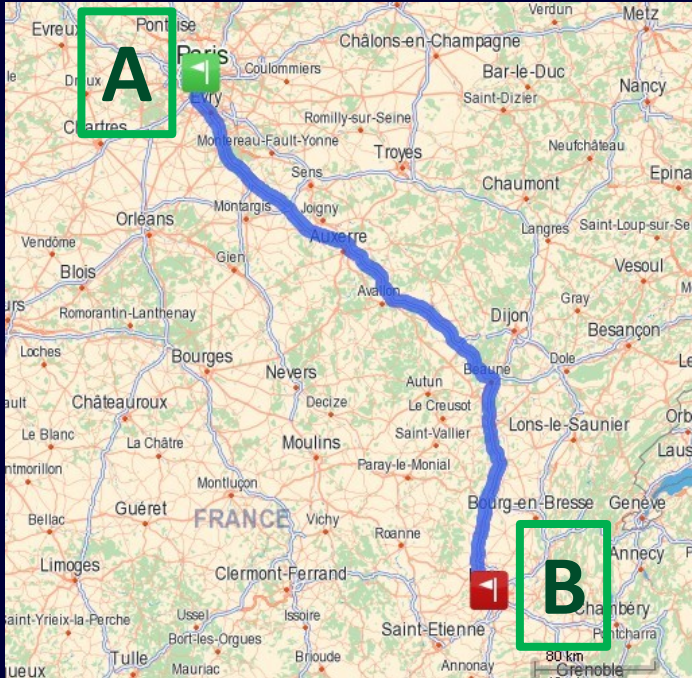# Project: getting from A to B
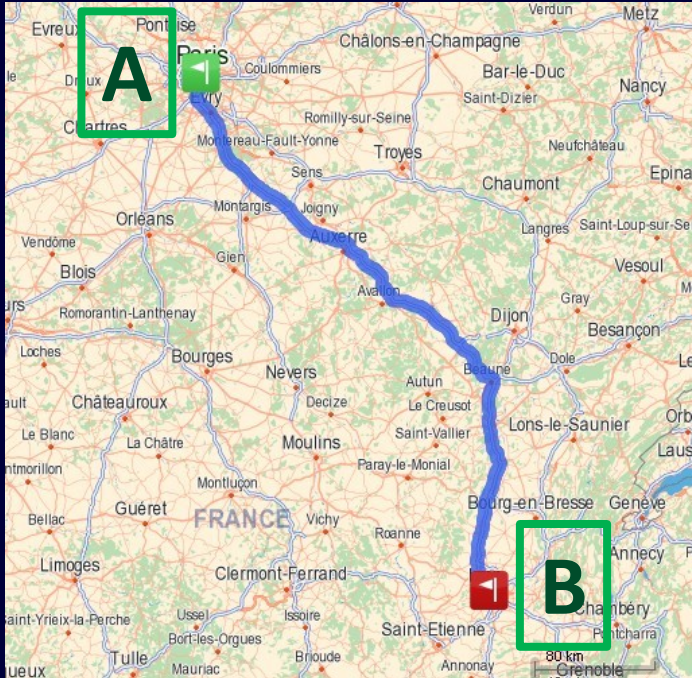
➤ **How do we get there?**

Project: getting from A to B

➢ **How do we get there?**

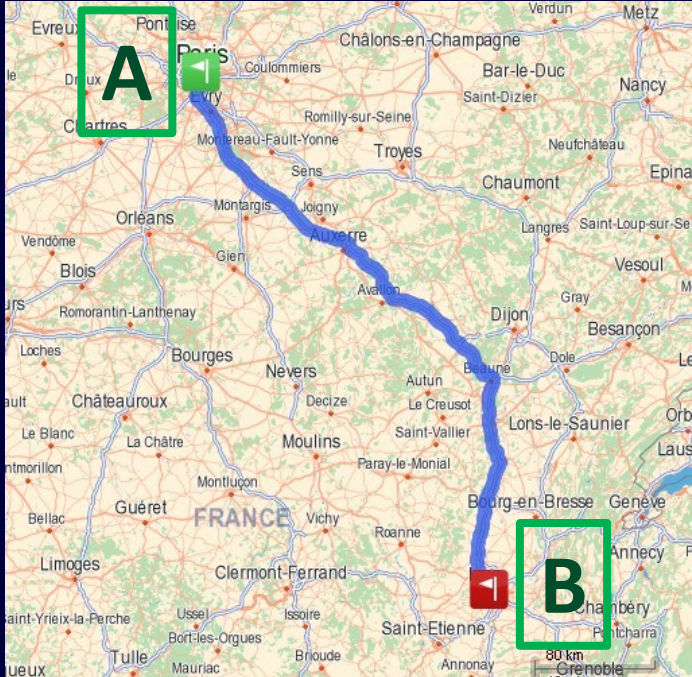➢ **What does it require?**

Project: getting from A to B

➢ **How do we get there?**

➢ **What does it require?**

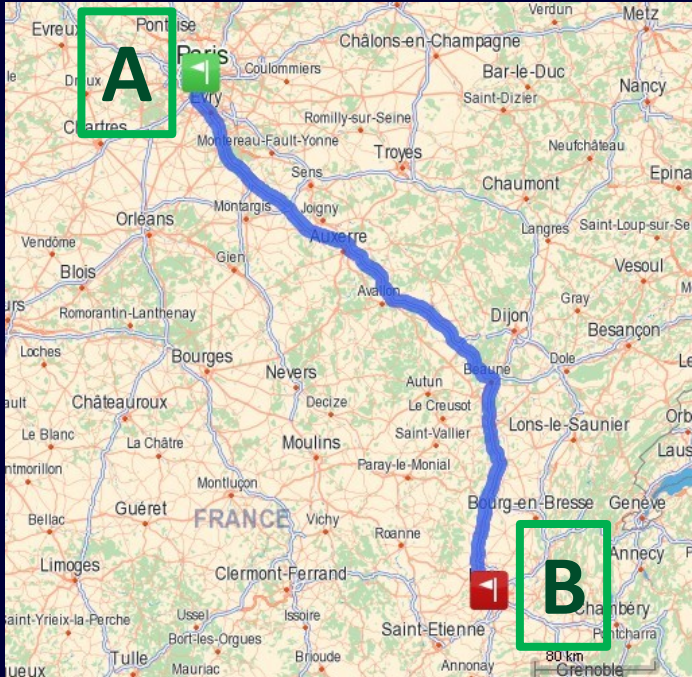➢ **How long will it take?**

Project: getting from A to B

➢ **How do we get there?**

➢ **What does it require?**

➢ **How long will it take?**

➢ **How much will it cost?**

Project: getting from A to B

- ➢ **How do we get there?**

- ➢ **What does it require?**

- ➢ **How long will it take?**

- ➢ **How much will it cost?**

- ➢ **What are the risks?**

Project: getting from A to B

- ➢ **How do we get there?**

- ➢ **What does it require?**

- ➢ **How long will it take?**

- ➢ **How much will it cost?**

- ➢ **What are the risks?**

- ➢ **How should the project be executed, monitored & controlled?**

Project: getting from A to B

➤ **Do it!**

Project: getting from A to B

➢ **Do it!**

➢ **Make sure you do it right!**

Project: getting from A to B
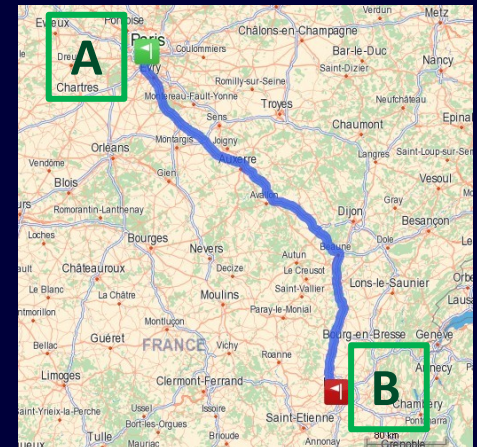

➢ **Do it!**

➢ **Make sure you do it right!**

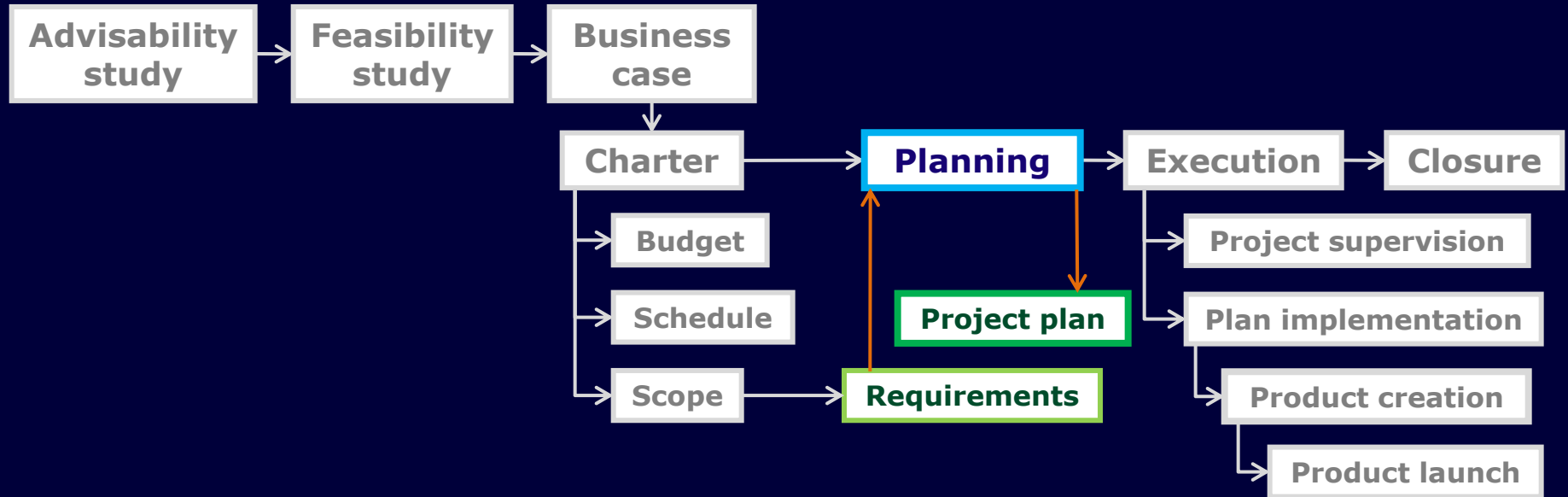➢ **Report back regularly!**

Project plan (1)
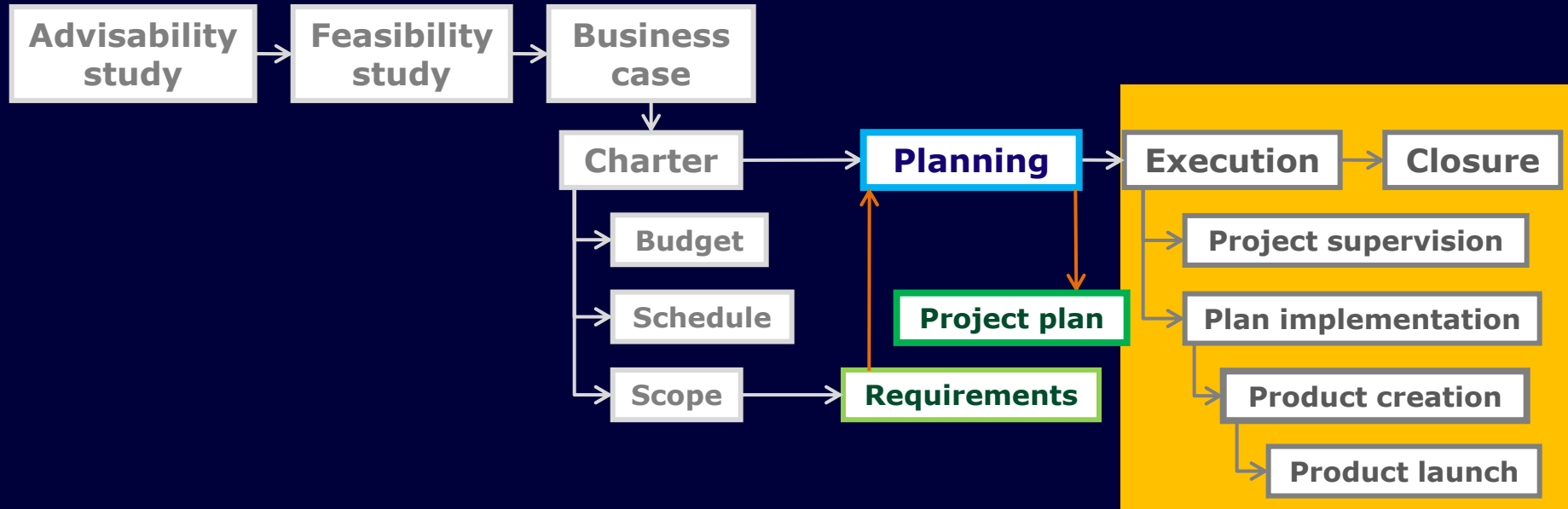
Road map for project execution, based on...

➤ **in-depth analysis of requirements**

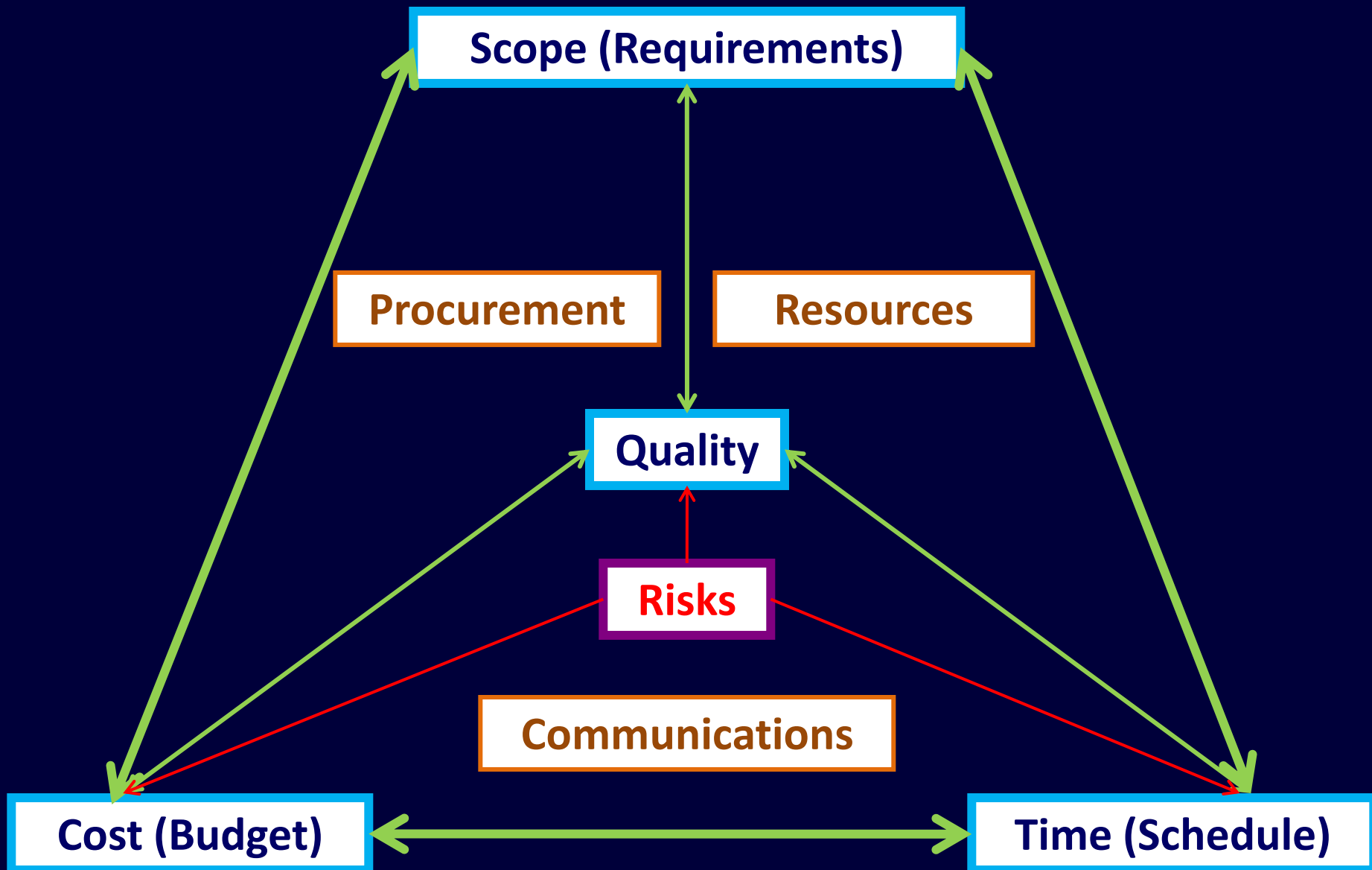➤ **identification and evaluation of the various components of the project**
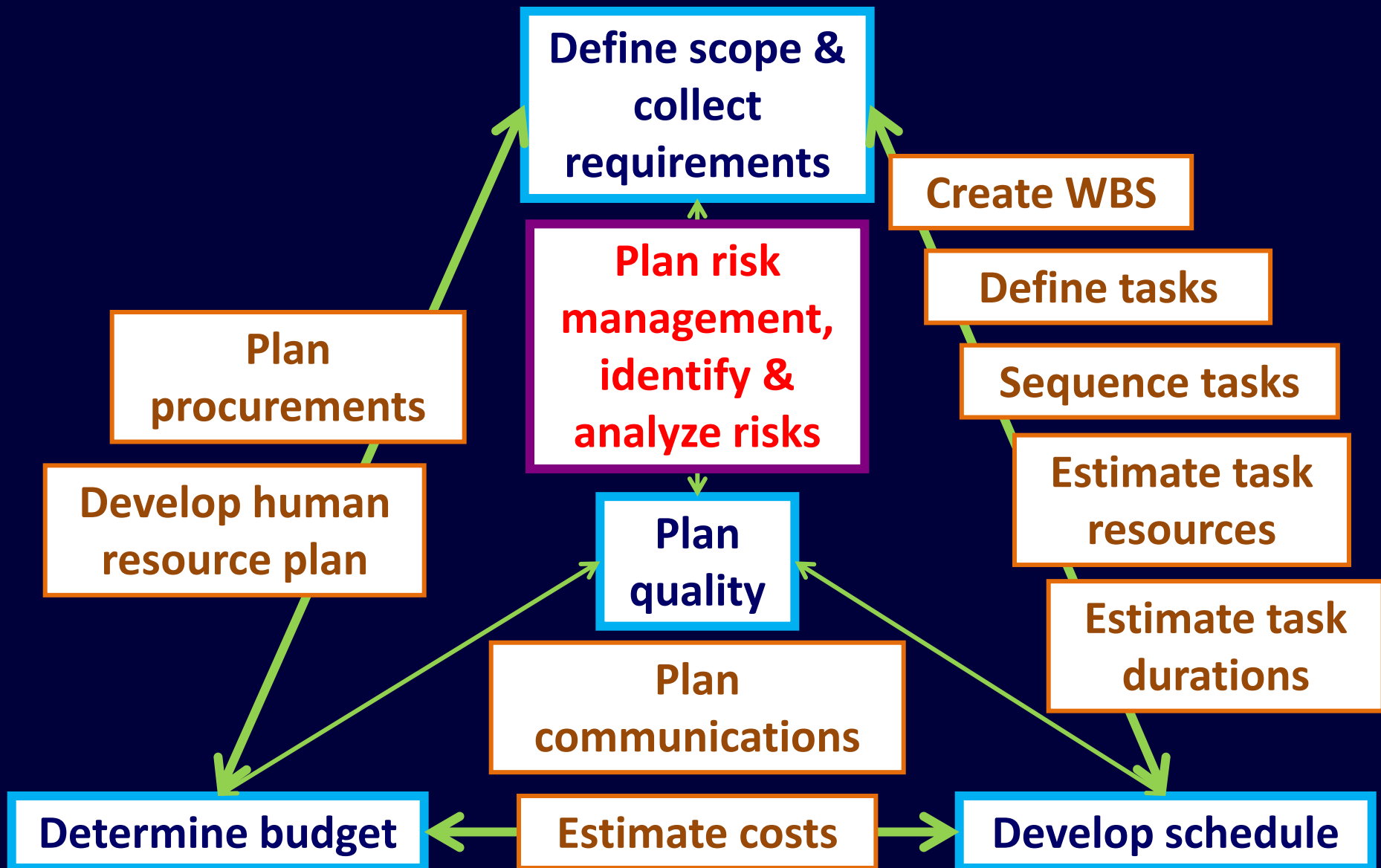
Project plan (2)

Advisability study	→	Feasibility study	→	Business case

Business case → **Charter**

Charter → **Planning** → **Execution** → **Closure**

Charter →
- → Budget
- → Schedule
- → Scope → **Requirements**

Requirements → **Planning**

Planning → **Project plan**

Execution →
- → Project supervision
- → Plan implementation
  - → Product creation
    - → Product launch

➢ **Detailed and comprehensive**

➢ **Master plan incorporating several subsidiary plans**

Project planning areas

Scope (Requirements)

Procurement

Resources

Quality

Risks

Communications

Cost (Budget)

Time (Schedule)

Project planning processes

Define scope & collect requirements

Create WBS

Plan risk management, identify & analyze risks

Define tasks

Plan procurements

Sequence tasks

Develop human resource plan

Plan quality

Estimate task resources

Estimate task durations

Plan communications

Determine budget
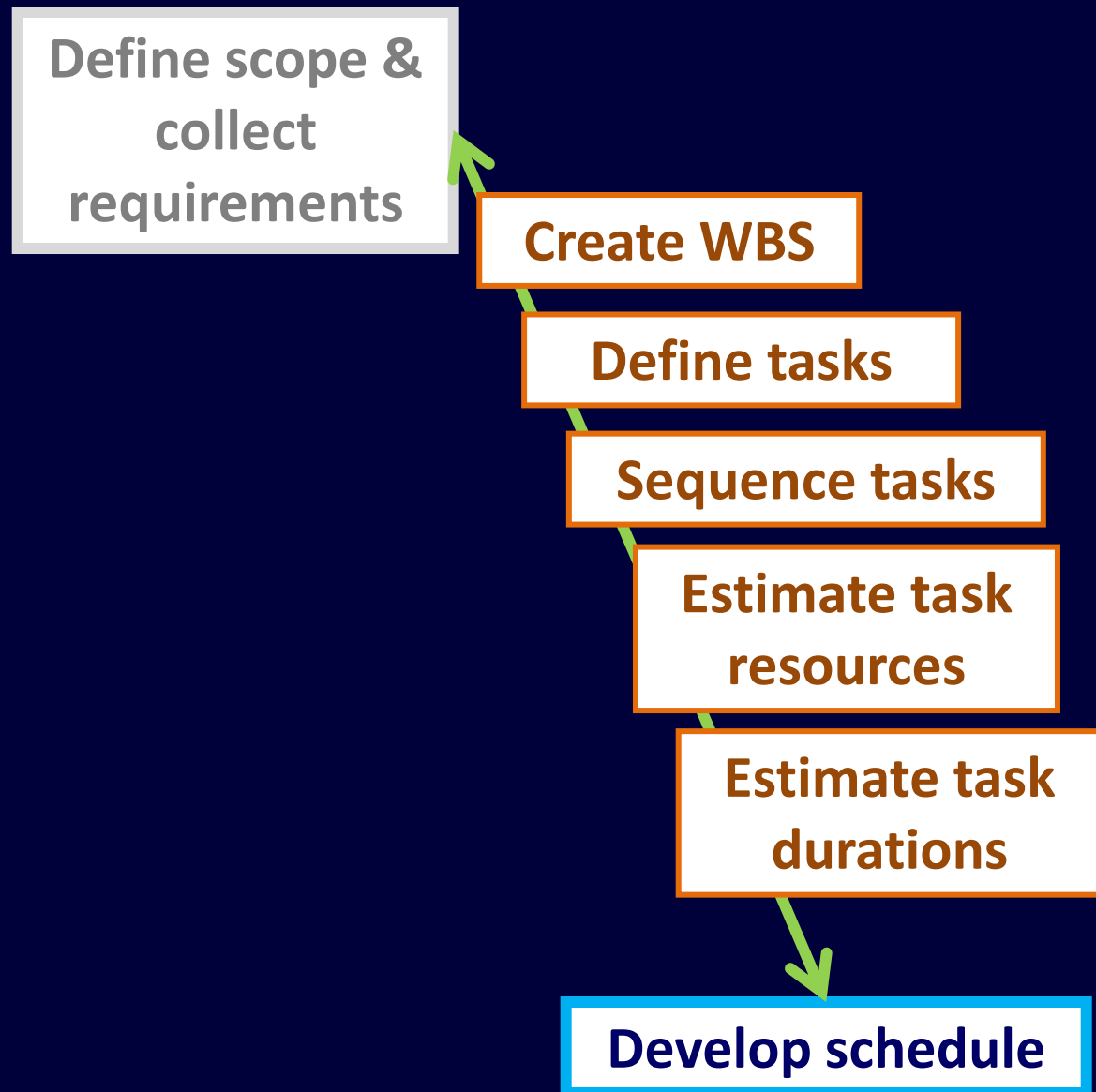
Estimate costs

Develop schedule

Define scope & collect requirements

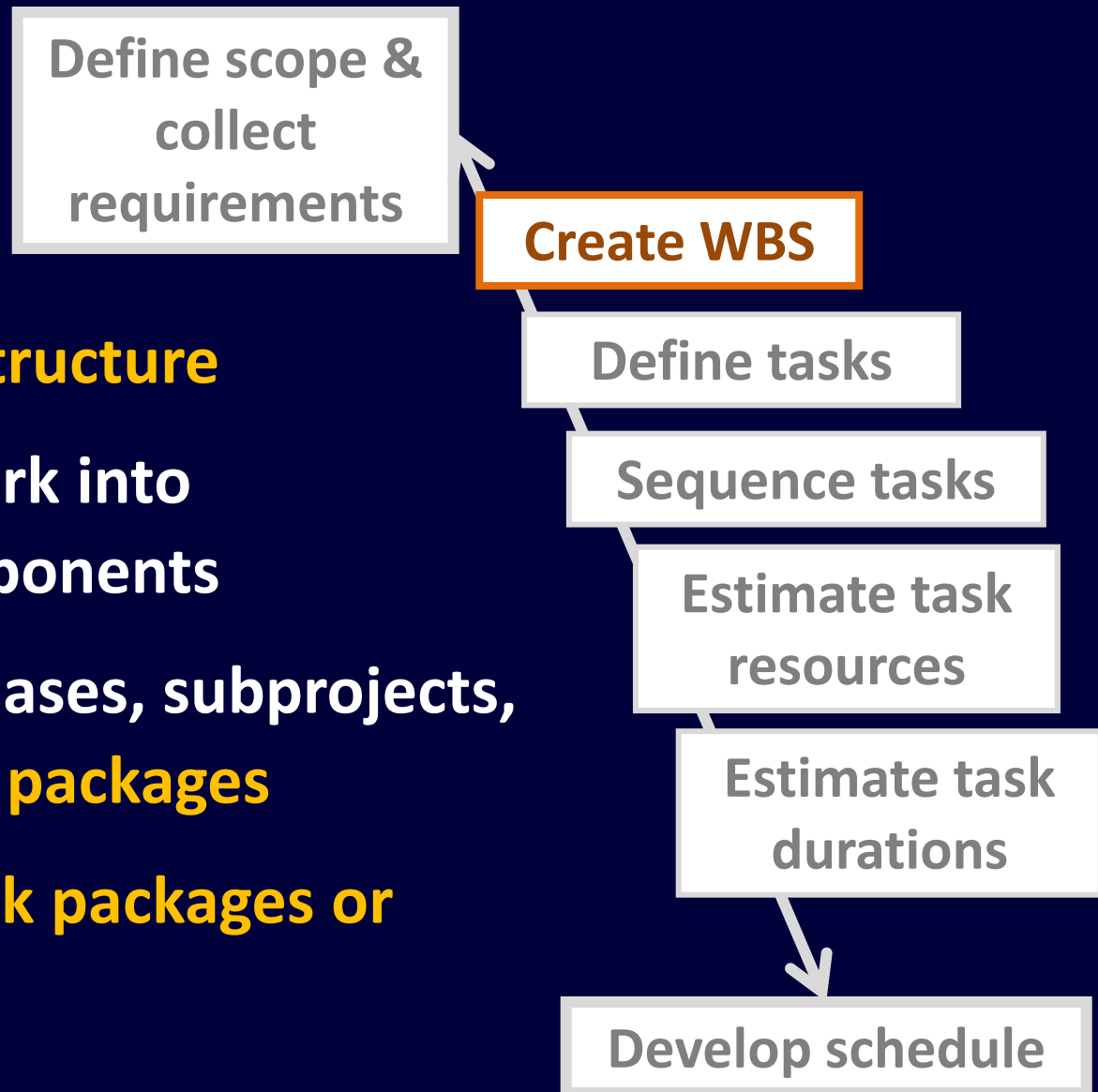**Define scope & collect requirements**

Scope & Requirements:

➢ **defined before the planning stage**

➢ **may be reviewed and refined at project execution time**

From scope/requirements to schedule

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Create WBS (1)

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Work Breakdown Structure

➢ **Subdivision of work into manageable components**

➢ **Higher levels = phases, subprojects, work areas, work packages**

➢ **Lower level = work packages or tasks**

Create WBS (2)

Define scope & collect requirements

Create WBS

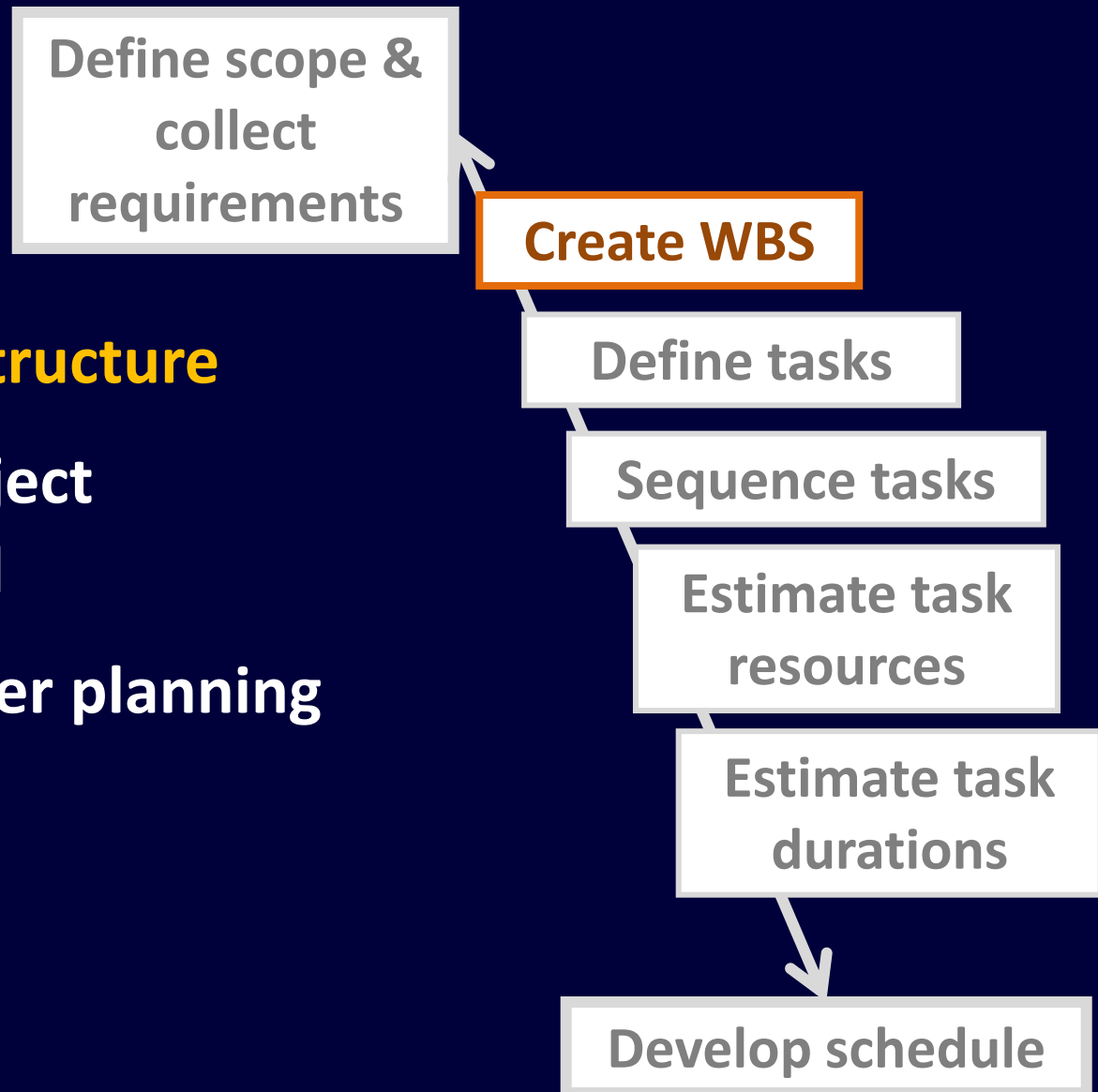**Define tasks**

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Work Breakdown Structure

➢ **"100% rule":**

✓ **all of the work to be done (no less, no more)**

➢ **Text outline and/or diagram**

Create WBS (3)

Define scope & collect requirements

Create WBS

Work Breakdown Structure

➢ **Fundamental project management tool**

➢ **Reference for other planning processes**

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Create WBS (4)

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule
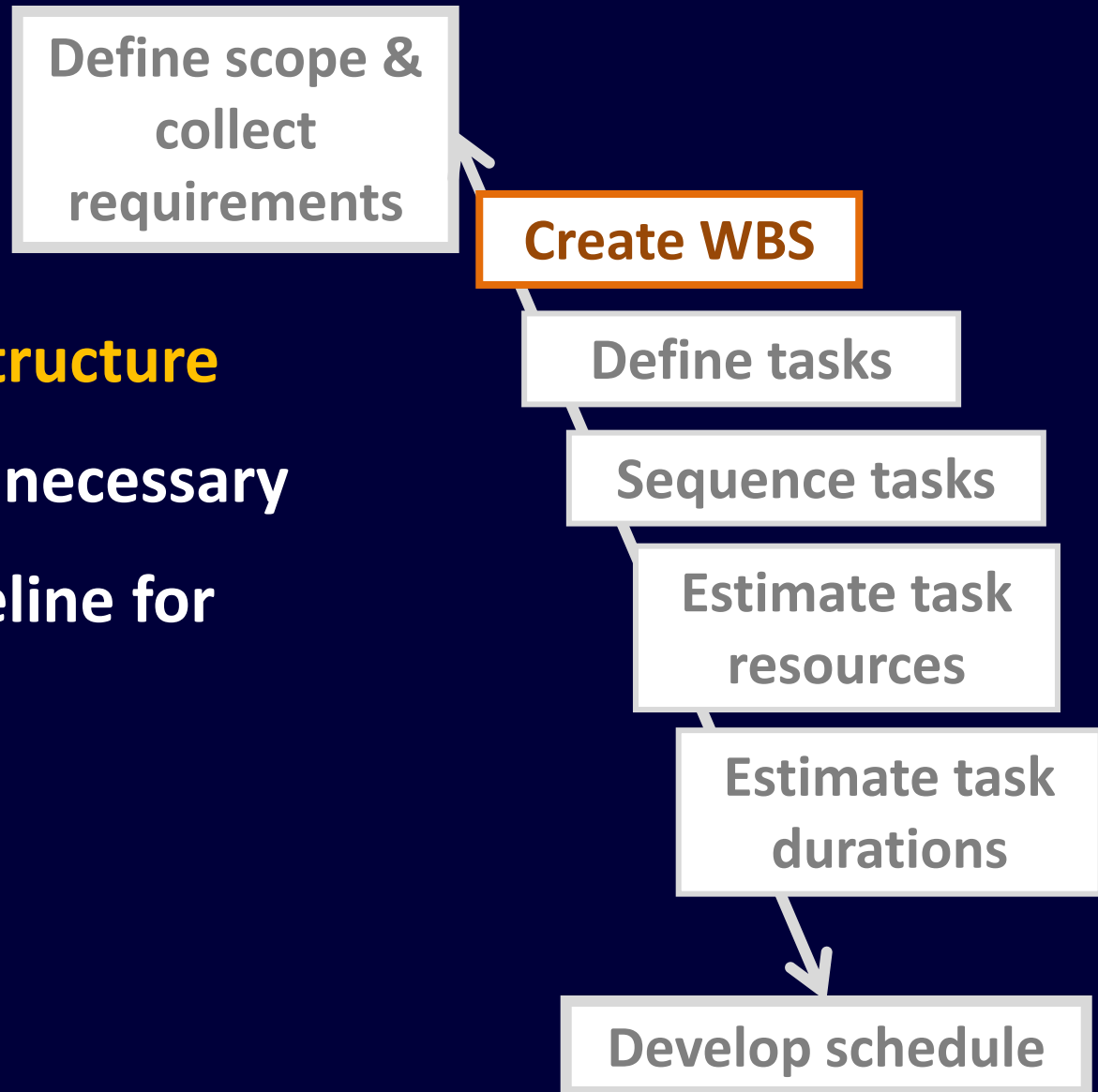
Work Breakdown Structure

- ➢ **Revisions may be necessary**

- ➢ **Initial WBS = baseline for change control**

Create WBS (5)

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations
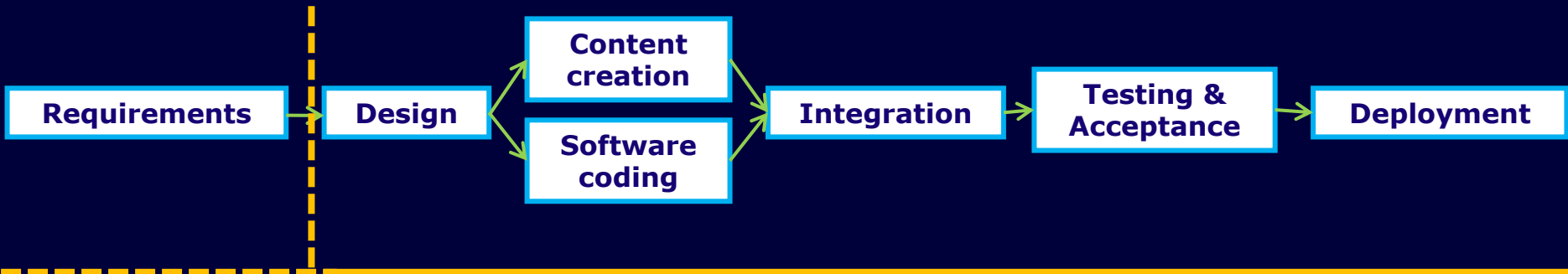
Develop schedule
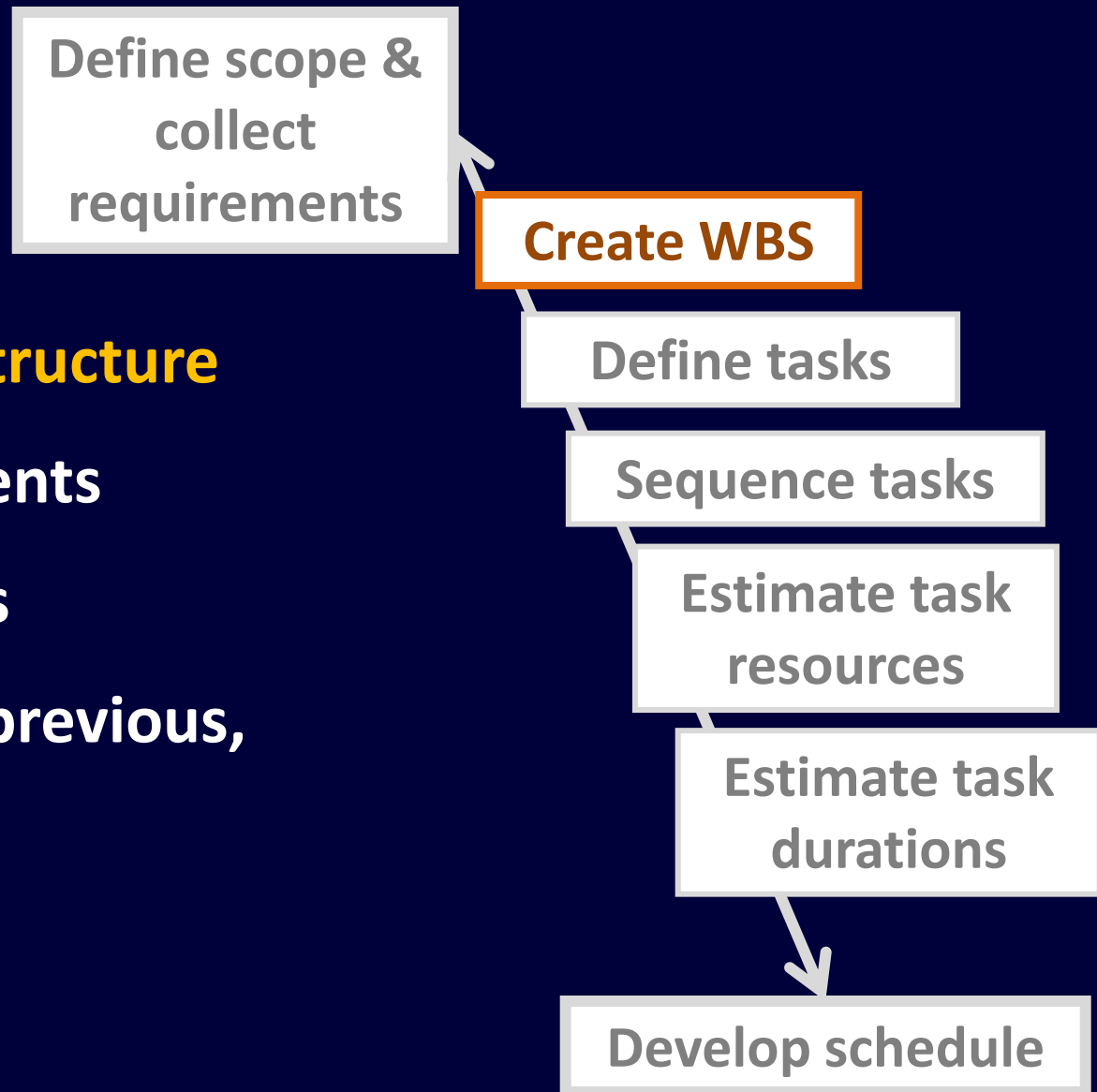
Work Breakdown Structure

➢ **Input = requirements**

➢ **Help from experts**

➢ **Experience from previous, similar projects**

➢ **Imagination!**

Major phases of product creation

```
Requirements → Design ⟶ Content creation
                      ⟶ Software coding
Content creation, Software coding → Integration → Testing & Acceptance → Deployment
```

➢ **Generally appear in the project's WBS**

Influence of model/methodology (1)

V model

Requirements

Acceptance test plan

Acceptance testing

System design

Integration test plan

Integration & System testing

Unit design

Unit test plan

Unit testing

Implementation
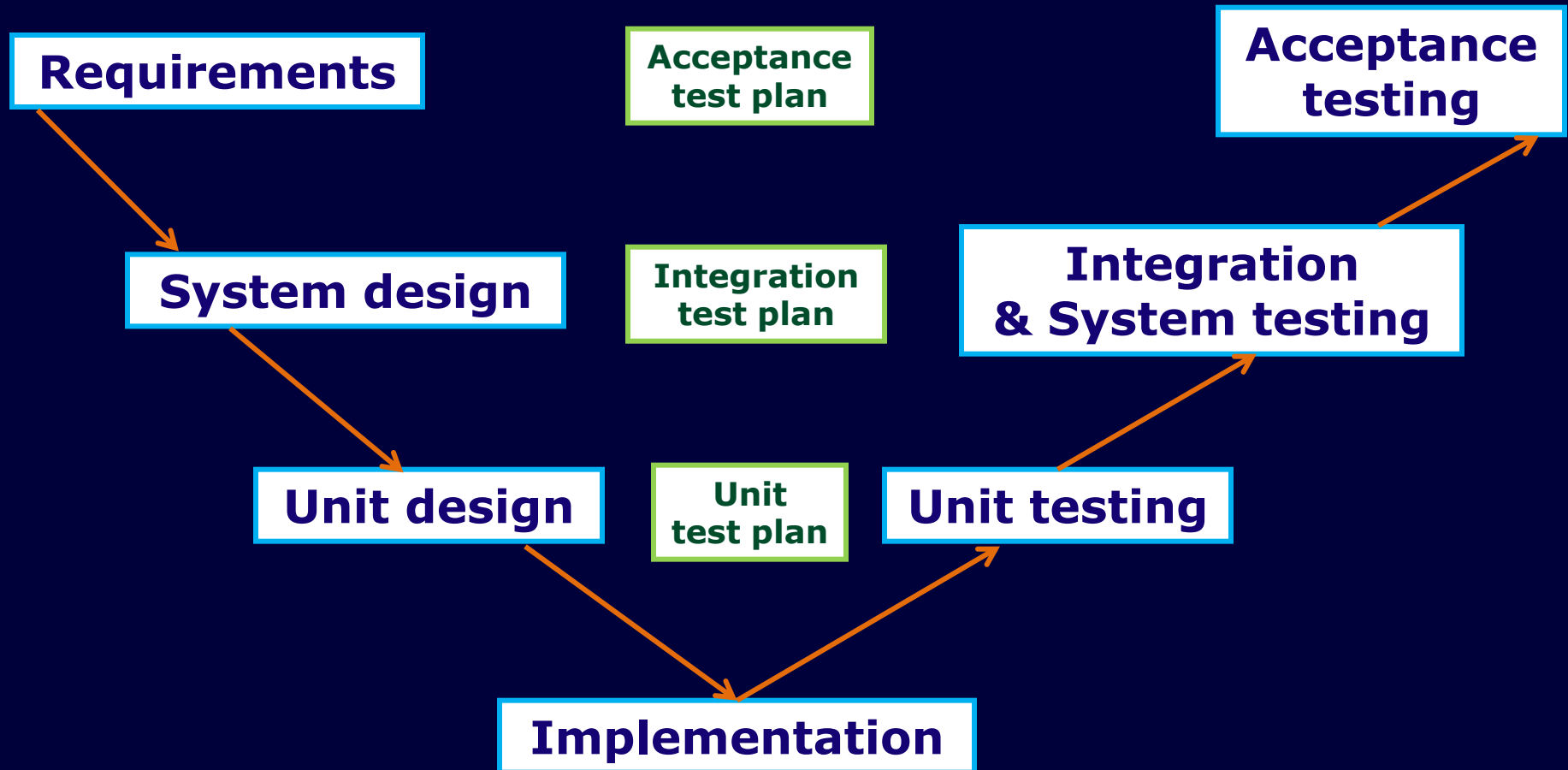
Influence of model/methodology (2)

Spiral model

Influence of model/methodology (3)

Requirements → Design → Content creation & Software coding → Integration → Testing & Acceptance → Deployment

XP Practices

Whole Team

Collective Ownership — Coding Standard

Test-Driven Development

Pair Programming — Refactoring

Customer Tests — Planning Game

Simple Design

Continuous Integration — Sustainable Pace

Metaphor

Small Releases

www.XProgramming.com
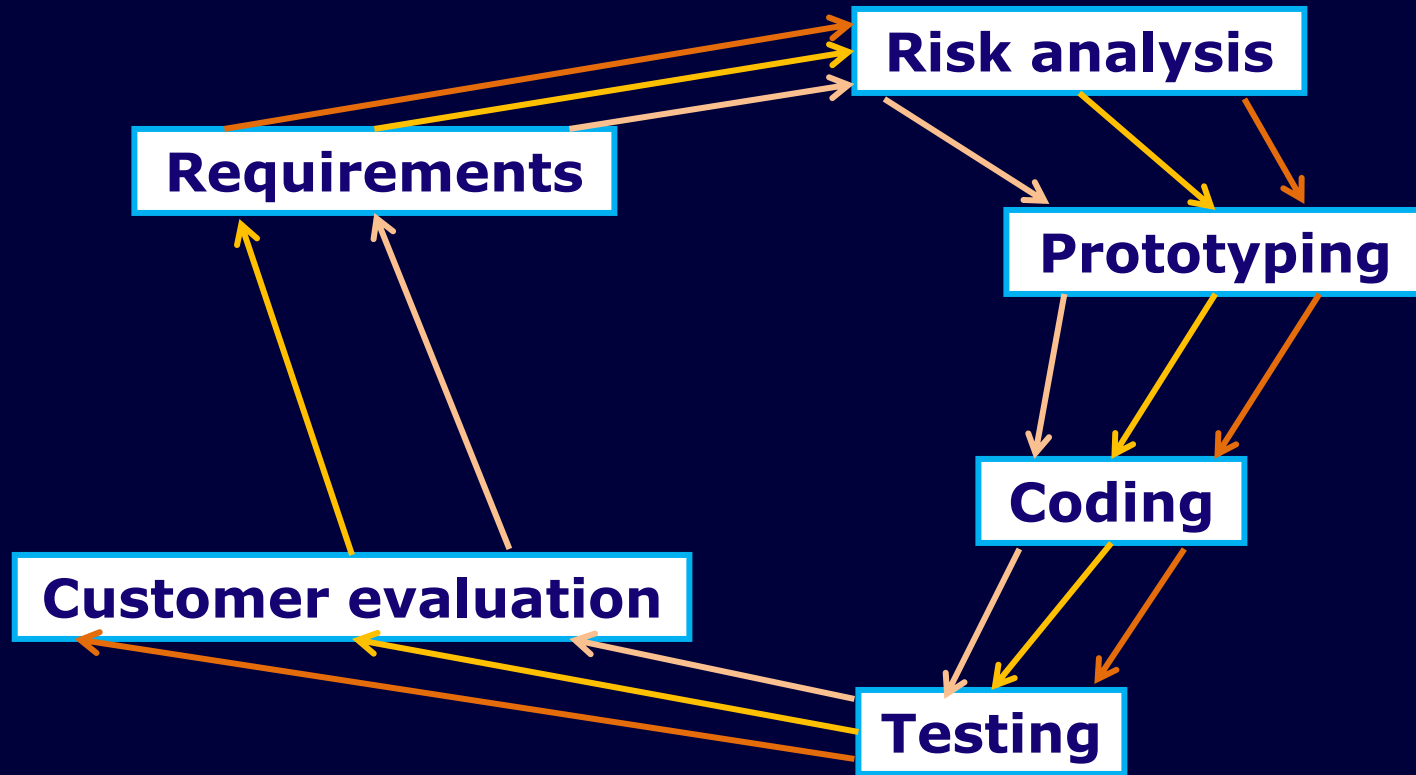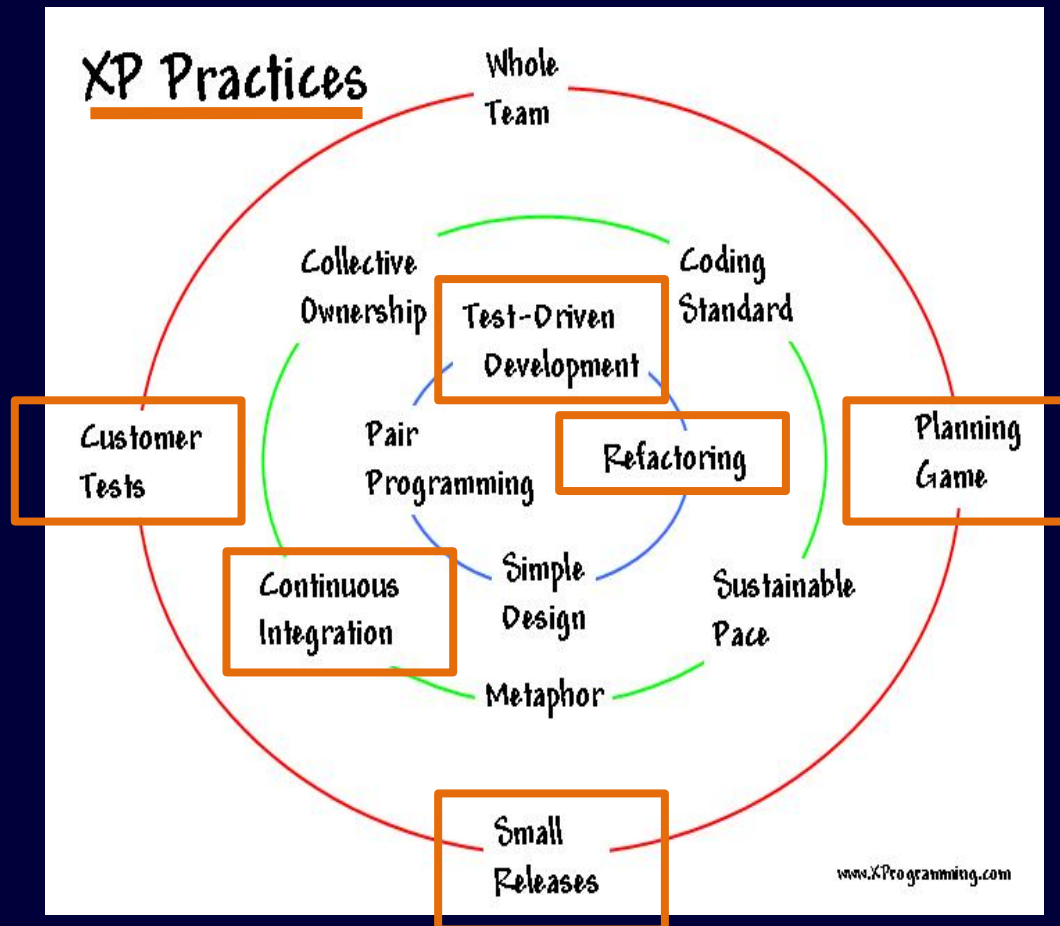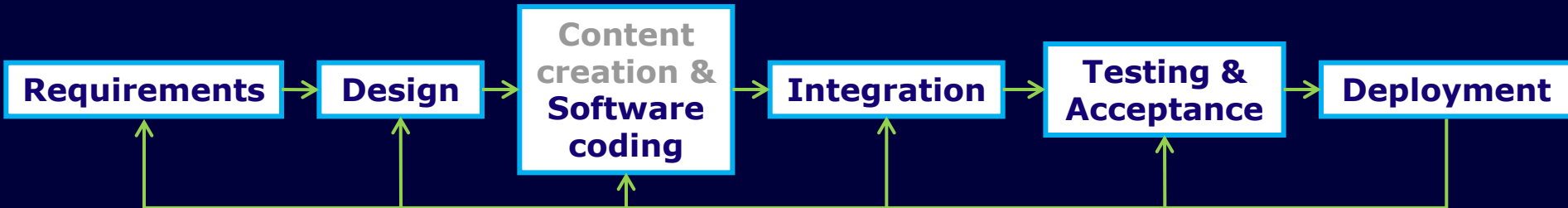
Example: WBS of EHM initial project

Tools
- Data architecture
- DTDs
- Editing tools
- Data consistency verification tools
- Technical support to editors
- Technical interface with developers

Content
- List of entries
- Writing/editing
- Media sourcing
- Animation scripting & coding
- Media captions
- Timeline
- Quiz
- Proofreading
- Text & media indexing
- Text & media linking

Software
- Training of developers
- Design specs
- Implementation
- Integration of content
- Testing
- Acceptance
- Delivery

Project Mgmt
- Requirements
- Planning
- Hiring
- Organization
- Procurement
- Quality assurance
- Risk mgmt
- Reporting & Communication
- Interfacing w/ Mktg & Sales
- Supervision
- Closure

Example: WBS of localization project

Product training for translators

Bilingual glossary creation

User interface translation

Help translation

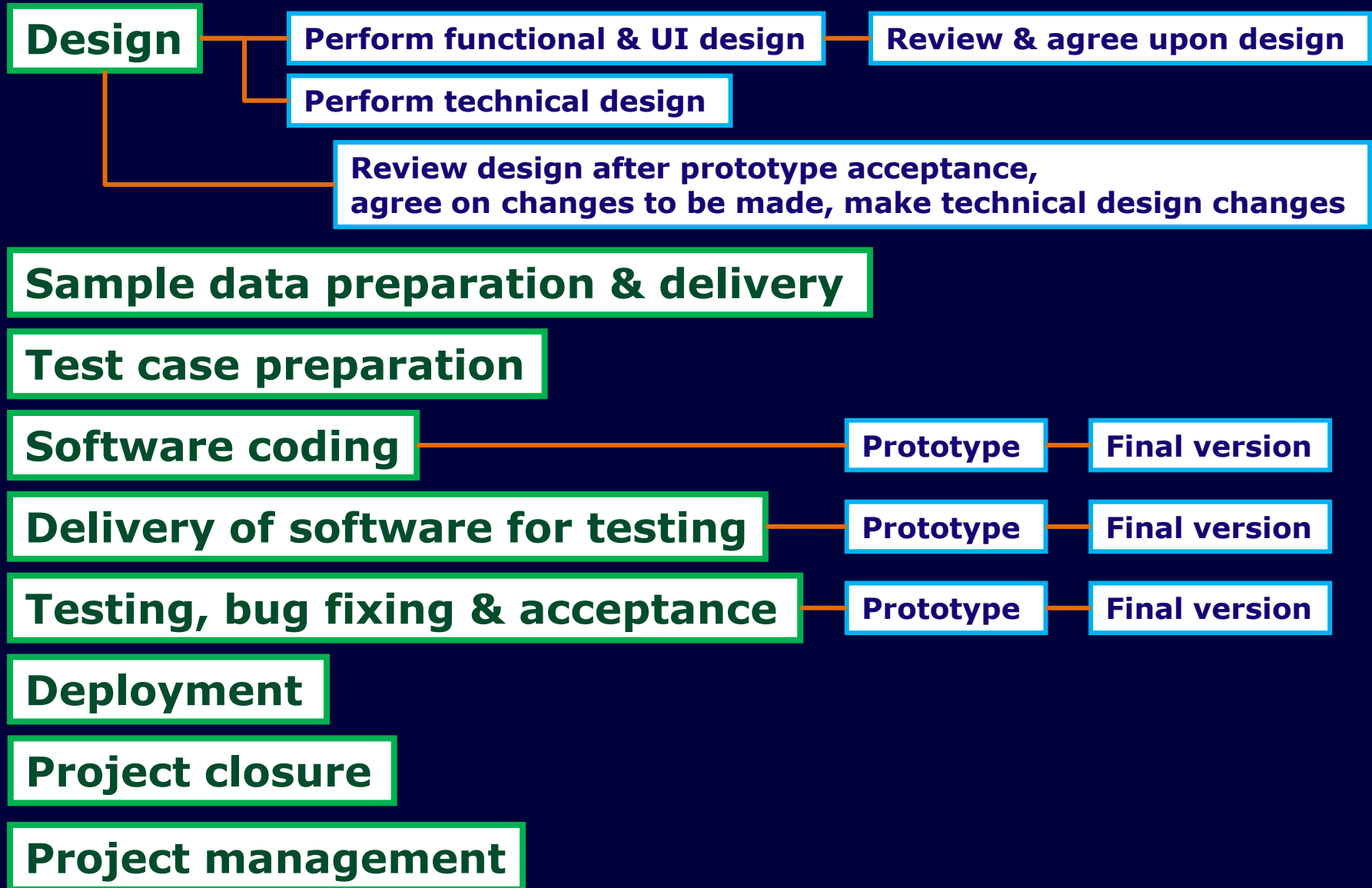Administrator's & Teacher's guides translation & illustration

Testing (proofreading)

Integration & Integration testing
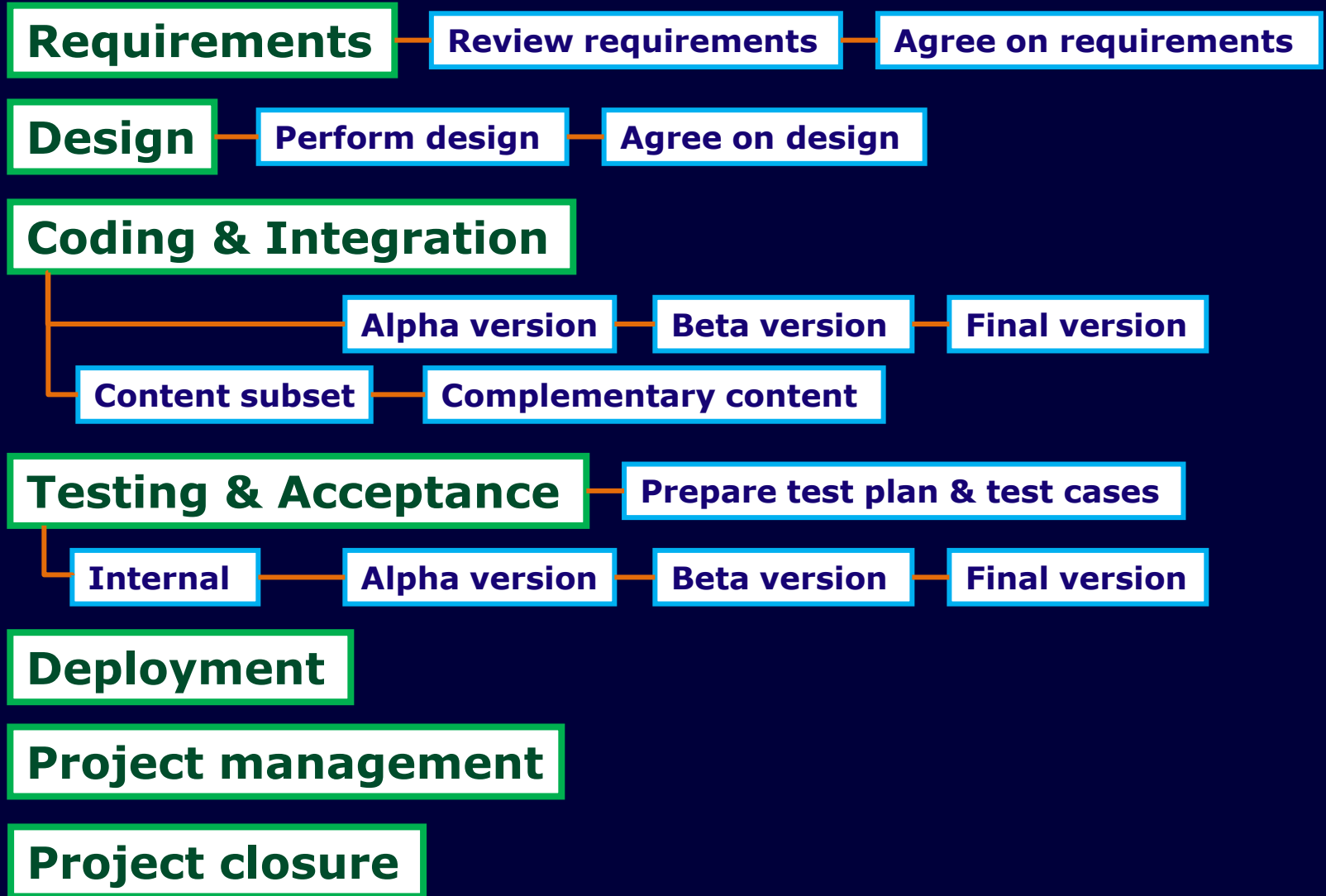
Project management

Project closure

Example: WBS of other project

Design — **Perform functional & UI design** — **Review & agree upon design**

Perform technical design

Review design after prototype acceptance, agree on changes to be made, make technical design changes

Sample data preparation & delivery

Test case preparation

Software coding — **Prototype** — **Final version**

Delivery of software for testing — **Prototype** — **Final version**

Testing, bug fixing & acceptance — **Prototype** — **Final version**

Deployment

Project closure

Project management

Example: Project EXONE (Contractor's WBS)

Requirements — Review requirements — Agree on requirements

Design — Perform design — Agree on design

Coding & Integration
- Alpha version — Beta version — Final version
- Content subset — Complementary content

Testing & Acceptance — Prepare test plan & test cases
- Internal — Alpha version — Beta version — Final version

Deployment

Project management

Project closure

Example: Project EXONE (Client's WBS)

Requirements — Review & agree on requirements w/ contractor

Software Design — Discuss & agree on design w/ contractor

Software implementation
- Alpha version — Beta version — Final version

Content creation & integration
- Creation, proofreading, preparation & delivery to contractor
- Content subset — Complementary content

Testing & Acceptance — Prepare test plan & test cases
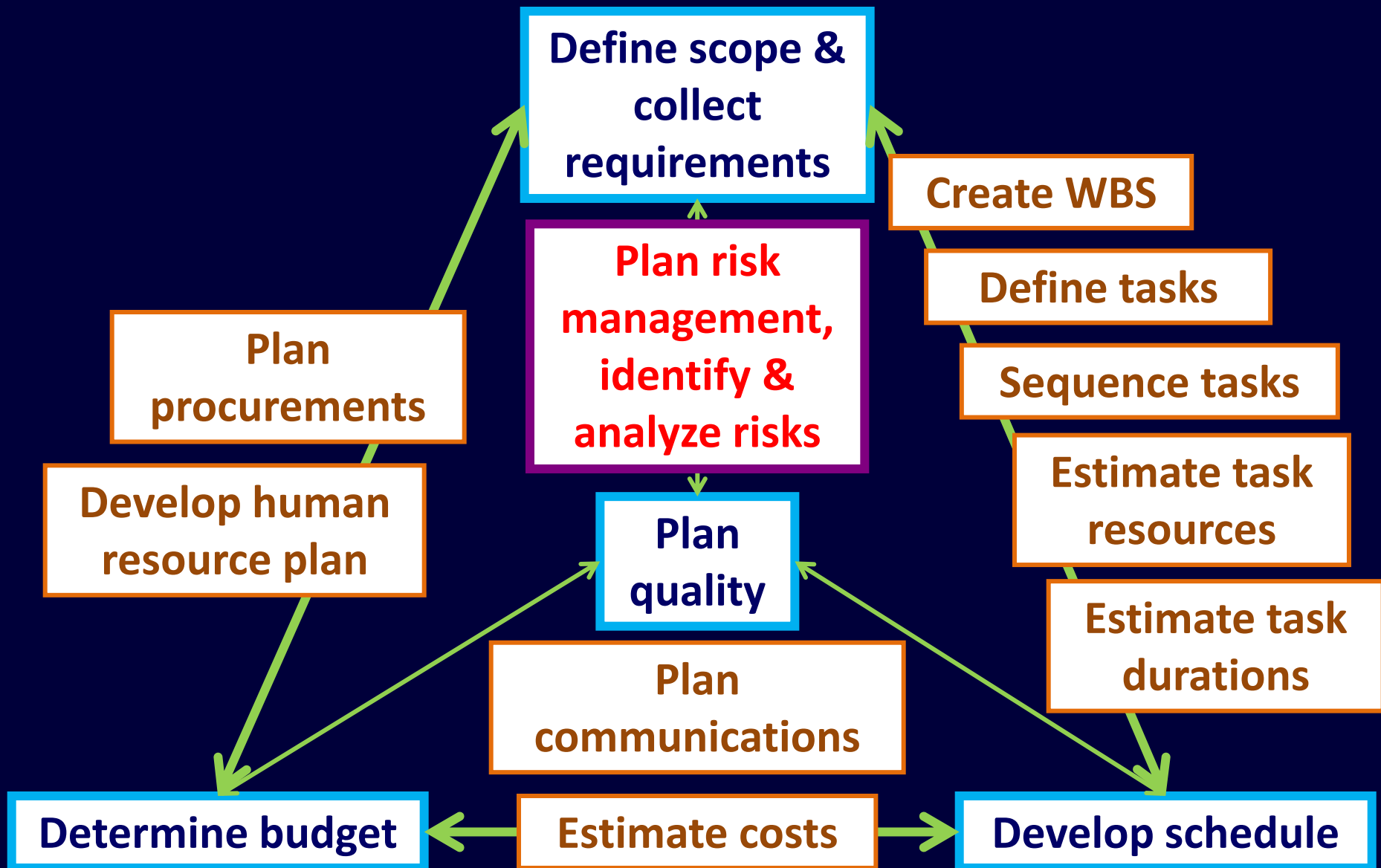- Alpha version — Beta version — Final version
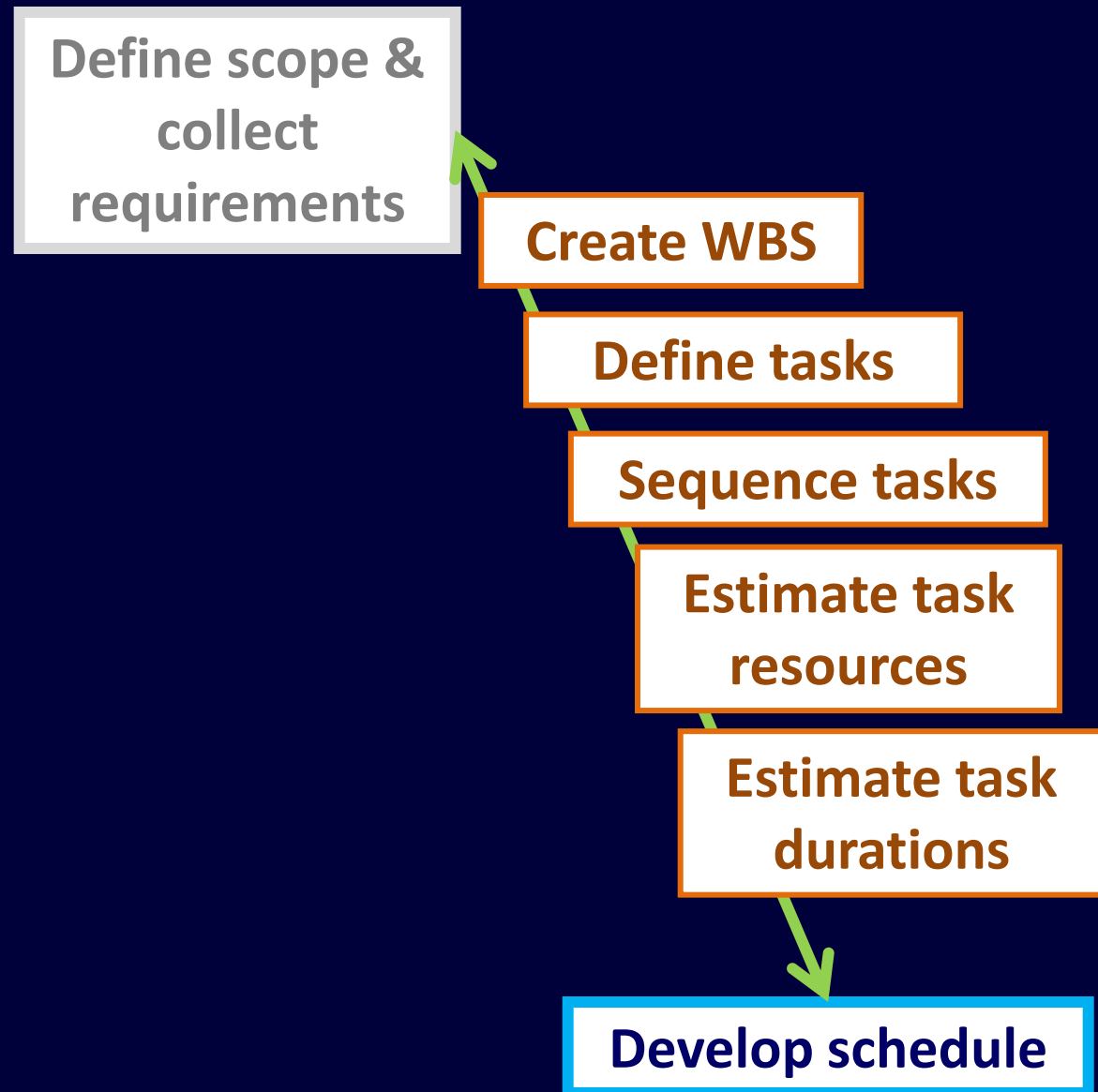
Deployment

Overall project management

Project closure

Questions?

Project planning processes

- Define scope & collect requirements
- Create WBS
- Define tasks
- Sequence tasks
- Estimate task resources
- Estimate task durations
- Plan procurements
- Develop human resource plan
- Plan risk management, identify & analyze risks
- Plan quality
- Plan communications
- Determine budget
- Estimate costs
- Develop schedule

From scope/requirements to schedule

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Tasks (1)

Define scope & collect requirements

Create WBS

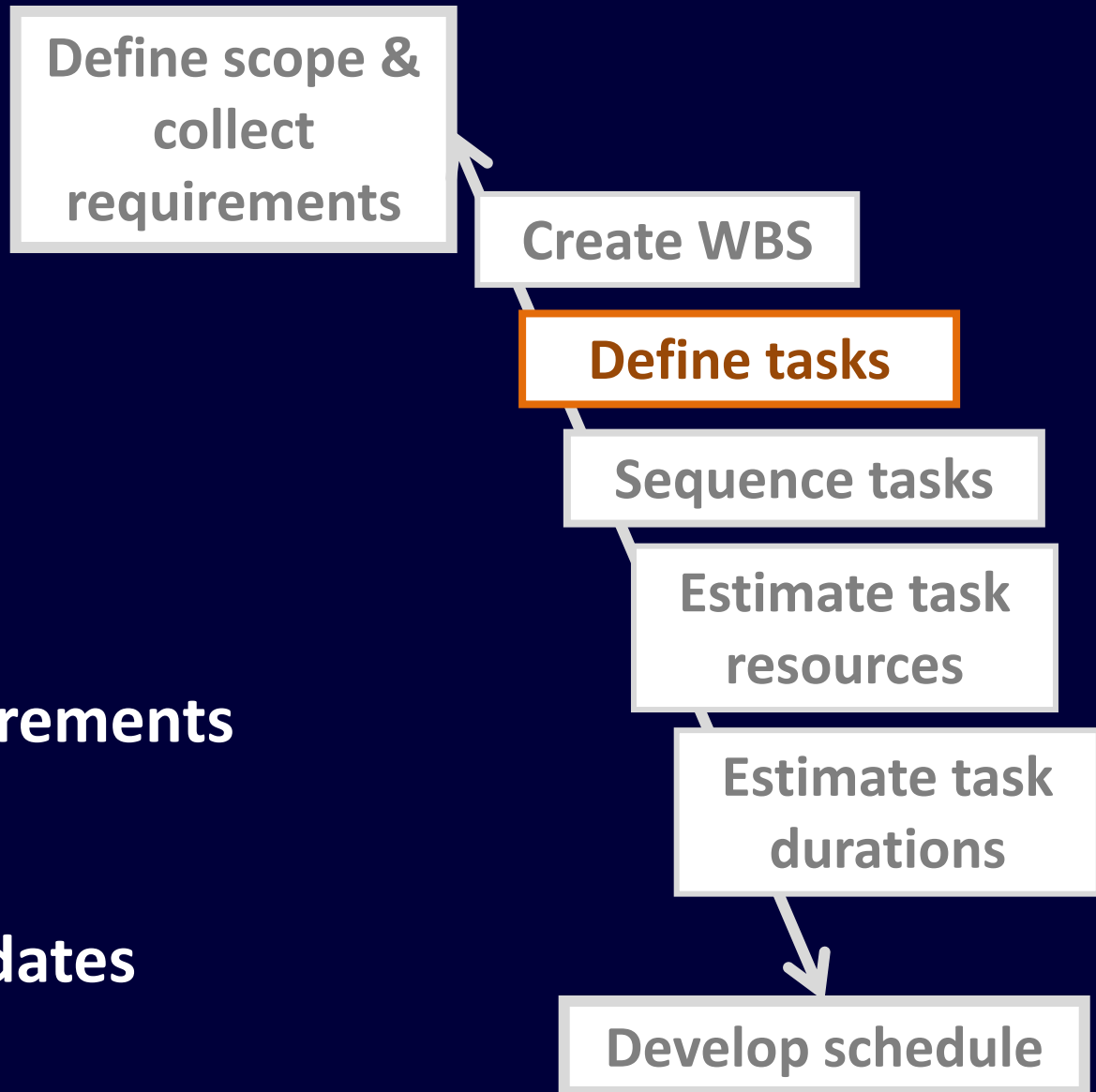**Define tasks**

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

➢ **Tasks are the basic components of work packages**

➢ **The "100% rule" applies to tasks in a WP**
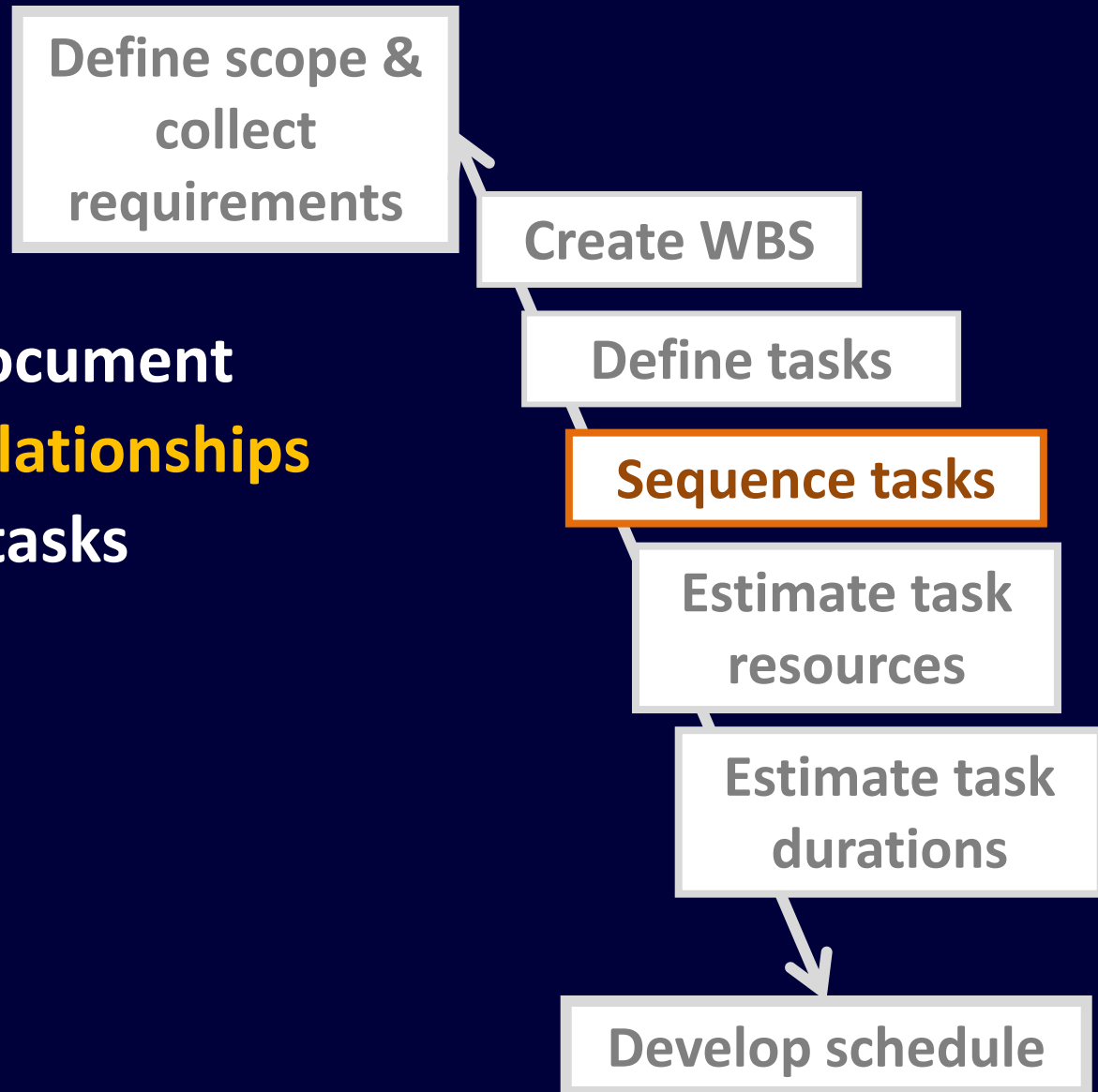
Tasks (2)

Task attributes:

- ✓ **identifier**
- ✓ **description**
- ✓ **resource requirements**
- ✓ **duration**
- ✓ **start and end dates**
- ✓ **etc.**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Sequence tasks

> **Determine and document (chrono)logical relationships between project tasks**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Define & Sequence tasks (1)

Defining & sequencing tasks made easier by first drawing a network diagram

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule
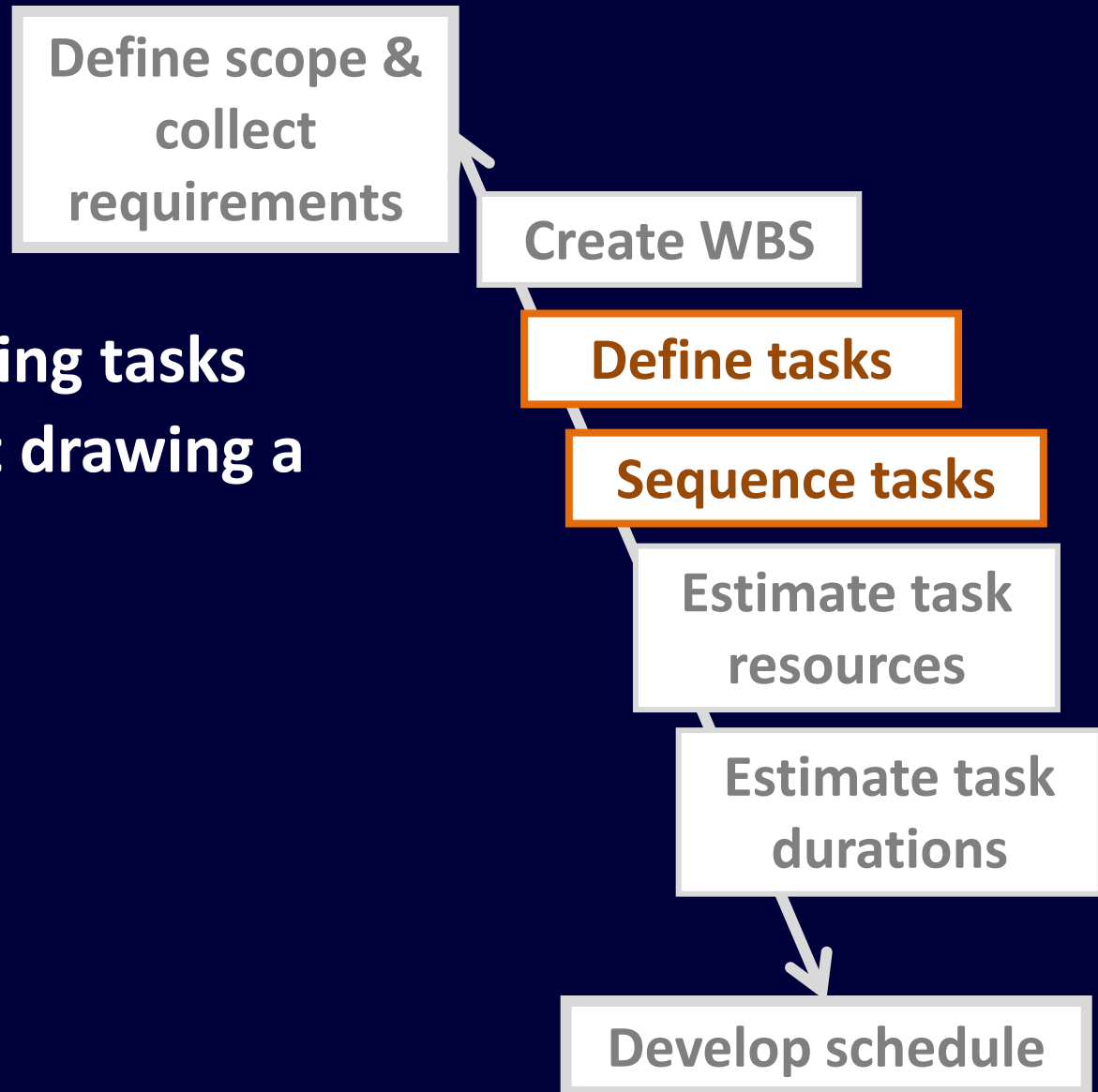
Define & Sequence tasks (2)

Network diagram

- **nodes = tasks**

- **arrows = relationships between tasks**

Task A → Task B → Task E
Task A → Task C → Task D → Task E

Define scope & collect requirements
→ Create WBS
→ **Define tasks**
→ **Sequence tasks**
→ Estimate task resources
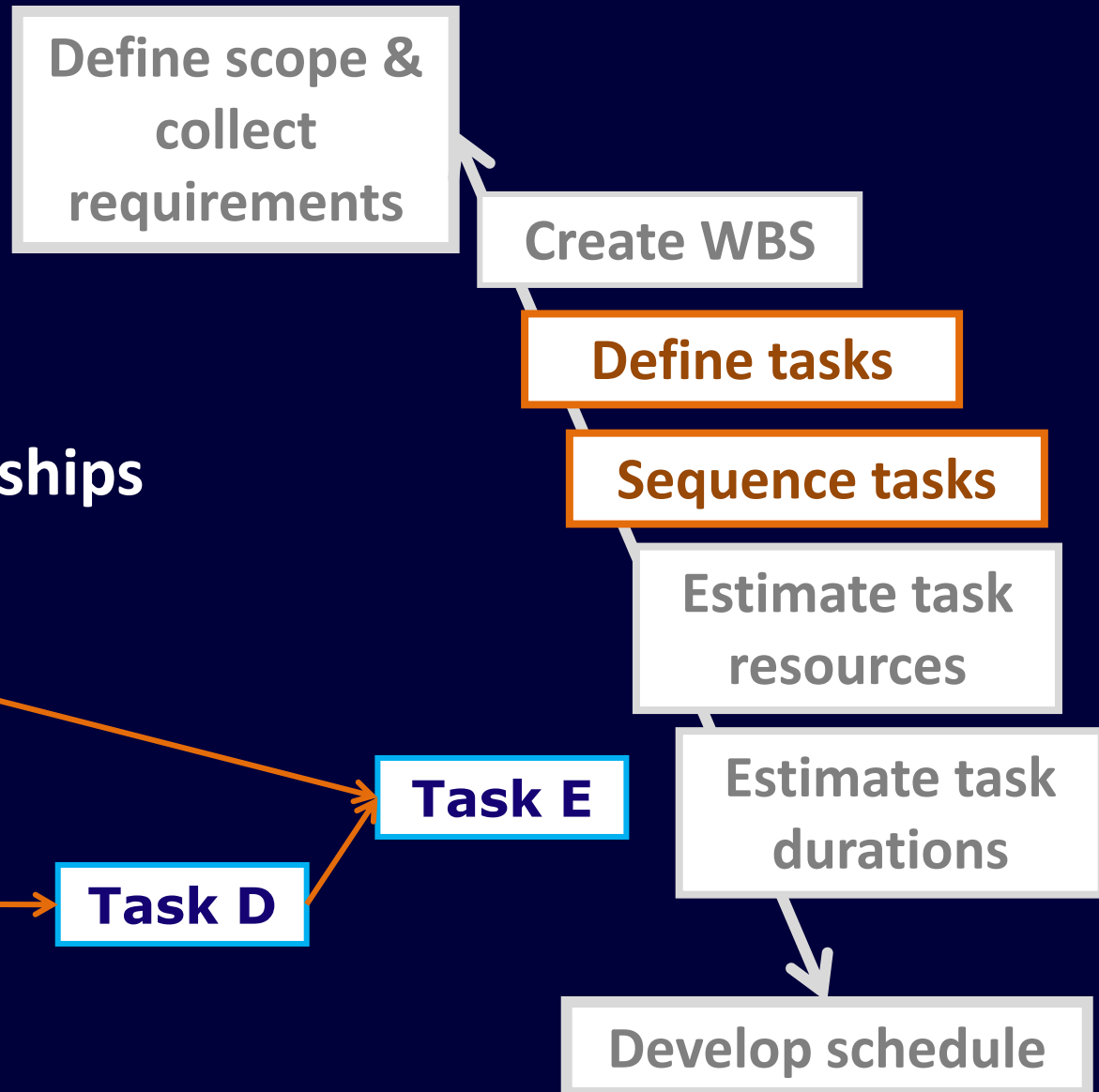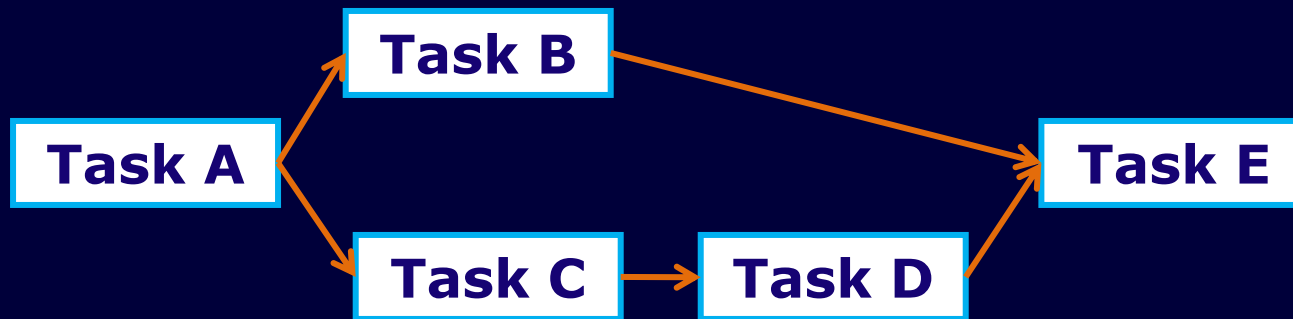→ Estimate task durations
→ Develop schedule

Diagram example: online store creation

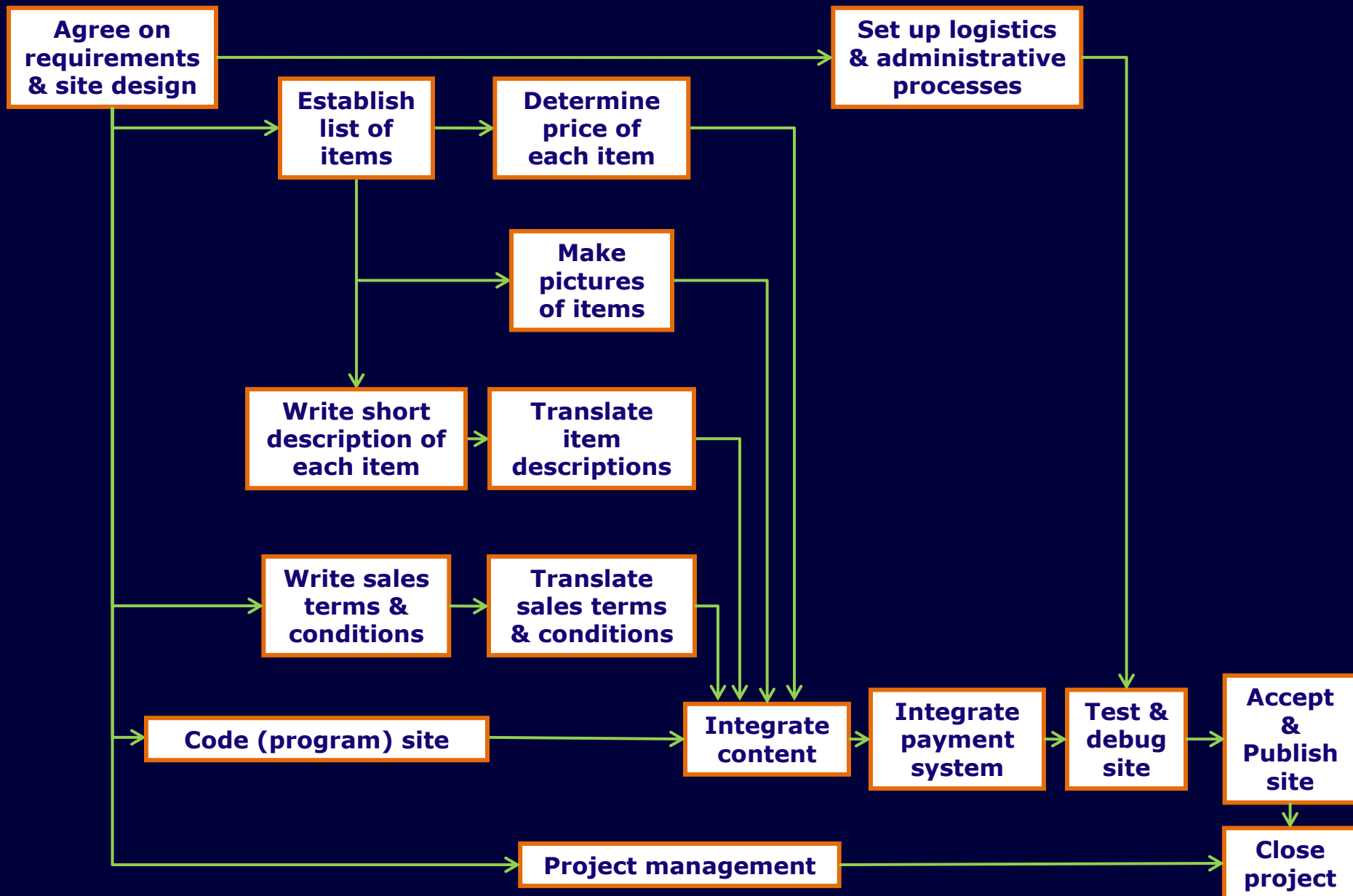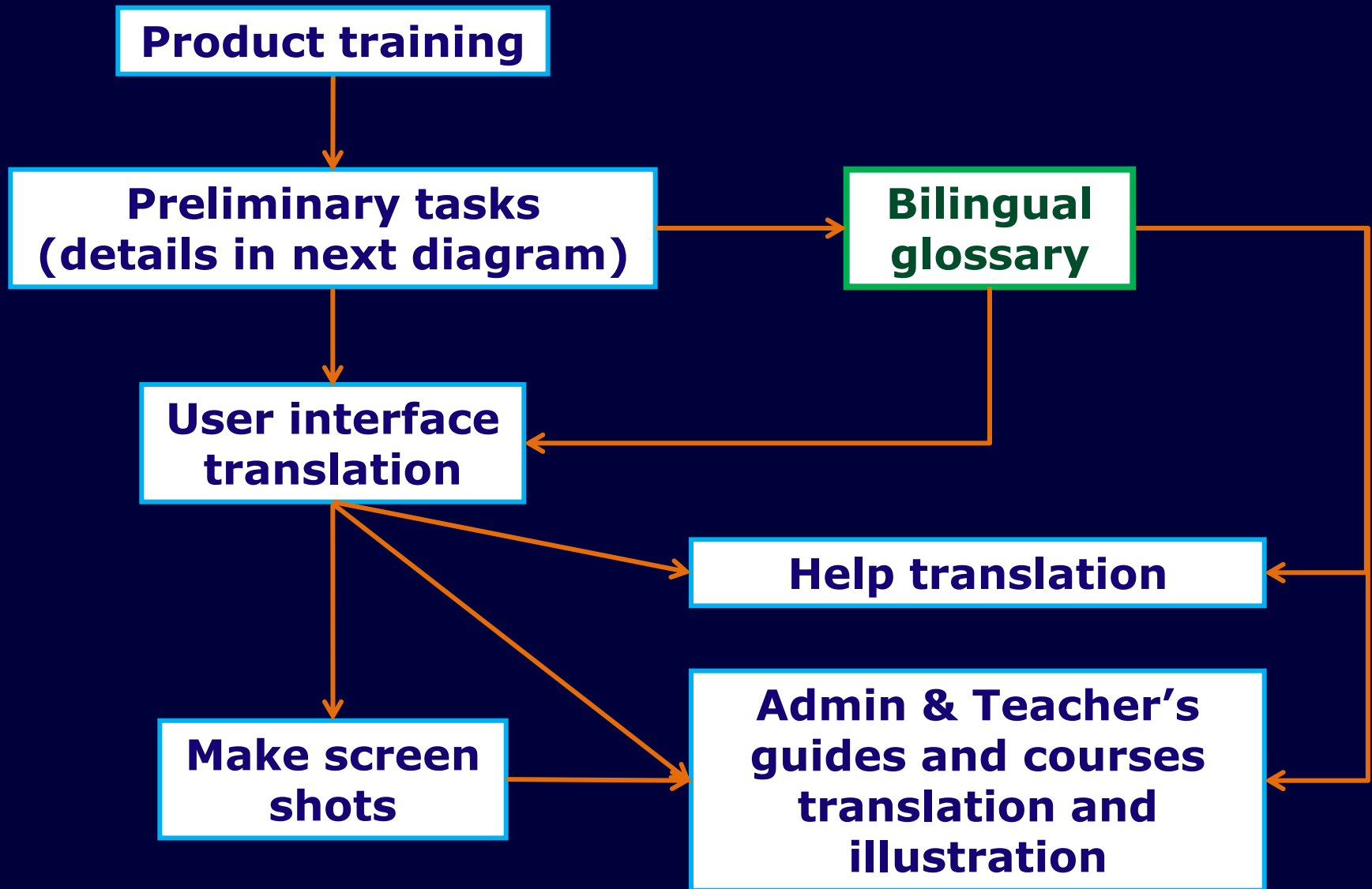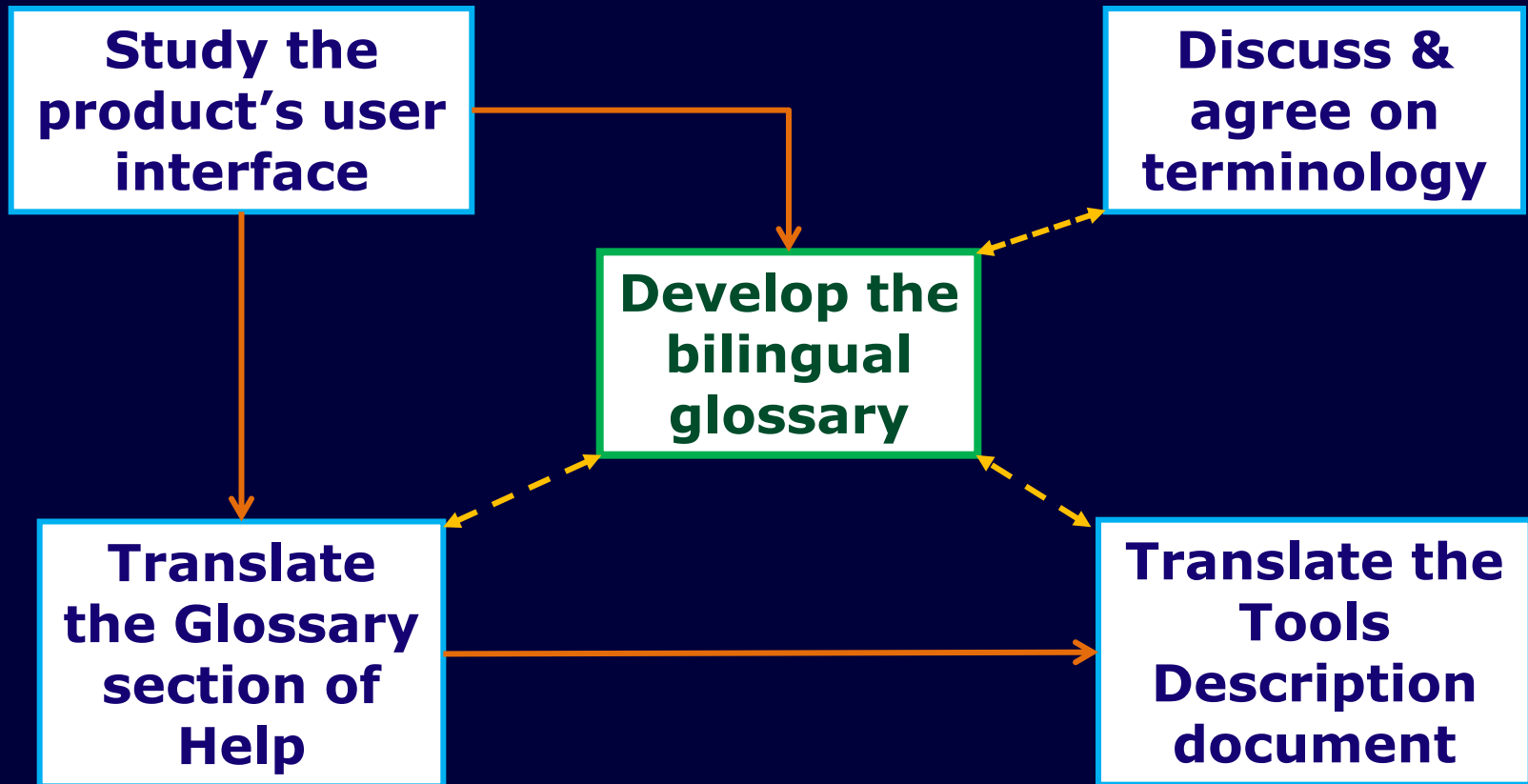# Diagram example: localization (1)

Diagram example: localization (2)

Network diagram example: EHM

EHM editorial project progress - 15/6/96

Develop data engineering, editing & content management tools
-> 15/2/96

SW Development

Establish nomenclature
-> 15/2/96

Digitize articles
-> 15/5/96

Choose sources for articles
-> 15/2/96

Specify data structure
-> 15/6/96

Create DTD
-> 30/6/96

Restructure and rewrite existing articles
-> 31/7/96

Write new articles
-> 15/7/96

Capture handwritten articles
-> 31/7/96

Proofread articles
-> 31/8/96

Update & enhance language dictionary
-> 31/8/96

Capture corrections
-> 15/9/96

Define topic tree
-> 31/7/96

Assign topics to texts
-> 30/11/96

Mark up text (SGML)
-> 30/11/96

Define & procure multimedia assets
-> 15/7/96

Write scenarios for animations, interactive drawings and timeline
-> 31/7/96

Create multimedia assets
-> 15/10/96

Assign topics to multimedia assets
-> 30/11/96

Write captions
-> 31/8/96

Digitize pictures
-> 31/8/96

Establish links between texts and multimedia assets
-> 30/11/96

Design
-> 24/6/96

Prototype
-> 15/7/96

Alpha version
-> 31/8/96

Beta version
-> 15/12/96

Release candidate
-> 15/1/97

Master
-> 1/2/97

Background diagram example: EHM

EHM textual content building

AXIS Encyclopedia

Language dictionary:
- 65,697 entries
- incl 3,649 encyclopedic articles

Proper nouns:
- 29,548 entries

Total encyclopedic dictionary:
- 95,245 entries
- 33 million characters

Other articles:
- 1,300 entries
- 44.5 million characters

Total encyclopedia:
- 96,545 entries
- 77.5 million characters

Other sources

Other encyclopedic sources:
- EGH
- Grolier Canada
- Quillet
- La Nature
- AXIS & GH annual updates

65,697 definitions "as is"

13,181 articles "as is"

2,268 articles transformed

24,610 articles "as is"

4,938 articles transformed

Documents transformed and/or restructured:
- 6,724 articles
- 28.5 million characters

Additional entries:
- 5,162 articles
- 14.5 million characters

Creations:
- 2,429 articles
- 3.6 million characters

EHM CD-ROM

- **Language dictionary:**
  - 65,697 entries
  - 15 million characters

- **Encyclopedic articles:**
  - 34,710 entries
  - 60 million characters

- **Total encyclopedia:**
  - 100,407 entries
  - 75 million characters

Other network diagram example

Functional & UI design

Design review, adjustment & agreement

Sample data preparation & delivery

Test case preparation

Technical design

Prototype coding

Delivery of prototype software

Testing

Prototype bug fixing

Final test & acceptance of prototype

Design review, & agreement on changes

Implementation of design changes

Final version coding

Delivery of final software

Testing

Final version bug fixing

Final test & acceptance of final version

Deployment

Project closure

Overall project management

Reminder: EXONE (Contractor's WBS)

Requirements — Review requirements — Agree on requirements

Design — Perform design — Agree on design

Coding & Integration
- Alpha version — Beta version — Final version
- Content subset — Complementary content

Testing & Acceptance — Prepare test plan & test cases
- Internal — Alpha version — Beta version — Final version

Deployment

Project management

Project closure

EXONE: Contractor's network diagram (1)

Review, complete & agree on requirements & plan
→ Perform & agree on design
→ Prepare test plan & test cases
→ Internal testing & bug fixing

Perform & agree on design → Coding → Internal testing & bug fixing

Receive content subset → Integrate content subset → Produce Alpha version → Alpha testing & bug fixing
→ Coding → Internal testing & bug fixing

Receive complementary content → Integrate complementary content → Produce Beta version → Beta testing & bug fixing → Produce Final version → Final testing, bug fixing & acceptance → Deployment

Project management → Closure

WBS

Requirements	Review requirements	Agree on requirements

Design	Perform design	Agree on design

Coding & Integration
- Alpha version — Beta version — Final version
- Content subset — Complementary content

Testing & Acceptance — Prepare test plan & test cases
- Internal — Alpha version — Beta version — Final version

Deployment

Project management

Project closure

EXONE: Contractor's network diagram (2)

Reminder: EXONE (Client's WBS)

Requirements — Review & agree on requirements w/ contractor

Software Design — Discuss & agree on design w/ contractor

Software implementation

Alpha version — Beta version — Final version

Content creation & integration

Creation, proofreading, preparation & delivery to contractor

Content subset — Complementary content

Testing & Acceptance — Prepare test plan & test cases
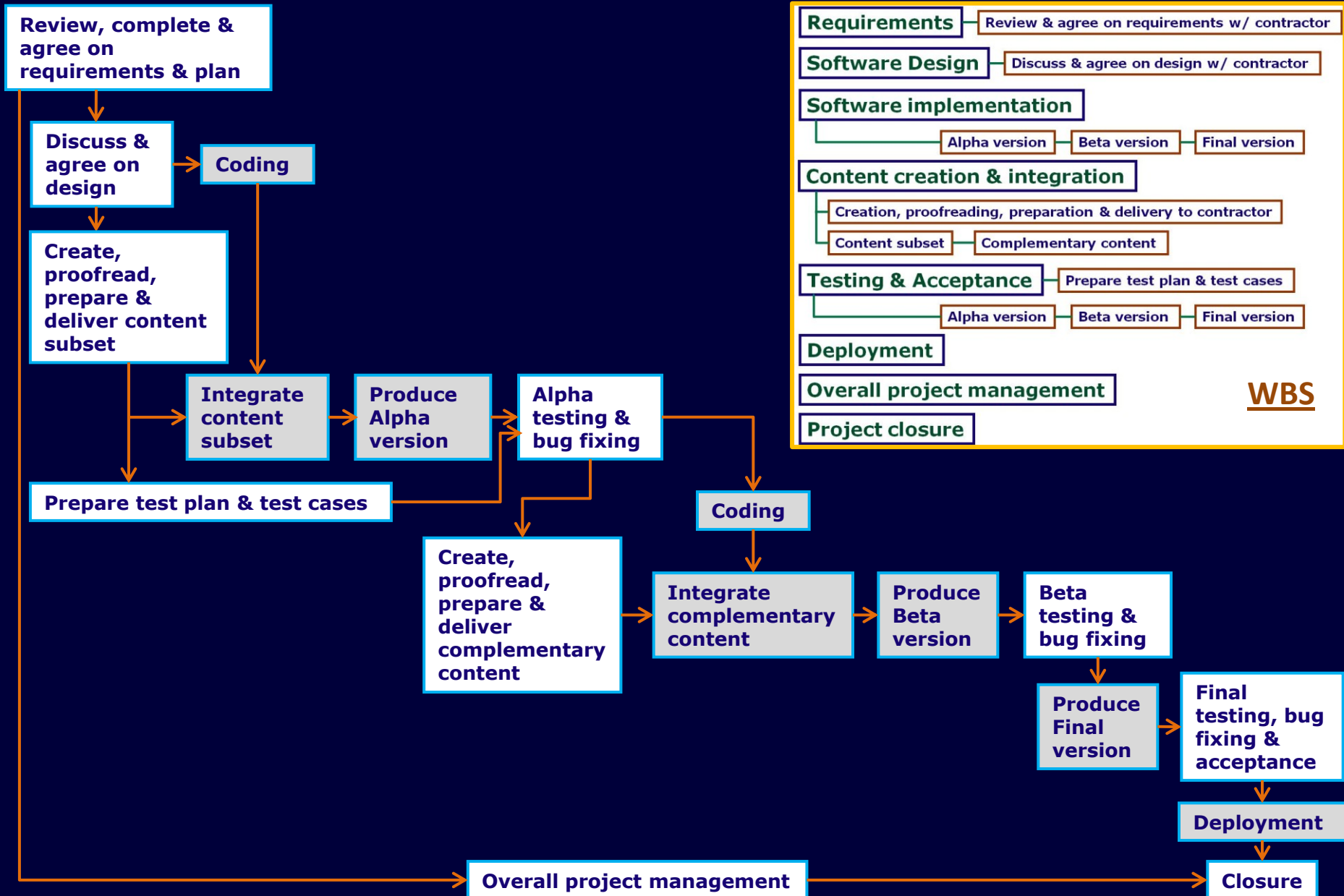
Alpha version — Beta version — Final version

Deployment

Project management

Project closure

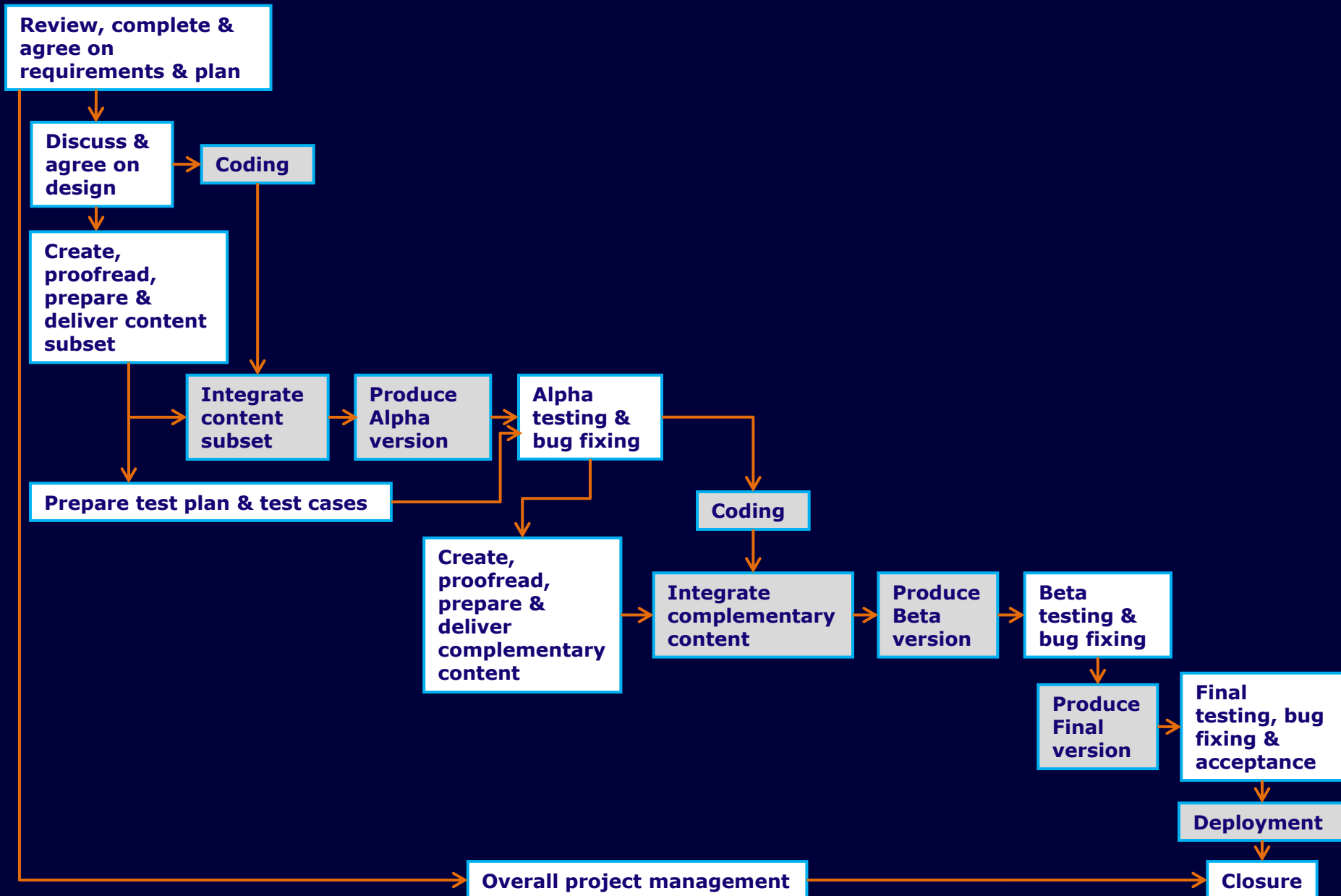# EXONE: Client's network diagram (2)

Diagram > Task list ex: EXONE - Contractor

Review, complete & agree on requirements & plan

Perform & agree on design

Prepare test plan & test cases

Coding

Internal testing & bug fixing

Receive content subset

Integrate content subset

Produce Alpha version

Alpha testing & bug fixing

Coding

Internal testing & bug fixing

Receive complementary content

Integrate complementary content

Produce Beta version

Beta testing & bug fixing

Produce Final version

Final testing, bug fixing & acceptance

Deployment

Project management

Closure

Part 1

PROJECT EXONE (Contractor's WBS)
REQUIREMENTS
- Review and complete requirements & plan with client
- Final discussion and agreement with client on req'ts & plan

DESIGN
- Write design specifications
- Check design with respect to requirements
- Meet with client to discuss & agree on design

IMPLEMENTATION
- Coding - Alpha version
- Debugging phase 1 (following internal Alpha testing)
- Production of Alpha version and delivery to client
- Debugging phase 2 (following client Alpha testing)
- Coding - Beta version
- Debugging phase 3 (following internal Beta testing)
- Production of Beta version and delivery to client
- Debugging phase 4 (following client Beta testing)
- Production of Final version and delivery to client
- Debugging phase 5 & delivery (following client Final testing)

Part 2

INTEGRATION
- Delivery of content subset by client
- Integration of content subset
- Delivery of complementary content by client
- Integration of complementary content

TESTING & ACCEPTANCE
- Prepare test plan and test cases
- Internal testing - Alpha version
- Alpha testing by client
- Internal testing - Beta version
- Beta testing by client
- Final testing by client
- Acceptance by client

DEPLOYMENT AT CLIENT'S SITE
PROJECT MANAGEMENT (After Req'ts WP & before Closure)
PROJECT CLOSURE

Diagram > Task list ex: EXONE - Client

Review, complete & agree on requirements & plan

Discuss & agree on design

Coding

Create, proofread, prepare & deliver content subset

Prepare test plan & test cases

Integrate content subset

Produce Alpha version

Alpha testing & bug fixing

Create, proofread, prepare & deliver complementary content

Coding

Integrate complementary content

Produce Beta version

Beta testing & bug fixing

Produce Final version

Final testing, bug fixing & acceptance

Deployment

Overall project management

Closure

Part 1

PROJECT EXONE (Client's WBS)
REQUIREMENTS
  Review and complete requirements & plan with contractor
  Final discussion and agreement with contractor on req'ts & plan
SOFTWARE DESIGN
  Write & check design specifications
  Meet with contractor to discuss & agree on design
SOFTWARE IMPLEMENTATION
  Coding, internal testing & bug fixing - Alpha version
  Delivery of Alpha version by contractor
  Debugging following Alpha testing
  Coding, internal testing & bug fixing - Beta version
  Delivery of Beta version by contractor
  Debugging following Beta testing
  Delivery of Final version by contractor
  Debugging following Final testing & delivery for acceptance
CONTENT CREATION & INTEGRATION
  Creation of content subset
  Proofreading of content subset
  Preparation of content subset & delivery to contractor
  Integration of content subset
  Creation of complementary content
  Proofreading of complementary content
  Preparation of complementary content & delivery to contractor
  Integration of complementary content

Part 2

TESTING & ACCEPTANCE
  Prepare test plan and test cases
  Alpha testing
  Beta testing
  Final testing
  Acceptance
DEPLOYMENT
PROJECT MANAGEMENT (After Req'ts WP & before Closure)
CONTRACTOR'S PROJECT CLOSURE
OVERALL PROJECT CLOSURE

Task list example: EXONE - Contractor

PROJECT EXONE (Contractor's WBS)

REQUIREMENTS
- Review and complete requirements & plan with client
- Final discussion and agreement with client on req'ts & plan
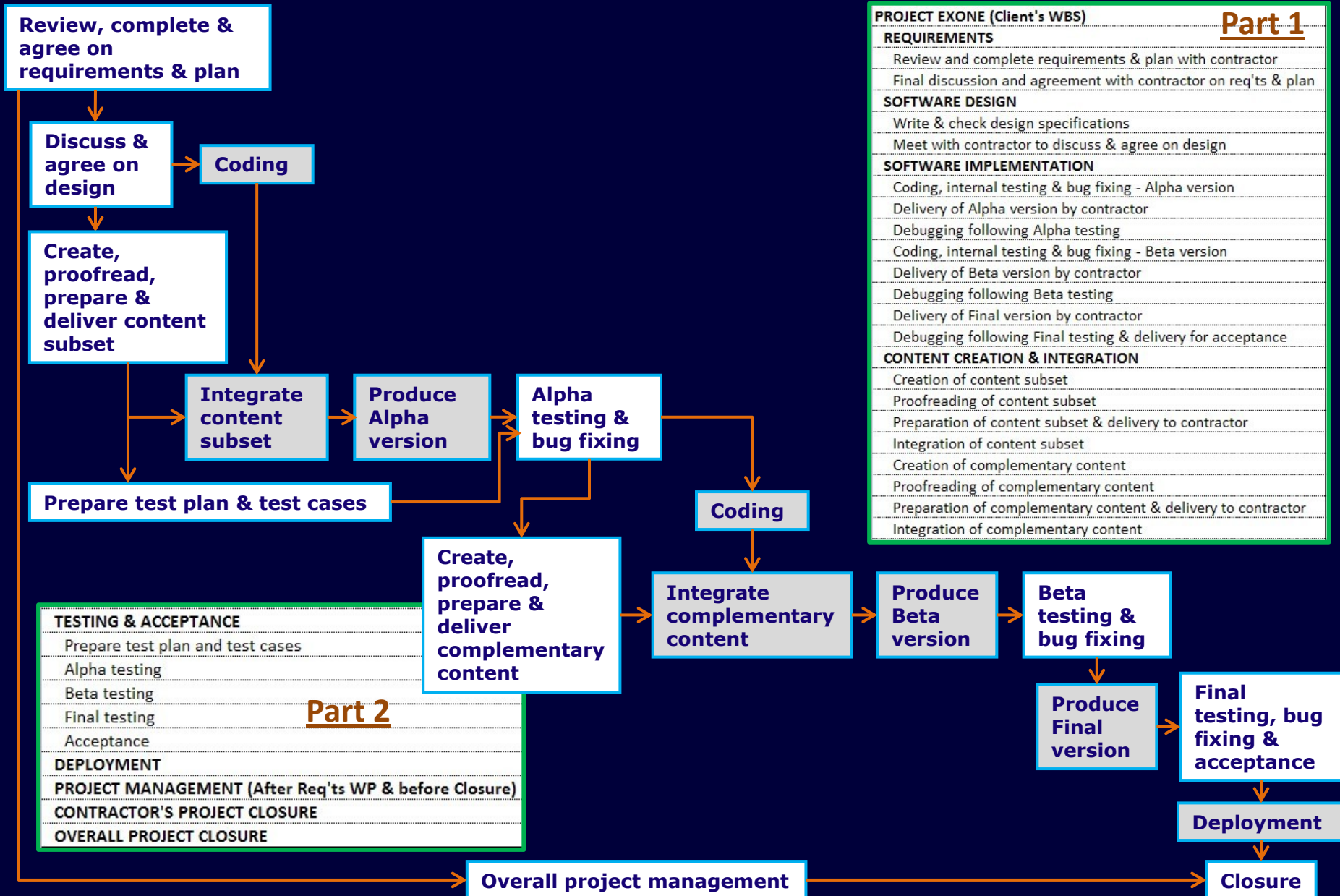
DESIGN
- Write design specifications
- Check design with respect to requirements
- Meet with client to discuss & agree on design

IMPLEMENTATION
- Coding - Alpha version
- Debugging phase 1 (following internal Alpha testing)
- Production of Alpha version and delivery to client
- Debugging phase 2 (following client Alpha testing)
- Coding - Beta version
- Debugging phase 3 (following internal Beta testing)
- Production of Beta version and delivery to client
- Debugging phase 4 (following client Beta testing)
- Production of Final version and delivery to client
- Debugging phase 5 & delivery (following client Final testing)

INTEGRATION
- Delivery of content subset by client
- Integration of content subset
- Delivery of complementary content by client
- Integration of complementary content

TESTING & ACCEPTANCE
- Prepare test plan and test cases
- Internal testing - Alpha version
- Alpha testing by client
- Internal testing - Beta version
- Beta testing by client
- Final testing by client
- Acceptance by client

DEPLOYMENT AT CLIENT'S SITE

PROJECT MANAGEMENT (After Req'ts WP & before Closure)

PROJECT CLOSURE

➢ **Level 1 = Project**

➢ **Level 2 = Work packages (WPs)**

➢ **Level 3 = Tasks**

Task list example: EXONE - Client

PROJECT EXONE (Client's WBS)
REQUIREMENTS
- Review and complete requirements & plan with contractor
- Final discussion and agreement with contractor on req'ts & plan

SOFTWARE DESIGN
- Write & check design specifications
- Meet with contractor to discuss & agree on design

SOFTWARE IMPLEMENTATION
- Coding, internal testing & bug fixing - Alpha version
- Delivery of Alpha version by contractor
- Debugging following Alpha testing
- Coding, internal testing & bug fixing - Beta version
- Delivery of Beta version by contractor
- Debugging following Beta testing
- Delivery of Final version by contractor
- Debugging following Final testing & delivery for acceptance

CONTENT CREATION & INTEGRATION
- Creation of content subset
- Proofreading of content subset
- Preparation of content subset & delivery to contractor
- Integration of content subset
- Creation of complementary content
- Proofreading of complementary content
- Preparation of complementary content & delivery to contractor
- Integration of complementary content

TESTING & ACCEPTANCE
- Prepare test plan and test cases
- Alpha testing
- Beta testing
- Final testing
- Acceptance

DEPLOYMENT
PROJECT MANAGEMENT (After Req'ts WP & before Closure)
CONTRACTOR'S PROJECT CLOSURE
OVERALL PROJECT CLOSURE

➢ **Level 1 = Project**

➢ **Level 2 = Work packages (WPs)**

➢ **Level 3 = Tasks**

Task list examples: project EXONE (1)

PROJECT EXONE (Contractor's WBS)

  REQUIREMENTS
  - Review and complete requirements & plan with client
  - Final discussion and agreement with client on req'ts & plan

  DESIGN
  - Write design specifications
  - Check design with respect to requirements
  - Meet with client to discuss & agree on design

  IMPLEMENTATION
  - Coding - Alpha version
  - Debugging phase 1 (following internal Alpha testing)
  - Production of Alpha version and delivery to client
  - Debugging phase 2 (following client Alpha testing)
  - Coding - Beta version
  - Debugging phase 3 (following internal Beta testing)
  - Production of Beta version and delivery to client
  - Debugging phase 4 (following client Beta testing)
  - Production of Final version and delivery to client
  - Debugging phase 5 & delivery (following client Final testing)

  INTEGRATION
  - Delivery of content subset by client
  - Integration of content subset
  - Delivery of complementary content by client
  - Integration of complementary content

  TESTING & ACCEPTANCE
  - Prepare test plan and test cases
  - Internal testing - Alpha version
  - Alpha testing by client
  - Internal testing - Beta version
  - Beta testing by client
  - Final testing by client
  - Acceptance by client

  DEPLOYMENT AT CLIENT'S SITE
  PROJECT MANAGEMENT (After Req'ts WP & before Closure)
  PROJECT CLOSURE

→

PROJECT EXONE (Contractor's WBS)

  REQUIREMENTS
  - Review and complete requirements & plan with client
  - Final discussion and agreement with client on req'ts & plan

  DESIGN
  - Write design specifications
  - Check design with respect to requirements
  - Meet with client to discuss & agree on design

  IMPLEMENTATION, INTEGRATION, TESTING & ACCEPTANCE
  - Coding - Alpha version
  - Prepare test plan and test cases
  - Internal testing - Alpha version
  - Debugging phase 1 (following internal Alpha testing)
  - Delivery of content subset by client
  - Integration of content subset
  - Production of Alpha version and delivery to client
  - Alpha testing by client
  - Debugging phase 2 (following client Alpha testing)
  - Coding - Beta version
  - Internal testing - Beta version
  - Debugging phase 3 (following internal Beta testing)
  - Delivery of complementary content by client
  - Integration of complementary content
  - Production of Beta version and delivery to client
  - Beta testing by client
  - Debugging phase 4 (following client Beta testing)
  - Production of Final version and delivery to client
  - Final testing by client
  - Debugging phase 5 & delivery (following client Final testing)
  - Acceptance by client

  DEPLOYMENT AT CLIENT'S SITE
  PROJECT MANAGEMENT (After Req'ts WP & before Closure)
  PROJECT CLOSURE

Task list examples: project EXONE (2)

PROJECT EXONE (Contractor's WBS)

REQUIREMENTS

Suited to MS Project,

not to ProjectLibre

IMPLEMENTATION
- Coding - Alpha version
- Debugging phase 1 (following internal Alpha testing)
- Production of Alpha version and delivery to client
- Debugging phase 2 (following client Alpha testing)
- Coding - Beta version
- Debugging phase 3 (following internal Beta testing)
- Production of Beta version and delivery to client
- Debugging phase 4 (following client Beta testing)
- Production of Final version and delivery to client
- Debugging phase 5 & delivery (following client Final testing)

INTEGRATION
- Delivery of content subset by client
- Integration of content subset
- Delivery of complementary content by client
- Integration of complementary content

TESTING & ACCEPTANCE
- Prepare test plan and test cases
- Internal testing - Alpha version
- Alpha testing by client
- Internal testing - Beta version
- Beta testing by client
- Final testing by client
- Acceptance by client

DEPLOYMENT AT CLIENT'S SITE

PROJECT MANAGEMENT (After Req'ts WP & before Closure)

PROJECT CLOSURE

PROJECT EXONE (Contractor's WBS)

REQUIREMENTS

Suited to MS Project

and to ProjectLibre

Meet with client to discuss & agree on design

IMPLEMENTATION, INTEGRATION, TESTING & ACCEPTANCE
- Coding - Alpha version
- Prepare test plan and test cases
- Internal testing - Alpha version
- Debugging phase 1 (following internal Alpha testing)
- Delivery of content subset by client
- Integration of content subset
- Production of Alpha version and delivery to client
- Alpha testing by client
- Debugging phase 2 (following client Alpha testing)
- Coding - Beta version
- Internal testing - Beta version
- Debugging phase 3 (following internal Beta testing)
- Delivery of complementary content by client
- Integration of complementary content
- Production of Beta version and delivery to client
- Beta testing by client
- Debugging phase 4 (following client Beta testing)
- Production of Final version and delivery to client
- Final testing by client
- Debugging phase 5 & delivery (following client Final testing)
- Acceptance by client

DEPLOYMENT AT CLIENT'S SITE

PROJECT MANAGEMENT (After Req'ts WP & before Closure)

PROJECT CLOSURE

Task list examples: project EXONE (3)

PROJECT EXONE (Client's WBS)

REQUIREMENTS
- Review and complete requirements & plan with contractor
- Final discussion and agreement with contractor on req'ts & plan

SOFTWARE DESIGN
- Write & check design specifications
- Meet with contractor to discuss & agree on design

SOFTWARE IMPLEMENTATION
- Coding, internal testing & bug fixing - Alpha version
- Delivery of Alpha version by contractor
- Debugging following Alpha testing
- Coding, internal testing & bug fixing - Beta version
- Delivery of Beta version by contractor
- Debugging following Beta testing
- Delivery of Final version by contractor
- Debugging following Final testing & delivery for acceptance

CONTENT CREATION & INTEGRATION
- Creation of content subset
- Proofreading of content subset
- Preparation of content subset & delivery to contractor
- Integration of content subset
- Creation of complementary content
- Proofreading of complementary content
- Preparation of complementary content & delivery to contractor
- Integration of complementary content

TESTING & ACCEPTANCE
- Prepare test plan and test cases
- Alpha testing
- Beta testing
- Final testing
- Acceptance

DEPLOYMENT

PROJECT MANAGEMENT (After Req'ts WP & before Closure)

CONTRACTOR'S PROJECT CLOSURE

OVERALL PROJECT CLOSURE

→

PROJECT EXONE (Client's WBS)

REQUIREMENTS
- Review and complete requirements & plan with contractor
- Final discussion and agreement with contractor on req'ts & plan

SOFTWARE DESIGN
- Write & check design specifications
- Meet with contractor to discuss & agree on design

IMPLEMENTATION, INTEGRATION, TESTING & ACCEPTANCE
- Coding, internal testing & bug fixing - Alpha version
- Creation of content subset
- Prepare test plan and test cases
- Proofreading of content subset
- Preparation of content subset & delivery to contractor
- Integration of content subset
- Delivery of Alpha version by contractor
- Alpha testing
- Creation of complementary content
- Proofreading of complementary content
- Debugging following Alpha testing
- Coding, internal testing & bug fixing - Beta version
- Preparation of complementary content & delivery to contractor
- Integration of complementary content
- Delivery of Beta version by contractor
- Beta testing
- Debugging following Beta testing
- Delivery of Final version by contractor
- Final testing
- Debugging following Final testing & delivery for acceptance
- Acceptance

DEPLOYMENT

PROJECT MANAGEMENT (After Req'ts WP & before Closure)

CONTRACTOR'S PROJECT CLOSURE

OVERALL PROJECT CLOSURE

Task list examples: project EXONE (4)

PROJECT EXONE (Client's WBS)

<table>
<tr><th colspan="2" align="center">Suited to MS Project, <u>not</u> to ProjectLibre</th></tr>
</table>

SOFTWARE IMPLEMENTATION
- Coding, internal testing & bug fixing - Alpha version
- Delivery of Alpha version by contractor
- Debugging following Alpha testing
- Coding, internal testing & bug fixing - Beta version
- Delivery of Beta version by contractor
- Debugging following Beta testing
- Delivery of Final version by contractor
- Debugging following Final testing & delivery for acceptance

CONTENT CREATION & INTEGRATION
- Creation of content subset
- Proofreading of content subset
- Preparation of content subset & delivery to contractor
- Integration of content subset
- Creation of complementary content
- Proofreading of complementary content
- Preparation of complementary content & delivery to contractor
- Integration of complementary content

TESTING & ACCEPTANCE
- Prepare test plan and test cases
- Alpha testing
- Beta testing
- Final testing
- Acceptance

DEPLOYMENT

PROJECT MANAGEMENT (After Req'ts WP & before Closure)

CONTRACTOR'S PROJECT CLOSURE

OVERALL PROJECT CLOSURE

PROJECT EXONE (Client's WBS)

<table>
<tr><th colspan="2" align="center">Suited to MS Project <u>and</u> to ProjectLibre</th></tr>
</table>

IMPLEMENTATION, INTEGRATION, TESTING & ACCEPTANCE
- Coding, internal testing & bug fixing - Alpha version
- Creation of content subset
- Prepare test plan and test cases
- Proofreading of content subset
- Preparation of content subset & delivery to contractor
- Integration of content subset
- Delivery of Alpha version by contractor
- Alpha testing
- Creation of complementary content
- Proofreading of complementary content
- Debugging following Alpha testing
- Coding, internal testing & bug fixing - Beta version
- Preparation of complementary content & delivery to contractor
- Integration of complementary content
- Delivery of Beta version by contractor
- Beta testing
- Debugging following Beta testing
- Delivery of Final version by contractor
- Final testing
- Debugging following Final testing & delivery for acceptance
- Acceptance

DEPLOYMENT

PROJECT MANAGEMENT (After Req'ts WP & before Closure)

CONTRACTOR'S PROJECT CLOSURE

OVERALL PROJECT CLOSURE

Questions?

From scope/requirements to schedule

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Sequence, resources, durations, schedule

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations
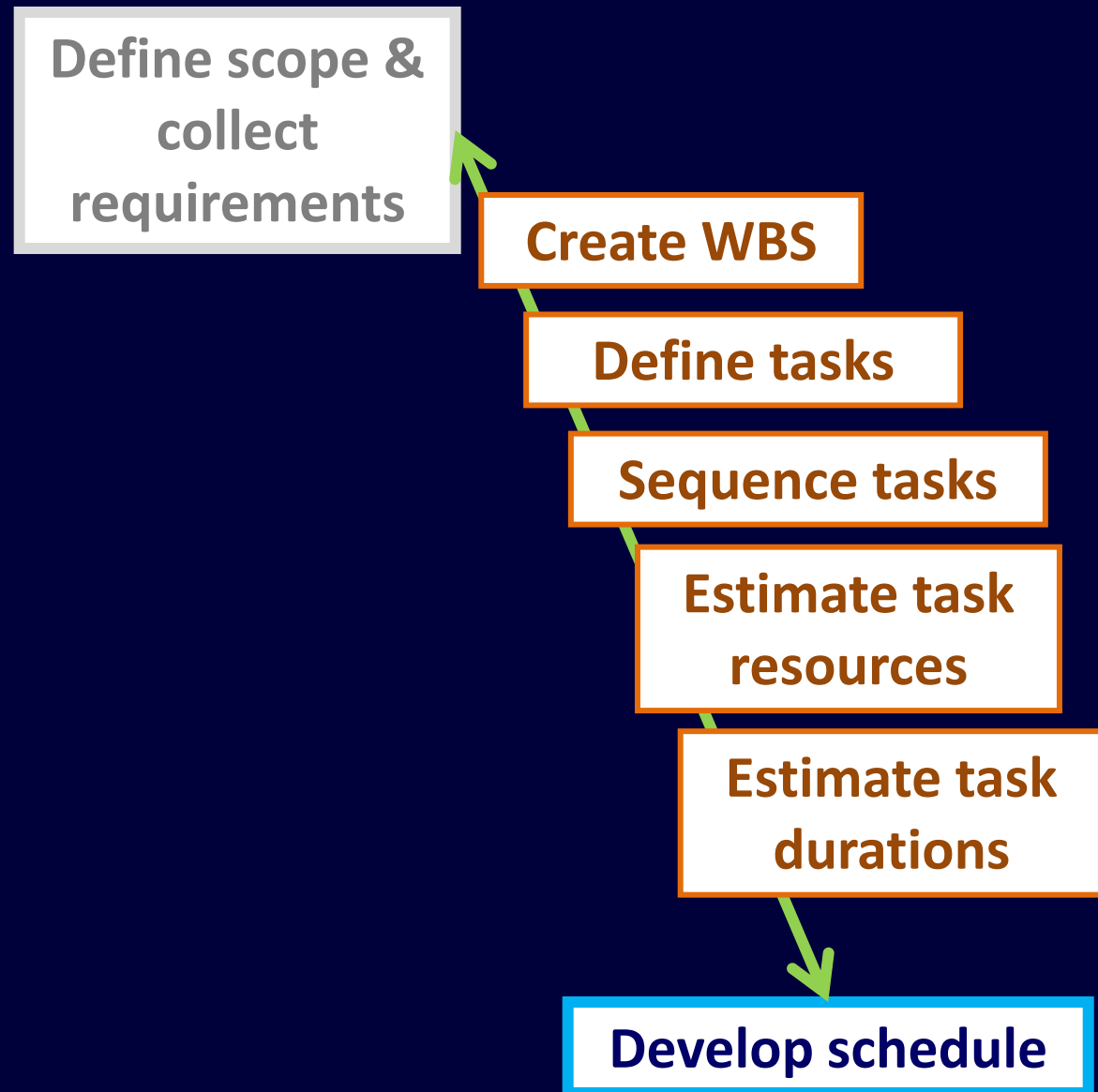
Develop schedule

Interdependent processes

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule
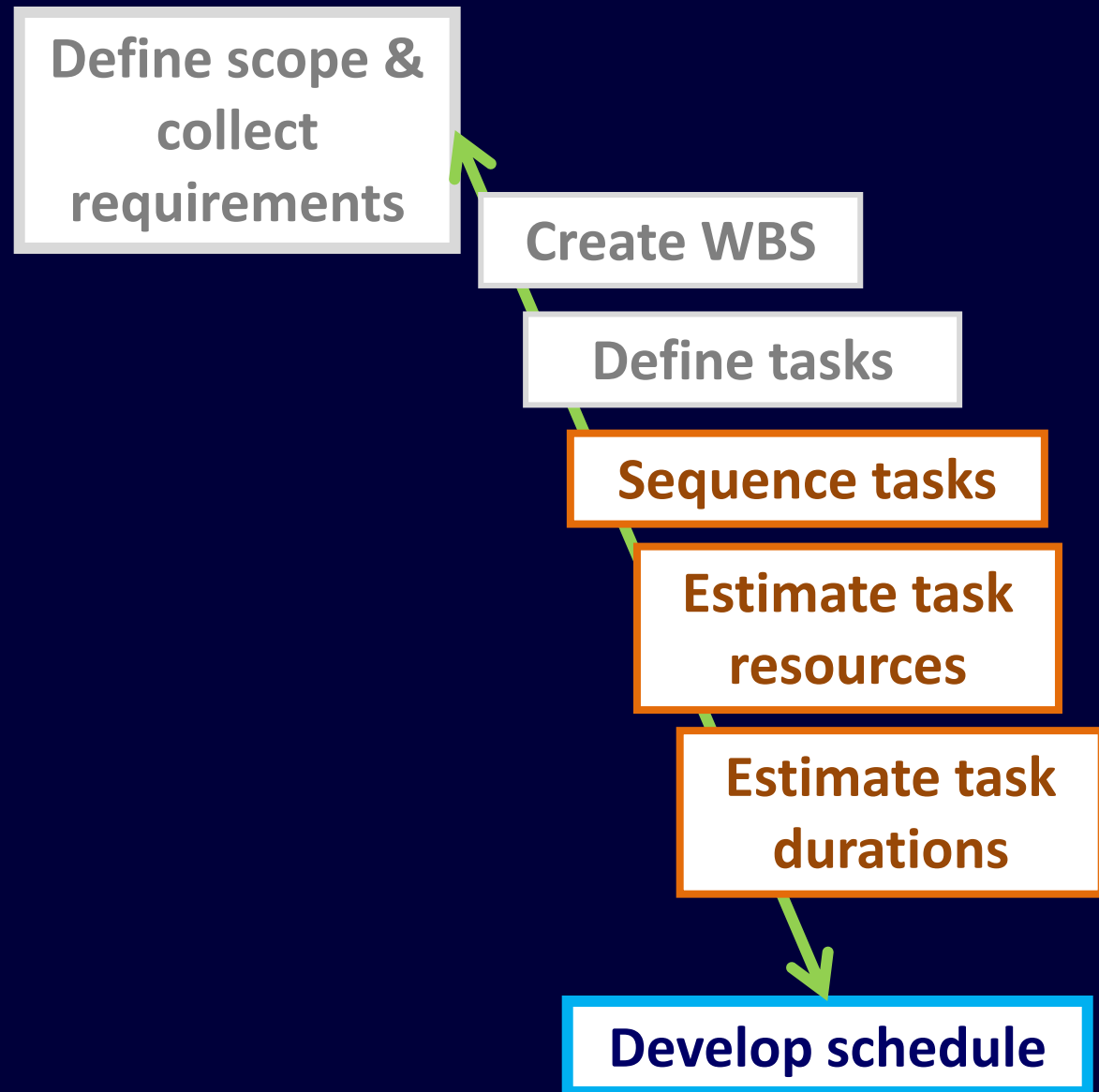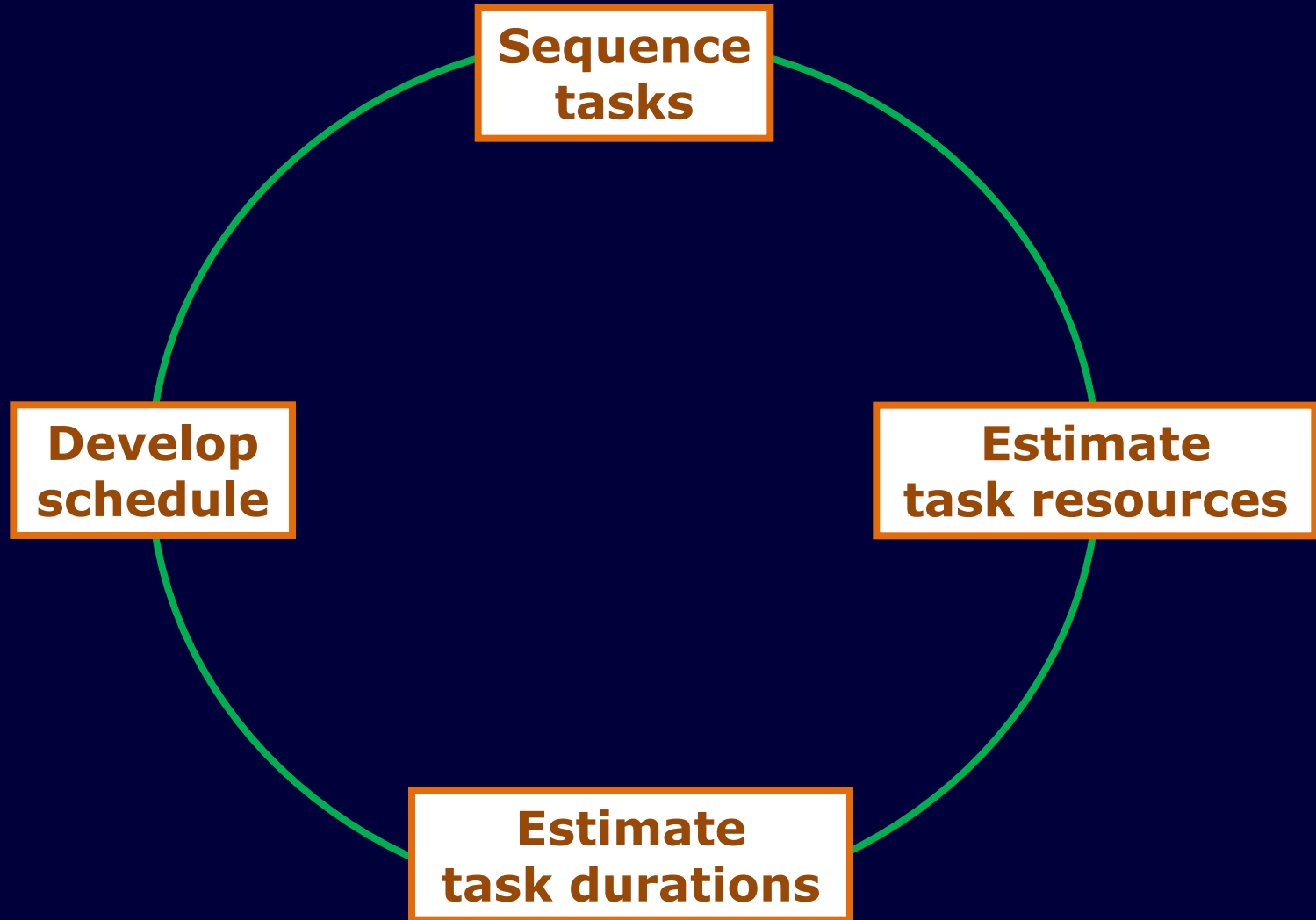
Duration vs Workload (example 1)

> **Workload = 3 person-days**

> **Duration = 3 days**

> **Duration = 1 day**

Interdependence: example (1)

Tasks to be performed:

✓ **write 3 articles**

✓ **translate 3 articles**

Assumptions:

✓ **1 person-day to write an article**

✓ **1 person-day to translate an article**

➢ **Total workload = 6 person-days**

Interdependence: example (2)

Logical task sequence:

1) write articles

2) translate articles

Resource assumptions:

✓ 1 writer

✓ 1 translator

| Write 3 articles | → | Translate 3 articles |

| Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 |

Workload = 6 person-days | Duration = 6 days

Interdependence: example (3)

Additional assumption:

✓ **translation can begin as soon as one article has been written**

Write 3 articles

Translate 3 articles

| Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 |

Workload = 6 person-days | Duration = 4 days

Interdependence: example (4)

Different resource assumption:

✓ **3 writers and 3 translators available**

Write article 1	→	Translate article 1
Write article 2	→	Translate article 2
Write article 3	→	Translate article 3

W1 → T1
W2 → T2
W3 → T3

Day 1 **Day 2** Day 3 Day 4 Day 5 Day 6
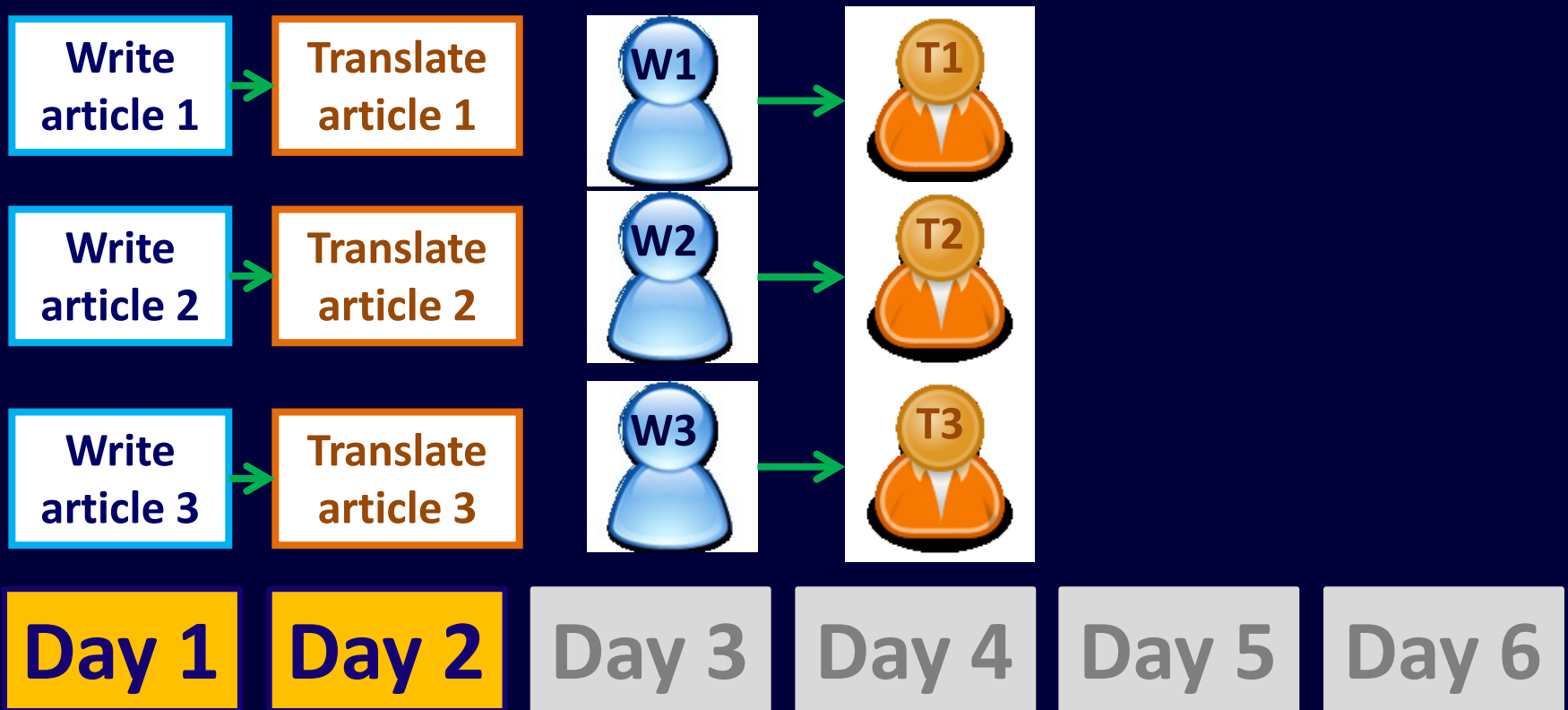
Workload = 6 person-days | Duration = 2 days

Questions?

Sequence, resources, durations, schedule

Define scope & collect requirements

Interdependent processes

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Sequence Tasks

Develop schedule

Estimate task resources

Estimate task durations
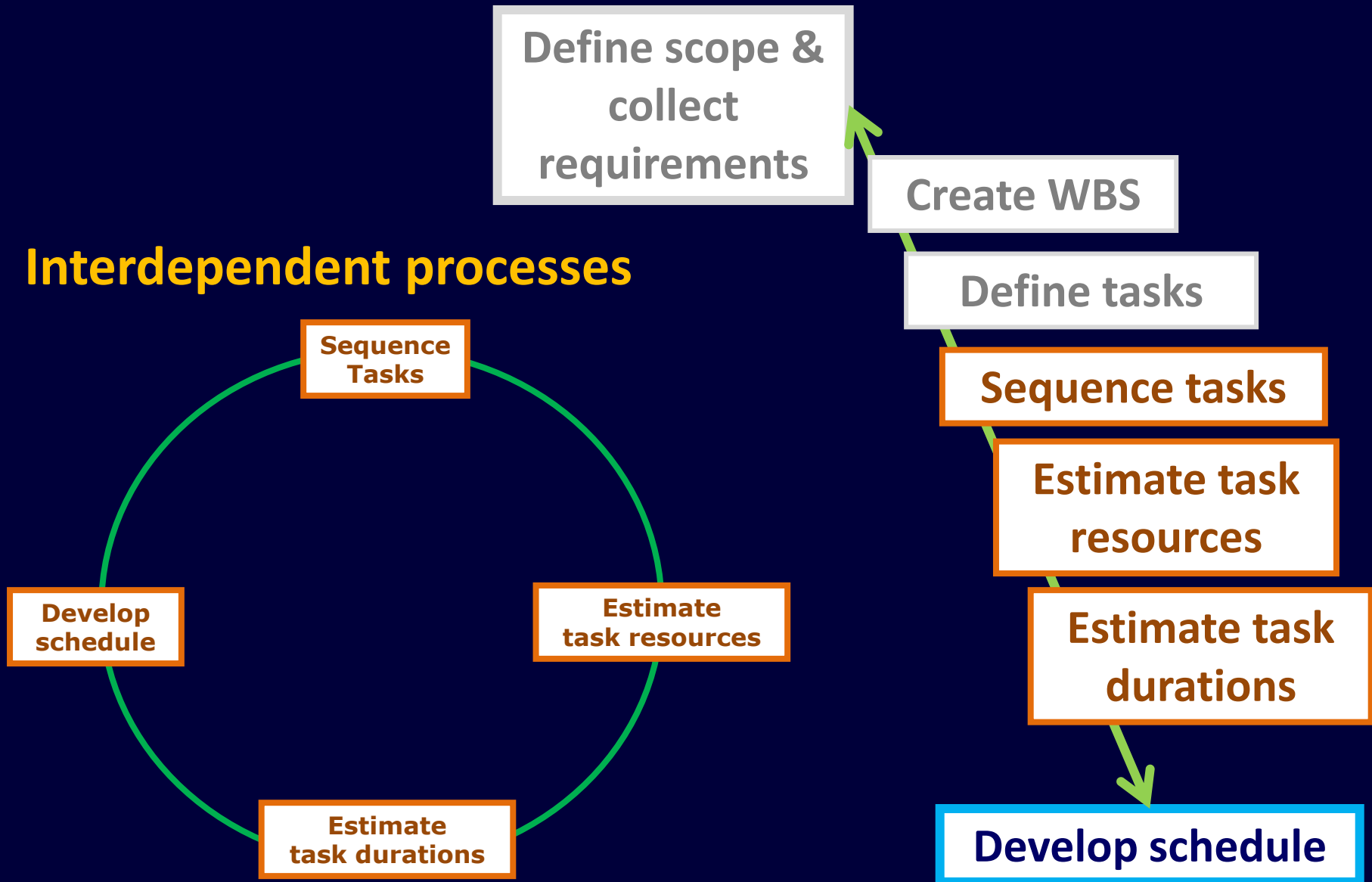
Sequencing ex.: EXONE - Contractor (1)

MS Project

	WBS	Task Name	Predecessors
1	1	⊟ PROJECT EXONE	
2	1.1	⊟ REQUIREMENTS	
3	1.1.1	Review and complete requirements & plan with client	
4	1.1.2	Final discussion and agreement with client on req'ts & plan	3
5	1.2	⊟ DESIGN	
6	1.2.1	Write design specifications	4
7	1.2.2	Check design with respect to requirements	6
8	1.2.3	Meet with client to discuss & agree on design	7
9	1.3	⊟ IMPLEMENTATION	
10	1.3.1	Coding – Alpha version	8
11	1.3.2	Debugging phase 1 (following internal Alpha testing)	27;10
12	1.3.3	Production of Alpha version and delivery to client	22
13	1.3.4	Debugging phase 2 (following client Alpha testing)	28
14	1.3.5	Coding – Beta version	13
15	1.3.6	Debugging phase 3 (following internal Beta testing)	29;14
16	1.3.7	Production of Beta version and delivery to client	24
17	1.3.8	Debugging phase 4 (following client Beta testing)	30
18	1.3.9	Production of Final version and delivery to client	17
19	1.3.10	Debugging phase 5 & delivery (following client Final testing)	31
20	1.4	⊟ INTEGRATION	
21	1.4.1	Delivery of content subset by client	11FF-2 days
22	1.4.2	Integration of content subset	21;11
23	1.4.3	Delivery of complementary content by client	15FF-2 days
24	1.4.4	Integration of complementary content	23;15
25	1.5	⊟ TESTING & ACCEPTANCE	
26	1.5.1	Prepare test plan and test cases	8
27	1.5.2	Internal testing – Alpha version	10SS+3 days;26
28	1.5.3	Alpha testing by client	12
29	1.5.4	Internal testing – Beta version	14SS+5 days
30	1.5.5	Beta testing by client	16
31	1.5.6	Final testing by client	18
32	1.5.7	Acceptance by client	19
33	1.6	DEPLOYMENT AT CLIENT'S SITE	32
34	1.7	PROJECT MANAGEMENT (After Req'ts WP & before Closure)	2;33FF
35	1.8	PROJECT CLOSURE	34

Sequencing ex.: EXONE - Contractor (2)

ProjectLibre

	WBS	Nom	Prédécesseurs
1	1	⊟PROJECT EXONE	
2	1.1	⊟REQUIREMENTS	
3	1.1.1	Review and complete requirements & plan with client	
4	1.1.3	Final discussion and agreement with client on req'ts & plan	3
5	1.2	⊟DESIGN	
6	1.2.1	Write design specifications	4
7	1.2.2	Check design with respect to requirements	6
8	1.2.3	Meet with client to discuss & agree on design	7
9	1.3	⊟IMPLEMENTATION, INTEGRATION, TESTING & ACCEPTANCE	
10	1.3.1	Coding - Alpha version	8
11	1.3.2	Prepare test plan and test cases	8
12	1.3.3	Internal testing - Alpha version	10SS+3 jours;11
13	1.3.4	Debugging phase 1 (following internal Alpha testing)	10;12
14	1.3.5	Delivery of content subset by client	13FF-2 jours
15	1.3.6	Integration of content subset	13;14
16	1.3.7	Production of Alpha version and delivery to client	15
17	1.3.8	Alpha testing by client	16
18	1.3.9	Debugging phase 2 (following client Alpha testing)	17
19	1.3.10	Coding - Beta version	18
20	1.3.11	Internal testing - Beta version	19SS+5 jours
21	1.3.12	Debugging phase 3 (following internal Beta testing)	19;20
22	1.3.13	Delivery of complementary content by client	21FF-2 jours
23	1.3.14	Integration of complementary content	21;22
24	1.3.15	Production of Beta version and delivery to client	23
25	1.3.16	Beta testing by client	24
26	1.3.17	Debugging phase 4 (following client Beta testing)	25
27	1.3.18	Production of Final version and delivery to client	26
28	1.3.19	Final testing by client	27
29	1.3.20	Debugging phase 5 and delivery (following client Final testing)	28
30	1.3.21	Acceptance by client	29
31	1.4	DEPLOYMENT AT CLIENT'S SITE	30
32	1.5	PROJECT MANAGEMENT (After Req'ts WP & before Closure)	2;31FF
33	1.6	PROJECT CLOSURE	32

Sequencing ex.: EXONE - Client (1)

MS Project

	WBS	Task Name	Predecessors
1	1	⊟ PROJECT EXONE	
2	1.1	⊟ REQUIREMENTS	
3	1.1.1	Review and complete requirements & plan with contractor	
4	1.1.2	Final discussion and agreement with contractor on req'ts & plan	3
5	1.2	⊟ SOFTWARE DESIGN	
6	1.2.1	Write and check design specifications	4
7	1.2.2	Meet with contractor to discuss & agree on design	6
8	1.3	⊟ SOFTWARE IMPLEMENTATION	
9	1.3.1	Coding, internal testing & bug fixing – Alpha version	7
10	1.3.2	Delivery of Alpha version by contractor	21
11	1.3.3	Debugging following Alpha testing	28
12	1.3.4	Coding, internal testing & bug fixing – Beta version	11
13	1.3.5	Delivery of Beta version by contractor	25;12
14	1.3.6	Debugging following Beta testing	29
15	1.3.7	Delivery of Final version by contractor	14
16	1.3.8	Debugging following Final testing & delivery for acceptance	30
17	1.4	⊟ CONTENT CREATION & INTEGRATION	
18	1.4.1	Creation of content subset	7
19	1.4.2	Proofreading of content subset	18SS+4 days
20	1.4.3	Preparation of content subset & delivery to contractor	9FF–2 days;19
21	1.4.4	Integration of content subset	20;9
22	1.4.5	Creation of complementary content	28
23	1.4.6	Proofreading of complementary content	22SS+4 days
24	1.4.7	Preparation of complementary content & delivery to contractor	12FF–2 days;23
25	1.4.8	Integration of complementary content	24;12
26	1.5	⊟ TESTING & ACCEPTANCE	
27	1.5.1	Prepare test plan and test cases	18
28	1.5.2	Alpha testing	10;27
29	1.5.3	Beta testing	13
30	1.5.4	Final testing	15
31	1.5.5	Acceptance	16
32	1.6	DEPLOYMENT	31
33	1.7	PROJECT MANAGEMENT (After Req'ts WP & before Closure)	2;32FF
34	1.8	CONTRACTOR'S PROJECT CLOSURE	33
35	1.9	OVERALL PROJECT CLOSURE	34

Sequencing ex.: EXONE - Client (2)

ProjectLibre

	WBS	Nom	Prédécesseurs
1	1	⊟PROJECT EXONE	
2	1.1	⊟REQUIREMENTS	
3	1.1.1	Review and complete requirements & plan with contractor	
4	1.1.3	Final discussion and agreement with contractor on req'ts & plan	3
5	1.2	⊟SOFTWARE DESIGN	
6	1.2.1	Write & check design specifications	4
7	1.2.3	Meet with contractor to discuss & agree on design	6
8	1.3	⊟IMPLEMENTATION, INTEGRATION, TESTING & ACCEPTANCE	
9	1.3.1	Coding, internal testing & bug fixing - Alpha version	7
10	1.3.2	Creation of content subset	7
11	1.3.3	Prepare test plan and test cases	10
12	1.3.4	Proofreading of content subset	10SS+4 jours
13	1.3.5	Preparation of content subset & delivery to contractor	9FF-2 jours;12
14	1.3.6	Integration of content subset	9;13
15	1.3.7	Delivery of Alpha version by contractor	14
16	1.3.8	Alpha testing	15
17	1.3.9	Creation of complementary content	16
18	1.3.10	Proofreading of complementary content	17SS+4 jours
19	1.3.11	Debugging following Alpha testing	16
20	1.3.12	Coding, internal testing & bug fixing - Beta version	19
21	1.3.13	Preparation of complementary content & delivery to contractor	18;20FF-2 jours
22	1.3.14	Integration of complementary content	20;21
23	1.3.15	Delivery of Beta version by contractor	22
24	1.3.16	Beta testing	23
25	1.3.17	Debugging following Beta testing	24
26	1.3.18	Delivery of Final version by contractor	25
27	1.3.19	Final testing	26
28	1.3.20	Debugging following Final testing & delivery for acceptance	27
29	1.3.21	Acceptance	28
30	1.4	DEPLOYMENT	29
31	1.5	PROJECT MANAGEMENT (After Req'ts WP & before Closure)	2;30FF
32	1.6	CONTRACTOR'S PROJECT CLOSURE	31
33	1.7	OVERALL PROJECT CLOSURE	32

Precedence diagramming method (PDM)

Finish-to-Start (FS)

Task A

Task B

Start-to-Start (SS)

Task A

Task B

Finish-to-Finish (FF)

Task A

Task B

Start-to-Finish (SF)

Task A

Task B
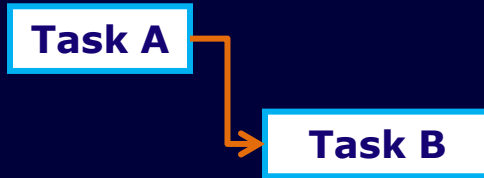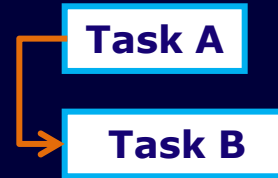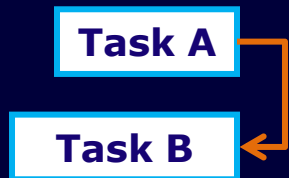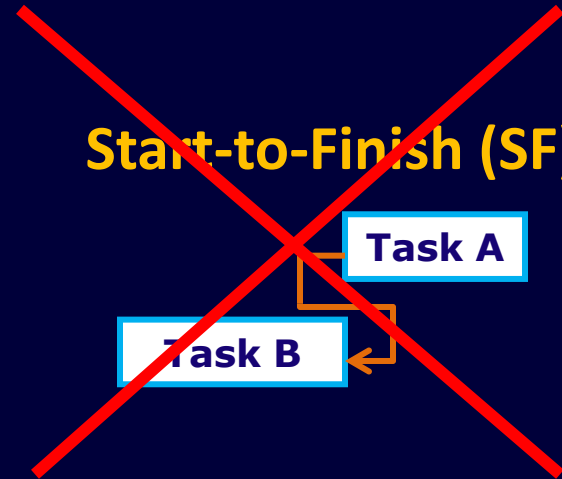
Lags & Leads

Finish-to-Start (FS)

Task A

< lag >

Task B

Start-to-Start (SS)

Task A

< lag >

Task B

Finish-to-Finish (FF)

Task A

< lead >

Task B
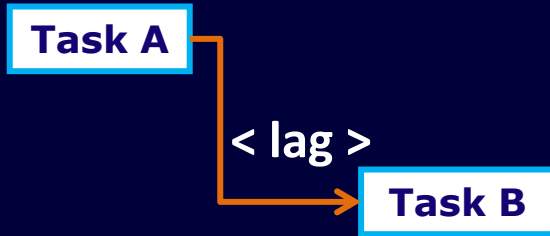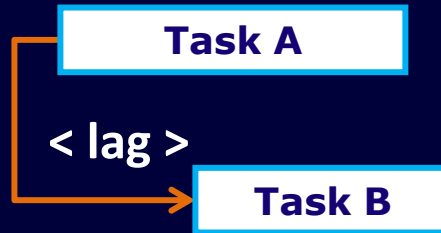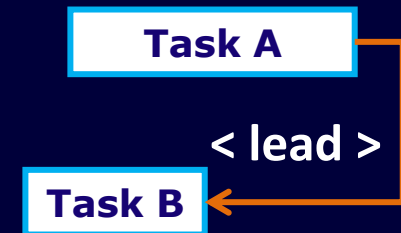
SS & FF / Lag & Lead ex.: EXONE - CTR

	WBS	Task Name	Predecessors
1	1	⊟ PROJECT EXONE	
2	1.1	⊟ REQUIREMENTS	
3	1.1.1	Review and complete requirements & plan with client	
4	1.1.2	Final discussion and agreement with client on req'ts & plan	3
5	1.2	⊟ DESIGN	
6	1.2.1	Write design specifications	4
7	1.2.2	Check design with respect to requirements	6
8	1.2.3	Meet with client to discuss & agree on design	7
9	1.3	⊟ IMPLEMENTATION	
10	1.3.1	Coding – Alpha version	8
11	1.3.2	Debugging phase 1 (following internal Alpha testing)	27;10
12	1.3.3	Production of Alpha version and delivery to client	22
13	1.3.4	Debugging phase 2 (following client Alpha testing)	28
14	1.3.5	Coding – Beta version	13
15	1.3.6	Debugging phase 3 (following internal Beta testing)	29;14
16	1.3.7	Production of Beta version and delivery to client	24
17	1.3.8	Debugging phase 4 (following client Beta testing)	30
18	1.3.9	Production of Final version and delivery to client	17
19	1.3.10	Debugging phase 5 & delivery (following client Final testing)	31
20	1.4	⊟ INTEGRATION	
21	1.4.1	Delivery of content subset by client	11FF-2 days
22	1.4.2	Integration of content subset	21;11
23	1.4.3	Delivery of complementary content by client	15FF-2 days
24	1.4.4	Integration of complementary content	23;15
25	1.5	⊟ TESTING & ACCEPTANCE	
26	1.5.1	Prepare test plan and test cases	8
27	1.5.2	Internal testing – Alpha version	10SS+3 days;26
28	1.5.3	Alpha testing by client	12
29	1.5.4	Internal testing – Beta version	14SS+5 days
30	1.5.5	Beta testing by client	16
31	1.5.6	Final testing by client	18
32	1.5.7	Acceptance by client	19
33	1.6	**DEPLOYMENT AT CLIENT'S SITE**	32
34	1.7	**PROJECT MANAGEMENT (After Req'ts WP & before Closure)**	2;33FF
35	1.8	**PROJECT CLOSURE**	34

SS & FF / Lag & Lead ex.: EXONE - CLT

	WBS	Task Name	Predecessors
1	1	⊟ **PROJECT EXONE**	
2	1.1	⊟ **REQUIREMENTS**	
3	1.1.1	Review and complete requirements & plan with contractor	
4	1.1.2	Final discussion and agreement with contractor on req'ts & plan	3
5	1.2	⊟ **SOFTWARE DESIGN**	
6	1.2.1	Write and check design specifications	4
7	1.2.2	Meet with contractor to discuss & agree on design	6
8	1.3	⊟ **SOFTWARE IMPLEMENTATION**	
9	1.3.1	Coding, internal testing & bug fixing – Alpha version	7
10	1.3.2	Delivery of Alpha version by contractor	21
11	1.3.3	Debugging following Alpha testing	28
12	1.3.4	Coding, internal testing & bug fixing – Beta version	11
13	1.3.5	Delivery of Beta version by contractor	25;12
14	1.3.6	Debugging following Beta testing	29
15	1.3.7	Delivery of Final version by contractor	14
16	1.3.8	Debugging following Final testing & delivery for acceptance	30
17	1.4	⊟ **CONTENT CREATION & INTEGRATION**	
18	1.4.1	Creation of content subset	7
19	1.4.2	Proofreading of content subset	18SS+4 days
20	1.4.3	Preparation of content subset & delivery to contractor	9FF–2 days;19
21	1.4.4	Integration of content subset	20;9
22	1.4.5	Creation of complementary content	20
23	1.4.6	Proofreading of complementary content	22SS+4 days
24	1.4.7	Preparation of complementary content & delivery to contractor	12FF–2 days;23
25	1.4.8	Integration of complementary content	24;12
26	1.5	⊟ **TESTING & ACCEPTANCE**	
27	1.5.1	Prepare test plan and test cases	18
28	1.5.2	Alpha testing	10;27
29	1.5.3	Beta testing	13
30	1.5.4	Final testing	15
31	1.5.5	Acceptance	16
32	1.6	**DEPLOYMENT**	31
33	1.7	**PROJECT MANAGEMENT (After Req'ts WP & before Closure)**	2;32FF
34	1.8	**CONTRACTOR'S PROJECT CLOSURE**	33
35	1.9	**OVERALL PROJECT CLOSURE**	34

Questions?

Sequence, resources, durations, schedule

Define scope & collect requirements

Create WBS

Define tasks

Interdependent processes

Sequence Tasks

Sequence tasks

Estimate task resources

Estimate task resources

Develop schedule

Estimate task durations

Estimate task durations

Develop schedule

Estimate task resources (1)
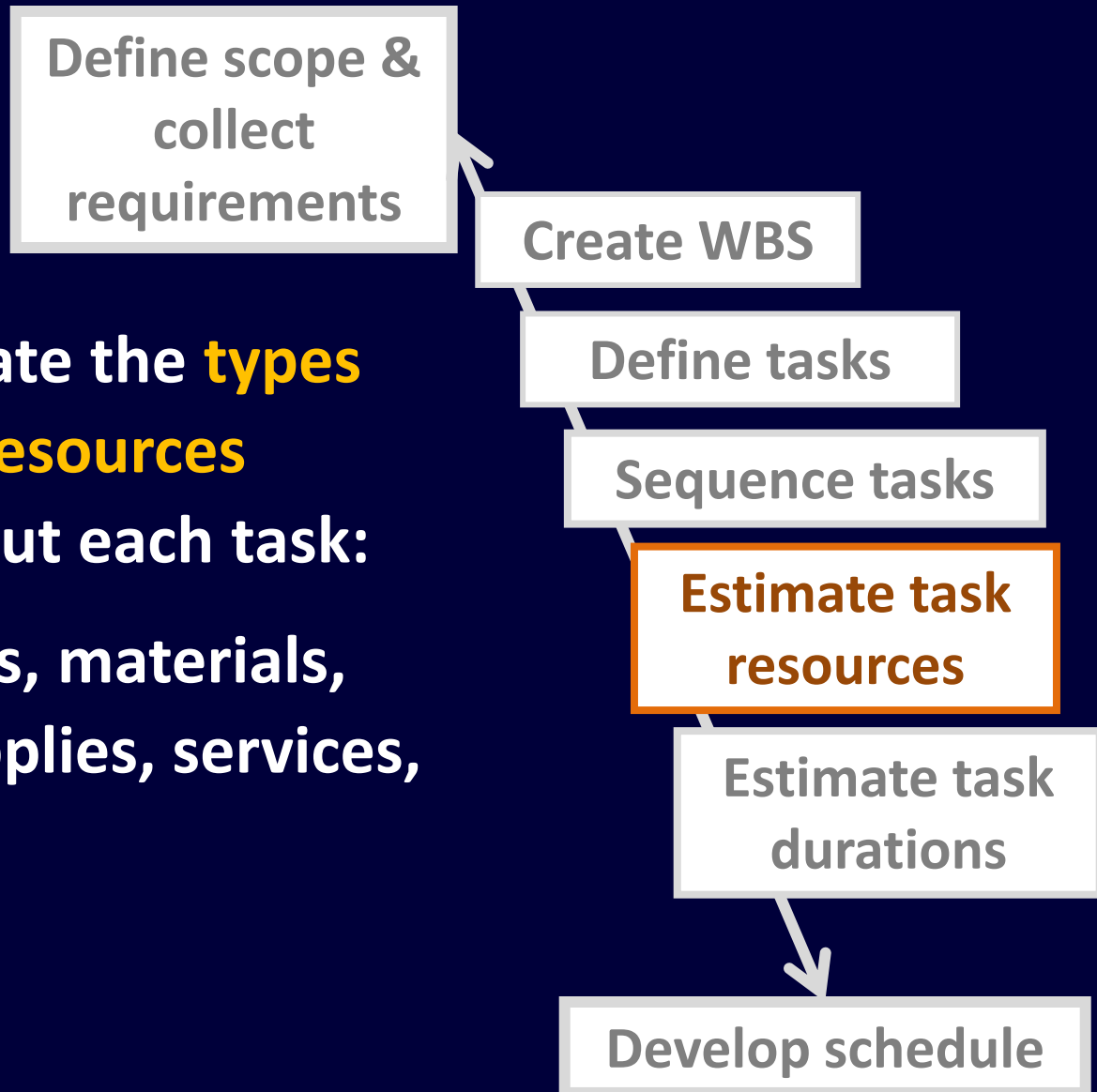
➢ **Identify and evaluate the types and quantities of resources required to carry out each task:**

✓ **people, facilities, materials, equipment, supplies, services, etc.**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Estimate task resources (2)

> **Expert judgment and experience**

> **Projects knowledge base**

> **Advice from people who have done similar work**

> **Simulations**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule
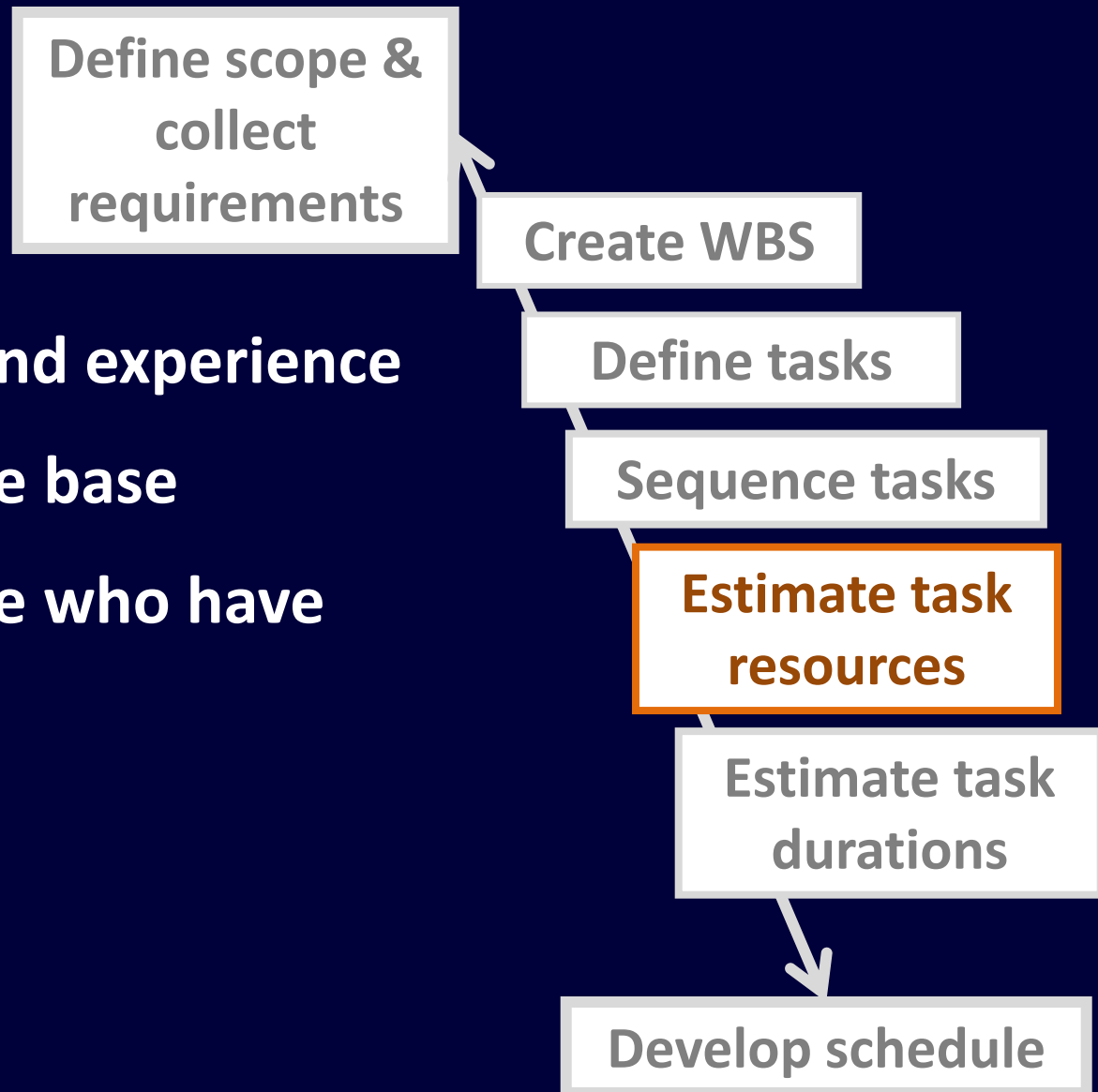
Estimate task resources (3)
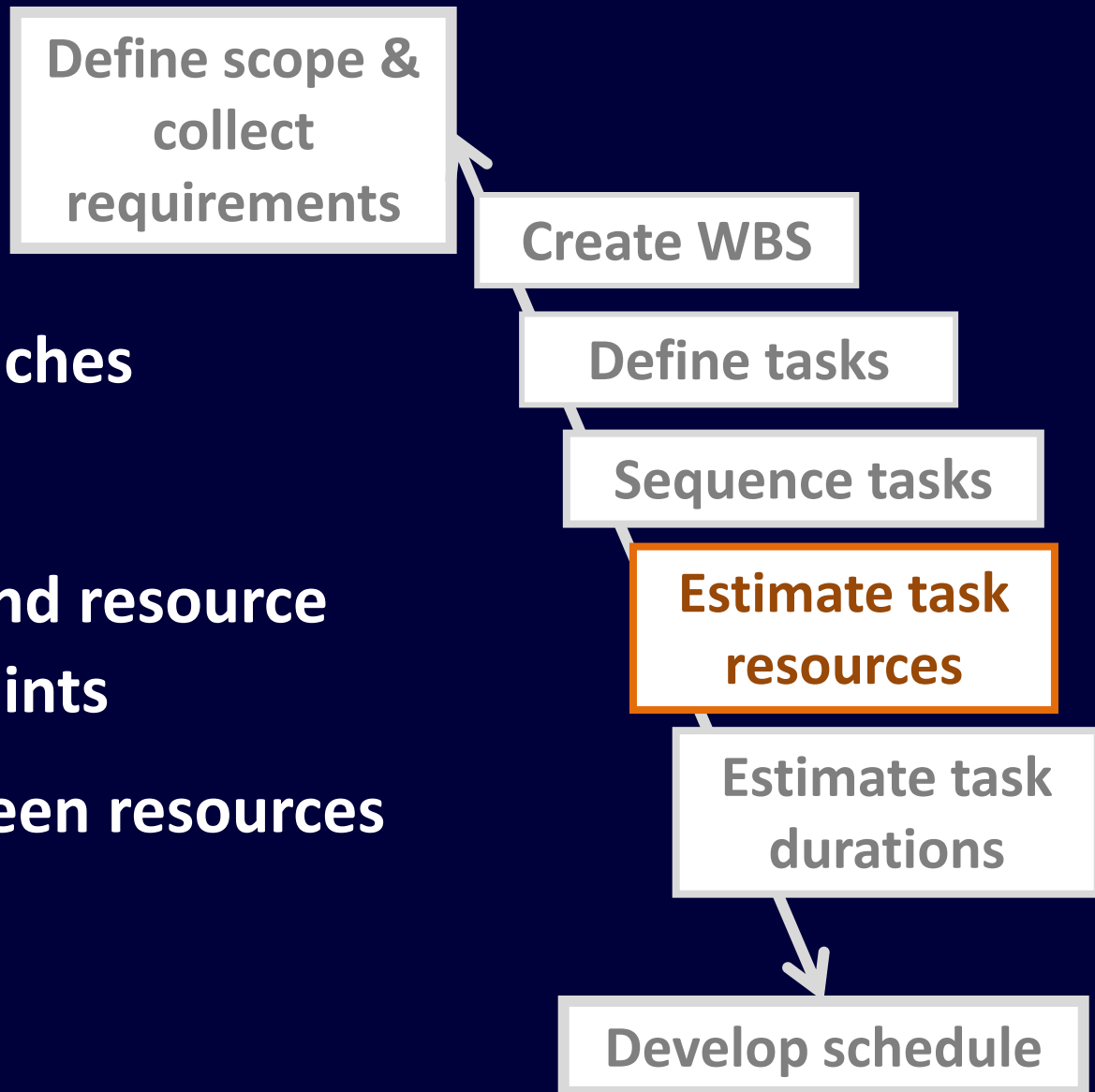
- **Alternative approaches**

- **Make or buy**

- **Project schedule and resource availability constraints**

- **Relationship between resources and duration**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Estimate task resources (4)

- **Human resources**

- **Offices (building, floor space, furniture…)**

- **Workstations (computers and software licences)**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule
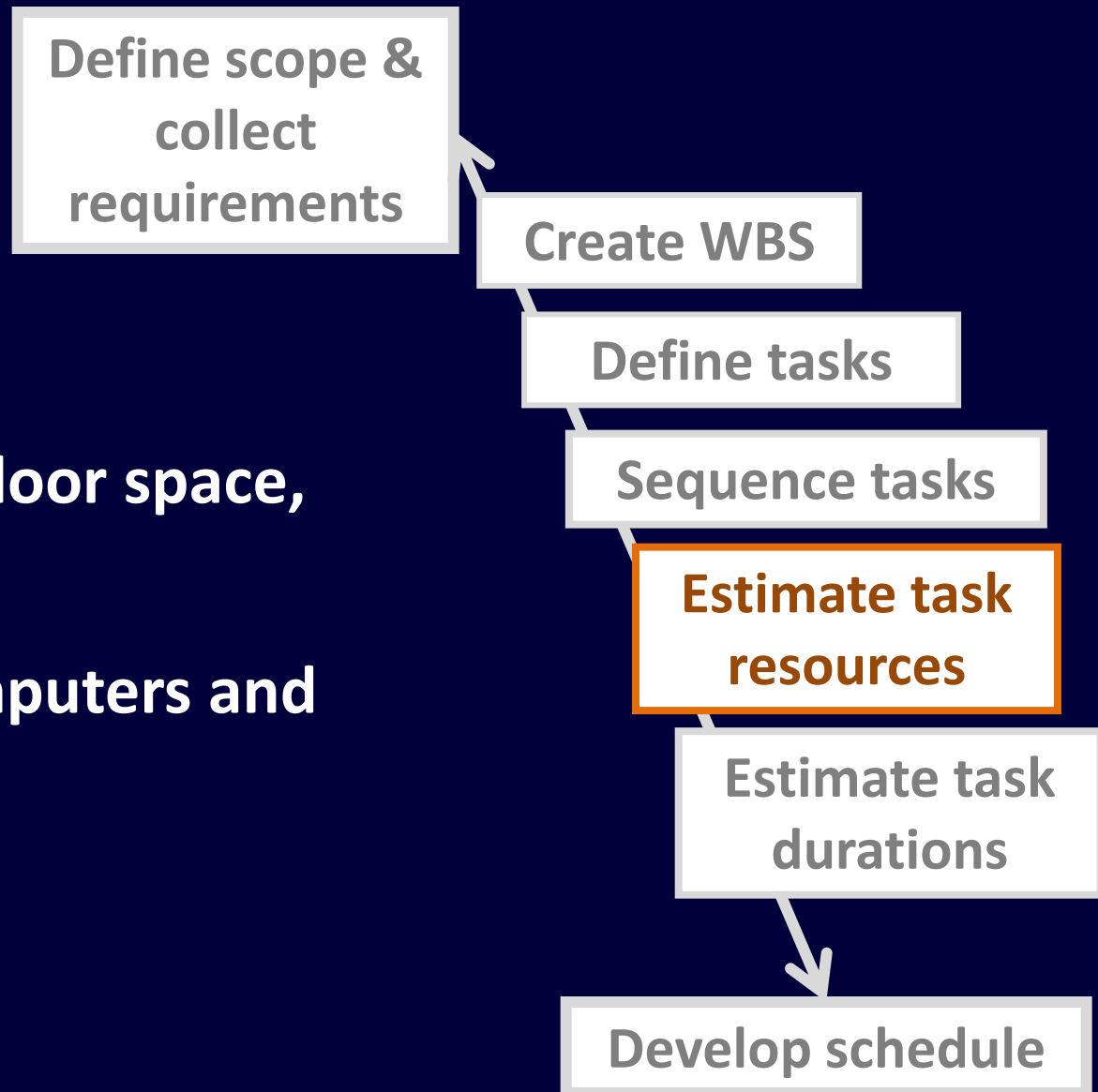
Estimate task resources (5)

- **Servers, hosting service, domain name rental, etc.**

- **Printers, scanners, audiovisual equipment, etc.**

- **Documentation (reference books, etc.)**

- **…**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Estimate task resources (6)

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule
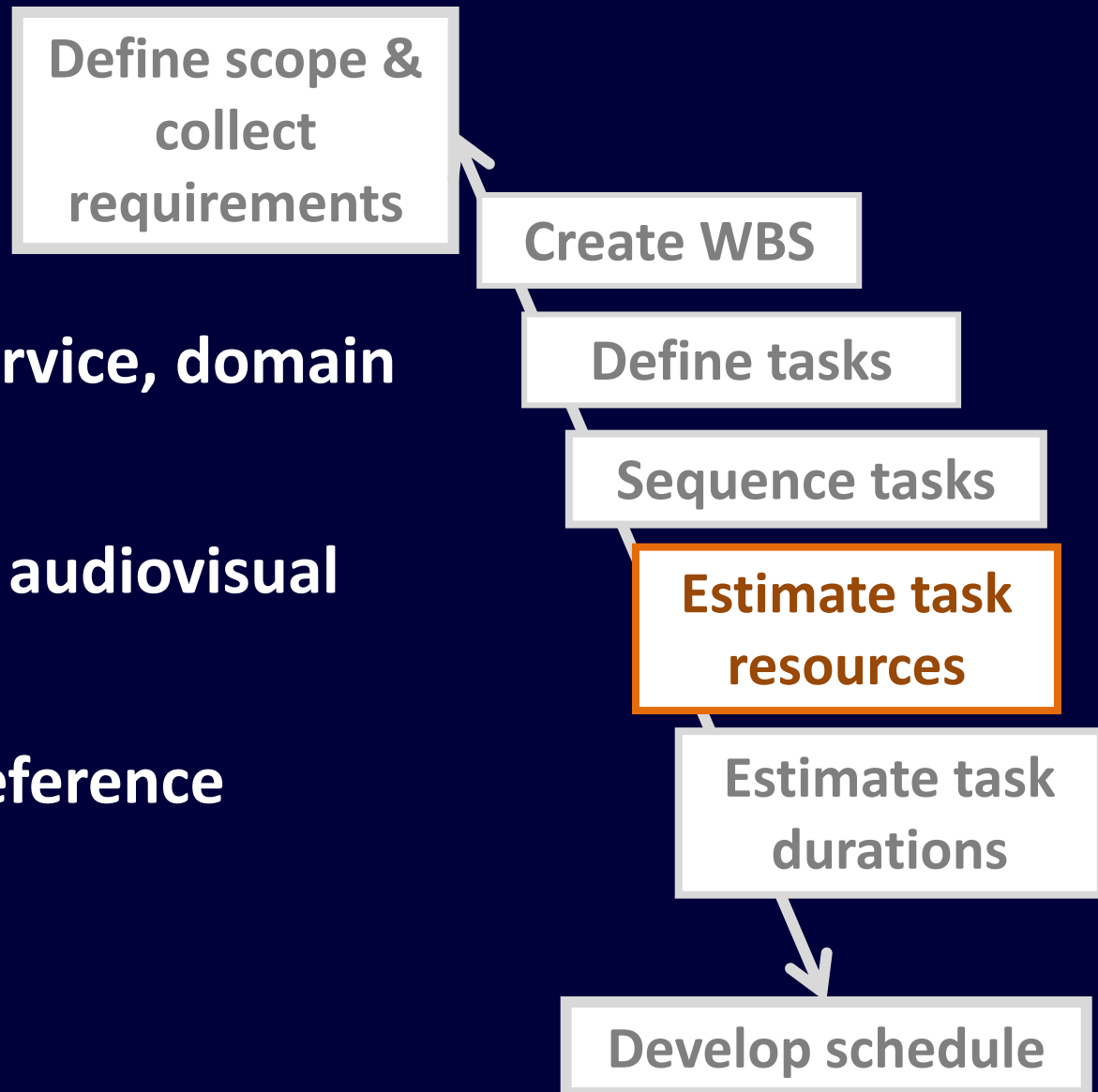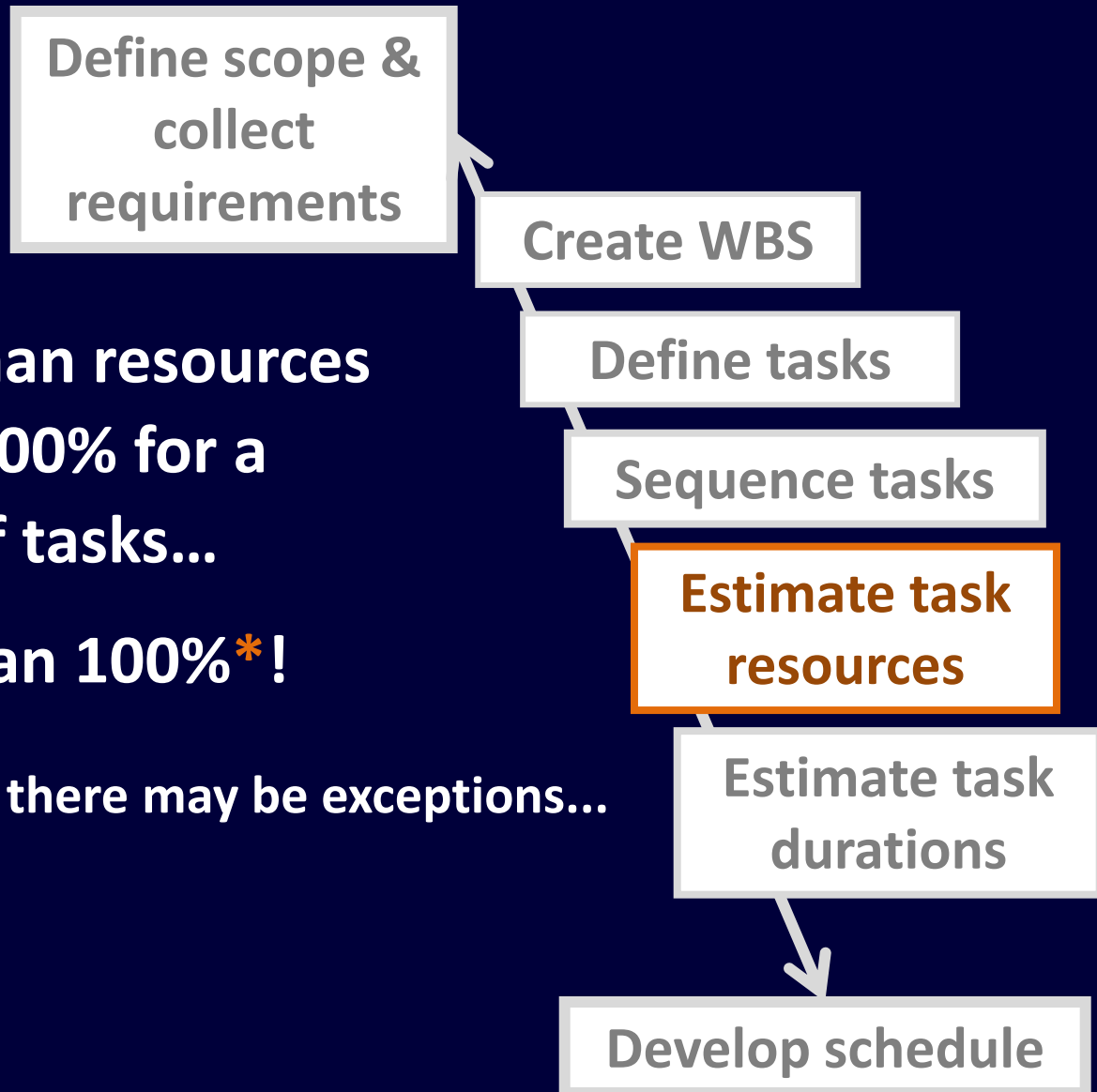
➢ **Availability of human resources may be less than 100% for a given task or set of tasks...**

✓ **but no more than 100%*!**

* **there may be exceptions...**

Estimate task resources (7)
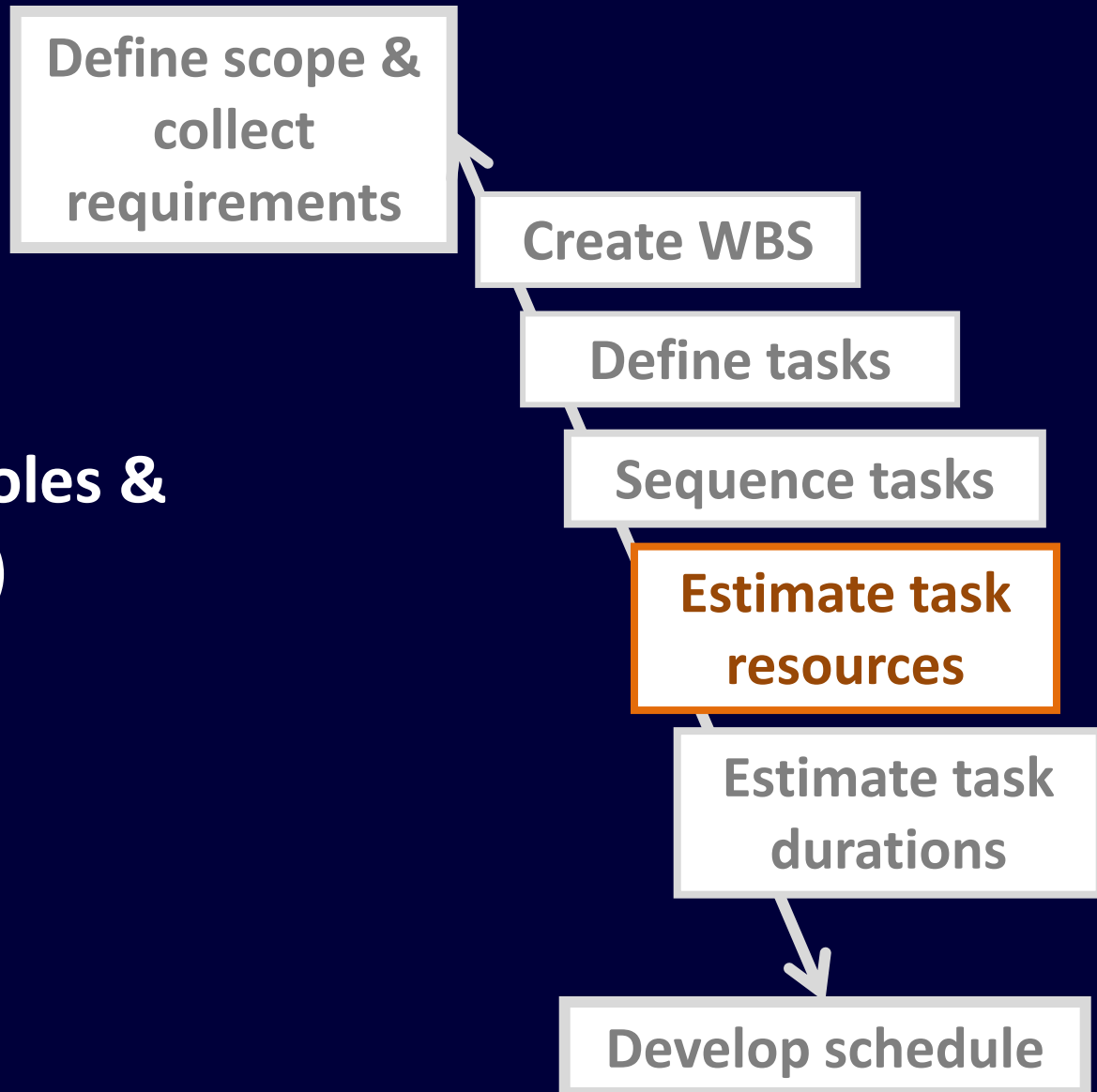
> **Task resource list:**

- ✓ **people (skills, roles & responsibilities)**
- ✓ **equipment**
- ✓ **materials**
- ✓ **etc.**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule

Resource sheet example: EXONE - CTR

Project manager
Senior technical consultant
Junior technical consultant
Developer 1
Developer 2
Tester 1
Tester 2
Client

Resource Name	Type	Max. Units
PM	Work	100%
STC	Work	100%
JTC	Work	100%
DVPR1	Work	100%
DVPR2	Work	100%
TSTR1	Work	100%
TSTR2	Work	100%
CLT	Work	100%
TRAVEL	Cost	

➢ **Recommendation: use abbreviations!**

Resource sheet example: EXONE - CLT

Overall project manager
Editor 1
Editor 2
Editor 3
Editor 4
Data engineer
Proofreader 1
Proofreader 2
Testing service provider
Contractor

Resource Name	Type	Max. Units
OPM	Work	100%
EDTR1	Work	100%
EDTR2	Work	100%
EDTR3	Work	100%
EDTR4	Work	100%
DATENG	Work	100%
PRFRDR1	Work	100%
PRFRDR2	Work	100%
TSTSP	Work	100%
CTR	Work	100%
CTR_COST	Cost	
HW	Material	
MMLIC	Material	
TRAVEL	Cost	

Resource ass'g't ex.: EXONE - Contractor

	WBS	Task Name	Predecessors	Resource Names
1	1	⊟ PROJECT EXONE		
2	1.1	⊟ REQUIREMENTS		
3	1.1.1	Review and complete requirements & plan with client		STC;DVPR1;CLT;PM
4	1.1.2	Final discussion and agreement with client on req'ts & plan	3	CLT;PM
5	1.2	⊟ DESIGN		
6	1.2.1	Write design specifications	4	DVPR1;STC
7	1.2.2	Check design with respect to requirements	6	DVPR1;STC;PM[50%]
8	1.2.3	Meet with client to discuss & agree on design	7	STC;PM[50%];DVPR1;CLT
9	1.3	⊟ IMPLEMENTATION		
10	1.3.1	Coding – Alpha version	8	DVPR2;DVPR1
11	1.3.2	Debugging phase 1 (following internal Alpha testing)	27;10	DVPR2;DVPR1
12	1.3.3	Production of Alpha version and delivery to client	22	DVPR2
13	1.3.4	Debugging phase 2 (following client Alpha testing)	28	DVPR1;DVPR2
14	1.3.5	Coding – Beta version	13	DVPR2;DVPR1
15	1.3.6	Debugging phase 3 (following internal Beta testing)	29;14	DVPR2;DVPR1
16	1.3.7	Production of Beta version and delivery to client	24	DVPR2
17	1.3.8	Debugging phase 4 (following client Beta testing)	30	DVPR1;DVPR2
18	1.3.9	Production of Final version and delivery to client	17	DVPR2
19	1.3.10	Debugging phase 5 & delivery (following client Final testing)	31	DVPR2;DVPR1
20	1.4	⊟ INTEGRATION		
21	1.4.1	Delivery of content subset by client	11FF–2 days	CLT
22	1.4.2	Integration of content subset	21;11	DVPR2
23	1.4.3	Delivery of complementary content by client	15FF–2 days	CLT
24	1.4.4	Integration of complementary content	23;15	DVPR2
25	1.5	⊟ TESTING & ACCEPTANCE		
26	1.5.1	Prepare test plan and test cases	8	STC[50%];JTC
27	1.5.2	Internal testing – Alpha version	10SS+3 days;26	TSTR1;TSTR2
28	1.5.3	Alpha testing by client	12	CLT
29	1.5.4	Internal testing – Beta version	14SS+5 days	TSTR1;TSTR2
30	1.5.5	Beta testing by client	16	CLT
31	1.5.6	Final testing by client	18	CLT
32	1.5.7	Acceptance by client	19	CLT
33	1.6	DEPLOYMENT AT CLIENT'S SITE	32	DVPR2;JTC;TRAVEL[€ 750.00]
34	1.7	PROJECT MANAGEMENT (After Req'ts WP & before Closure)	2;33FF	PM[50%]
35	1.8	PROJECT CLOSURE	34	DVPR1;PM;STC;TSTR1;CLT[50%]

Resource ass'g't ex.: EXONE - Client

	WBS	Task Name	Predecessors	Resource Names
1	1	⊟ PROJECT EXONE		
2	1.1	⊟ REQUIREMENTS		
3	1.1.1	Review and complete requirements & plan with contractor		CTR;OPM;DATENG;TRAVEL[€ 1,000.00]
4	1.1.2	Final discussion and agreement with contractor on req'ts & plan	3	CTR;OPM
5	1.2	⊟ SOFTWARE DESIGN		
6	1.2.1	Write and check design specifications	4	CTR
7	1.2.2	Meet with contractor to discuss & agree on design	6	OPM[50%];CTR;TRAVEL[€ 400.00]
8	1.3	⊟ SOFTWARE IMPLEMENTATION		
9	1.3.1	Coding, internal testing & bug fixing – Alpha version	7	CTR
10	1.3.2	Delivery of Alpha version by contractor	21	CTR
11	1.3.3	Debugging following Alpha testing	28	CTR
12	1.3.4	Coding, internal testing & bug fixing – Beta version	11	CTR
13	1.3.5	Delivery of Beta version by contractor	25;12	CTR
14	1.3.6	Debugging following Beta testing	29	CTR
15	1.3.7	Delivery of Final version by contractor	14	CTR
16	1.3.8	Debugging following Final testing & delivery for acceptance	30	CTR
17	1.4	⊟ CONTENT CREATION & INTEGRATION		
18	1.4.1	Creation of content subset	7	EDTR1;EDTR2;EDTR3;EDTR4
19	1.4.2	Proofreading of content subset	18SS+4 days	PRFRDR1;PRFRDR2
20	1.4.3	Preparation of content subset & delivery to contractor	9FF-2 days;19	DATENG
21	1.4.4	Integration of content subset	20;9	CTR
22	1.4.5	Creation of complementary content	28	EDTR1;EDTR2;EDTR3;EDTR4
23	1.4.6	Proofreading of complementary content	22SS+4 days	PRFRDR1;PRFRDR2
24	1.4.7	Preparation of complementary content & delivery to contractor	12FF-2 days;23	DATENG
25	1.4.8	Integration of complementary content	24;12	CTR
26	1.5	⊟ TESTING & ACCEPTANCE		
27	1.5.1	Prepare test plan and test cases	18	EDTR1;EDTR2
28	1.5.2	Alpha testing	10;27	EDTR3;EDTR4
29	1.5.3	Beta testing	13	EDTR3;EDTR4;TSTSP
30	1.5.4	Final testing	15	EDTR3;EDTR4;TSTSP[50%]
31	1.5.5	Acceptance	16	OPM[50%];EDTR1;EDTR2;EDTR3;EDTR4
32	1.6	DEPLOYMENT	31	CTR
33	1.7	PROJECT MANAGEMENT (After Req'ts WP & before Closure)	2;32FF	OPM[50%]
34	1.8	CONTRACTOR'S PROJECT CLOSURE	33	OPM[50%];CTR;TRAVEL[€ 250.00]
35	1.9	OVERALL PROJECT CLOSURE	34	DATENG;EDTR1;EDTR3;OPM;EDTR2;EDTR4

Part-time work examples: EXONE - CTR

	WBS	Task Name	Predecessors	Resource Names
1	1	⊟ PROJECT EXONE		
2	1.1	⊟ REQUIREMENTS		
3	1.1.1	Review and complete requirements & plan with client		STC;DVPR1;CLT;PM
4	1.1.2	Final discussion and agreement with client on req'ts & plan	3	CLT;PM
5	1.2	⊟ DESIGN		
6	1.2.1	Write design specifications	4	DVPR1;STC
7	1.2.2	Check design with respect to requirements	6	DVPR1;STC;PM[50%]
8	1.2.3	Meet with client to discuss & agree on design	7	STC;PM[50%];DVPR1;CLT
9	1.3	⊟ IMPLEMENTATION		
10	1.3.1	Coding – Alpha version	8	DVPR2;DVPR1
11	1.3.2	Debugging phase 1 (following internal Alpha testing)	27;10	DVPR2;DVPR1
12	1.3.3	Production of Alpha version and delivery to client	22	DVPR2
13	1.3.4	Debugging phase 2 (following client Alpha testing)	28	DVPR1;DVPR2
14	1.3.5	Coding – Beta version	13	DVPR2;DVPR1
15	1.3.6	Debugging phase 3 (following internal Beta testing)	29;14	DVPR2;DVPR1
16	1.3.7	Production of Beta version and delivery to client	24	DVPR2
17	1.3.8	Debugging phase 4 (following client Beta testing)	30	DVPR1;DVPR2
18	1.3.9	Production of Final version and delivery to client	17	DVPR2
19	1.3.10	Debugging phase 5 & delivery (following client Final testing)	31	DVPR2;DVPR1
20	1.4	⊟ INTEGRATION		
21	1.4.1	Delivery of content subset by client	11FF–2 days	CLT
22	1.4.2	Integration of content subset	21;11	DVPR2
23	1.4.3	Delivery of complementary content by client	15FF–2 days	CLT
24	1.4.4	Integration of complementary content	23;15	DVPR2
25	1.5	⊟ TESTING & ACCEPTANCE		
26	1.5.1	Prepare test plan and test cases	8	STC[50%];JTC
27	1.5.2	Internal testing – Alpha version	10SS+3 days;26	TSTR1;TSTR2
28	1.5.3	Alpha testing by client	12	CLT
29	1.5.4	Internal testing – Beta version	14SS+5 days	TSTR1;TSTR2
30	1.5.5	Beta testing by client	16	CLT
31	1.5.6	Final testing by client	18	CLT
32	1.5.7	Acceptance by client	19	CLT
33	1.6	**DEPLOYMENT AT CLIENT'S SITE**	32	DVPR2;JTC;TRAVEL[€ 750.00]
34	1.7	**PROJECT MANAGEMENT (After Req'ts WP & before Closure)**	2;33FF	PM[50%]
35	1.8	**PROJECT CLOSURE**	34	DVPR1;PM;STC;TSTR1;CLT[50%]

Part-time work examples: EXONE - CLT

	WBS	Task Name	Predecessors	Resource Names
1	1	⊟ **PROJECT EXONE**		
2	1.1	⊟ **REQUIREMENTS**		
3	1.1.1	Review and complete requirements & plan with contractor		CTR;OPM;DATENG;TRAVEL[€ 1,000.00]
4	1.1.2	Final discussion and agreement with contractor on req'ts & plan	3	CTR;OPM
5	1.2	⊟ **SOFTWARE DESIGN**		
6	1.2.1	Write and check design specifications	4	CTR
7	1.2.2	Meet with contractor to discuss & agree on design	6	OPM[50%];CTR;TRAVEL[€ 400.00]
8	1.3	⊟ **SOFTWARE IMPLEMENTATION**		
9	1.3.1	Coding, internal testing & bug fixing – Alpha version	7	CTR
10	1.3.2	Delivery of Alpha version by contractor	21	CTR
11	1.3.3	Debugging following Alpha testing	28	CTR
12	1.3.4	Coding, internal testing & bug fixing – Beta version	11	CTR
13	1.3.5	Delivery of Beta version by contractor	25;12	CTR
14	1.3.6	Debugging following Beta testing	29	CTR
15	1.3.7	Delivery of Final version by contractor	14	CTR
16	1.3.8	Debugging following Final testing & delivery for acceptance	30	CTR
17	1.4	⊟ **CONTENT CREATION & INTEGRATION**		
18	1.4.1	Creation of content subset	7	EDTR1;EDTR2;EDTR3;EDTR4
19	1.4.2	Proofreading of content subset	18SS+4 days	PRFRDR1;PRFRDR2
20	1.4.3	Preparation of content subset & delivery to contractor	9FF−2 days;19	DATENG
21	1.4.4	Integration of content subset	20;9	CTR
22	1.4.5	Creation of complementary content	28	EDTR1;EDTR2;EDTR3;EDTR4
23	1.4.6	Proofreading of complementary content	22SS+4 days	PRFRDR1;PRFRDR2
24	1.4.7	Preparation of complementary content & delivery to contractor	12FF−2 days;23	DATENG
25	1.4.8	Integration of complementary content	24;12	CTR
26	1.5	⊟ **TESTING & ACCEPTANCE**		
27	1.5.1	Prepare test plan and test cases	18	EDTR1;EDTR2
28	1.5.2	Alpha testing	10;27	EDTR3;EDTR4
29	1.5.3	Beta testing	13	EDTR3;EDTR4;TSTSP
30	1.5.4	Final testing	15	EDTR3;EDTR4;TSTSP[50%]
31	1.5.5	Acceptance	16	OPM[50%];EDTR1;EDTR2;EDTR3;EDTR4
32	1.6	**DEPLOYMENT**	31	CTR
33	1.7	**PROJECT MANAGEMENT (After Req'ts WP & before Closure)**	2;32FF	OPM[50%]
34	1.8	**CONTRACTOR'S PROJECT CLOSURE**	33	OPM[50%];CTR;TRAVEL[€ 250.00]
35	1.9	**OVERALL PROJECT CLOSURE**	34	DATENG;EDTR1;EDTR3;OPM;EDTR2;EDTR4

Questions?

Sequence, resources, durations, schedule

Define scope & collect requirements

Create WBS

Interdependent processes

Define tasks

Sequence Tasks

Sequence tasks

Develop schedule

Estimate task resources

Estimate task resources

Estimate task durations

Estimate task durations

Develop schedule
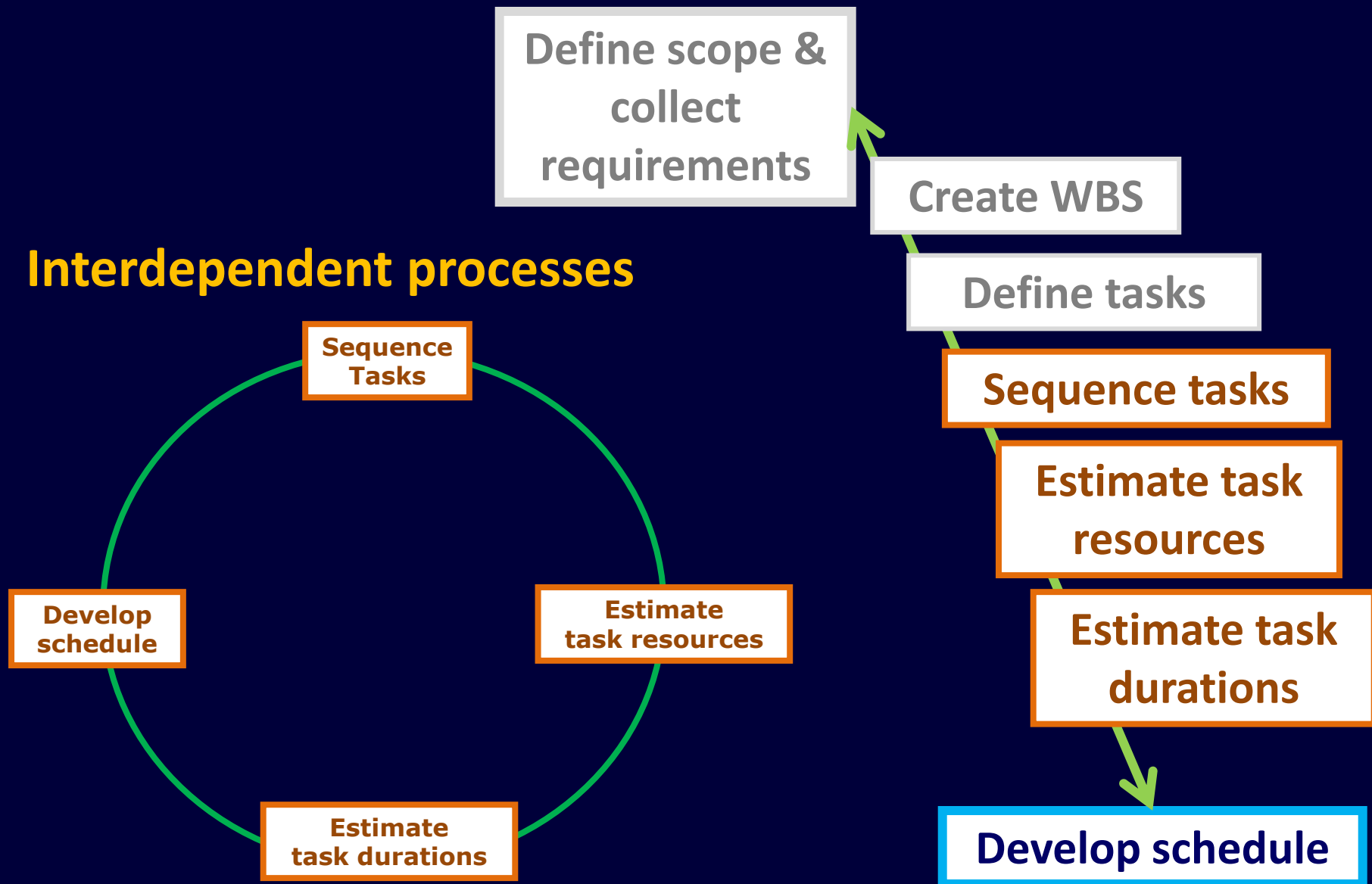
Estimate task durations (1)

- **Amount of <u>working</u> time required to complete each task with assigned resources**
- **Closely related to "Estimate task resources"**
- **Imposed durations and/or dates**
  - ✓ **planning constraints**
- **Duration vs workload**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule
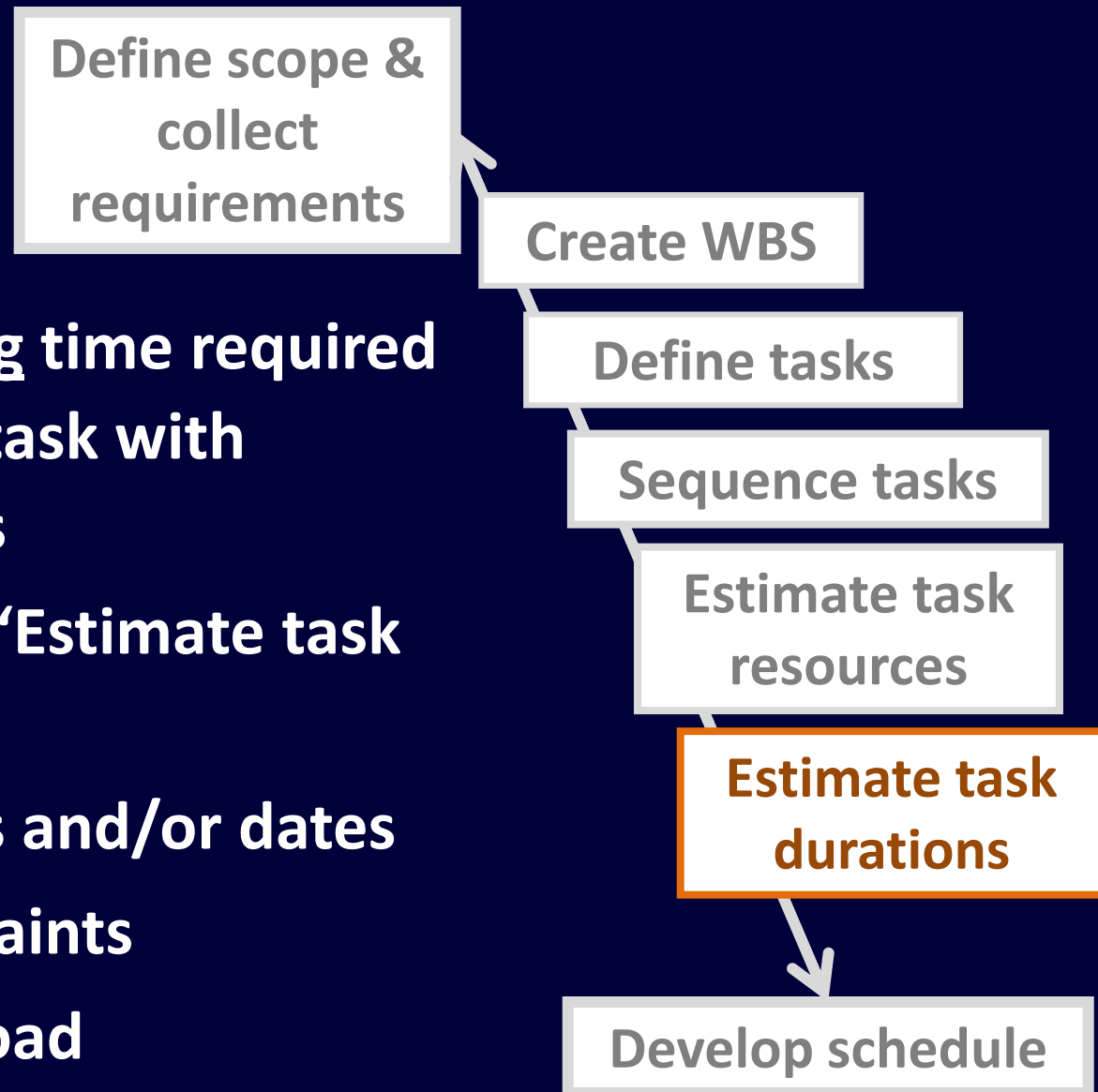
Estimate task durations (2)

- **Expert judgment**

- **Analogous estimates**

- **Parametric estimates**

- **Three-point estimates:**

  - ✓ Te = (To+4xTm+Tp)/6

- **Reserve analysis**

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule
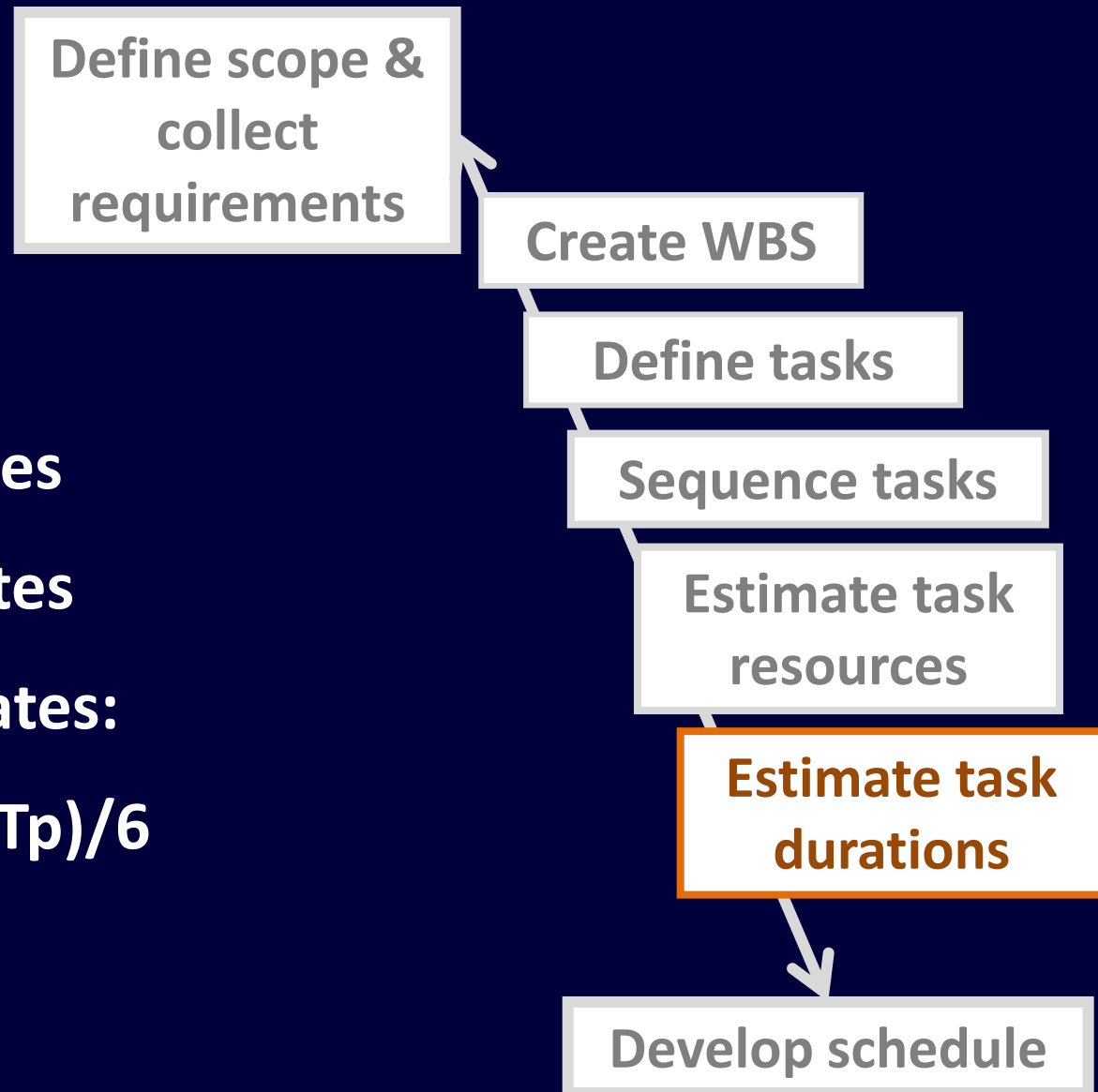
Example of simulation: EHM indexing

➢ **Number of articles to index: 50,000**

➢ **Number of minutes measured per article: 5**

➢ **Total number of minutes required: 250,000**

➢ **Margin of error (as a precaution...): 15%**

➢ **Number of minutes required after adjustment: 287,500**

➢ **Number of hours: 4,792**

➢ **Number of 7-hour days: 685**

➢ **Number of 5-day weeks: 137**

➢ **Number of 4-week months calculated for task: 34 (A)**

➢ **Imposed maximum lead time in months: 6 (B)**

➢ **Number of persons required: 6 (= A/B, rounded)**

Duration vs Workload (reminder)

> **Workload = 3 person-days**

> **Duration = 3 days**

> **Duration = 1 day**

Duration & Workload: EXONE - CTR

	WBS	Task Name	Predecessors	Resource Names	Duration	Work
1	1	☐ PROJECT EXONE			65 days	177 days
2	1.1	☐ REQUIREMENTS			4 days	14 days
3	1.1.1	Review and complete requirements & plan with client		STC;DVPR1;CLT;PM	3 days	12 days
4	1.1.2	Final discussion and agreement with client on req'ts & plan	3	CLT;PM	1 day	2 days
5	1.2	☐ DESIGN			11 days	26 days
6	1.2.1	Write design specifications	4	DVPR1;STC	7 days	14 days
7	1.2.2	Check design with respect to requirements	6	DVPR1;STC;PM[50%]	2 days	5 days
8	1.2.3	Meet with client to discuss & agree on design	7	STC;PM[50%];DVPR1;CLT	2 days	7 days
9	1.3	☐ IMPLEMENTATION			46 days	61 days
10	1.3.1	Coding – Alpha version	8	DVPR2;DVPR1	7 days	14 days
11	1.3.2	Debugging phase 1 (following internal Alpha testing)	27;10	DVPR2;DVPR1	3 days	6 days
12	1.3.3	Production of Alpha version and delivery to client	22	DVPR2	1 day	1 day
13	1.3.4	Debugging phase 2 (following client Alpha testing)	28	DVPR1;DVPR2	2 days	4 days
14	1.3.5	Coding – Beta version	13	DVPR2;DVPR1	8 days	16 days
15	1.3.6	Debugging phase 3 (following internal Beta testing)	29;14	DVPR2;DVPR1	3 days	6 days
16	1.3.7	Production of Beta version and delivery to client	24	DVPR2	1 day	1 day
17	1.3.8	Debugging phase 4 (following client Beta testing)	30	DVPR1;DVPR2	4 days	8 days
18	1.3.9	Production of Final version and delivery to client	17	DVPR2	1 day	1 day
19	1.3.10	Debugging phase 5 & delivery (following client Final testing)	31	DVPR2;DVPR1	2 days	4 days
20	1.4	☐ INTEGRATION			23 days	5 days
21	1.4.1	Delivery of content subset by client	11FF-2 days	CLT	1 day	1 day
22	1.4.2	Integration of content subset	21;11	DVPR2	1 day	1 day
23	1.4.3	Delivery of complementary content by client	15FF-2 days	CLT	1 day	1 day
24	1.4.4	Integration of complementary content	23;15	DVPR2	2 days	2 days
25	1.5	☐ TESTING & ACCEPTANCE			47 days	32.5 days
26	1.5.1	Prepare test plan and test cases	8	STC[50%];JTC	5 days	7.5 days
27	1.5.2	Internal testing – Alpha version	10SS+3 days;26	TSTR1;TSTR2	4 days	8 days
28	1.5.3	Alpha testing by client	12	CLT	2 days	2 days
29	1.5.4	Internal testing – Beta version	14SS+5 days	TSTR1;TSTR2	4 days	8 days
30	1.5.5	Beta testing by client	16	CLT	4 days	4 days
31	1.5.6	Final testing by client	18	CLT	2 days	2 days
32	1.5.7	Acceptance by client	19	CLT	1 day	1 day
33	1.6	DEPLOYMENT AT CLIENT'S SITE	32	DVPR2;JTC;TRAVEL[€ 750.00]	2 days	4 days
34	1.7	PROJECT MANAGEMENT (After Req'ts WP & before Closure)	2;33FF	PM[50%]	60 days	30 days
35	1.8	PROJECT CLOSURE	34	DVPR1;PM;STC;TSTR1;CLT[50%]	1 day	4.5 days

Duration & Workload: EXONE - CLT

	WBS	Task Name	Predecessors	Resource Names	Duration	Work
1	1	⊟ **PROJECT EXONE**			**66 days**	**200 days**
2	1.1	⊟ **REQUIREMENTS**			**4 days**	**11 days**
3	1.1.1	Review and complete requirements & plan with contractor		CTR;OPM;DATENG;TRAVEL[€ 1,000.00]	3 days	9 days
4	1.1.2	Final discussion and agreement with contractor on req't's & plan	3	CTR;OPM	1 day	2 days
5	1.2	⊟ **SOFTWARE DESIGN**			**11 days**	**12 days**
6	1.2.1	Write and check design specifications	4	CTR	9 days	9 days
7	1.2.2	Meet with contractor to discuss & agree on design	6	OPM[50%];CTR;TRAVEL[€ 400.00]	2 days	3 days
8	1.3	⊟ **SOFTWARE IMPLEMENTATION**			**46 days**	**35 days**
9	1.3.1	Coding, internal testing & bug fixing – Alpha version	7	CTR	12 days	12 days
10	1.3.2	Delivery of Alpha version by contractor	21	CTR	1 day	1 day
11	1.3.3	Debugging following Alpha testing	28	CTR	2 days	2 days
12	1.3.4	Coding, internal testing & bug fixing – Beta version	11	CTR	12 days	12 days
13	1.3.5	Delivery of Beta version by contractor	25;12	CTR	1 day	1 day
14	1.3.6	Debugging following Beta testing	29	CTR	4 days	4 days
15	1.3.7	Delivery of Final version by contractor	14	CTR	1 day	1 day
16	1.3.8	Debugging following Final testing & delivery for acceptance	30	CTR	2 days	2 days
17	1.4	⊟ **CONTENT CREATION & INTEGRATION**			**32 days**	**69 days**
18	1.4.1	Creation of content subset	7	EDTR1;EDTR2;EDTR3;EDTR4	6 days	24 days
19	1.4.2	Proofreading of content subset	18SS+4 days	PRFRDR1;PRFRDR2	3 days	6 days
20	1.4.3	Preparation of content subset & delivery to contractor	9FF-2 days;19	DATENG	3 days	3 days
21	1.4.4	Integration of content subset	20;9	CTR	1 day	1 day
22	1.4.5	Creation of complementary content	28	EDTR1;EDTR2;EDTR3;EDTR4	6 days	24 days
23	1.4.6	Proofreading of complementary content	22SS+4 days	PRFRDR1;PRFRDR2	3 days	6 days
24	1.4.7	Preparation of complementary content & delivery to contractor	12FF-2 days;23	DATENG	3 days	3 days
25	1.4.8	Integration of complementary content	24;12	CTR	2 days	2 days
26	1.5	⊟ **TESTING & ACCEPTANCE**			**41 days**	**33.5 days**
27	1.5.1	Prepare test plan and test cases	18	EDTR1;EDTR2	4 days	8 days
28	1.5.2	Alpha testing	10;27	EDTR3;EDTR4	2 days	4 days
29	1.5.3	Beta testing	13	EDTR3;EDTR4;TSTSP	4 days	12 days
30	1.5.4	Final testing	15	EDTR3;EDTR4;TSTSP[50%]	2 days	5 days
31	1.5.5	Acceptance	16	OPM[50%];EDTR1;EDTR2;EDTR3;EDTR4	1 day	4.5 days
32	1.6	**DEPLOYMENT**	31	CTR	**2 days**	**2 days**
33	1.7	**PROJECT MANAGEMENT (After Req't's WP & before Closure)**	2;32FF	OPM[50%]	**60 days**	**30 days**
34	1.8	**CONTRACTOR'S PROJECT CLOSURE**	33	OPM[50%];CTR;TRAVEL[€ 250.00]	**1 day**	**1.5 days**
35	1.9	**OVERALL PROJECT CLOSURE**	34	DATENG;EDTR1;EDTR3;OPM;EDTR2;EDTR4	**1 day**	**6 days**

Develop the schedule (1)

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations
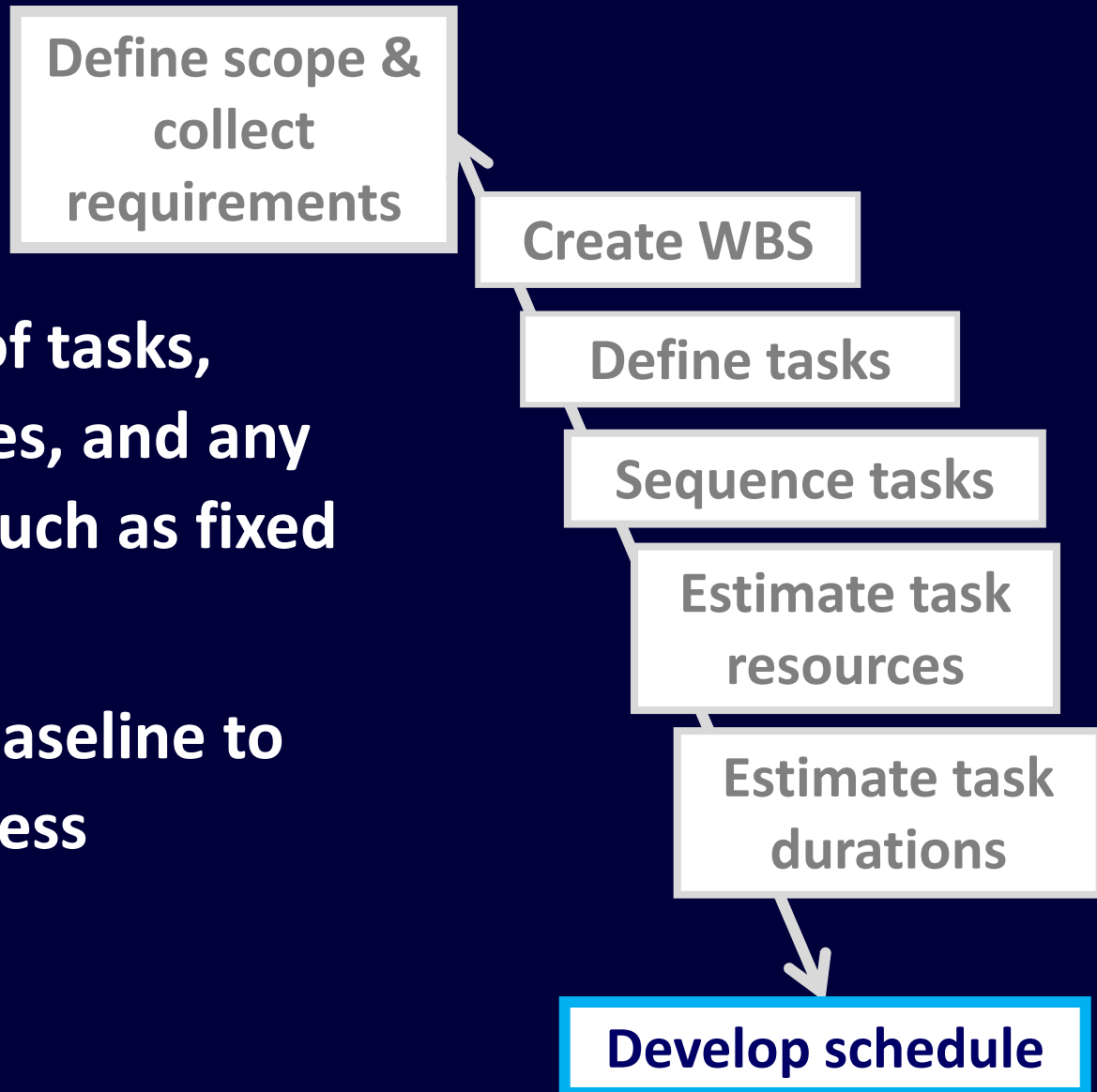
Develop schedule

➢ **Input = sequence of tasks, durations, resources, and any other constraints such as fixed milestones**

➢ **Initial schedule = baseline to track project progress**

Develop the schedule (2)

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations
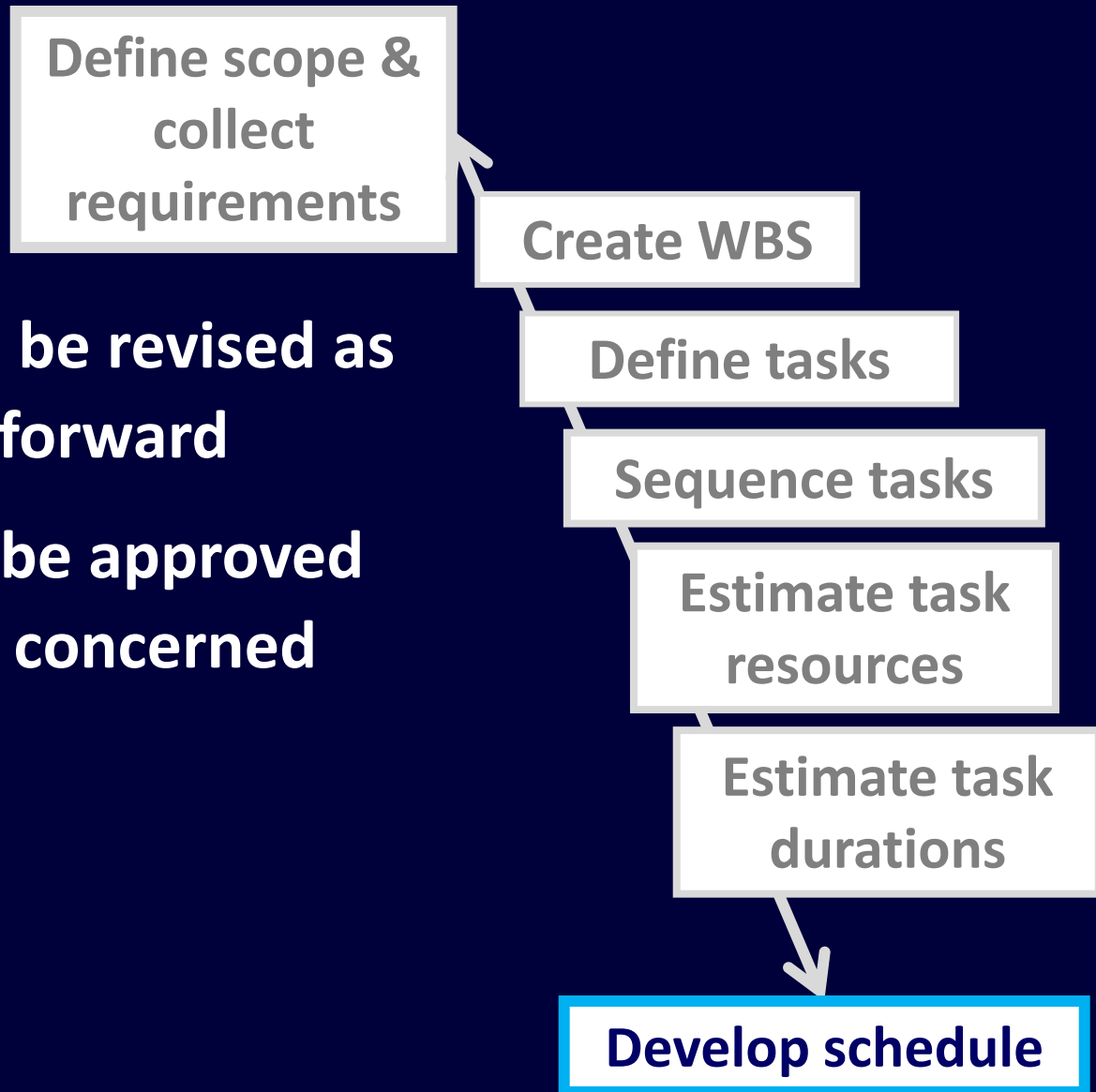
Develop schedule

> **Generally needs to be revised as the project moves forward**

> **Major revisions to be approved by all stakeholders concerned**

Develop the schedule (3)

Define scope & collect requirements

Create WBS

Define tasks

Sequence tasks

Estimate task resources

Estimate task durations

Develop schedule
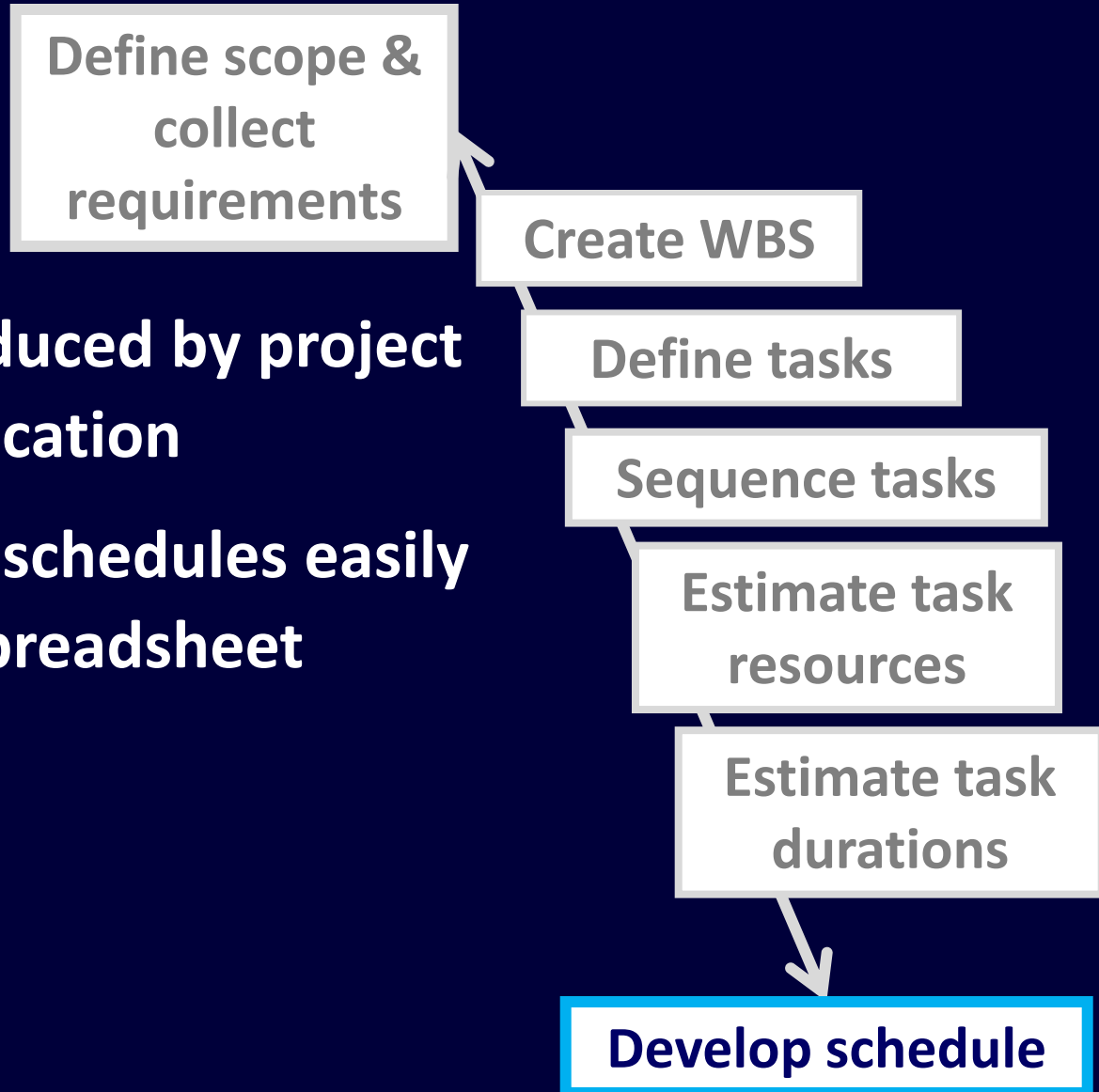
➢ **Automatically produced by project management application**

➢ **Simple (summary) schedules easily produced with a spreadsheet**

Start & End dates: EXONE - CTR

	WBS	Task Name	Predecessors	Resource Names	Duration	Start	Finish
1	1	⊟ PROJECT EXONE			65 days	03/01/17	03/04/17
2	1.1	⊟ REQUIREMENTS			4 days	03/01/17	06/01/17
3	1.1.1	Review and complete requirements & plan with client		STC;DVPR1;CLT;PM	3 days	03/01/17	05/01/17
4	1.1.2	Final discussion and agreement with client on req'ts & plan	3	CLT;PM	1 day	06/01/17	06/01/17
5	1.2	⊟ DESIGN			11 days	09/01/17	23/01/17
6	1.2.1	Write design specifications	4	DVPR1;STC	7 days	09/01/17	17/01/17
7	1.2.2	Check design with respect to requirements	6	DVPR1;STC;PM[50%]	2 days	18/01/17	19/01/17
8	1.2.3	Meet with client to discuss & agree on design	7	STC;PM[50%];DVPR1;CLT	2 days	20/01/17	23/01/17
9	1.3	⊟ IMPLEMENTATION			46 days	24/01/17	28/03/17
10	1.3.1	Coding – Alpha version	8	DVPR2;DVPR1	7 days	24/01/17	01/02/17
11	1.3.2	Debugging phase 1 (following internal Alpha testing)	27;10	DVPR2;DVPR1	3 days	06/02/17	08/02/17
12	1.3.3	Production of Alpha version and delivery to client	22	DVPR2	1 day	10/02/17	10/02/17
13	1.3.4	Debugging phase 2 (following client Alpha testing)	28	DVPR1;DVPR2	2 days	15/02/17	16/02/17
14	1.3.5	Coding – Beta version	13	DVPR2;DVPR1	8 days	17/02/17	28/02/17
15	1.3.6	Debugging phase 3 (following internal Beta testing)	29;14	DVPR2;DVPR1	3 days	02/03/17	06/03/17
16	1.3.7	Production of Beta version and delivery to client	24	DVPR2	1 day	09/03/17	09/03/17
17	1.3.8	Debugging phase 4 (following client Beta testing)	30	DVPR1;DVPR2	4 days	16/03/17	21/03/17
18	1.3.9	Production of Final version and delivery to client	17	DVPR2	1 day	22/03/17	22/03/17
19	1.3.10	Debugging phase 5 & delivery (following client Final testing)	31	DVPR2;DVPR1	2 days	27/03/17	28/03/17
20	1.4	⊟ INTEGRATION			23 days	06/02/17	08/03/17
21	1.4.1	Delivery of content subset by client	11FF-2 days	CLT	1 day	06/02/17	06/02/17
22	1.4.2	Integration of content subset	21;11	DVPR2	1 day	09/02/17	09/02/17
23	1.4.3	Delivery of complementary content by client	15FF-2 days	CLT	1 day	02/03/17	02/03/17
24	1.4.4	Integration of complementary content	23;15	DVPR2	2 days	07/03/17	08/03/17
25	1.5	⊟ TESTING & ACCEPTANCE			47 days	24/01/17	29/03/17
26	1.5.1	Prepare test plan and test cases	8	STC[50%];JTC	5 days	24/01/17	30/01/17
27	1.5.2	Internal testing – Alpha version	10SS+3 days;26	TSTR1;TSTR2	4 days	31/01/17	03/02/17
28	1.5.3	Alpha testing by client	12	CLT	2 days	13/02/17	14/02/17
29	1.5.4	Internal testing – Beta version	14SS+5 days	TSTR1;TSTR2	4 days	24/02/17	01/03/17
30	1.5.5	Beta testing by client	16	CLT	4 days	10/03/17	15/03/17
31	1.5.6	Final testing by client	18	CLT	2 days	23/03/17	24/03/17
32	1.5.7	Acceptance by client	19	CLT	1 day	29/03/17	29/03/17
33	1.6	DEPLOYMENT AT CLIENT'S SITE	32	DVPR2;JTC;TRAVEL[€ 750.00]	2 days	30/03/17	31/03/17
34	1.7	PROJECT MANAGEMENT (After Req'ts WP & before Closure)	2;33FF	PM[50%]	60 days	09/01/17	31/03/17
35	1.8	PROJECT CLOSURE	34	DVPR1;PM;STC;TSTR1;CLT[50%]	1 day	03/04/17	03/04/17

Start & End dates: EXONE - CLT

	WBS	Task Name	Predecessors	Resource Names	Duration	Start	Finish
1	1	⊟ PROJECT EXONE			66 days	03/01/17	04/04/17
2	1.1	⊟ REQUIREMENTS			4 days	03/01/17	06/01/17
3	1.1.1	Review and complete requirements & plan with contractor		CTR;OPM;DATENG;TRAVEL[€ 1,000.00]	3 days	03/01/17	05/01/17
4	1.1.2	Final discussion and agreement with contractor on req'ts & plan	3	CTR;OPM	1 day	06/01/17	06/01/17
5	1.2	⊟ SOFTWARE DESIGN			11 days	09/01/17	23/01/17
6	1.2.1	Write and check design specifications	4	CTR	9 days	09/01/17	19/01/17
7	1.2.2	Meet with contractor to discuss & agree on design	6	OPM[50%];CTR;TRAVEL[€ 400.00]	2 days	20/01/17	23/01/17
8	1.3	⊟ SOFTWARE IMPLEMENTATION			46 days	24/01/17	28/03/17
9	1.3.1	Coding, internal testing & bug fixing – Alpha version	7	CTR	12 days	24/01/17	08/02/17
10	1.3.2	Delivery of Alpha version by contractor	21	CTR	1 day	10/02/17	10/02/17
11	1.3.3	Debugging following Alpha testing	28	CTR	2 days	15/02/17	16/02/17
12	1.3.4	Coding, internal testing & bug fixing – Beta version	11	CTR	12 days	17/02/17	06/03/17
13	1.3.5	Delivery of Beta version by contractor	25;12	CTR	1 day	09/03/17	09/03/17
14	1.3.6	Debugging following Beta testing	29	CTR	4 days	16/03/17	21/03/17
15	1.3.7	Delivery of Final version by contractor	14	CTR	1 day	22/03/17	22/03/17
16	1.3.8	Debugging following Final testing & delivery for acceptance	30	CTR	2 days	27/03/17	28/03/17
17	1.4	⊟ CONTENT CREATION & INTEGRATION			32 days	24/01/17	08/03/17
18	1.4.1	Creation of content subset	7	EDTR1;EDTR2;EDTR3;EDTR4	6 days	24/01/17	31/01/17
19	1.4.2	Proofreading of content subset	18SS+4 days	PRFRDR1;PRFRDR2	3 days	30/01/17	01/02/17
20	1.4.3	Preparation of content subset & delivery to contractor	9FF-2 days;19	DATENG	3 days	02/02/17	06/02/17
21	1.4.4	Integration of content subset	20;9	CTR	1 day	09/02/17	09/02/17
22	1.4.5	Creation of complementary content	28	EDTR1;EDTR2;EDTR3;EDTR4	6 days	15/02/17	22/02/17
23	1.4.6	Proofreading of complementary content	22SS+4 days	PRFRDR1;PRFRDR2	3 days	21/02/17	23/02/17
24	1.4.7	Preparation of complementary content & delivery to contractor	12FF-2 days;23	DATENG	3 days	28/02/17	02/03/17
25	1.4.8	Integration of complementary content	24;12	CTR	2 days	07/03/17	08/03/17
26	1.5	⊟ TESTING & ACCEPTANCE			41 days	01/02/17	29/03/17
27	1.5.1	Prepare test plan and test cases	18	EDTR1;EDTR2	4 days	01/02/17	06/02/17
28	1.5.2	Alpha testing	10;27	EDTR3;EDTR4	2 days	13/02/17	14/02/17
29	1.5.3	Beta testing	13	EDTR3;EDTR4;TSTSP	4 days	10/03/17	15/03/17
30	1.5.4	Final testing	15	EDTR3;EDTR4;TSTSP[50%]	2 days	23/03/17	24/03/17
31	1.5.5	Acceptance	16	OPM[50%];EDTR1;EDTR2;EDTR3;EDTR4	1 day	29/03/17	29/03/17
32	1.6	DEPLOYMENT	31	CTR	2 days	30/03/17	31/03/17
33	1.7	PROJECT MANAGEMENT (After Req'ts WP & before Closure)	2;32FF	OPM[50%]	60 days	09/01/17	31/03/17
34	1.8	CONTRACTOR'S PROJECT CLOSURE	33	OPM[50%];CTR;TRAVEL[€ 250.00]	1 day	03/04/17	03/04/17
35	1.9	OVERALL PROJECT CLOSURE	34	DATENG;EDTR1;EDTR3;OPM;EDTR2;EDTR4	1 day	04/04/17	04/04/17

Schedule example: EXONE – CTR (1)
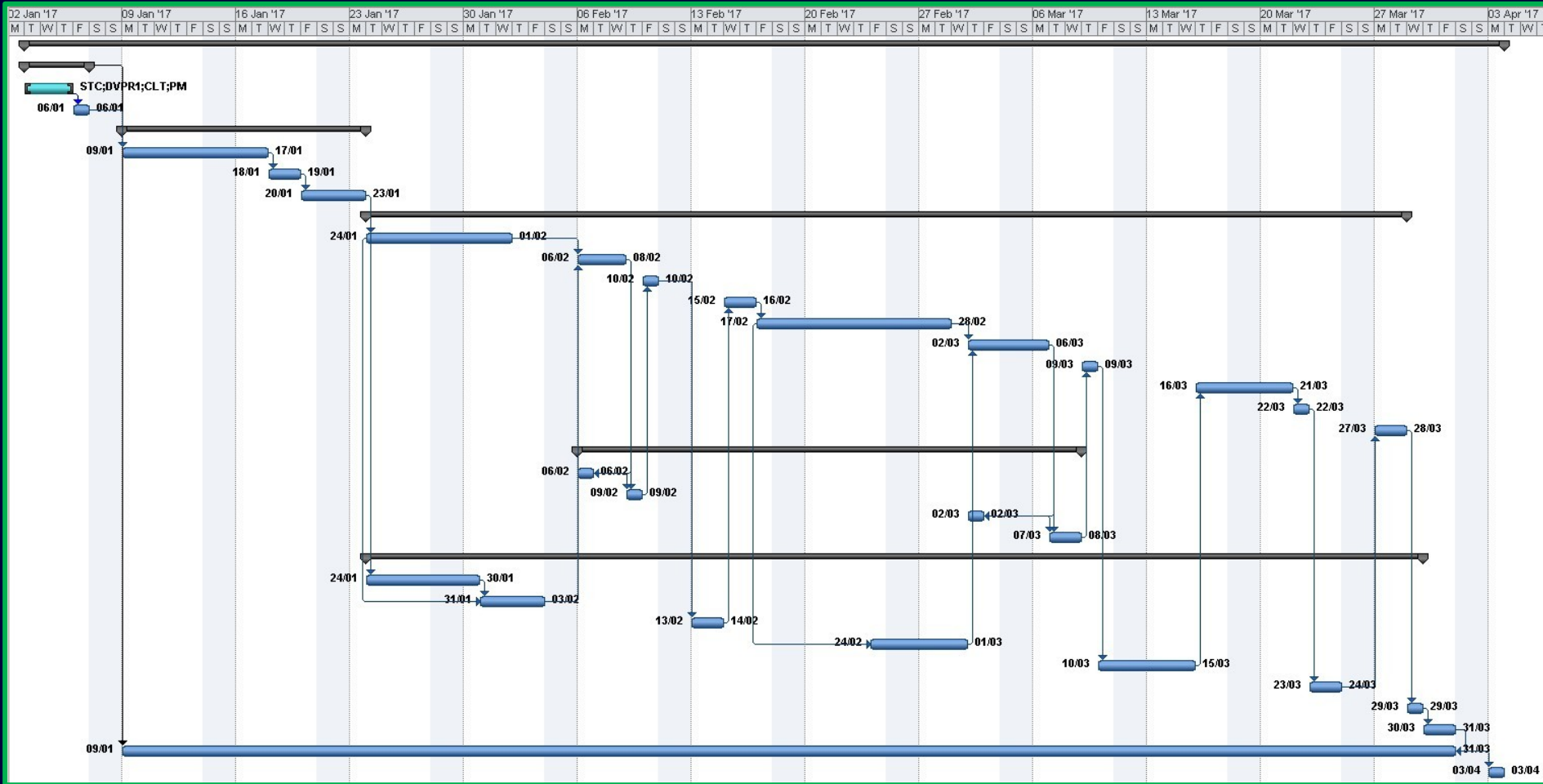
Schedule example: EXONE – CLT (1)
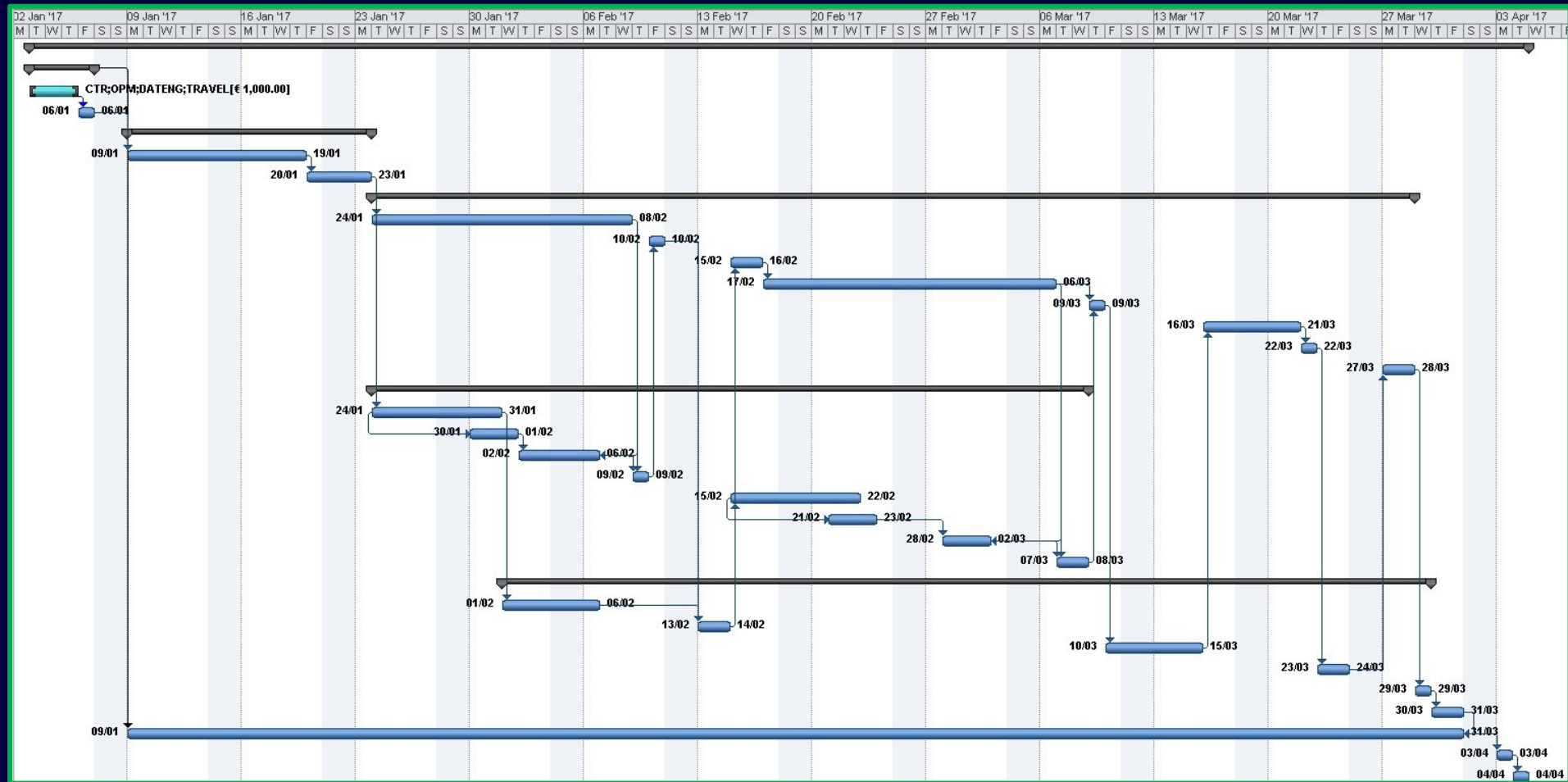
Schedule example: EXONE - CTR (2)

January 2017

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
02	03	04	05	06	07	08
	Review and complete requirements & plan with client; 3 days			Final discussion and agreement with		
09	10	11	12	13	14	15
		Write design specifications; 7 days				
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
16	17	18	19	20	21	22
Write design specifications; 7 days		Check design with respect to requirements; 2 days		Meet with client to discuss & agree on design; 2 days		
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
23	24	25	26	27	28	29
Meet with client to discuss & agree o			Coding - Alpha version; 7 days			
			Prepare test plan and test cases; 5 days			
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
30	31	01 Feb	02	03	04	05
	Coding - Alpha version; 7 days					
Prepare test plan and test cases; 5 d		Internal testing - Alpha version; 4 days				
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
06	07	08	09	10	11	12
	Debugging phase 1 (following internal Alpha testing); 3 days		Integration of content subset; 1 day	Production of Alpha version and del		
Delivery of content subset by client;						
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
13	14	15	16	17	18	19
Alpha testing by client; 2 days		Debugging phase 2 (following client Alpha testing); 2 days		Coding - Beta version; 8 days		
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
20	21	22	23	24	25	26

Schedule example: EXONE - CLT (2)

◀ ▶ January 2017

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
02	03	04	05	06	07	08
	Review and complete requirements & plan with contractor; 3 days			Final discussion and agreement with cor		
09	10	11	12	13	14	15
		Write and check design specifications; 9 days				
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
16	17	18	19	20	21	22
	Write and check design specifications; 9 days			Meet with contractor to discuss & agree on design; 2 days		
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
23	24	25	26	27	28	29
Meet with contractor to discuss & agree (		Coding, internal testing & bug fixing - Alpha version; 12 days				
		Creation of content subset; 6 days				
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
30	31	01 Feb	02	03	04	05
		Coding, internal testing & bug fixing - Alpha version; 12 days				
Creation of content subset; 6 days				Prepare test Preparation content subset & delivery to contractor; 3 days		
	Proofreading of content subset; 3 days					
		PROJECT MANAGEMENT (After Req'ts WP & before Closure); 60 days				
06	07	08	09	10	11	12
	Coding, internal testing & bug fixing - Alpha version; 12 days		Integration of content subset; 1 day	Delivery of Alpha version by contractor;		

Summary schedule ex.: EXONE - CTR

	PROJECT EXONE CONTRACTOR'S SCHEDULE	Starts on 3/1/17												Finishes on 3/4/17
		2/1	9/1	16/1	23/1	30/1	6/2	13/2	20/2	27/2	6/3	13/3	20/3	27/3	3/4

REQUIREMENTS
- Review and complete requirements & plan with client
- Final discussion and agreement with client on req'ts & plan

DESIGN
- Write design specifications
- Check design with respect to requirements
- Meet with client to discuss & agree on design

IMPLEMENTATION
- Coding - Alpha version
- Debugging phase 1 (following internal Alpha testing)
- Production of Alpha version and delivery to client
- Debugging phase 2 (following client Alpha testing)
- Coding - Beta version
- Debugging phase 3 (following internal Beta testing)
- Production of Beta version and delivery to client
- Debugging phase 4 (following client Beta testing)
- Production of Final version and delivery to client
- Debugging phase 5 & delivery (following client Final testing)

INTEGRATION
- Delivery of content subset by client
- Integration of content subset
- Delivery of complementary content by client
- Integration of complementary content

TESTING & ACCEPTANCE
- Prepare test plan and test cases
- Internal testing - Alpha version
- Alpha testing by client
- Internal testing - Beta version
- Beta testing by client
- Final testing by client
- Acceptance by client

DEPLOYMENT AT CLIENT'S SITE

PROJECT MANAGEMENT (After Req'ts WP & before Closure)

PROJECT CLOSURE

Summary schedule ex.: EXONE - CLT

PROJECT EXONE	**Starts on 3/1/17**													**Finishes on 4/4/17**	
CLIENT'S SCHEDULE	2/1	9/1	16/1	23/1	30/1	6/2	13/2	20/2	27/2	6/3	13/3	20/3	27/3	3/4
REQUIREMENTS														
Review and complete requirements & plan with contractor														
Final discussion and agreement with contractor on req'ts & plan														
SOFTWARE DESIGN														
Write & check design specifications														
Meet with contractor to discuss & agree on design														
SOFTWARE IMPLEMENTATION														
Coding, internal testing & bug fixing - Alpha version														
Delivery of Alpha version by contractor														
Debugging following Alpha testing														
Coding, internal testing & bug fixing - Beta version														
Delivery of Beta version by contractor														
Debugging following Beta testing														
Delivery of Final version by contractor														
Debugging following Final testing & delivery for acceptance														
CONTENT CREATION & INTEGRATION														
Creation of content subset														
Proofreading of content subset														
Preparation of content subset & delivery to contractor														
Integration of content subset														
Creation of complementary content														
Proofreading of complementary content														
Preparation of complementary content & delivery to contractor														
Integration of complementary content														
TESTING & ACCEPTANCE														
Prepare test plan and test cases														
Alpha testing														
Beta testing														
Final testing														
Acceptance														
DEPLOYMENT														
PROJECT MANAGEMENT (After Req'ts WP & before Closure)														
CONTRACTOR'S PROJECT CLOSURE														
OVERALL PROJECT CLOSURE														

Summary schedule example: CHRO

CHRO-UNAB PROJECT SCHEDULE (v3) - To be discussed (and finalized) at 11/02/08 meeting in Champs-sur-Marne

Activities	By	2007 December 1H	2H	January 1H	2H	2008 February 1H	2H	March 1H	2H	April 1H
Agreement on conclusions of 26-27/11/07 meeting (document sent by IDM on 30/11)	CH+IDM	3/12								
Details of UI elements + mock-up screens provided to CH for graphic design briefing	IDM	3-7								
Graphic designer briefing and provision of materials and information by CH	CH	12/12								
Graphic design - work on Website designs	COPIOUS				18/1					
Graphic design - work on Holding page designs	COPIOUS				29/1					
Work on detailed specifications (with development team)	IDM									
Workshop at IDM in Champs-sur-Marne	CH+IDM			9-10						
Review and fine-tuning of detailed specifications	CH+IDM				9/1-19/2					
Submit specifications to CH for approval	IDM						13/2			
Approval of detailed data and functional specifications	CH						15/2			
Data preparation (delivery to IDM via XDCC)	CH		*intermediate deliveries + final on:* **17/3**							
Representative data sample supplied to IDM	CH				31/1					
Development work (including fixing bugs reported during test phases)	IDM						18/2			7/4
1st Beta version made available to CH for testing	IDM							7/3		
1st Beta test (including accessibility) and bug reporting	CH							10-13		
2nd Beta version made available to CH for testing	IDM							14/3		
2nd Beta test (including accessibility + payment system) and bug reporting	CH								17-20	
3rd Beta version (Release candidate) made available to CH for testing	IDM								21/3	
3rd Beta / RC test (full functionality) and bug reporting	CH								22/3-7/4	
Site goes live	CH+IDM									7/4

Summary schedule example: PM Course

PROJECT MANAGEMENT COURSE	Week 1 13/3	Week 2 20/3	Week 3 27/3	Week 4 3/4	Week 5 10/4	Week 6 17/4	Week 7 24/4	Week 8 1/5	Week 9 8/5	Week 10 15/5	Week 11 22/5	Week 12 29/5	Week 13 5/6	Week 14 12/6	Week 15 19/6
BEFORE THE COURSE															
Agree on schedule with EPITA															
Get list & photos of students from EPITA															
Exchange mails w/ students re names & photos															
Agree on final list of students with EPITA															
Produce Attendance sheet and Photo register															
Send PM Guide to EPITA for printing															
Prepare PM web page															
Send mail to students re PM course info															
DURING THE COURSE	28/3	5/4	12/4	19/4	26/4	3/5	10/5	17/5	23/5	30/5	6/6	14/6			
Classes	T	W	W	W	W	W	W	W	T	T	T	W			
Update PM web page															
Reminder to students re PM Guide															
Get confirmation from EPITA of MSDNAA access instructions															
Reminder to students re MSDNAA access, etc.															
Send Requirements Specification example to students															
Prepare laptop for MS Project demo															
Send Design Specifications example to students															
PROJECT PLANNING ASSIGNMENT															
Prepare Project Planning assignment & related documents															
Present Project Planning assignment															
Grade Project Planning assignment															
Send Project Planning assignment grades to students															
Send Project Planning assignment grades to EPITA															
PROJECT MANAGEMENT EXAM (QUIZ)															
Prepare PM quiz & related documents															
Send PM quiz to EPITA for printing															
PM exam															
Grade PM exam papers															
Send PM exam grades & average grades for PM course to students															
Send PM exam grades & average grades for PM course to EPITA															
Return PM exam papers to EPITA															
AFTER THE COURSE															
Send final message to students															

Questions?

Planning processes: where do we stand?

Scope defined & requirements collected

WBS created

Plan risk management, identify & analyze risks

Tasks defined

Tasks sequenced

Plan procurements

Task resources estimated

Develop human resource plan

Plan quality

Task durations estimated

Plan communications

Determine budget

Estimate costs

Schedule developed