

Managing Projects with openSE

Part **1**

References

The following resources were used to prepare this training session material :

ISO 21500 :2012. *Guidance on Project Management*. International Organization for Standardization, Geneva, Switzerland. 42 p.

D. Milosevic, P.Patanakul. “Standardized Project Management May Increase Development Projects Success.” *International Journal of Project Management* 23 (3) Apr. 2005. 181–192.

S. J. Kapurch (2007) *NASA Systems Engineering Handbook*. Washington, DC, USA : NASA Headquarters. 440 p.

ISBN 9780471715375.

The openSE editorial community (2014) *openSE Framework*, Geneva, Switzerland.

— (2016) *Initiating a Complex Systems Project. Drafting and Releasing a Project Proposal/Roadmap*, Geneva, Switzerland. *openSE Guidelines no. 1009*.

— (2014) *Setting up a Project Management System. Drafting and Releasing a Project Management Plan*, Geneva, Switzerland. *openSE Guidelines no. 1000*.

PMI Standard Committee (2008) *A guide to the project management body of knowledge*. 4th ed. Newton Square, PA : Project Management Institute. 403 p. ISBN 1933890517.

0. Foundations

Managing Projects with openSE

D Diagnose
needs
problems
opportunities
means

D Define
objectives
processes
roles
results

D Decide
actions
assignment
delegation
validation



Managing **Projects** with openSE

i.e. studies and projects

Entrepreneurial activities

- ➔ Specific mandates, organizations and objectives
- ➔ Change-oriented
- ➔ Unique product
- ➔ Heterogeneous teams
- ➔ A start and an end

Operations activities

- ➔ Permanent mandates, organizations and objectives
- ➔ Status quo-oriented
- ➔ Standard product
- ➔ Homogeneous teams
- ➔ No temporal limitation

Intrusiveness

- 6 New projects
- 5 Upgrade projects/activities
- 4 Consolidation projects/activities

- 3 Corrective maintenance activities
- 2 Preventive maintenance activities
- 1 Inspection activities

Managing **Projects** with openSE

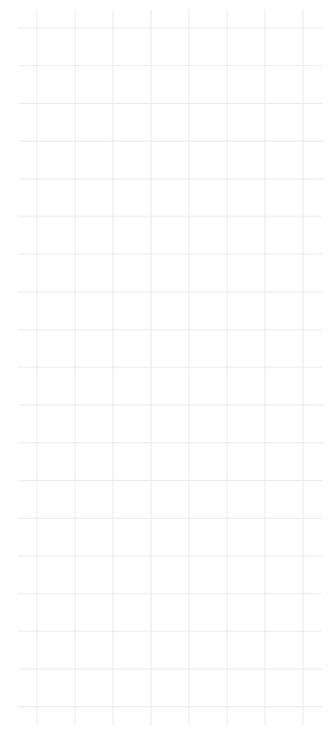
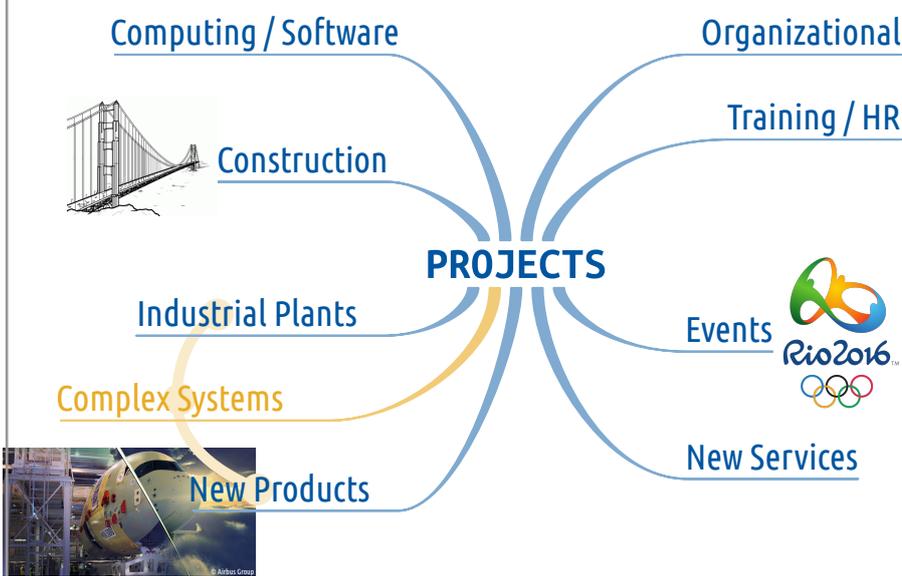
A unique set of processes consisting of coordinated and controlled activities with start and end dates, performed to achieve project objectives.

 21500:2012

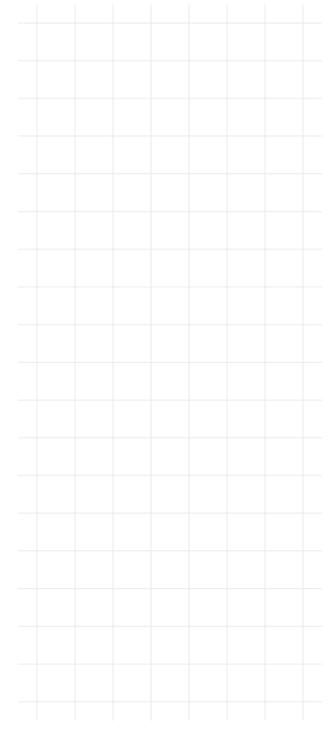
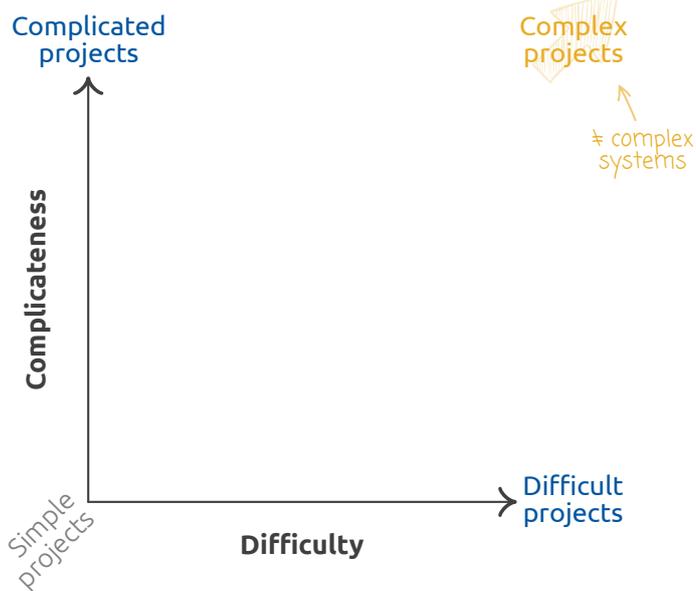
“Project triangle”:



Managing **Projects** with OPENSENSE

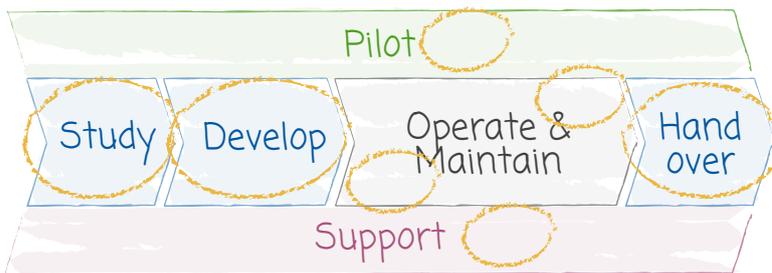


Managing **Projects** with OPENSENSE



Managing **Projects** with openSE

Projects can be found everywhere!



Managing **Projects** with openSE

Project = { project activities }

 \exists activities \neq project activities

Program = { projects, non project activities }

Portfolio = { projects, non project activities }

← focused on a common goal

← not necessarily focused on a common goal



At CERN (in the A&T Sector) Typology of projects

Regimented by EDMS 1398374

- ➔ **Beam-facility-related** (large-scale) programs and projects
LHC Project, LIU Project, HL-LHC Project*, HIE-ISOLDE Project, AWAKE Project, etc.*
- ➔ **Non beam-facility-related** programs and projects
SM18 Refurbishing Project, Building 107 Project, Building 311 Project, etc.
- ➔ **Equipment- and systems-related** projects
*Consolidation and renewal of the demineralised water production plant of building 378
Renovation of the Meyrin site electrical safety network*
- ➔ **Facility-related** sub-projects (work package of a facility-related project)
*Development of the RF cryomodules for HIE-ISOLDE
Development of the cryolink in IR3 of the LHC
Development of the crab cavities for HL-LHC
Development of beam diagnostic boxes for HIE-ISOLDE
Installation of the cooling and ventilation system of the Linac 4 building
Upgrade of the HVAC system of the CERN computer centre (building 513)
Development of teleoperated shielding doors for MEDICIS*

*Centennial Engineer
Lab. n° 1002*



At CERN (in the A&T Sector) Typology of projects

Regimented by EDMS 1398374

- ➔ **Large-scale studies** managed as programs or projects
CLIC Study, FCC Study, etc.
- ➔ **Organisational or IT-related** programs and projects
CAD'20 Replacement Program, EDMS Portal Refurbishing Project, etc.

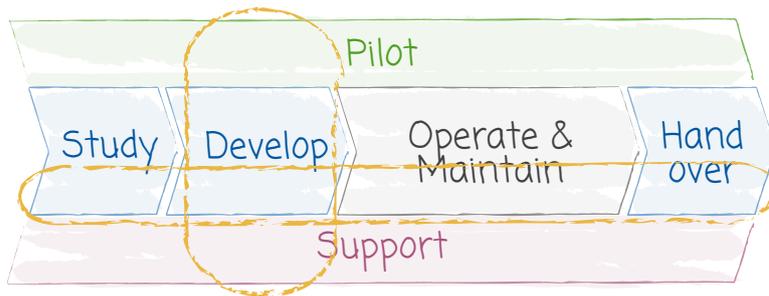
Facility-related projects → multi-trade projects

Several equipment groups involved

*Centennial Engineer
Lab. n° 1002*

Managing **Projects** with openSE

Programs are more transverse!



Managing **Projects** with openSE

The application of **methods, tools, techniques** and **competencies** to a project  21500:2012

 **PMBOK**

 10006:2003

IPMA[»] ICB

Hermes

 #748

CCPM

 Systems Engineering Handbook NASA/SP-2007-6105 Rev1

INCOSE **G2SEBOK**

 EUROPEAN COORDINATION FOR SPACE STANDARDISATION



RUP
RATIONAL
UNIFIED
PROCESS

 PRINCE2

GDPM

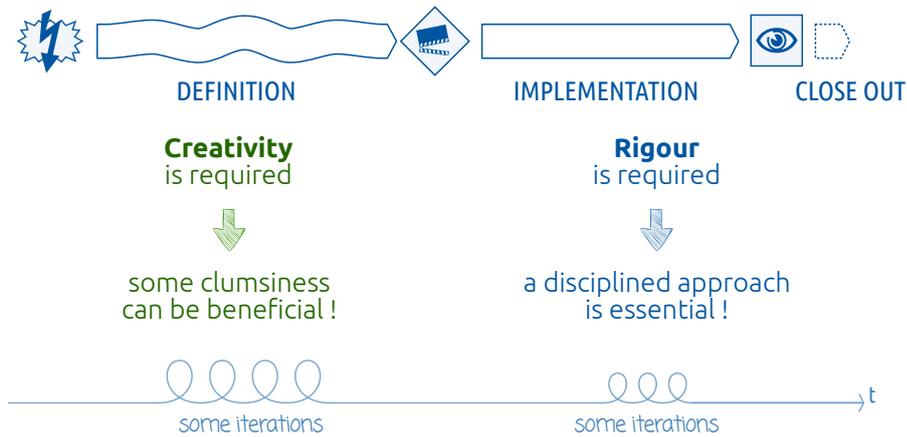
SCRUM
+KANBAN

XP
EXTREME
PROGRAMMING

 21500:2012

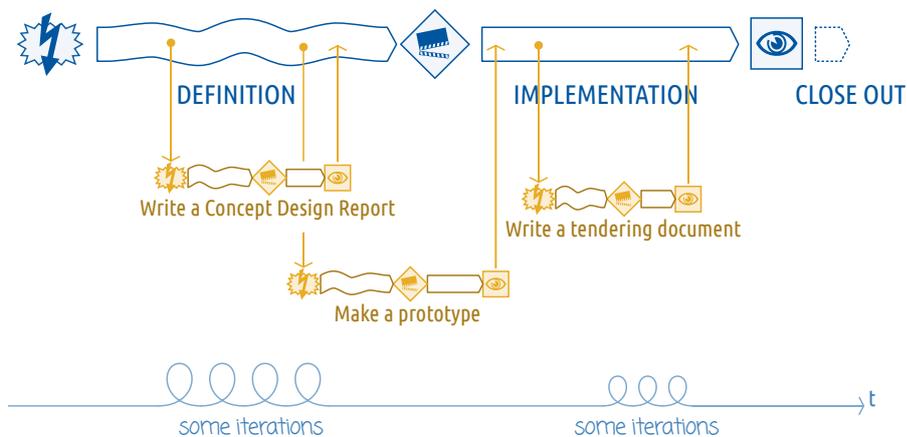
Managing Projects with openSE

Concept of **lifecycle**



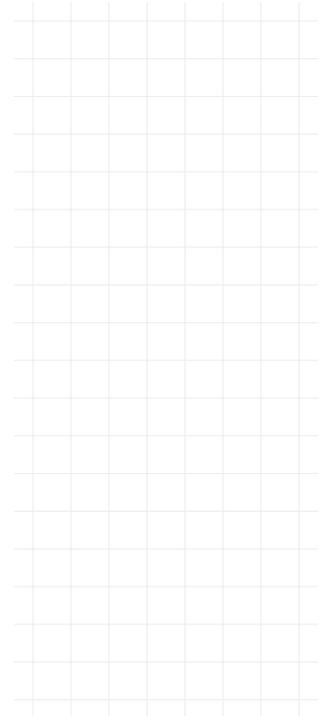
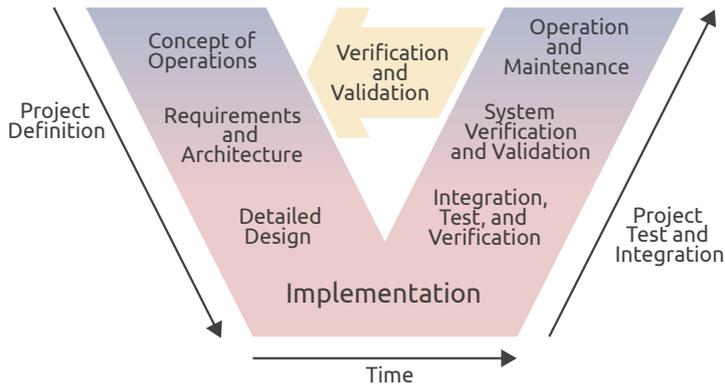
Managing Projects with openSE

Lifecycle → "fractal perception"

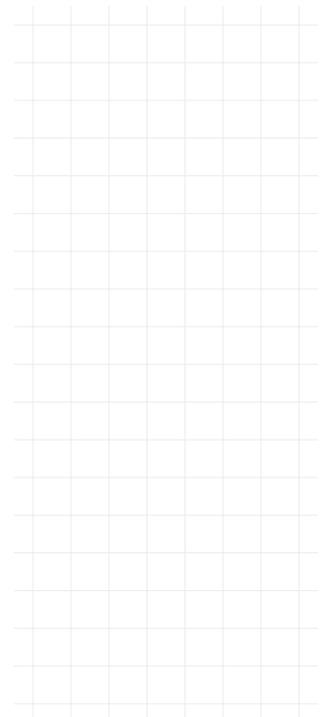
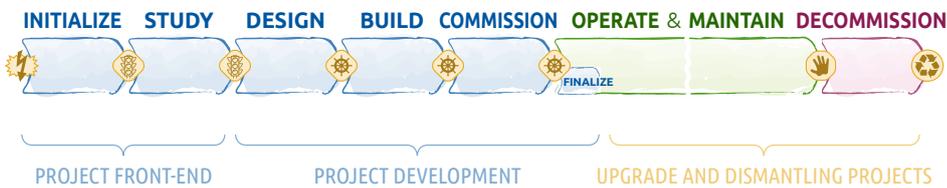


Managing **Projects** with openSE

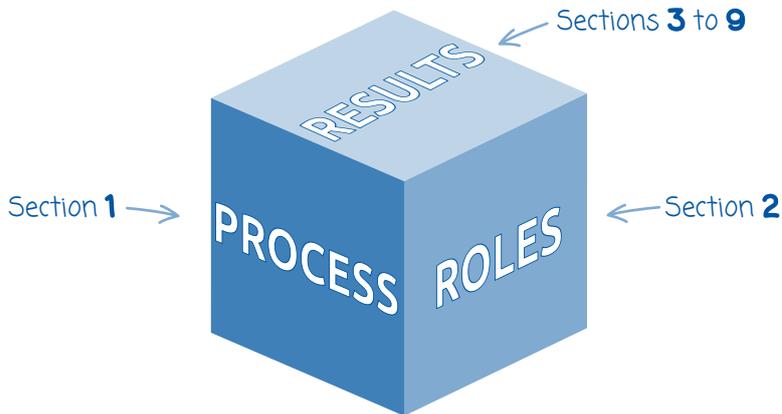
V-Modell (systems engineering lifecycle)



Managing **Projects** with openSE



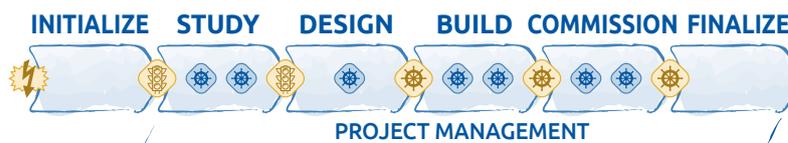
Managing Projects with openSE



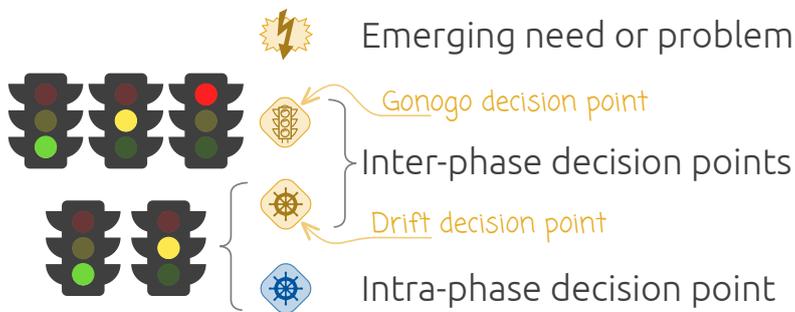
Inspired from *Hermès*

1. Project Management Processes

Phases and Decision Points



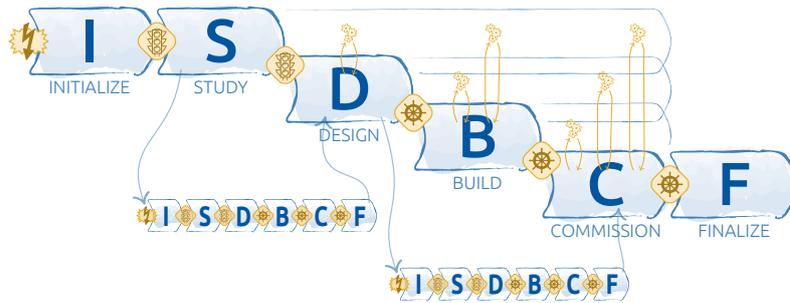
 Phase  Support process



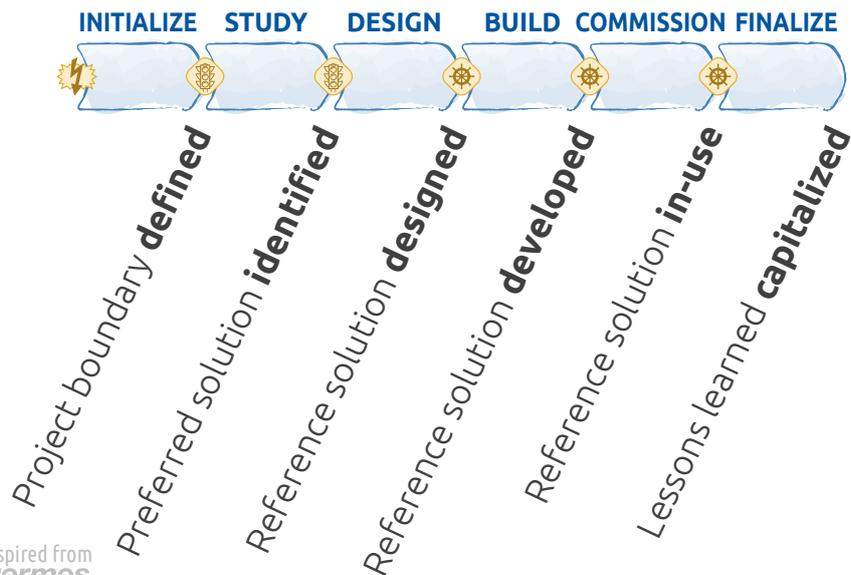
Inspired from *Hermès*

Complexity of the Project Lifecycle

Echo among phases
Nested sub-projects



Phases and Decision Points

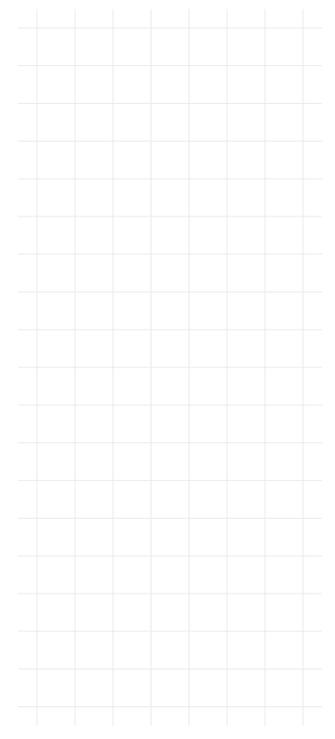
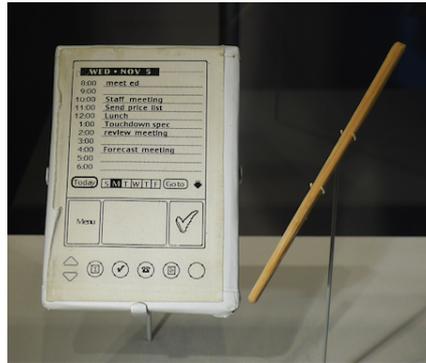


Inspired from
Hermès

Study Project



CDR
Conceptual
Design Report



Development Project



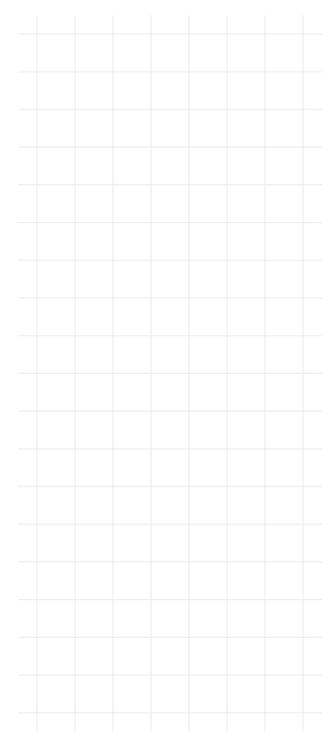
CDR
Conceptual
Design Report



TDR
Technical
Design Report



**Project / Product
Documentation**

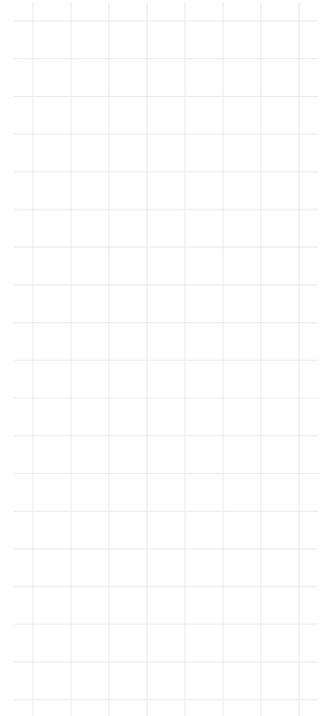


Initialize



- ➔ Formalize the **decision** to perform the project
- ➔ Analyse the **current situation**; define the **problem**
- ➔ Propose some **possible solutions**

Inspired from *Hermès*



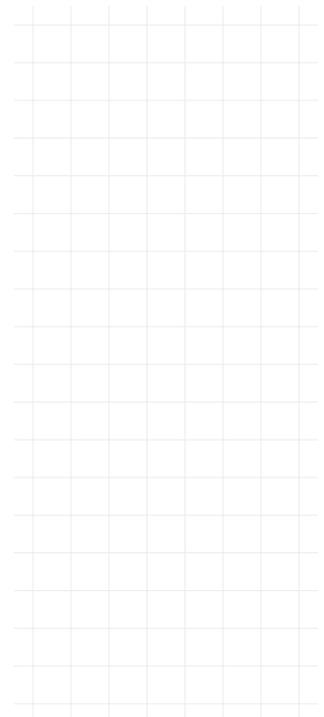
Study



- ➔ Define more precisely the **scientific/user requirements**
- ➔ Convert the gathered UR's into **product/systems requirements**
- ➔ Identify straightforwardly all possible solutions
- ➔ Propose one solution and demonstrate its **feasibility**
- ➔ If required, develop **prototypes**, mock-ups...



Inspired from *Hermès*

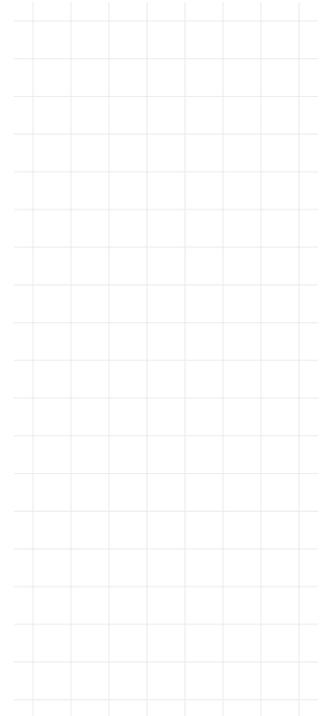


Design



- ➔ Finalise the definition of the **scientific/user requirements**
- ➔ Finalise the **product/systems requirements** accordingly
- ➔ Design the solution (design and engineering tasks)
- ➔ Plan the **BUILD** and **COMMISSION** phases
- ➔ If required, develop further prototypes, mock-ups...

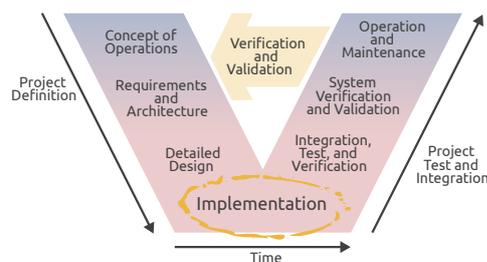
Inspired from *Hermès*



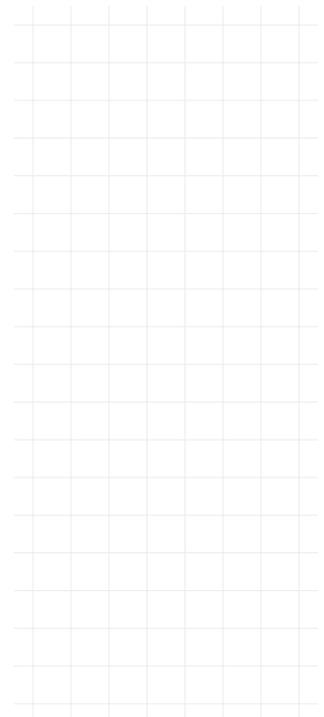
Build



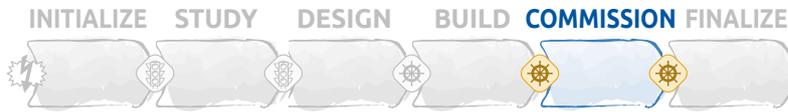
- ➔ Perform the **detailed design**
- ➔ **Materialize**, i.e. procure, manufacture, assemble...
- ➔ **Verify** and **validate** at components and subsystems levels



Inspired from *Hermès*

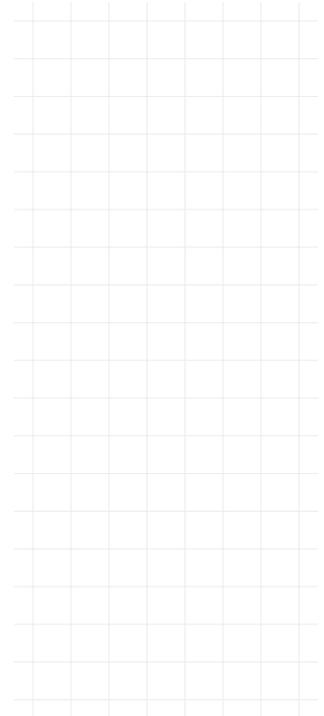


Commission



- ➔ Further **validate** (i.e. commission) at systems level
- ➔ Refine and ramp-up
- ➔ **Train** of the users
- ➔ Adapt to the evolving context

Inspired from *Hermès*

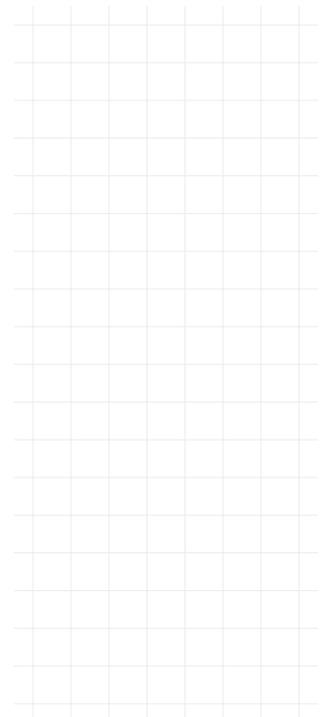


Finalize

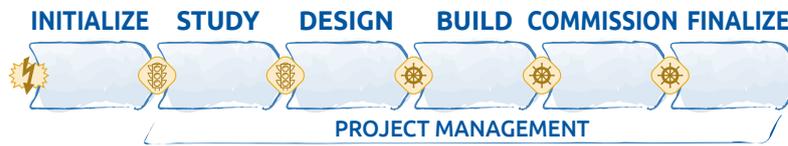


- ➔ **Capitalize** of the lessons learned

Inspired from *Hermès*



Support Processes



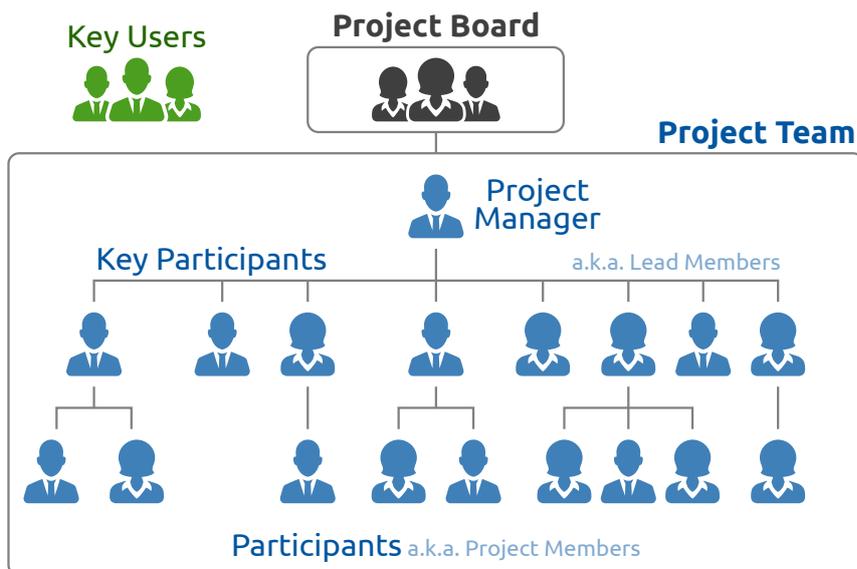
- ➔ Project **Integration** Management
- ➔ Project **Scope** (i.e. various Breakdown Structures) Management
- ➔ Project **Time** (i.e. Project Master and Coordination Schedules) Management
- ➔ Project **Resource** and **Cost** (incl. Budgets and Follow-up) Management
- ➔ Project **Human Resource** (i.e. Project Staffing and Leadership) Management
- ➔ Project **Quality** (incl. Configuration Management) Management
- ➔ Project **Communication** (incl. Project Marketing) Management
- ➔ Project **Risk** (incl. Safety, Security, Environmental Impact) Management
- ➔ Project **Procurement** (incl. Supply Chain, In-kind Contributions) Management

■ P.M.I. Project Management Institute's PMBOK

2. Project Management Roles

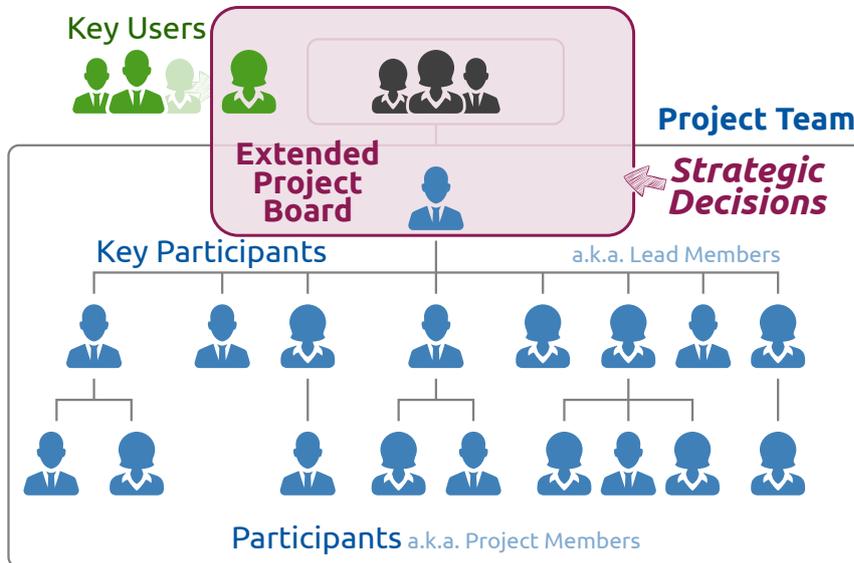
Roles

Core roles



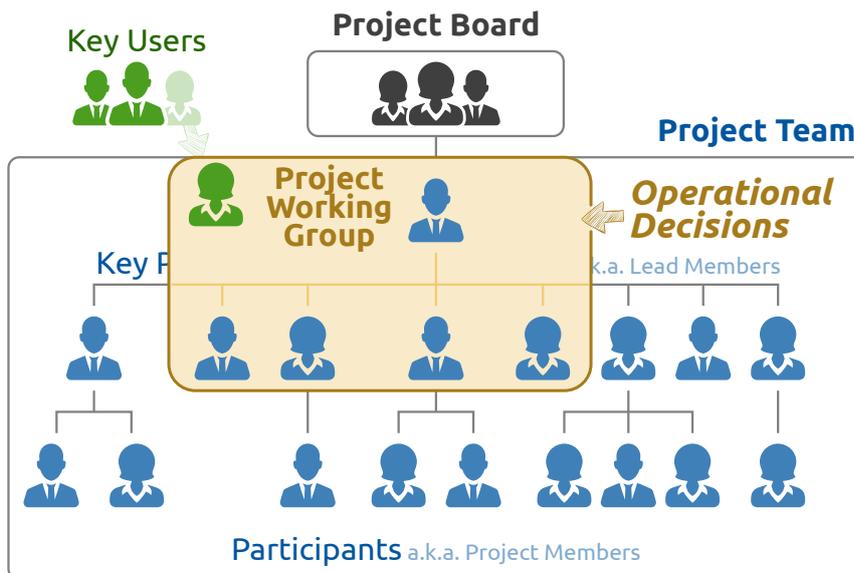
Roles

Core roles



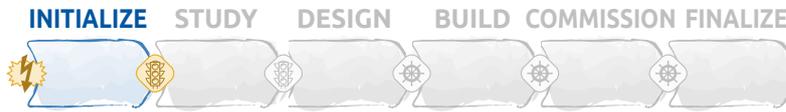
Roles

Core roles



Roles

Core roles



Project Initiators



Study Team



Roles

Responsibilities



Project Board (PB)

Strategic/Steering Board/Committee,
Project Owner, Product/Systems Owner,
Comité de projet (CoP),
Comité de pilotage (COFIL),
Donneur d'ordre,
Maître d'ouvrage (MOU),
Projektausschuss,
Comitato di progetto...



- Ensure the **strategic management** of the project
- Is ultimately responsible w.r.t. successful completion of the project
- Guarantee the acquisition and availability of resources
- Validate transitions between phases (and intra phases also)
- In case of conflict or disagreement within the project team, arbitrate

Roles

Responsibilities



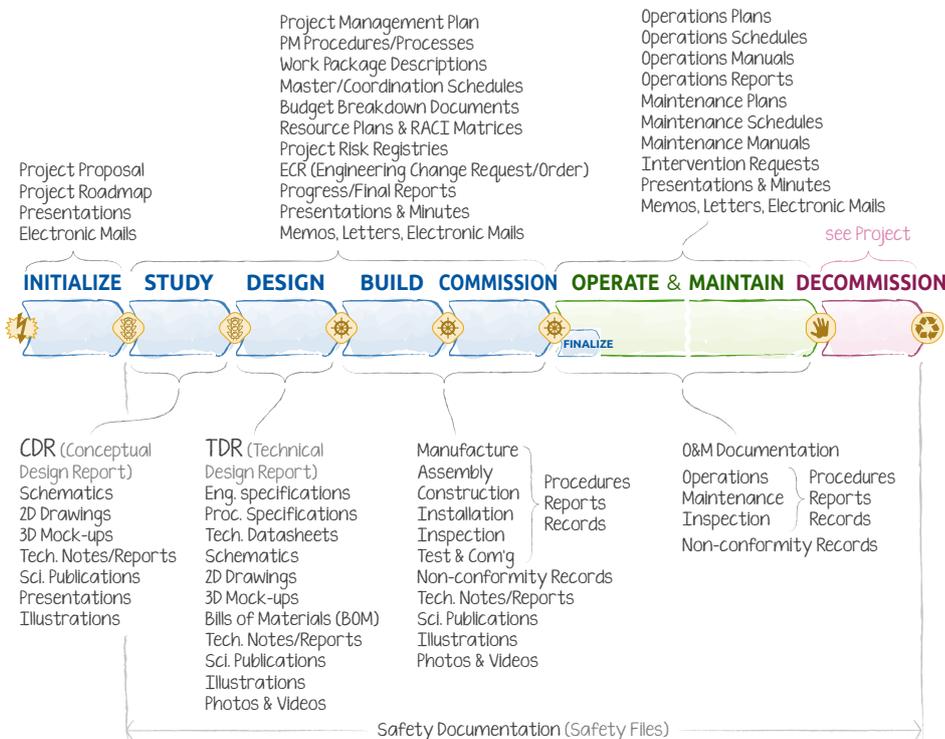
Project Manager (PM)

Project Leader (PL), Project Coordinator, Coordinator, Chef de projet (CP), Maître d'œuvre (MŒU), Projektleiter (PL), capoprogetto (CP)...

- ⇒ Ensure the **operational management** of the project
- ⇒ Is responsible for the **organisation** of the project and for its coordination

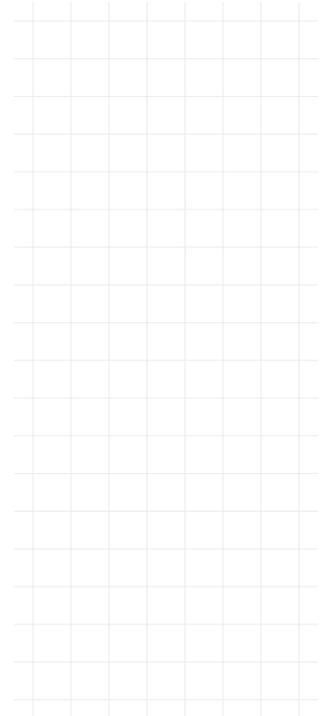
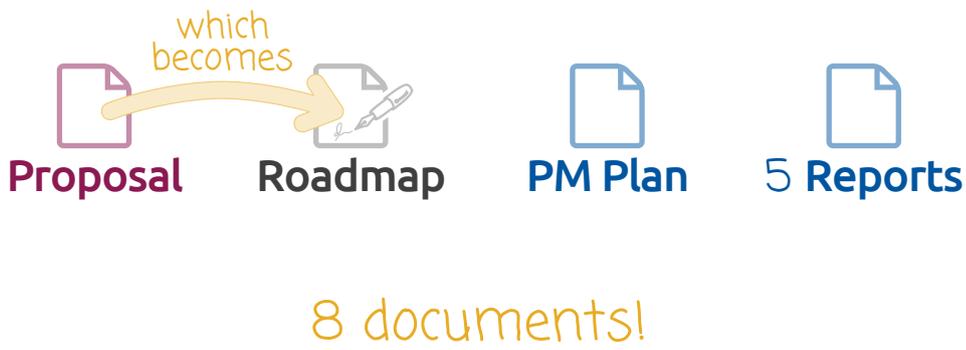
Most of **project management** is about setting this organisation

3. Project Management Results



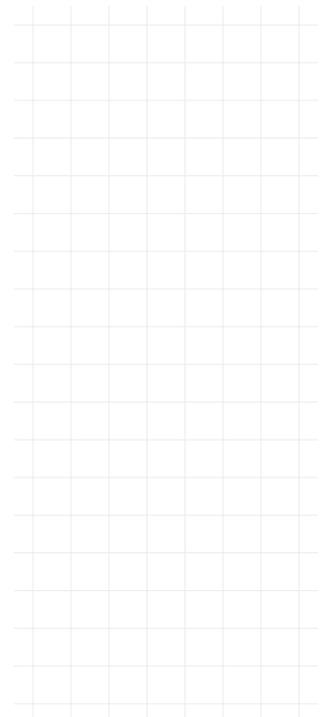
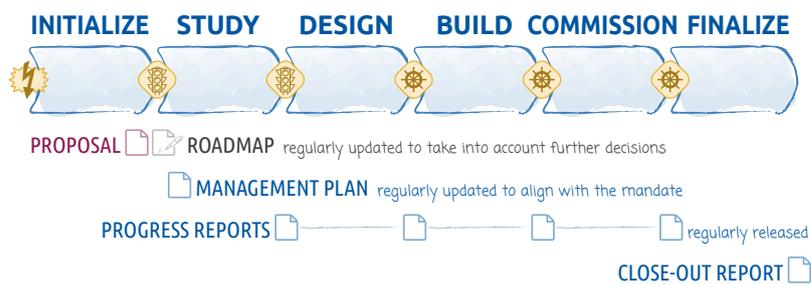
Key Results

“Lean Project Management”



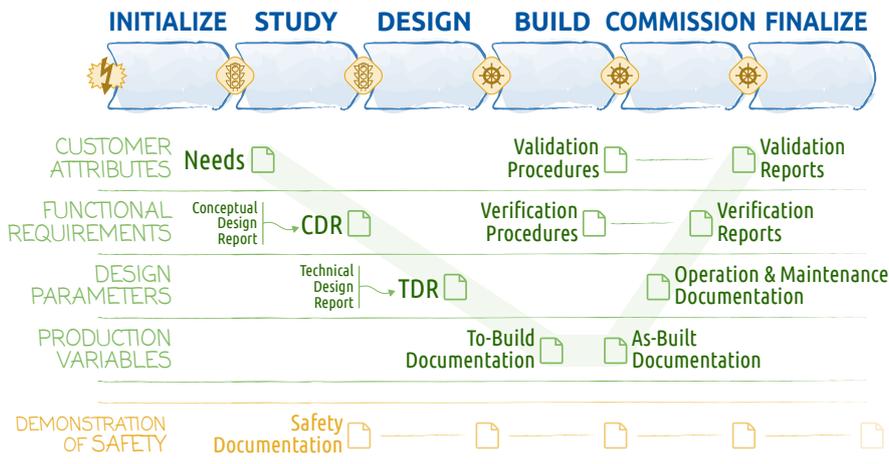
Key Results

Project Management Documents



Key Results

Technical Documents



■ Nam-pyo Suh (1990) Principles of Design. Oxford University Press

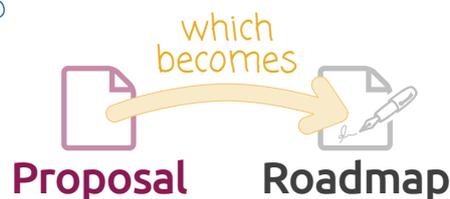
3.1 Project Mandate / Roadmap

Project Roadmap

It is a document that summarizes the direction to be followed by the project team (for the **STUDY**, **DESIGN**, **BUILD** and **COMMISSIONING** phases)

Other names for this document:

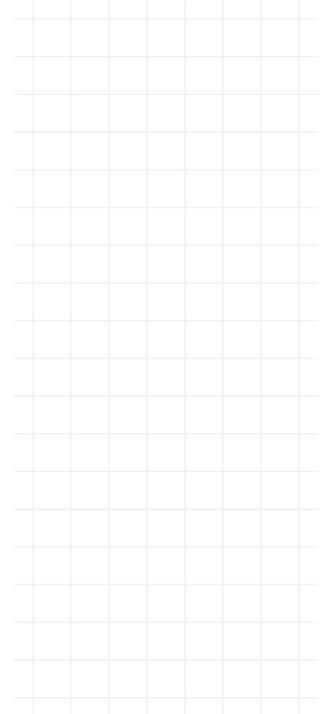
- ➔ (Project) Charter
- ➔ (Project) Mandate (e.g. GDPM)
- ➔ (Project) Mission Statement
- ➔ (Project) Brief



Project Proposal

Typical Table of Contents

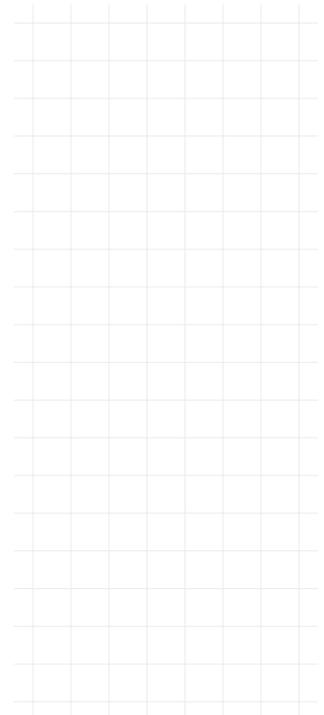
- 0 **Executive Summary** To the attention of the Project Board
- 1 **Initial Situation** Problem statement, rationale, current situation
- 2 **Project Objectives**
- 3 **Possible Solutions**
- 4 ***A priori* Preferred Solution**
 - 4.1 Description of the preferred solution
 - 4.2 Stakeholders and “approched Project Board” membership
 - 4.3 Phasing, project organization, masterplan
 - 4.4 Required resources
 - 4.5 Outcomes and benefits of the project
- 5 **Preliminary Risk Register**



Project Proposal

Editorial Process

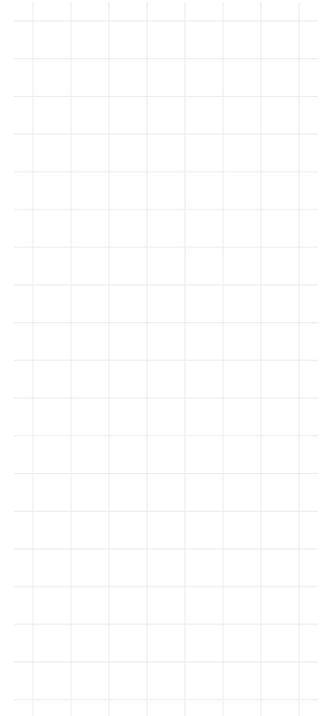
- ➔ **Authoring:** Project Initiators 
- ➔ **Verification:** Some experts in the field
The foreseen Project Manager
A few possible Key Project Participants
- ➔ **Validation:** ∅



Project Roadmap

Typical Table of Contents

- 0 Executive Summary
- 1 Initial Situation
- 2 Project Objectives
- 3 Possible Solutions
- 4 *A priori* Preferred Solution
- 5 Preliminary Risk Register
- 6 Decisions
 - 6.1 Decisions w.r.t. the **STUDY** phase
 - 6.1.1 Validation of the PB membership and project organization
 - 6.1.2 Decision w.r.t. the preferred solution
 - 6.1.3 Decision w.r.t. budgets and masterplan
 - 6.2 Decisions w.r.t. the **DESIGN** phase
 - ⋮



Project Roadmap

Editorial Process

- ➔ **Authoring:** Project Initiators 
- ➔ **Verification:** Some experts in the field
The foreseen Project Manager
A few possible Key Project Participants
- ➔ **Validation:** Project Board 

