Managing Projects with openSE

Part 1

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0. Foundations

Managing Projects with openSE

Diagnose needs problems opportunities means
Define objectives processes roles results
Decide actions assignment delegation validation

D³

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**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

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

"Project triangle":
- Requirements Engineering
- Planning & Scheduling
- Costing
- Performance
- Quality
- Time
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Computing / Software
Construction
Industrial Plants
Complex Systems
New Products

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Complicated projects
Complex projects
Simple projects

Complicateness
Difficulty
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Projects can be found everywhere!

Project = \{ project activities \}

- \exists \text{ activities} \neq \text{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

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
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The application of methods, tools, techniques and competencies to a project

ISO 21500:2012

Managing Projects with

Concept of lifecycle

Creativity is required

some clumsiness can be beneficial!

Rigour is required

a disciplined approach is essential!

co-operation

some iterations

Co-operation

some iterations

some iterations

some iterations
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V-Modell (systems engineering lifecycle)

Concept of Operations
Verification and Validation
Operation and Maintenance
System Verification and Validation
Integration, Test, and Verification
Detailed Design
Requirements and Architecture
Implementation
Project Definition
Project, Test and Integration
Time

Managing Projects with openSE

INITIALIZE STUDY DESIGN BUILD COMMISSION OPERATE & MAINTAIN DECOMMISSION

PROJECT FRONT-END PROJECT DEVELOPMENT UPGRADE AND DISMANTLING PROJECTS

DECOMMISSION OPERATE & MAINTAIN FINALIZE COMMISSION BUILD DESIGN STUDY INITIALIZE PROJECT FRONT-END PROJECT DEVELOPMENT UPGRADE AND DISMANTLING PROJECTS

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1. Project Management Processes

Phases and Decision Points

- INITIALIZE
- STUDY
- DESIGN
- BUILD
- COMMISSION
- FINALIZE

Phase
Support process
Emerging need or problem

Inter-phase decision points
- Gonogo decision point
- Drift decision point
- Intra-phase decision point
Complexity of the Project Lifecycle

Echo among phases
Nested sub-projects

Phases and Decision Points

1. Project boundary defined
2. Preferred solution identified
3. Reference solution designed
4. Reference solution developed
5. Reference solution in-use
6. Lessons learned capitalized
Study Project

Development Project

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Initialize

Formalize the decision to perform the project

Analyze the current situation; define the problem

Propose some possible solutions

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…
**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...

**Build**

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

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

Finalize

- Capitalize of the lessons learned
Nine (9) Supporting Processes

INITIALIZE | STUDY | DESIGN | BUILD | COMMISSION | FINALIZE

- Launching a project
- Defining requirements
- Planning & scheduling
- Managing risks
- Handling issues
- Ensuring quality
- Reporting progress
- Finalizing a project

2. Project Management Roles

Roles
Core roles

Key Users
Project Board
Project Team

Key Participants
a.k.a. Lead Members
Participants a.k.a. Project Members

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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 (COPIL), Donn...
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"

which becomes

Proposal  Roadmap  PM Plan  5 Reports

8 documents!

Key Results
Project Management Documents

INITIALIZE  STUDY  DESIGN  BUILD  COMMISSION  FINALIZE

PROPOSAL  ROADMAP regularly updated to take into account further decisions
MANAGEMENT PLAN regularly updated to align with the mandate
PROGRESS REPORTS regularly released
CLOSE-OUT REPORT

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Key Results
Technical Documents

3.1 Project Proposal / 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
- (Project) Mission Statement
- (Project) Brief
- Project Initiation Document
- Project Overview Statement
- Concept of Operations

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 "approached 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:  Ø
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
References

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


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Pierre Bonnal & Thijs Wijnands