Project Management for Scientists

Project Definition

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Outline

- Questions to ask
- Key Players and Stakeholders
- Project Rules
- Project Charter
- Project Statement of Work
- Responsibilities and authorities

Input Document

- Written specifications
- Contract
- Request for proposal
- Any document specifying project need / objective

Is it a project?

- Clear beginning and end?
- Specific, measurable (SMART) objectives?
- Unique one-time effort requiring custom solution?
- Quick response required?
- Coordination and management of several independent elements, organizations, resources?

Project Start-Up Questions

- Will I do all the work alone, or are others involved?
- Who will be on the team?
- Who will use the end product?
- Who will specify the requirements
- Who will approve the final product?
- Who is paying the bill?
- How available are the others involved?
- Do I have the authority to ask for help?

Project Stakeholders

- Stakeholders:
  - Anyone with a stake (interest) in project
  - Anyone who contributes to project or is affected by its results
- Individuals, organizations
  - Actively involved in project
  - Their interests may be affected as a result of project execution or project completion
  - May also exert influence over the project's objectives and outcomes

Project Stakeholders cont.

- Stakeholders
  - Make all important decisions during definition and planning
  - Establish agreements, goals, constraints, strategies, schedules, budget
  - Ultimately judge success of project
- must identify stakeholders, determine their requirements and expectations, manage their influence in relation to the requirements

Identifying Stakeholders

- Who will contribute to accomplishing project?
- Who will be affected (during or after) by project?

Key Players/Stakeholders

- Project sponsor (project owner) provides the funding
- Project scientist (defines the science scope)
- Project manager (makes the project happen)
- Project team (members)
- Customer / recipient
- Management
- Representatives of external constraints
- Advocates, opponents, innocent bystanders

Key Players Example: EPICS

For Phase A study:

- Project sponsor: *ESO, NOVA*
- Project scientist: *C.U.Keller (UU)*
- Project manager: *R.Jagers (ASTRON)*
- Other key project stakeholders: *NL, CH, and other European science communities*
- Team members: Venema, Roelsema, Schmid, Waters, Stam, Keller
- Customer/Recipient: ESO

Project Sponsor

- Sponsor has formal authority over and ultimate responsibility for project
- Projects often cross organizational boundaries
- Project manager often does not have sufficient authority
- Project sponsor can solve problems
- Primary task is to help team to be successful
- Project champions

Project Scientist

- Primary responsibility for science capabilities (scope)
- Larger projects: assisted by Science Working Group
- Prime contact for all science-related issues
- Authority to make science decisions
- Must work together with project manager

Project Manager

- Project "conductor"
- Moves things along in harmony
- Primary role in industry
- Often at equal level with project scientist role in scientific projects

Leading Stakeholders

- Lead diverse group
- Control who becomes a stakeholder
  - Too many people want to influence project (too many cooks)
  - Remove them if they do not have right to this influence
- Manage upward
  - Stakeholders often have more authority than you
  - Ask hard questions
  - Provide reasonable alternatives
  - Confront with facts
  - Motivate with persistence and enthusiasm

Project Rules

- Every project is (very) different
- Must have agreement on goal and success criteria
- Have to re-create roles and processes
- Need to answer:
  - Who is responsible for what?
  - How will we communicate?
  - Who has authority?
- No answer, no success

Successful Projects (LO1)

1. **Agreement among project team, customers, and management on the goals of the project**
2. Plan that shows an overall path and clear responsibilities that can be used to measure the progress of the project
3. Constant, effective communication among everyone involved in the project
4. **A controlled scope**
5. **Management support**

Agreement on Project Goals

- Can be difficult
- Stakeholders: diverse group with diverse interests
- Must find agreement among stakeholders before project money flows
- Must find agreement on how to change project goals in the future (see Change Management)

Controlled Scope

- Project is largely unknown when starting
- Uniqueness leads to:
  - Challenge and fun of projects
  - Overruns in budget and schedule
- Define rules on how to control/manage scope (science capability)

Management Support

- Project manager rarely has authority over all stakeholders
- Project sponsor is crucial ingredient for success
- Management needs to agree with rules:
  - Project Charter
  - Statement of Work
  - Responsibility Matrix
  - Communication Plan

Project Charter

- Formally announces project existence
- Makes key players public
- Demonstrates management support
- Establishes project managers/scientists rights and authority
- May be combined with statement of work

Project Name

- Good for marketing
- Can be a lot of fun
- Make list of words that should appear
- Synonyms for these words
- Be aware of cultural sensitivities
  - Solar Spectrometer (SS)
  - Swedish International Development Cooperation Agency (SIDA)

Project Objectives

- **S**pecific: What is the project about?
- **M**easurable: How to determine success/failure?
- **A**greed: All key stakeholders agree.
- **R**ealistic: Sober realism based on budget, schedule
- **T**ime-constrained: Finite beginning and end.
- Will be a measure of success
- Initial science goals
- May contain objectives regarding side effects

Project Objectives Example

Conceptual design of an instrument with

- Spectral range: 600-1800-nm (goal: 500 - 2500 nm)
- Observing modes
  - Spectral imaging with spectral resolution R > 50 (consider higher resolution if improvement in speckle rejection expected)
  - Differential polarimetry mode, tbc
- Spatial sampling: at least Nyquist at shortest wavelengths (consider finer sampling if improvement in speckle rejection expected)
- Field-of-View: 2 arcseconds (goal 4 arcsec in NIR), inner working angle: < 30 mas (goal 20 mas)

Deliverables

- What the project will produce
- Defines boundaries of the project
- Focuses team on project outcome
- Intermediate deliverables are used to manage project
- Final deliverables define project outcome

Deliverables Example

- 7101 Differential polarimetry trade-off study
- 7102 Fast modulator in front of AO system: requirements on wave front control
- 7201 Differential polarimetry system design and analysis
- 7301 Models for differential aberrations, and temporal wave front distortions of polarization modulators
- 7302 Measurements for the differential aberrations, and temporal wave front distortions of selected polarization modulators
- 7303 Wave front control with polarization modulation test report

Project Budget & Schedule

- Budget and how flexible it is
- Schedule and how flexible it is
- Reason for budget (limits) and deadline
- Reliable estimates? Can be very unclear in scientific projects
- End date can be very unclear in scientific projects

Assumptions

- Document major assumptions underlying project charter elements
- Factors/situations assumed to exit or not exist
- Example: availability date of key resource is not well defined ➔ make guess and document this assumption
- Do not assume away all risks
- Make reasonable assumptions
- Document them
- Discuss them with project sponsor

Relation with other Projects

- Project is likely linked to strategic goal
- Other projects may be linked to same goal
- Project is thereby linked to other projects
- Resource conflicts likely, should be identified in beginning
- Not an easy to find all connections to strategic goals and other projects
- Identification of relations and potential conflicts will reduce future chaos

Sponsor Responsibilities

- Sponsor has authority over and lends it to project
- Prominently support project
- Review and approve statement of work, plans
- Solve resource conflicts with other projects
- Help overcome organizational obstacles
- Sponsor and key stakeholders need to discuss and agree on charter

Statement of Work (SOW)

A top-level summary

- Purpose statement: Why this project? Provides a guide for decision making
- Scope statement: What is and is not required to meet the project goals? Sets clear limits of what will be done
- Deliverables
- Cost and schedule estimates
- Objectives: Measure of success
- Stakeholders
- Chain of command: organization chart

Responsibility (RACI) Matrix

- Details responsibility of each involved group
- Shows cross-organizational interaction
- Major project activities vs. stakeholder groups
- Entries of RACI matrix:
  - **R**esponsible (conducts work, one or several)
  - **A**pproval authority (accountable, only one)
  - **C**onsultation (2-way communication)
  - **I**nformation (1-way communication)
- Part of project rules

RACI Matrix Example

Task	C.U.Keller	H.M.Becher	Students
Lectures	R, A	C	I
Define problems	R, A	R	I
Solve problems		A	R
Correct Exercises	A	R	C

Communication Plan

Answers the following questions:

- Who needs information?
- What information do they need?
- When and how will they get it?
- What response is required within what time frame?

May also define:

- Regular project meetings
- Escalation procedure
- Repetitive information through different channels

Example Communication Plan

- Monthly Technical Activity Report: prepared from project team input, covers monthly team activities and relates them to schedule
- Monthly Financial Reports: Finance & Control will provide project manager with reports on costs, direct labor hours and cost, commitments of funds
- Quarterly Reports: Project manager will prepare summary of project status; budget, subcontracts, and technical problems, compared to project schedule
- Technical Reports: numbered reports, prepared by project team, will provide record of technical work

Transition to Planning Phase

- Charter and statement of work should be signed and distributed
- Project manager assembles project team
- Plan will be more detailed than charter and SOW
- Plan provides roadmap for achieving project goal