Growing as a Research Professional

Project Management

Faculty Orientation

University of Tennessee

Adapted from Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty (2nd Edition)
Topics to be discussed:

- Deciding on a Project
- Statement of Work
- Defining the Audience
- Project Schedules
Project Management

"Look, can't we just build the damn thing next to the quarry?"
Project Management
Project Management

- *Project Management*: A series of flexible and iterative steps through which you identify where you want to go, a reasonable way to get there, with specifics of who will do what and when.

- **Deciding on project – defining overall objective**
  - Consider all resources
  - Ask:
    - What experiments need to be conducted to write a research paper and submit it for publication before the grant deadline?
    - Is there enough time to obtain the necessary data?
    - Which students and post-docs could generate these data?
Planning the Project

• Planning helps to accurately anticipate time and resources needed for a project

• Work backwards from the stated objective:
  “To get an R01 funded within 1½ years, I must…”
  • Obtain final data for the grant proposal (12 months)
  • Submit the grant with preliminary data (9 months)
  • Submit a paper for publication (6 months)
  • Integrate data and start writing a manuscript (5 months)
  • Complete the initial set of experiments (1-5 months)

• Each step is then planned more carefully …
  • How long will it take?
  • Do we have the necessary people?
  • Do we have the funds?
Getting Started

• Statement of Work – a written document that clearly explains the project in four sections: *Purpose, Objectives, Constraints, Assumptions*

• Purpose – why the project is being considered
  – Background
  – Scope of Work
  – Strategy

• Objectives – end results of the project:
  – Statement
  – Measures
  – Specifications
Getting Started (cont.)

- **Constraints - Restrictions on the project**
  - Limitations: Constraints set by others
  - Needs: Constraints set by the project team

- **Assumptions – unknowns posited in developing the plan**

- **Flexibility – As project progresses, goals may change**
  - Build in periodic reviews of results against objectives
  - Remember that it is never too late to redirect or stop work altogether
Audience

• Define your audience – know the people and groups that have an interest in your project, are affected by it, or are needed to support it
  – List the project’s audiences (within and outside of your institution)
  – Divide audience into three categories: Drivers, Supporters, and Observers

  • Drivers – individuals who define what your project will produce and what constitutes success; PI (main driver), competitors and collaborators, scientific journal editors, study section reviewers
  • Supporters – People who will perform the work or make the work possible
  • Observers – Those who do not fall into the first two categories
Work Breakdown Structure (WBS)

- An outline of all the work that will have to be performed for the project
  - Start with broad work assignments
  - Break down into activities / divide into discrete steps
    - Consider both time and resources needed
    - Create a timeline (think in 1- and 2-week increments)
    - Some team members might need more detail than others (i.e., undergrads vs. experienced post-doc)
  - Level of detail; based on the WBS can…
    - You determine a reasonable estimate of resources for this work?
    - You determine a reasonable estimate of the time required?
    - Anyone responsible for the activity understand it to your satisfaction?
Tracking the Work and Resources

• Develop a Project Schedule – Outline the order of activities and the needed time and resources:
  1. Identify activities and events from the WBS
  2. Identify constraints from the Statement of Work
  3. Determine durations of different activities; if more than one person will be involved, who will be doing them
  4. Decide on the order of performance
  5. Develop an initial schedule
  6. Revise your schedule as necessary

• Schedule development tools:
  • Key Events Schedule (KES)
  • Activities Plan
  • Gantt Chart
  • PERT Chart
Example of a Key Events Schedule

A simple table showing events and target dates for reaching them.
### Example Activities Plan

A table showing activities and their planned start and end dates.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Person Responsible</th>
<th>Start Date</th>
<th>End Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify sources of prostate cells</td>
<td>Theresa</td>
<td>Aug. 1</td>
<td>Aug. 5</td>
<td></td>
</tr>
<tr>
<td>Identify sources of prostate cancer cells</td>
<td>Bob</td>
<td>Aug. 1</td>
<td>Aug. 5</td>
<td></td>
</tr>
<tr>
<td>Grow prostate cells</td>
<td>Theresa</td>
<td>Aug. 5</td>
<td>Aug. 26</td>
<td></td>
</tr>
<tr>
<td>Grow prostate cancer cells</td>
<td>Bob</td>
<td>Aug. 5</td>
<td>Aug. 26</td>
<td></td>
</tr>
<tr>
<td>Isolate RNA and protein from prostate cells</td>
<td>Theresa</td>
<td>Aug. 26</td>
<td>Sept. 26</td>
<td></td>
</tr>
<tr>
<td>Isolate RNA and protein from prostate cancer cells</td>
<td>Bob</td>
<td>Aug. 26</td>
<td>Sept. 26</td>
<td></td>
</tr>
<tr>
<td>Perform RT-PCR on prostate cells</td>
<td>Theresa</td>
<td>Sept. 26</td>
<td>Oct. 26</td>
<td></td>
</tr>
<tr>
<td>Perform RT-PCR on prostate cancer cells</td>
<td>Theresa</td>
<td>Sept. 26</td>
<td>Oct. 26</td>
<td></td>
</tr>
<tr>
<td>Perform Western blots on prostate cells</td>
<td>Bob</td>
<td>Sept. 26</td>
<td>Oct. 26</td>
<td></td>
</tr>
<tr>
<td>Perform Western blots on prostate cancer cells</td>
<td>Bob</td>
<td>Sept. 26</td>
<td>Oct. 26</td>
<td></td>
</tr>
<tr>
<td>Compare the levels of Sumecon RNA in the prostate and prostate cancer cells</td>
<td>Theresa and Bob</td>
<td>Oct. 26</td>
<td>Nov. 5</td>
<td></td>
</tr>
<tr>
<td>Compare the levels of Sumecon protein in the prostate and prostate cancer cells</td>
<td>Theresa and Bob</td>
<td>Oct. 26</td>
<td>Nov. 5</td>
<td></td>
</tr>
<tr>
<td>Compare the levels of Sumecon RNA and protein with each other</td>
<td>Theresa and Bob</td>
<td>Oct. 26</td>
<td>Nov. 5</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Each of these activities can be broken down further if more detail is needed. For example, if the activities are being performed by a new graduate student, you may want to explain the different protocols to use to perform RT-PCR from prostate cancer cells and what controls should be used as well as alternative protocols to use in case the first ones do not work.*
## Example of a Gantt Chart

A graph consisting of horizontal bars that depict the start date and duration for each activity.

<table>
<thead>
<tr>
<th>Activity</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>Person responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMACAN EXPRESSION IN PROSTATE CELLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Theresa, Theresa</td>
</tr>
<tr>
<td>Find cells</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Theresa</td>
</tr>
<tr>
<td>Grow cells</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Theresa</td>
</tr>
<tr>
<td>Isolate RNA and protein</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Theresa</td>
</tr>
<tr>
<td>RT-PCR and Western blots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Theresa and Bob</td>
</tr>
<tr>
<td>SUMACAN EXPRESSION IN PROSTATE CANCER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bob, Bob</td>
</tr>
<tr>
<td>Find cells</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bob</td>
</tr>
<tr>
<td>Grow cells</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bob</td>
</tr>
<tr>
<td>Isolate RNA and protein</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bob</td>
</tr>
<tr>
<td>RT-PCR and Western blots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Theresa and Bob</td>
</tr>
<tr>
<td>COMPARE RESULTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Theresa, Bob and PI</td>
</tr>
<tr>
<td>Data Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Theresa, Bob and PI</td>
</tr>
</tbody>
</table>

A tennisawi
Example of a PERT Chart

A diagram in which activities are represented by lines and events on the nodes
Controlling the Project

• **Project Management Software**
  – Microsoft Project and Act! (Symantec)
  – Also see [www.project-management-software.org](http://www.project-management-software.org)

• **PI as Manager: main research driver and manager**
  – Champions the project for the project audience
  – Removes obstacles for the project team
  – Provides resources, access to essential equipment, and technical skills
  – Communicates the project vision to keep the team motivated and focused
  – Communicates with department chair, sponsor, journal editors and external collaborators

• **Flexibility – Careful stewardship includes developing strategies and contingency plans to reduce the likelihood of deviations**