Keys to Successful Laboratory Management

Source

Making the Right Moves: A Practical guide to Scientific Management for Postdocs and New Faculty, 2nd edition

Howard Hughes Medical Institute

http://www.hhmi.org/resources/labmanagement/moves.html

Congratulations!

- You successfully obtained and negotiated a faculty position.
  - Salary
  - Teaching Responsibilities
  - Benefits
- You obtained and negotiated a faculty start-up package
  - Office and Laboratory Space
  - Equipment
  - Supplies
  - Student support
  - Summer salary

Now What? How do I Plan for Tenure

- Get to know people
  - Dean
  - Department Chair
  - Business personnel
  - Research infrastructure personnel
  - Established faculty members (mentors)
- Know about research infrastructure
  - Research support services
  - Indirect costs
  - Institutional review boards
  - Conflicts of interest
- Understand expectations for beginning independent investigators
  - Teaching
  - Advising
  - Service
  - Scholarship
  - Criteria for promotion and tenure
- **Establish your laboratory**

Successful Laboratory Management Presentation Overview

- Designing and Equipping your Laboratory
- Leadership
- Staffing
- Time Management
- Project Management
- Data Management and Laboratory Notebooks

Designing and Equipping your Lab

- Envision the relationships between the various workstations, preparation areas, and offices

- Arrange for and help supervise any renovations

- Order equipment and supervise its installation

- Acquire any licenses required by regulatory agencies

- Attend required training courses
  - radioactive or hazardous materials
  - use of animals
  - use of recombinant DNA, etc.

- Put in place data management systems
  - Accounting system for ordering and expenditures
  - System for documenting your research results

Your Role as a Laboratory Leader

- **Leadership:** Getting a group of people to enact a vision of what needs to be accomplished

- Leadership Functions
  - Development of a scientific strategy
  - Motivation of people
  - Managing budgets

  Leadership =Vision + Relationships + Tasks

Vision Statement

- Decide what values you want for your lab
  - Scientific excellence
  - Discipline
  - Teamwork
  - Competition
- Consider your social and financial goals in addition to scientific ones
- Craft a statement that you feel comfortable communication to your peers, superiors, and alb members.

Vision Statement Examples

- *The goal of our laboratory is to be among the most successful and respected in the area of cancer genetics. The ultimate goal is to help develop better therapies and cures for cancer. To this end, we will collaborate with other researchers in the area and share our results and reagents. We will be recognized for being fair and collegial*

- *Our lab aims to understand the mechanisms by which cells transport proteins. In particular, we will focus on technical challenges that others have not been able to overcome. A main focus of the lab is to train the next generation of scientists. We will create an environment that is conducive to learning and testing new skills.*

Vision

- *My vision is that we are going to regenerate the heart after a heart attack. This is really what I would like to accomplish with my career. Initially, I was worried that I would sound "sappy" in some fashion when I told people that I had a vision. I found that at first people may think it's a little odd, but pretty soon when they hear it again and again, you start seeing people nodding their heads and agreeing with you. Having a clearly stated vision does help to inspire in people the mission behind what you are working on.*

—Charles Murry, University of Washington School of Medicine

Leadership - Relationships

A leader enables others in the lab to do the work in a unified manner

- Build and manage teams

- Create an environment where people are able to give and receive feedback

- Motivate and support graduate students, postdocs, and technicians

- Delegate responsibility to others when possible

- Make fair decisions and manage conflicts

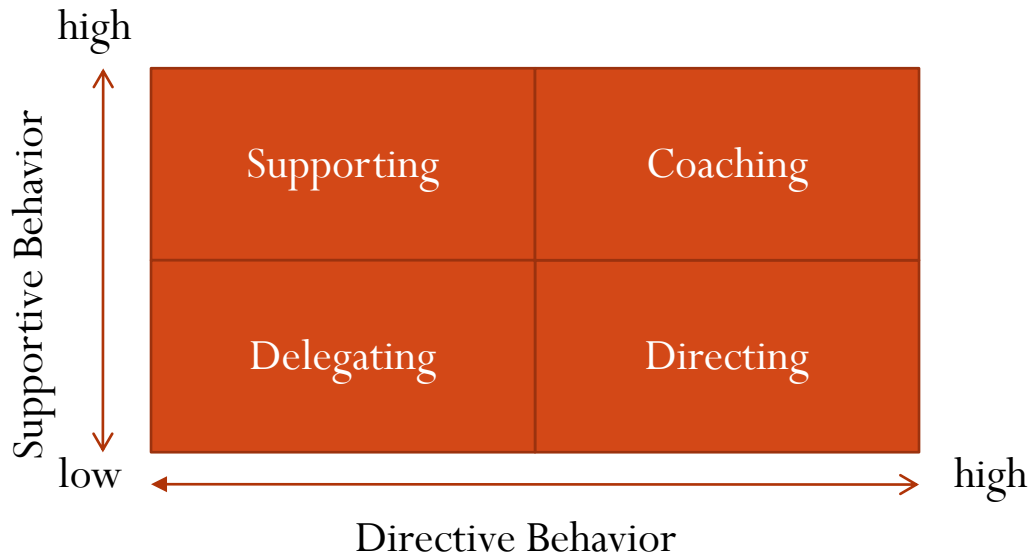- Communicate and listen

- Be a mentor to others

Leadership Tasks

- Design projects and determine time frames

- Create budgets

- Write grants and papers

How to Improve Your Leadership Skills

- Find a mentor

- Read books and attend courses

- Get to know your strengths and weaknesses

Four Styles of Leadership

Leadership Styles

❑ **Directing** – high focus on task, low focus on relationship
- effective when the person being supervised is not yet qualified or sufficiently qualified to independently carry out a task

❑ **Coaching** - high focus on both task and relationship
- typical of graduate student supervision. Requires direction and support of the student's professional development

❑ **Supportin**g – low focus on task and high focus on relationship
- Typical with postdocs and experienced graduate students

❑ **Delegating** – low focus on both task and relationship
- decision making and problem solving is completely turned over to the individual

Delegating Tasks

- Delegate authority with responsibility
- Give clear directions and make sure they are understood
- Clearly define the responsibilities assigned to each lab member – communicate to everyone in the lab
- Follow up to make sure the job is being done without interfering with it
- Back up delegates when authority is questioned
- Distribute responsibilities fairly among member of the lab

Communication Within the Lab

- Informally communicate with lab members on a daily basis
- Formally communicate with lab members
  - **Research group meetings** where each member reports (both orally and in writing) - weekly
    - Results from prior week
    - Interpretation of results
    - Plan for next week
    - Bottlenecks followed by discussion
  - **One-on-one meetings** with individual lab members - weekly
  - **Performance reviews** – quarterly
  - **Small group meetings** with individuals working on sub-projects
  - **Strategy meetings**
  - **Journal club meetings** – weekly or monthly
  - **Informal group activities** – celebration of accomplishments

Setting and Communicating Rules of Behavior

- **Work hours** – focusing on productivity if better than requiring students to be present a set number of hours which can foster resentment
- **Prolonged absences** – require several weeks notice of any prolonged absences, e.g. vacation, maternity, etc.
- **Authorship** of papers
- **Scientific ethics**
- **Project ownership**
  - Policy on letting projects leave the lab

Authorship of Papers

- The first author is normally the individual who is primarily responsible for the project.

- It is unwise to make upfront promises about authorship.

- In deciding whether to include someone as an author, ask "Could this project have been done without this person's conceptual or technical contribution?"

Keeping Lab Members Motivated

- Allow students to participate in decision making
- Set goals and define success for each person
- Recognize achievements via continuous feedback and special recognition
- Provide for a comfortable work environment
- Help students set deadlines, solve problems and plan future experiments
- Share your enthusiasm

Laboratory Staffing

- Know the difference between employees and students
  - Employees = post docs, technicians, research faculty members
    - Hired and fired
    - Received benefits and pay taxes
    - Personnel policies apply
  - Students
    - Assigned and released
- Avoid discrimination
- Determine your staffing needs

Recruiting

- Get the word out
  - Word-of-mouth
  - Formal advertisements
- Emphasize what you have to offer
  - Promote your vision
  - Communicate your lab culture
  - Convey your commitment to mentoring
  - Offer flexibility where you can
  - Provide a realistic level of reassurance regarding the stability of your funding

What Potential Lab Members are Looking For

- Lab technicians
  - Working closely with the PI
  - Learning new techniques
  - Being included on papers
  - Salary
- Graduate students
  - Opportunity to work with the PI
- Undergraduate students
  - Research experience that satisfies curiosity about research
  - Academic credit
  - Recommendations for graduate school or medical school
- Postdocs
  - Launch pad for their career
  - Institution's reputation
  - Geographic location

Selecting Applicants

- Invite the applicant to visit your lab

- Interview the applicant

Sample Interview Questions

- *Experience and Skills*
  - Tell me about your most significant accomplishments.
  - Tell me the part you played in conducting a specific project or implementing a new approach or technology in your lab.
  - I see you have worked with [insert specific technology or technique]. Tell me about its features and benefits.

- *Commitment and Initiative*
  - Why do you want to work in my lab?
  - Where do you see yourself in five years?
  - What kinds of projects do you want to do? Why?
  - Tell me how you stay current in your field.
  - Describe a time when you were in charge of a project and what you feel you accomplished.
  - Tell me about a project or situation that required you to take initiative.

- *Working and Learning Styles*
  - What motivates you at work?
  - Would you rather work on several projects at a time or on one project?
  - Do you learn better from books, hands-on experience, or other people?
  - Tell me about a project that required you to work as part of a team. What was the outcome of the team's efforts?
  - How would you feel about leaving a project for a few hours to help someone else?

- *Cultural differences*
  - How do you feel about getting in front of a group and describing your personal accomplishments?
  - How would you respond if a more senior lab colleague took credit for your project?
  - If you did not understand something, would you persist in asking for help even if the principal investigator got annoyed?

Interview Tips

- Make the applicant feel comfortable. Make appropriate small talk, offer a beverage, and compliment the applicant on making it thus far in the selection process. Remember that the applicant is also deciding whether he or she wants to work for you.

- Develop professional rapport, but avoid a social atmosphere:

- Explain how the interview will be structured.

- Briefly describe the selection process.

- Outline the responsibilities for the open position.

- Convey your expectations about the job. Include values that may seem obvious to you, such as your commitment to lab safety and scientific rigor. Keep in mind the topics to avoid.

- Take brief notes. Record actual answers to questions, not evaluative or conclusive comments.

- Listen carefully. Let the applicant do most of the talking.

- Develop a high tolerance for silence. Give the applicant a chance to think and develop thoughtful answers to your questions.

- Give the applicant many chances to ask questions. This will give you some insight into what is important to him or her.

- Never make promises or give commitments, even those that seem innocent to you.

- Ask the applicant about his or her timetable for leaving the current job, even if you asked it during the telephone interview.

Warning Signs

- Unwillingness to take responsibility for something that has gone wrong.

- Complaining about an adviser and coworkers.

- Demanding privileges not given to others.

- Delaying answering questions, challenging your questions, or avoiding answering them all together. (Humor and sarcasm can be tools to avoid answering questions.)

- Unless you have been rude, responding to an interview question with anger is never appropriate.

- Incongruence between what you hear and what you see (e.g., downcast eyes and slouching are not signs of an eager, assertive candidate).

- Trying to control the interview and otherwise behaving inappropriately.

Questions to ask before letting someone go

- Have you given the person at least some type of notice or warning?

- Have you made it clear to the person what he or she is doing wrong?

- Has the person received counseling or assistance in learning new or difficult tasks? If so, how much?

- Are you treating (or have you treated) the person differently from other staff in your lab?

- Are you following written procedures and institutional policies?

- Does the documentation in the personnel file support the reason for discharge?

How to Terminate

- Be polite.
- Stay focused on the issue at hand. Get to the point quickly. Explain the decision briefly and clearly. Don't apologize or argue with the employee in an effort to justify your decision.
- Avoid laying blame.
- Arrange to have scientific materials and equipment and supplies returned to you, including lab notebooks; protocol books (unless it is a personal copy); lists of clones, cells, and experiments in progress; and keys.
- Let the employee have an opportunity to have his or her say, and pay close attention to what is being said.
- Refer the employee to HR or to the office responsible for discussing benefit eligibility.
- Take notes that document this meeting and convert them into an informal or formal memo to file.
- Try to part on cordial terms. Science is a small community, and your paths may cross again.

Time Management

- **Establish Goals**
  - Long term goals -can be achieved in 3 to 5 years
  - Intermediate goals – can be achieved in six months to one year
  - Short-term goals – can be achieved in one week to one month
- **Making choices – learn to say no**
  - Some tasks you must say no to
  - Some tasks can be achieved with less than a stellar performance
  - Say yes judiciously
- **Maximize returns**
  - Identify projects that need to be completed to near perfection, e.g. grant proposal
  - Identify projects that do not need perfection, e.g., draft review of a collaborators manuscript
- **Learn to Disconnect**
  - Technological conveniences offer needless interruptions

Finding Extra Time

- **Get your e-mail under control.**
  - set aside specific times of the day for reading and responding to e-mails
  - Read your e-mails at home in the evening or morning
- **Buy an answering machine** or voice-mail service
- **Invest in a family cell phone**
  - to make sure you're available for family communication and emergencies when you have silenced your office phone.
- **Close your office** door or come in early.
  - A sign on your door that reads "Knock if important" lets your students and colleagues know you are in and working, but don't want to be disturbed. Early hours might buy you precious focused time away from clamoring students and colleagues.
- **Close your lab door.**
  - **S**ecuring uninterrupted time in the lab is of paramount importance to your career.
- **Make, and keep, appointments with yourself.**
  - Find a quiet hideaway and use it on a scheduled basis. This practice trains people to expect you to be inaccessible at predictable times.

Keys to Working and Living Right

1. **Learn how to say yes as well as how to say no**.
   - It's easier to say no to unwanted tasks if you have already committed to something you do want to do.

2. **Establish your absence as well as your presence**.
   - Set a schedule for being physically elsewhere and unavailable, and stick to it.

3. **Do a little bit of everything as well as all of one thing.**
   - Master the art of multitasking.

4. **Determine your tasks as well as your priorities.**
   - T here are many activities, small and large, that lead to your goal.

5. **Work until your time is up as well as until your task is done.**
   - Approach every task with the goal of making progress during a specific amount of time, then move on to the next task to maintain forward momentum.

6. **Bring some of your home to work as well as some of your work to home.**
   - You live in both worlds; look for ways to bring them together (e.g., if you have a long commute, leave home early to beat the traffic and save breakfast and the newspaper for your office).
   - Seek to integrate your professional and personal activities where appropriate as well as to separate work and play where appropriate; doing so can maximize your effectiveness and satisfaction in both areas.

Setting Priorities

- Plan ahead and know your deadlines
- Set aside blocks of time for specific tasks
- Break large tasks into smaller tasks
- Delegate tasks
- Complete tasks on time

Efficiency

- Create an environment conducive to productivity. Make a place for everything, and put everything in its place; clutter is inefficient.

- Find or make a quiet space (or time) to work.

- Know your biological clock, and protect your most productive hours for your writing and designing experiments and other critical tasks.

Time Management Grid

	Not Important	Important
Not Urgent	• Most email • Weekend plans of lab members • The Super Bowl pool	• Ongoing experiments • Next month's grant deadline • Preparing for a class
Urgent	• "you've got mail" alert • Ringing telephone • Inquiring colleague	• A lab fire • Tomorrow's grant deadline

Efficiency

- During your protected work hours, focus and don't allow interruptions.
- Set time limits. Give yourself predetermined amounts of time to complete tasks (e.g., two hours to review a paper).
- Eliminate unnecessary tasks.
- Avoid procrastination.
  - Start tasks early—at least in outline. If you have a grant due, write your goals early enough to let your lab staff start gathering relevant data without last-minute panic.
  - If a critical reagent requires a long lead time to produce, start it early enough to make sure it's ready when you need it.
- Structure and supervise meetings.
- Delegate work.
- Make a quick phone call instead of having an often less efficient back and forth e-mail conversation.
- Get a high-speed Internet connection at home.

Improving Your Lab Staff's Time Management Skills and Efficiency

- **Establish clear goals and expectations**
  - Star with simple tasks your staff can handle
  - Make sure they understand the tasks
  - Reward and correct them as appropriate
  - expand the tasks, then repeat the process.
- **Help them seek advice without taking up unnecessary time**
  - Teach them how to describe projects, issues, and problems accurately and efficiently.
- **Develop an agenda for every meeting and stick to it**.
  - Start meetings with a clear description of the purpose of the meeting and when it will end.
- **After meetings, send a "Dear gang" follow-up letter containing a summary and to-do list.**
  - Use these informal minutes to start the next meeting and gauge progress. (Meeting minutes are also useful for patent protections in establishing proof of an idea, attribution, and date.)

Project Management

- **Statement of Work to be Accomplished**
  - Background
    - Why was the project initiated
    - Who initiated the project
    - How does the project affect other projects
    - What happens if the project is not completed on time
- **Scope of work**
  - brief statement describing the major work to be performed
- **Strategy**
  - How will the work be done
  - Who will do the work
  - What funds are available for the work
- **Objectives**
  - Statement: Description of the desired outcome when project is complete
  - Measures: Indicators to assess how well the outcome has been achieved
  - Specifications: Target values of the measures that define successful results

Project Management

- **Constraints**
  - *Limitations:* constraints set by others
    - Limited start-up funds
    - Teaching responsibilities
  - *Needs*
    - Constraints set by the project team, e.g. Planned vacation leave

- **Assumptions**
  - New funding will be obtained
  - No one will leave the lab
  - Teaching load will remain as planned

The Work Breakdown Structure (WBS) Who does what and when

- **Work Breakdown Structure:** *an outline of all the work that will have to be performed for the project.*
  - Define Broad work statements
  - Define activities for each work statement
  - Define discrete steps for each activity – think in terms of one or two week increments
  - Define Milestones:
    - an event that marks the completion of one or more activities

Questions that determine if the WBS has enough detail

- Can you determine a reasonable estimate of the resources (including people) required for this work?

- Can you determine a reasonable estimate of the time required to do this work?

- Can anyone charged with one of these activities understand it well enough to do it to your satisfaction?

Tracking the Work and the Resources

1. Identify activities and events (from the WBS).

2. Identify constraints (from the statement of work).

3. Determine the durations of different activities and, 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.

Tools for Developing Schedules

- *Key events schedule: A table showing events and target dates for reaching them* (remember that events are milestones signaling the completion of one or more activities).

- *Activities plan: A table showing activities and their planned start and end* dates

- *Gantt chart: A graph consisting of horizontal bars that depict the start date* and duration for each activity

- *PERT chart: A diagram in which activities are represented by lines and* events on the nodes (typically depicted as circles or bubbles).

Controlling the Project

- Championing the project for the project audience
- Clearing away obstacles for the project team
- Providing resources
  - Funds
  - Access to equipment
  - Technical skills
- Communicating the project vision to keep the team motivated
- Communicating with external collaborators and other stakeholders

Data Management and Laboratory Notebooks

- Reasons to keep Laboratory Notebooks
  - To allow work to be reproduced by you or others
  - To teach others how to analyze data
  - To meet contractual requirements
  - To avoid fraud
  - To defend patents

Good Practice for Lab Notebooks

- Explain nonstandard abbreviations.

- Use ink and never obliterate original writing; never remove pages or portions of a page.

- If a page is left blank or a space within a page is left blank, draw a line through it.

- Permanently affix with glue any attachments (such as graphs or computer printouts) to the pages of the notebook; date and sign both the notebook page and the attachment.

- Outline new experiments, including their objectives and rationale.

- Include periodic factual, not speculative, summaries of status and findings.

- Enter ideas and observations into your notebook immediately. Summarize discussions from lab meetings and ideas or suggestions made by others, citing the persons by name.

Good Practice for Lab Notebooks

- Use a permanently bound book, with consecutive signed and dated entries. When appropriate, witness entries as well.

- Record entries chronologically.

- Each entry should stand on its own to permit others to replicate the work.

- Organize material with sections and headings.

- Identify and describe reagents and specimens used.

- Identify sources of those materials (e.g., reagent manufacturer, lot number, purity, expiration date).

- Enter instrument serial numbers and calibration dates.

- Use proper nouns for items.

- Write all entries in the first person, and be specific about who did the work.

Tracking and Storing Information

- Assign Responsibility
- What to store
  - Lab protocols
  - Primary data, including images
  - Lists of specimens and reagents
  - Information about instruments
- How to store
  - Printed records
  - Electronic records