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The APS Professional Development
Resource Guide: 2006 Edition

Edited by

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John Orrell, PhD

APS Committee on Careers and Professional Development
One Physics Ellipse
College Park, MD

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Chapters

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INTRODUCTION

This document presents the first ***Professional Development Resource Guide*** that lists resources identified as important for the professional development of today's scientists. This list is organized into ten chapters that represent steps that a scientist can take to improve their professional development while working concurrently on a technical project, which may include but is not limited to working on a PhD, completing a thesis, or working on a career. The ten steps have been identified by members of the APS Committee on Careers and Professional Development (CCPD). Interested readers are welcome to submit additional resources to be included in future editions.

In today's career environment, there are many types of employment opportunities and career choices available to scientists. Common to each of the many career choices are skills that are important to achieve success in a job. Typically, many of these skills are non-technical and are not part of a standard academic curriculum. Furthermore, each scientist is responsible for his or her own career development. Although many resources have been written to provide advice on this topic, the resources have been written at various times and exist in different publications, such as books, newsletters, magazines, and the internet. The purpose of this ***Guide*** is to assemble existing resources into one reference guide with a simple format.

Thus, by its nature, this guide presents material compiled across many disciplines and sources beyond those covered directly by the American Physical Society. The APS Committee on Careers and Professional Development believes these are valuable references for consideration, albeit without specifically endorsing the views presented. We thank the APS Executive Officer, Judy Franz, for her comments and support of this document.

Chapter 1 FOLLOW CURRENT EVENTS

An important step in the professional development of a scientist is the ability to articulate the importance of their work. Specifically, many scientists need to describe their work during annual reviews (industry, academia), tenure reviews (academia), and grant proposals (government, academia, industry). While typically this description may involve applications to other scientific fields, it may also have applications in other areas such as engineering, government, business, and medicine. As a result, it is important to be proactive and take steps to follow current events. Many of the links in this chapter have been presented as part of the 2005 IEEE Spectrum Magazine's Career Accelerator Forum on September 20, 2005, in a talk entitled, "How to Keep Your Technical Chops in Fast-Changing Fields." The purpose of this chapter is to provide free available resources in these areas.

1. Follow Current Events

- a. Know how the Physics is used
 - i. <http://www.howstuffworks.com>
- b. Physics and Nanotechnology
 - i. Physical Review Focus
 - 1. <http://www.focus.aps.org>
 - 2. owner-focus@lists.apsmsgs.org (weekly email)
 - ii. American Institute of Physics
 - 1. physnews@aip.org (weekly email)
 - iii. **Science News** (weekly magazine with annual subscription)
 - iv. Albany Nanotech and Solid State Technology Magazine
 - 1. ELevine@uamail.albany.edu
 - 2. 518-437-8623
 - 3. <http://www.albanynanotech.org>
- c. Materials Science
 - i. MRS Bulletin Table of Contents Alert
 - ii. enews@lucy.mrs.org (monthly email)
- d. Optics
 - i. **Photonics Spectrum** (monthly free magazine)
- e. Academia
 - i. INSIDE HIGHER ED
 - 1. newsroom@insidehighered.com

2. <http://insidehighered.com>

f. Government

- i. AIP Bulletin of Science Policy News (in Washington, DC)
 1. <http://www.aip.org/fyi>
 2. <http://www.aip.org/fyi/subfyi.html>
- ii. Grants.gov Opportunities Postings
 1. notifier@fedgrants.gov
- iii. US Department of Health and Human Services – National Institutes of Health
 1. olib@OD.NIH.GOV
- iv. What's New @ IEEE-USA
 1. IEEE-USA's Eye on Washington: Erica Wissolik, IEEE-USA
 - a. 1828 L Street, N.W. Suite 1202
 - b. Washington, DC 20036-5104
 - c. e.wissolik@ieee.org
 2. <http://whatsnew.ieee.org>
 3. <http://www.ieeeusa.org/emailupdates>

g. Engineering

- i. IEEE Career Alert
 1. ieee-career-alert@ieee.org
- ii. IEEE-USA Today's Engineer
 1. ieee-enotice@ieee.org (email update)
- iii. What's New @ IEEE
 1. whatsnewadmin@ieee.org
- iv. Electronic News**
 1. <http://reed-electronics.com/electronicnews>
- v. EETimes**
 1. <http://www.eetimes.com>
- vi. Test and Measurement World Magazine**
 1. tmworld@email.tmworld.com
 2. <http://www.reed-electronics.com/tmworld/>
- vii. **IEEE Spectrum** webcasts
 1. <http://www.spectrum.ieee.org/webcasts>
- viii. IEEE Career Advancement Forum**
 1. http://ieee.unisfair.com/productsServlet?command=product_update&next_page=ProductEdit.jsp&product_id=61&eid=75

- h. Industry
 - i. Electronic News Today
 - 1. ElectronicNews@email.electronicnews.com
 - 2. <http://www.ElectronicNews.com>
 - 3. <http://www.EETimes.com>
 - ii. Semiconductor International Weekly
 - 1. SIWeekly@email.semiconductor.net
 - 2. <http://www.semiconductor.net>
 - 3. semiconductor_international@email.semiconductor.net
- i. Medicine
 - i. Harvard Medical School weekly email newsletter
 - ii. HEALTHbeat@hms.harvard.edu
- j. Business
 - i. Harvard Business Review online
 - ii. Harvard_Business_Online@hbsp.ed10.net
 - iii. New York Times <http://www.nytimes.com>

Chapter 2 LEARN BASIC SKILLS

A second important step in the professional development of a scientist is the ability to learn basic non-technical skills. Typically these skills may involve an increasing use of the computer and the ability to interact remotely with people. Specifically, many scientists need to interact with colleagues who are no longer present in adjacent offices or down the hall. Instead, many colleagues are working at remote sites or are traveling, and the communication among colleagues is performed through writing (email) and teleconferences. For these forms of communication, the skills of writing and speech etiquette need to be adapted to the changing work environment in order to maximize the success in their jobs. The purpose of this chapter is to provide free available resources in these areas.

2. Learn Basic Skills

- a. UNIX/AIX. Windows.
- b. Willingness to learn new basic skills
 - i. Read “Good Writing and Speech – Their Importance to the Engineer,” by Alfred N. Goldsmith.
http://www.ieeeecs.org/pdfs/nov_dec04.pdf. IEEE PCS Newsletter, Vol. 48, No. 6, p. 26.
 - ii. Read “An Abuse of Engineeringese Was Observed,” by Jean-Luc Doumont.
http://www.ieeeecs.org/pdfs/sep_oct04.pdf. IEEE PCS Newsletter, Vol. 48, No. 5, p. 8.
- c. Email etiquette
 - i. Read “Say What You Mean in E-mail,” by Professor Grammar. http://www.ieeeecs.org/pdfs/mar_apr02.pdf. IEEE PCS Newsletter, Vol. 46, No. 2, p. 22.
- d. Phone etiquette
 - i. “Hello, this is John Smith calling for Dr. Physics. I am following up on the letter that I sent a few days ago. Is this a good time to speak?”
- e. How to write
 - i. Read “Be in the Business of Good Writing,” by Harvey Mackay. http://www.ieeeecs.org/pdfs/jul_aug01.pdf. IEEE PCS Newsletter, Vol. 45, No. 4, pp. 1, 5.

- ii. Read “Woe is the Dangling Phrase,” by Professor Grammar. http://www.ieeeecs.org/pdfs/jan_feb02.pdf. IEEE PCS Newsletter, Vol. 46, No. 1, p. 12-13.
- iii. Read “Tips for Making Writing Easier: Part 1: The Five-Minute Miracle,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/mar_apr03.pdf. IEEE PCS Newsletter, Vol. 47, No. 2, pp. 13-14.
- iv. Read “Tips for Making Writing Easier: Part 2: Narrow Your Questions, Shape Your Answers,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/may_jun03.pdf. IEEE PCS Newsletter, Vol. 47, No. 3, pp. 10, 14.
- v. Read “Tips for Making Writing Easier: Part 3: Focus on Your Key Message,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/jul_aug03.pdf. IEEE PCS Newsletter, Vol. 47, No. 4, p. 10.
- vi. Read “Tips for Making Writing Easier: Part 4: Break Out of the Endless Editing Cycle,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/sep_oct03.pdf. IEEE PCS Newsletter, Vol. 47, No. 5, pp. 11, 13.
- vii. Read “Tips for Making Writing Easier: Part 5: Quick Editing for Organization,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/nov_dec03.pdf. IEEE PCS Newsletter, Vol. 47, No. 6, pp. 9-10.
- viii. Read “Tips for Making Writing Easier: Part 6: Toning Your First Draft Up – Or Down,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/jan_feb04.pdf. IEEE PCS Newsletter, Vol. 48, No. 1, pp. 8-9.
- ix. Read “How Should Engineers Write? What Their Managers Say,” by Kathleen Mohn, http://www.ieeeecs.org/pdfs/mar_apr02.pdf. IEEE PCS Newsletter, Vol. 46, No. 2, pp. 1, 5-6.
- x. Read “How to Write Readable Reports and Winning Proposals. Part 1: Grab Your Reader with a PAW,” by Peter and Cheryl Reimold, http://www.ieeeecs.org/pdfs/may_jun02.pdf. IEEE PCS Newsletter, Vol. 46, No. 2, pp. 10-11.
- xi. Read “How to Write Readable Reports and Winning Proposals. Part 2: Structure Your Reports to Please Your Reader,” by Peter and Cheryl Reimold, http://www.ieeeecs.org/pdfs/jul_aug02.pdf. IEEE PCS Newsletter, Vol. 46, No. 4, pp. 15-16.
- xii. Read “How to Write Readable Reports and Winning Proposals. Part 3: Save Readers and Yourself Precious Time,” by Peter and Cheryl Reimold, http://www.ieeeecs.org/pdfs/sep_oct02.pdf. IEEE PCS Newsletter, Vol. 46, No. 5, pp. 1, 4.

- xiii. Read “How to Write Readable Reports and Winning Proposals. Part 4: Internal Proposals that Move Decision Makers,” by Peter and Cheryl Reimold, http://www.ieeepcs.org/pdfs/nov_dec02.pdf. IEEE PCS Newsletter, Vol. 46, No. 6, pp. 14, 16.
- xiv. Read “How to Write Readable Reports and Winning Proposals. Part 5: Persuasive External Proposals,” by Peter and Cheryl Reimold, http://www.ieeepcs.org/pdfs/jan_feb03.pdf. IEEE PCS Newsletter, Vol. 47, No. 1, p. 8.

- f. Learn to communicate
 - i. Read “Communication in the New Millennium,” Cheryl and Peter Reimold. http://www.ieeepcs.org/pdfs/may_jun00.pdf IEEE PCS Newsletter, Vol. 44, No. 3, May/June 2000, pp. 5-6.

- g. Microsoft Office Suite. Latex. Adobe acrobat. Spreadsheet programs – Excel, OriginLab.

Chapter 3 GIVE PRESENTATIONS

Another important step in the professional development of a scientist is the ability to give good presentations. Typically scientists are working on their technical projects until a deadline (conference deadline or proposal deadline) and put the presentation of the material together at the last minute. While this may be an efficient use of time in the lab, the actual language used in the oral component of the presentation may suffer. Specifically, when a presentation is assembled at the last minute, the scientist spends little time structuring the thoughts that will be used to engage the audience and describe the importance of the scientific work itself. The purpose of this chapter is to provide free available resources in these areas.

3. Give Presentations

- a. Describe the conclusions in 1-2 minutes at the beginning of your talk
- b. Practice! Practice!
- c. Read “A 12-Step Program For Running Meetings,” by James T. Heires. http://www.ieeeecs.org/pdfs/may_jun00.pdf. IEEE PCS Newsletter, Vol. 44, No. 3, May/June 2000, pp. 21-22.
- d. Read “Developing Effective Presenters I: Tips for Managers,” by Jason Palmeri and Paul Tuten. http://www.ieeeecs.org/pdfs/nov_dec03.pdf. IEEE PCS Newsletter, Vol. 47, No. 6, pp. 12-13.
- e. Read “The Twists and Turns of Effective Presentations,” by Jason Palmeri and Paul Tuten. http://www.ieeeecs.org/pdfs/mar_apr03.pdf. IEEE PCS Newsletter, Vol. 47, No. 2, pp. 16, 18.
- f. Read “How to Give Technical Presentations to Non-Technical Audiences: Part 1: Five Ways to Beat Stage Fright,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/may_jun04.pdf. IEEE PCS Newsletter, Vol. 48, No. 2, pp. 14-15.
- g. Read “How to Give Technical Presentations to Non-Technical Audiences: Part 2: Pitfalls in Preparation,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/may_jun04.pdf. IEEE PCS Newsletter, Vol. 48, No. 3, p. 14.

- h. Read “How to Give Technical Presentations to Non-Technical Audiences: Part 3: Magic Questions,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/jul_aug04.pdf. IEEE PCS Newsletter, Vol. 48, No. 4, pp. 5, 11.
- i. Read “How to Give Technical Presentations to Non-Technical Audiences: Part 4: Telling the Story in Their Language,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/sep_oct04.pdf. IEEE PCS Newsletter, Vol. 48, No. 5, p. 9.
- j. Read “How to Give Technical Presentations to Non-Technical Audiences: Part 5: A Fail-Safe Structure for Your Ideas,” by Cheryl and Peter Reimold. http://www.ieeeecs.org/pdfs/nov_dec04.pdf. IEEE PCS Newsletter, Vol. 48, No. 6, pp. 5-7.

Chapter 4 PREPARE A WELL-THOUGHT-OUT CV

Throughout the professional development of a scientist it is important to be able to prepare a well-thought-out resume or curriculum vitae (CV). Here we emphasize that there is no one-size-fits-all CV. Instead, a scientist needs to be proactive to find out which type of CV is suitable for the position for which they are applying, and then take the time to modify the CV to accommodate the job requirements. A sloppy CV is often the first written document that an employer will see from a job applicant, and it is important to take steps to give a good impression. A corollary to this point is the 30-second description of one's work that a scientist needs to have on the tip of his or her tongue in the not-so-rare case that someone asks "What do you do?" For this question, it is important to be able to assess the expertise of the person asking the question and then to provide a concise answer that *that person specifically* will understand. The purpose of this chapter is to provide free available resources in these areas.

4. Prepare a Well-Thought-Out CV

- a. "I believe in punctuality, though it makes me very lonely," *E. V. Lucas*.
- b. Develop a one-sentence description of your work
- c. 30-second description of your work
- d. Develop a simple explanation of what you do (for non-experts)
- e. CV template (see below)
- f. Read ***Landing Your First Job: A Guide for Physics Students***, by John S. Rigden, 2002, Springer, 110 pages, Softcover. ISBN: 0-7354-0080-6.
<http://www.springer.com/sgw/cda/frontpage/0,11855,4-102-22-8894770-0,00.html?changeHeader=true>
- g. Read „The Challenging Field of Engineering Writing and Speech,“ by John R. Pierce, *IEEE Professional Communications Society Newsletter*, vol. 48, No. 6, pp. 27-28.
http://www.ieeeecs.org/pdfs/nov_dec04.pdf
- h. Read "A Woman Physicist's Guide to Speaking," ***Physics Today***, February 2005, p. 54. <http://www.physicstoday.org/vol-58/iss-2/p54.html>
- i. Read "Arrogance – A Dangerous Weapon of the Physics Trade?" by J. Murray Gibson, ***Physics Today***. Vol. 56, p. 54.
<http://www.physicstoday.org/pt/vol-56/iss-2/p54.html>
- j.

CV Template

JOHN J. DOE, Ph.D.
Senior Member of the IEEE

Work address

Physics Department
University of Physics
Physics Road
Physics Town, CA 95101 USA

Phone: (999) 999-9999
FAX: (999) 999-9998
jjdoe@universityphysics.edu
<http://www.universityphysics.edu/jjdoe>

Current research interests

Quantum effects in two-dimensional electron gases.

Additional research interests

- Low temperature physics
- High-temperature superconductivity

Education

PHYSICS UNIVERSITY, Town, CA Aug. 2000 – Sept. 2005
Ph. D. in Physics, June 2005 (GPA = 3.8/4.0; 4.0 = A)
Ph. D Thesis Title: "Quantum effects in two-dimensional electron gases"
Advisor: Prof. Advisor, Physics Department

PHYSICS COLLEGE, Physics Town, CA Sept. 1995 - June 2000
A.B. in Physics, June 2000 (GPA = 3.5/4.0; 4.0 = A)
Honors: *Cum Laude*

Appointments and elected positions

SOCIETY OF PHYSICS STUDENTS (SPS)
Member of SPS Sept. 1996 – June 2000

Work experience summary

PHYSICS UNIVERSITY, Town, CA Aug. 2000 – Sept. 2005
Graduate Research Assistant
Measured quantum effects in two-dimensional electron gases

COMPANY LAB, Company Town, CA June – Aug. 1999
Consultant in the Field of Two-Dimensional Electron Gases
Designed and prepared specimens for precision measurements.

Work experience

PHYSICS UNIVERSITY, Town, CA Aug. 2000 – Sept. 2005
Graduate Research Assistant
Measured quantum effects in two-dimensional electron gases

- Developed measurement techniques
- Measured quantum effects in two-dimensional electron gases

COMPANY LAB, Company Town, CA June – Aug. 1999
Consultant in the Field of Two-Dimensional Electron Gases
Designed and prepared specimens for precision measurements

- Designed specialized specimens with two-dimensional electron gases
- Measured quantum effects in numerous specimens
- Discovered two new quantum effects in these specimens and verified with theory

Short courses

Advanced Programming Language, Company, Company Town, CA Sept., 2005
Operation of Machine Tools, Physics University, Town, C 2001

Skills

- Windows, UNIX Operating Systems
- Languages: French (basic knowledge)

Committees and technical duties

PHYSICS CONFERENCE, Town, CA
Session Chair 2005

PHYSICS JOURNAL, Town, CA
Technical reviewer 2003

Recognition and honors

PEER RECOGNITION
Senior Member of the IEEE Elected January, 2015

EMPLOYMENT RECOGNITION
Two Awards 2015

GRADUATE RECOGNITION
Graduate Student Travel Grants 2000, 2001
Awarding Institution: Physics University, Town, CA

Keynote speaker

April 23, 2005
"Keynote Speech"
Physics University, Town, CA

Invited talks

1. "Title," Physics University, Town, CA July 2, 2001
Department of Physics

Publications in refereed journals

1. A. Advisor and J. J. Doe, "Title," *Journal* 340, 128 (1999).

University Technical Research Reports

1. J. J. Doe, A. Advisor, "Title," *Research Report. R6*, Jan. 20, 2005.

Conference and workshop publications

1. A. Advisor and J. J. Doe, "Title," in Proc. Physics Workshop, 1999.

Conference and workshop presentations

1. "Graduate study in Physics," J. J. Doe. *Presentation to the Physics University Committee*, Town, CA. April 1992. *Panel Member*.

Patents

1. *Issued* "Title," A. Advisor, J. J. Doe. *US Patent No. 6,666,666*. Date of Patent: Sept. 30, 2013.
2. *Filed* "Title," A. Advisor and J. J. Doe. Filed Dec. 1, 2013.

Presentations at University workshops, including:

1. "Title," J. J. Doe, A. Advisor, University Physics Group, Town, CA, April 17, 2012.

Teaching and student supervision

PHYSICS UNIVERSITY, Town, CA

Teaching Assistant, Physics 2

Aug. – Dec. 2004

Taught review and weekly sections for a second-year course, "Physics"

Instructor: Prof. Physics

External presentations to Other Universities

1. "Title," J. J. Doe, A. Advisor, Quarterly Review, Town, CA, April 30, 2013.

Society memberships

Institute of Electrical and Electronics Engineers (IEEE)

American Physical Society

References Available On Request

Chapter 5 DON'T PROCRASTINATE

Here I think the title says it all. A scientist needs to understand that his or her work fits into a larger overall context of scientific work, and that it is important to complete their own work while it is still relevant to scientific progress (that is, before someone else does it).

5. Don't Procrastinate

- a. Do experiments. If it can be done today, do it.
- b. Don't spend more time than necessary writing the thesis
- c. Know how to write a paper. Write papers!
 - i. Read "Indeed!" by Jean-Luc Doumont.
http://www.ieeepcs.org/pdfs/sep_oct01.pdf. IEEE PCS Newsletter, Vol. 45, No. 5, p. 13.

Chapter 6 SET GOALS

It is important to distinguish the activity of the paper-writing, proposal-writing, and thesis-writing as distinct from the goals themselves. That is, writing a paper is not the goal itself. Rather the goal, for example, may be the understanding of some new scientific process or some engineering apparatus. The papers are simply milestones or road markers along the way that are prepared in order to chart the progress. It is important not to confuse these approaches and to set appropriate goals. In this very brief chapter we propose several goal horizons.

6. Set Goals

- a. "Nothing so conclusively proves a man's ability to lead others as what he does from day to day to lead himself," *Thomas J. Watson*.
- b. Today's goals. Write them down.
- c. Tomorrow's goals
- d. This year's goals
- e. 5-year goals
- f. 10-year goals
- g. Retirement goals.....

Chapter 7

IDENTIFY POTENTIAL EMPLOYERS AND RELEVANT JOBS

Another important step in the professional development of a scientist is the ability to identify potential employers and relevant jobs for which they are qualified. For example, in the case of a student working on the PhD, this step is ideally not left until the last year prior to graduation. Another way of putting this point is that the student should find out for himself or herself where he or she might be employed before studying for several years in an area with limited job prospects. The purpose of this chapter is to provide a preliminary list of types of jobs available in industry and government.

7. Identify Potential Employers and Relevant Jobs

- a. Consult the APS Career Center
 - i. <http://careers.aps.org>
- b. See the companies in the list below. **Look at these sites to see job descriptions and required skills to see how well your skills match available job postings. Take action if you do not identify any available jobs for your skill set.**
- c. **Academic Jobs**
 - i. Look at individual job postings on university and college websites
 - ii. Network at conferences
 - iii. Read the pages of each monthly issue of *Physics Today*
- d. **Industry Jobs (selected companies)**

Read "Educating Physicists for Industry: The Rest of the Story," by Kenneth C. Hass. <http://www.physicstoday.org/pt/vol-55/iss-12/p54.html>, *Physics Today*. Vol. 55, p. 54.

- i. Agere. <http://www.agere.com/careers/>
- ii. Applied Materials <http://www.appliedmaterials.com/careers/>
- iii. Google. <http://www.google.com/jobs/>
- iv. Hewlett Packard. <http://h10055.www1.hp.com/jobsathp/>
- v. IBM. <http://www.ibm.com/employment>
- vi. IBM Research. <http://www.research.ibm.com>
- vii. Intel. <http://www.intel.com/jobs/index.htm>
- viii. Lucent. <http://www.lucent.com/work/work.html>

- ix. Microsoft. <http://members.microsoft.com/careers/international.htm>
 - x. PPG <http://corporate.ppg.com/PPG/SciTech/default.htm>
 - xi. Texas Instruments. <http://www.ti.com/recruit/>
 - xii. Yahoo. <http://careers.yahoo.com/>
- e. **Official Job Site of the US Government.**
<http://www.usajobs.opm.gov>
- f. **US Government Labs**
- i. Argonne National Lab <http://www.anl.gov/Careers/index.html>
 - ii. Brookhaven National Lab. <http://www.bnl.gov/HR/jobs/>
 - iii. Jet Propulsion Lab. <http://careerlaunch.jpl.nasa.gov/>
 - iv. Lawrence Berkeley Lab. <http://jobs.lbl.gov/>
 - v. Lawrence Livermore Lab. http://jobs.llnl.gov/prod_index.html
 - vi. NASA. <http://www.nasajobs.nasa.gov/>
 - vii. NIST. http://www.nist.gov/public_affairs/employment.htm
- g. Be sure to know where you could be employed

Chapter 8

DO YOUR OWN THINKING

This chapter is the one where we let you in on the secret that despite all the advice and professional resources and available consulting expertise, no one is able to tell you how to make the most of your education and technical expertise. The best that we can do is to describe the trends that have existed in the past and to try to project existing job needs in the future. We can also provide anecdotes of specific scientists who have had different types of careers, but remember that each of these people developed under different circumstances and has a different educational and personal background from all the others. It is therefore difficult to make generalizations about what you need to do to succeed. After all, moreover, your definition of success may be different from someone else's definition. It is therefore your job to figure out where your particular skills and interests will best fit. One stark way to state this point is to say that for the rest of your life you will have to either do your own thinking, or let other people do the thinking for you.

8. Do Your Own Thinking

- a. "All the problems of the world could be settled easily if men were only willing to think. The trouble is that men very often resort to all sorts of devices in order not to think, because thinking is such hard work." *Thomas J. Watson*
- b. "I always have a quotation ready. It saves original thinking."
Dorothy Sayers
- c. Have you participated in writing a grant proposal?
- d. Have you ordered equipment or software?
- e. Have you designed an experiment?
- f. Read ***Practical Experiment Designs for Scientists and Engineers***, by William J. Diamond, Third Edition. Wiley Press. 2001.
- g. Have you learned statistics?
- h. Read ***Applied Multivariate Statistical Analysis***, by Johnson and Wichern. Fifth Edition. Prentice-Hall. 2002.
- i. If your project involves multi-variate data, read ***Graphical Analysis of Multiresponse Data***, by Basford and Tukey, Chapman & Hall/CRC. 1999.
- j. How do you make decisions?
- k. What is the next step in your project?

Chapter 9 LEARN SOFT SKILLS

Another important step in the professional development of a scientist is the ability to learn a variety of non-technical skills. In some cases in the existing literature, these skills are referred to as *Soft Skills*. Some of this information has been codified in books, and these books are listed below.

9. Learn Soft Skills

- a. Read "Some Boosts for Your Career," by Joseph A. Robinson.
http://www.ieeeecs.org/pdfs/may_jun00.pdf. IEEE PCS Newsletter, Vol. 44, No. 3, May/June 2000, p. 18.
- b. Read "Tools and Obstacles," by Cheryl and Peter Reimold,
http://www.ieeeecs.org/pdfs/sep_oct01.pdf. IEEE PCS Newsletter, Vol. 45, No. 5, pp. 18-19.
- c. Read ***Stuff You Don't Learn in Engineering School: Skills for Success in the Real World***, by Carl Selinger (November 2004).
<http://www.carlselinger.com>.
<http://www.wiley.com/WileyCDA/WileyTitle/productCd-0471655767.html>
- d. Read ***A PhD is Not Enough: A Guide to Survival in Science***, by Peter J. Feibelman (Paperback, January 1994).
<http://www.amazon.com/gp/product/0201626632/102-5516575-9738503?v=glance&n=283155>

Chapter 10 JOIN PROFESSIONAL ORGANIZATIONS

Professional organizations provide an environment in which scientists can interact with other scientists in similar technical fields or with a similar technical background who have been working in the field much longer than they. Specifically, recent PhD graduates have typically had the opportunity to interact with other new PhD graduates and with their advisor. The opportunity to join professional organizations provides exposure to many other experienced scientists who may have worked in a field for decades. The purpose of this chapter is to provide a list of organizations and to encourage the scientists to join the relevant organizations and to consider volunteering their expertise and time.

10. Join Professional Organizations

- a. APS
 - i. American Physical Society
 - ii. <http://www.aps.org>
 - iii. **Physics Today** (free monthly magazine for APS members)
 - iv. **APS News** (free monthly circular)
- b. AAAS
 - i. American Association for the Advancement of Science
 - ii. “the world’s largest scientific society”
 - iii. <http://www.aaas.org>
- c. AAPT
 - i. American Association of Physics Teachers
 - ii. <http://www.aapt.org>
- d. AAS
 - i. American Astronomical Society
 - ii. <http://www.aas.org>
- e. MRS
 - i. Materials Research Society
 - ii. <http://www.mrs.org>
 - iii. **MRS Bulletin** (free monthly magazine for MRS members)
- f. OSA
 - i. Optical Society of America
 - ii. <http://www.osa.org>
 - iii. **Optics and Photonics News** (free monthly for OSA members)

- g. Engineering Societies: IEEE & IEEE societies
 - i. Institute of Electrical and Electronics Engineers
 - ii. <http://www.ieee.org>
 - iii. **IEEE Spectrum** (free monthly magazine for IEEE members)
 - iv. IEEE Solid-State Circuits Society (**SSCS**)
 - 1. <http://www.sscs.org>
 - 2. **IEEE SSCS Newsletter** (free for SSCS members)
 - v. IEEE Lasers and Electro-optics Society (**LEOS**)
 - 1. <http://www.i-leos.org>
 - 2. **IEEE LEOS Newsletter** (free for LEOS members)
 - vi. IEEE Women in Engineering (**WIE**)

Chapter 11
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- a. Read “An Open Letter to the Next Generation,” by James D. Patterson, *Physics Today*, July 2004, p. 56.
<http://www.physicstoday.org/vol-57/iss-7/p56.html>.