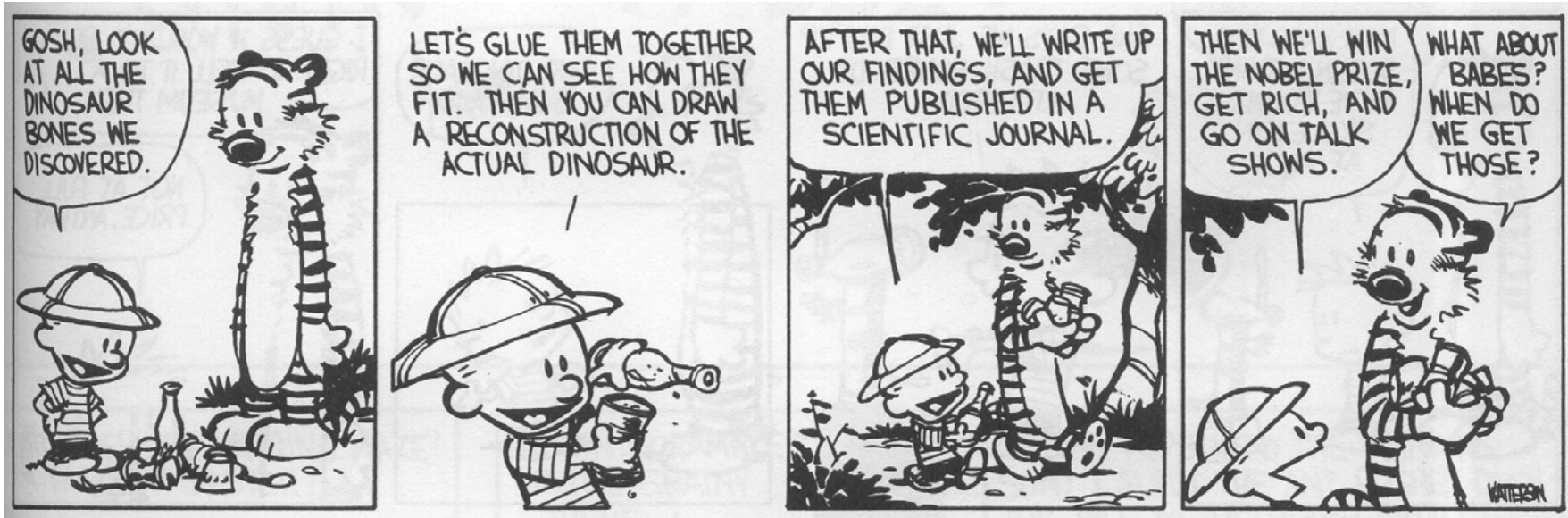


# **Exploring a Nuclear Physics Career Outside of Academia**

**G. Garino**

**June 17, 2008**

# ... When Things Don't Go as Planned





# Step 1: Get Out of the Cave

- ❑ Are you focused on small world of research
- ❑ Many opportunities for PhDs outside of academia
- ❑ Need a broad knowledge
  - ❖ not just knowledge of some small esoteric field
  - ❖ develop this NOW



*Non scholae, sed vitae discimus.*  
We learn not for school but for life.  
– Seneca

# Do You Know This Man?



# The Story so Far...



**PhD, Nuclear Physics, electron scattering, 1990**



U of Illinois

**Postdoc, photon scattering, 1990–1994**

東京大学

**NSF-JSPS Fellow, photon scattering, 1994–1996**



**Visiting Asst. Prof, 1997–1999**



GWU

**Visiting Asst. Prof, 1999–2000**



**Senior Scientist, 2000–2006**



**Science Advisor, DOE / NNSA Office of  
Emergency Response, 2006–present**

# What I Learned by Getting a PhD

- Discipline
- Self motivation
- Openness to new ideas
- How to write
  - ❖ Good technical writing
  - ❖ Know your audience
- How to give a talk\*
  
- ... and some physics



Dearborn Observatory  
Northwestern University

\* Some attendees tonight may disagree

# Sword Master vs. Tea Master



All roads lead to Rome.



Via Appia



# Writing

## □ Writing skills will be useful in any career

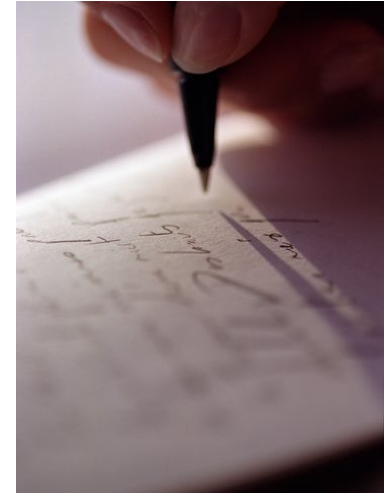
### ❖ Proposal writing

➤ not just for science → non-profits?

### ❖ Writing articles

➤ not just for Phys. Rev. Letters! → Journalism?

## □ Thesis writing is excellent practice



Television has raised writing to a new low  
– Samuel Goldwyn

I can't believe it! Reading and writing actually paid off!  
– Matt Groening

Typos are very important to all written form. They give the reader something to look for so they aren't distracted by the total lack of content in your writing.  
– Randy K. Milholland

# Service

- Military
- Government
- Teaching
  - ❖ College
  - ❖ High school
- Non-profits

## Thomas Jefferson High School for Science and Technology

Arlington, VA

81% of teachers have a master's or PhD

#1 Rated High School in US.

– US News and World Report 2008

Make service your first priority, not success and success will follow.

– Author Unknown



# Teaching

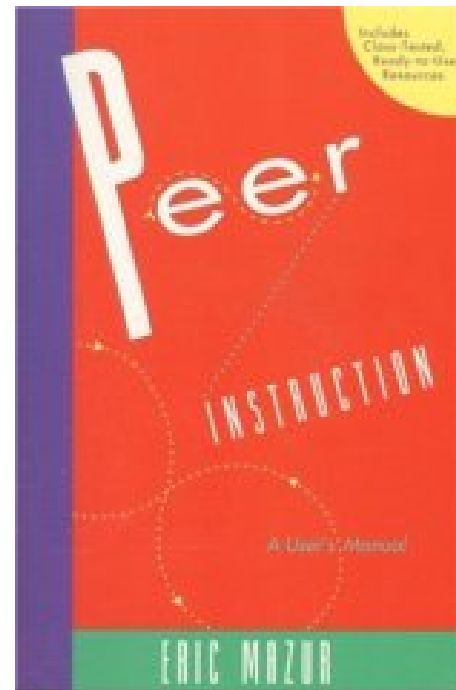
❑ The U.S. needs good teachers

*Docendo discimus.*  
We learn by teaching.  
– Seneca

❑ Get experience now

- ❖ As a grad student
- ❖ As a post doc

❑ Innovate



# Teaching at a Small College

- Very competitive
- Its very hard work (especially initially)
- Many “teaching” schools require research for tenure



Northern Virginia Community College



Swarthmore College

# What Teaching has Taught Me

- ❑ How to manage people
  - ❖ How to make rules and stick to them
  - ❖ How to treat people fairly (treat every one the same)
- ❑ How to explain ideas to non-scientists
  - ❖ Explain to policy makers
- ❑ Project management
  - ❖ Planning
  - ❖ Setting deadlines and keeping them
  - ❖ Producing deliverables
- ❑ ... and a lot of physics!



# Outside the Box Ideas

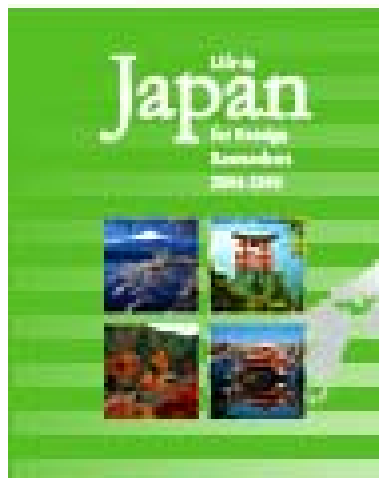
- Foreign fellowships (NSF, JSPS, etc.)
- Internships (Washington DC, etc.)
- Insert yours here*



JSPS

Japan Society for the Promotion of Science

Postdoctoral Fellowships for  
Foreign Researchers



FastLane

[Home](#) [News](#) [Comments](#) [nsf.gov](#)

## NSF Postdoctoral Research Fellowships and Other Programs

Select the Fellowship Program to which you want to apply by Clicking on the **GO** button preceding the name of the Fellowship program.

- CEDAR, GEM and SHINE Postdoctoral Research
- East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI)
- International Research Fellowship Program
- Mathematical Sciences Postdoctoral Research Fellowships (MSPRF)
- Minority Postdoctoral Research Fellowships and Supporting Activities
- NSF Astronomy and Astrophysics Postdoctoral Fellowships (AAPF)
- NSF Earth Sciences Postdoctoral Fellowships (EAR-PF)
- Postdoctoral Fellowships in Polar Regions Research
- Postdoctoral Research Fellowships in Biology
- Science and Society (S&S)

National Science Foundation  
4201 Wilson Boulevard  
Arlington, Virginia 22230, USA

Tel: 703-292-5111  
FIRS: 800-877-8339  
TDD: 703-292-5090

# Where to Look

For Federal jobs:



For teaching (and other academic) jobs:

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THE CHRONICLE OF HIGHER EDUCATION

---

For academic and industry (including government contractor) jobs:

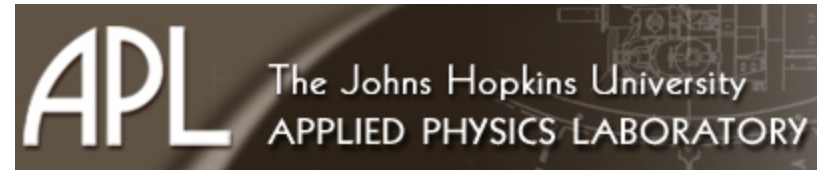


For industry (including government contractor) jobs in the DC area:



# Research Facilities

- FFRDCs
  - ❖ DOE National Labs
- UARCs
- Military research facilities
- Others...





# Work with a Different Crowd

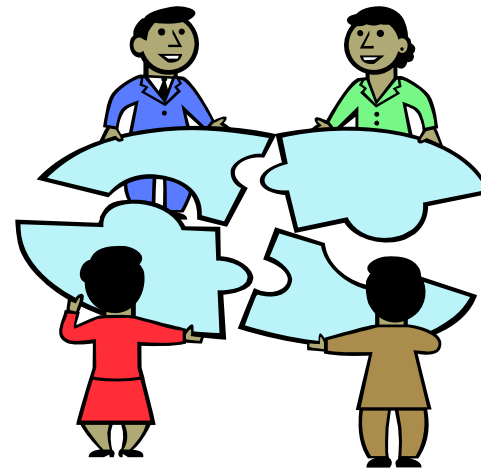
## □ People with many different

- ❖ backgrounds
- ❖ educations
- ❖ ideas



# People Skills

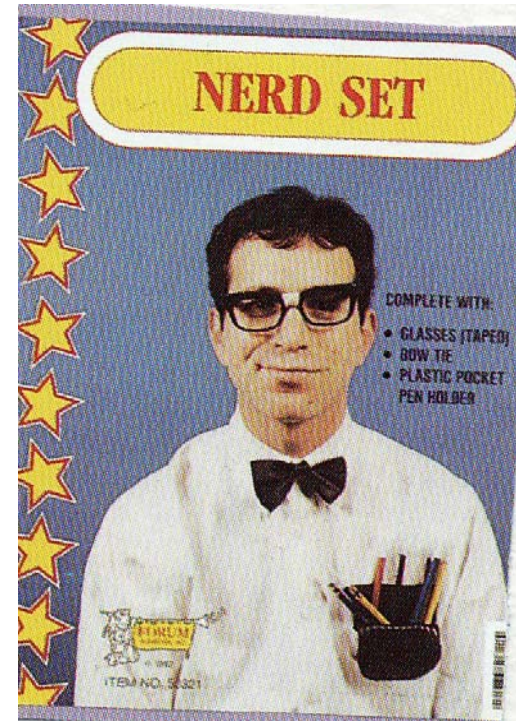
- ❑ The result is important not necessarily the process
  - ❖ Other people's ideas may be better
  - ❖ Don't need\* to micromanage
- ❑ Be open to learning new things
- ❑ Don't pretend to know more than you do
- ❑ Give credit where credit is due
- ❑ Maintain humility
- ❑ Your non-scientist boss may have good boss qualities
  - ❖ Management skills
  - ❖ Strategic thinking



\* sometimes you do

# Perception of PhDs

- ❑ “Eggheads”
- ❑ Can’t do anything except science
  - ❖ Can’t manage people
  - ❖ Can’t do operations
- ❑ No link to reality → “Ivory Tower”
  
- ❑ How to overcome this...?



... Become well a rounded person\*

\* and get a high power laser pointer

# Science vs. Operations / Policy / Applications

science

policy

Ultimate arbiter



Mother Nature



Consensus or decision maker

Making decisions

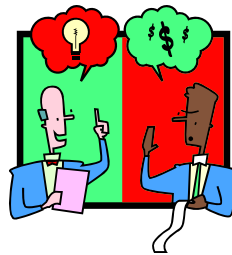


Gray → uncertainties



Need a yes or no

Final answers



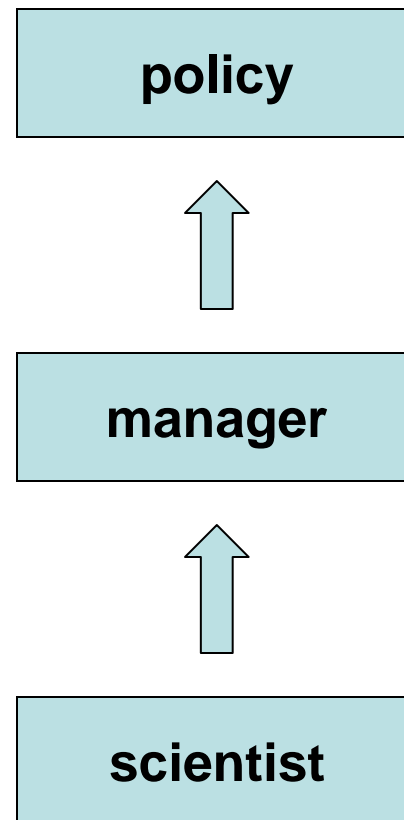
Proposal for more data



Need decision now

# Advancement

- ❑ There are no “senior scientists” in government
- ❑ ... and the few that there are come out of academia



# Back to School

- ❑ Consider certifications
  - ❖ Certified Health Physicist
  - ❖ Project Management Certification
- ❑ Certifications lend credibility
- ❑ Your employer may help pay



**Health Physics Society**

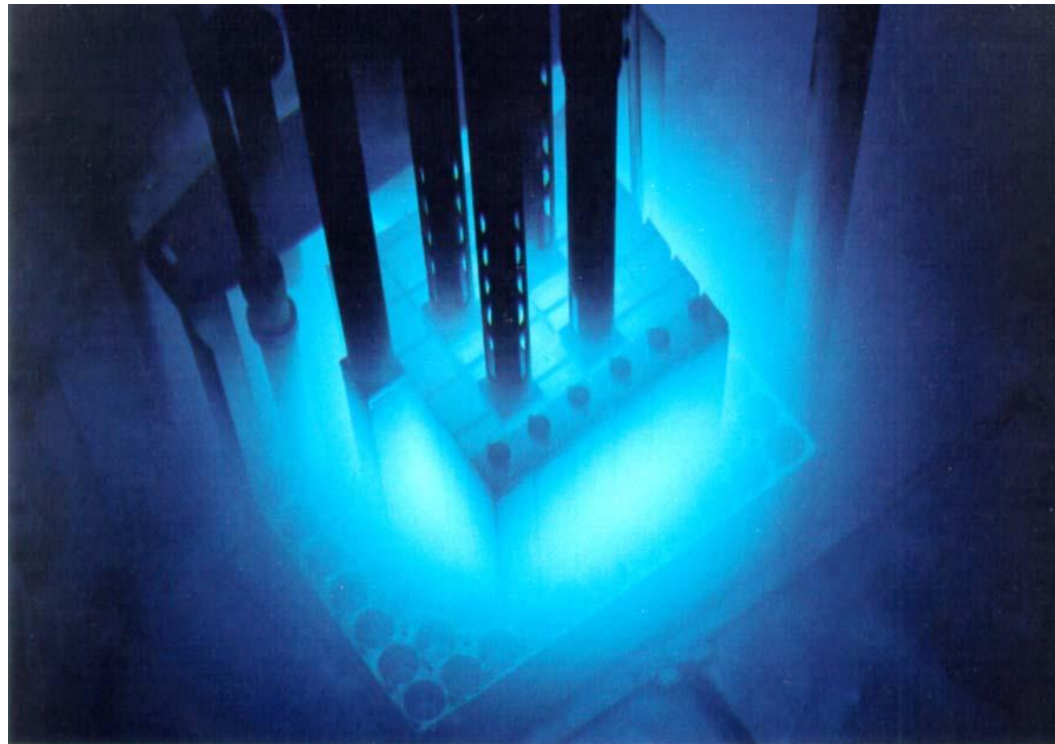
Specialists in Radiation Safety • Founded 1956 • <http://hps.org/>



We now accept the fact that learning is a lifelong process of keeping abreast of change.  
– Peter Drucker

# What is Applied Physics?

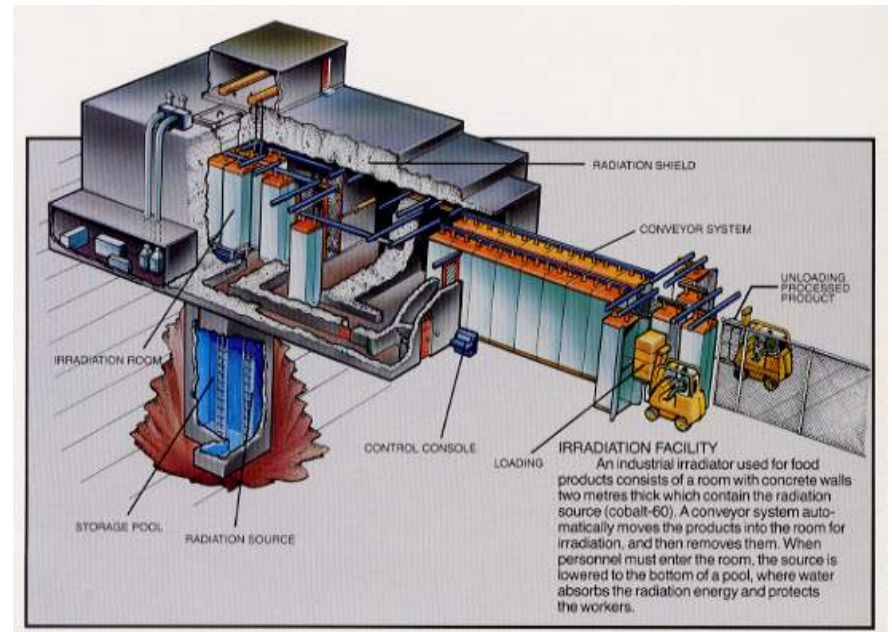
- ❑ It depends on what the application is!
- ❑ Operations
  - ❖ Using science to get things done
- ❑ Engineering
  - ❖ Making things smaller, better, lighter, cheaper ...



# What is “High Energy?”



Tevatron ~ TeV



$^{60}\text{Co}$  irradiator facility ~ MeV



# What Does “Portable” Mean

**Lab Scientist**



**Field Deployer**



**Not Portable**



**Portable**



# My Day Job

## Manage two technical programs (applied and R&D)

- ❖ Call for proposals → Proposal review
- ❖ Project oversight

## Manage an operational team

- ❖ Manage the budget
- ❖ Define training and goals
- ❖ Ensure proper equipment

## Help write policy

## Point of contact for a foreign technical exchange

## Deploy in emergencies

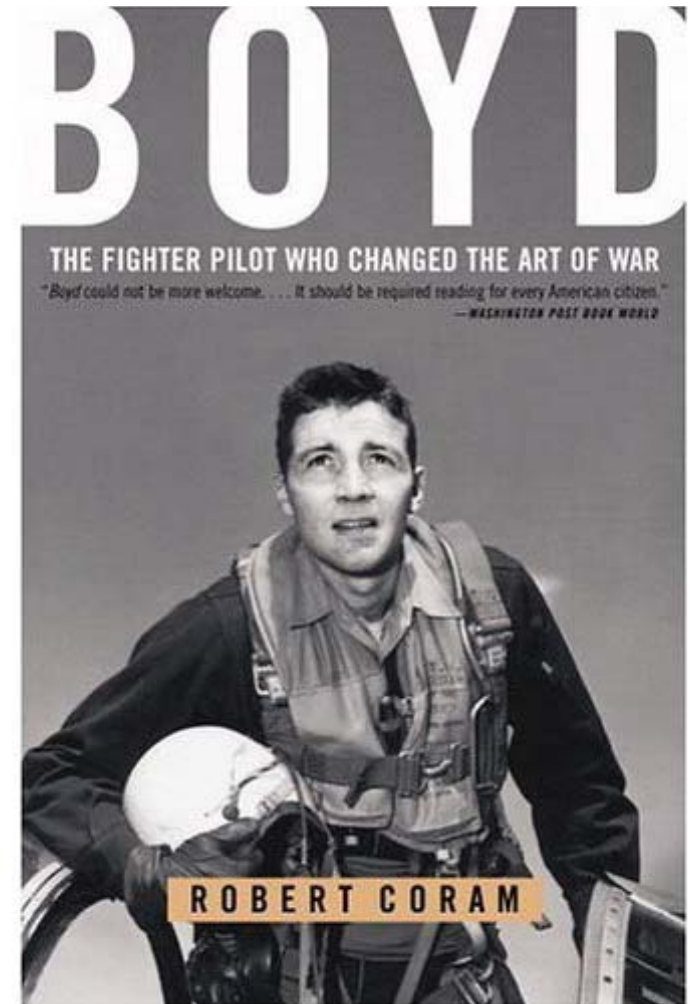
- ❖ Training
- ❖ Stand a watch bill

## Try to keep up on happenings in science and current events



# Lessons from Boyd

- ❑ **People** → Ideas → Hardware
- ❑ Decide whether to **be somebody** or to **do something**



# Lessons from a Thesis Advisor

**Remember, you are doing the experiment on yourself.**



Don Geesaman, Argonne National Lab

# Parting Thoughts

- ❑ Be flexible (things change)
- ❑ Keep current on science
  - ❖ Not just physics



**Computer (1980s)**



**Manhattan Skyline (pre 2001)**

**Questions?**

