from academia import research_staff

A Talk Sponsored by Yale Physics Professional Development Organization (YPPDO)
Sabrina Lyn Hiner Dimassimo

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Outline

• BLUF: I think of Institute for Defense Analysis (IDA) as having all the good parts of academia with all the bad parts removed.

• My IDA/think tank journey
• My field and role
• My skills then and now
• Tips for preparing to enter the field
Who am I?

Sabrina

Legend:
- Career Track
- Life Track

Undergrad
University of Wyoming

Grad
Universidad de Concepcion

Postdoc
Yale University

Interviews

Data Science Companies
Caltech

Other Defense Orgs

IDA
INSTITUTE FOR DEFENSE ANALYSES
Why (I decided to) transition from academia to IDA

We do ourselves a **disservice** by implying that Academia is the default path for PhDs in STEM. It’s not and the data proves it. (Insert stats/article.)

**Astronomy is not the only cool STEM career**
- I prefer a faster pace

**Academia is not the only cool job sector**
- I was looking for something with greater impact

**Work-life balance**
- **Myth**: If you love what you do you’ll spend all of your time doing it
- **Reality**: Being always “plugged in” is not sustainable
- Long term investments are pushed off until “later” (i.e., family, homeownership, retirement savings)
Field/Industry: (Oversight of) Operational test and evaluation of military systems, machines, equipment, and instrumentation

Other terms for “Operational Test and Evaluation” include:
- Engineering Statistics
- Systems Evaluation
- Operations Analysis
- Operations Research
- Systems Analysis

Oversight is important and socially responsible.
Effective analysts have a myriad of skills

- Computer Science
- Math & Statistics
- Subject Matter Expertise

Communication

Guidance

The Business of Systems Engineering (Acquisitions)
The concepts and skills I learned during my PhD/postdoc experience extend to my current work

**Physics**
- Control Systems
- Dynamics (Aero, Fluid, Thermal)
- Detectors
- Radar
- Optics
- Signal Processing
- Electromagnetism

**Computer Science**
- Coding best practices
- Modeling and Simulations
- High Performance Computing Architecture
- Visualization (Tell the story)
- Machine Learning

**Statistics**
- Descriptive statistics
- Inferential statistics
- Uncertainty quantification
Skills that I had to pick up and skills that I am developing

Communication (Tell the Story)
- Editorial and Peer-Review Process
- Writing
- Visualization

Technical Program and Military Knowledge
- Coworkers are Subject Matter Experts
- Radar Course
- DOD and IDA 101 Seminars

Statistics and Techniques
- Work closely with Statisticians
- Design of Experiments
- Reliability
- Modeling and Simulation
- Machine Learning
Skills that I had to pick up and skills that I am developing
Folks from a variety of STEM backgrounds and job sectors excel at IDA.

<table>
<thead>
<tr>
<th>Division</th>
<th>Description</th>
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<tbody>
<tr>
<td>STD</td>
<td>Science and Technology Division</td>
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<tr>
<td>SED</td>
<td>System Evaluation Division</td>
</tr>
<tr>
<td>OED</td>
<td>Operational Evaluation Division</td>
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<tr>
<td>ITSD</td>
<td>Information Technology &amp; Systems Division</td>
</tr>
<tr>
<td>CARD</td>
<td>Cost Analysis &amp; Research Division</td>
</tr>
<tr>
<td>SFRD</td>
<td>Strategic Forces Research Division</td>
</tr>
<tr>
<td>JAWD</td>
<td>Joint Advanced Warfighting Division</td>
</tr>
<tr>
<td>IAD</td>
<td>Intelligence Analyses Division</td>
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</tbody>
</table>

Legend:
- Economics, Social & Political Sciences
- Business Administration /Management
- Humanities
- Engineering
- Chemistry
- Physics
- Math, Statistics & Operations Research
- Computer Science
- Biology
- Behavioral Sciences
- Strategic Intelligence

Technology (Infancy)  Program (Product)  Force (Trade studies and how many?)  Operations (UX)
IDA supports a collegial and active learning environment (and other perks)

Peer-reviewed research
Stability
Excellent benefits
Interesting travel
Flat organizational structure

Training opportunities:
• On-campus IDA Training
• Off-IDA Professional Development (Courses)
• Workshops
• Self-study through online courses (e.g., Coursera)
The typical IDA interview is like interviewing for a professorship

<table>
<thead>
<tr>
<th>Time</th>
<th>Meet</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00a - 9:30</td>
<td>Human Resources</td>
<td>Benefits</td>
</tr>
<tr>
<td>9:30 - 10:10</td>
<td>Dr. Steven Rabinowitz</td>
<td>Your host, our resident recruiter</td>
</tr>
<tr>
<td>10:10 - 11:00</td>
<td>Interview 1 with potential teammate or task leader</td>
<td>Meet and greet</td>
</tr>
<tr>
<td>11:00 - 12:00p</td>
<td>Presentation</td>
<td>Usually on dissertation or postdoctoral research, Hint: show off your analytical and communicative skills, we are curious people so be prepared to be interrupted with questions</td>
</tr>
<tr>
<td>12:00 - 1:30</td>
<td>Lunch</td>
<td>Relax, have lunch with several potential coworkers, ask questions about IDA and life in DC</td>
</tr>
<tr>
<td>1:30 - 3:00</td>
<td>Technical Panel Discussion</td>
<td>Our chance dig deeper into you technical abilities, your chance to learn more about life at IDA and living in DC</td>
</tr>
<tr>
<td>3:00 - 4:00</td>
<td>Interview 2 with potential teammate or task leader</td>
<td>Meet and greet</td>
</tr>
<tr>
<td>4:00 - 4:45</td>
<td>Mr. Robert R. Soule, Division Director</td>
<td>What does IDA/OED do? Why IDA? Any questions you have.</td>
</tr>
<tr>
<td>4:45</td>
<td>Dr. Steven Rabinowitz</td>
<td>Final comments, say thanks</td>
</tr>
</tbody>
</table>
Prepare: For IDA, an analytical mind is your single most important asset, and you must effectively demonstrate this in your interview

Plan:
Know your Audience – Technical non-experts (mostly PhDs)
Prepare and Practice your Talk – Peer-Review!!!
Show off Your Quantitative and Analytical Skills with Data, Graphs, Statistics
Organization should include
  ▪ Statement of problem and hypothesis
  ▪ How did you scope the problem?
  ▪ Problem solving approach
  ▪ Analysis
  ▪ Conclusions

During your Talk:
Be Mindful of Time – Plan for 30-45 minutes of Talking for the 1-hour slot
Be Prepared to be Interrupted by Questions
Be Gracious
If you are interested in the position, Show it!
My bookshelf includes texts on pedagogy, statistics, operations analysis, programming, computer modeling and simulation, data visualization, and various Navy systems.
Special Event Application

https://chk.tbe.taleo.net/chk01/ats/careers/v2/viewRequisition?org=INSTITUTEDA&ws=39&rid=1006
Backup
IDA SAC Divisions
Spectrum of Analytical Activity

**Technology**
Can we use a new phenomenon or principle to design a useful Widget?
What breakthroughs are necessary to make better Widgets?

**Program**
Does the new Widget work as promised?
Is this Widget worth the price?
Is this Widget interoperable with existing systems and platforms?

**Force**
How many Widgets do we need to do the job?
Are there other Widgets that would be better suited?
Would it be better to use a combination of different types of Widgets?

**Operations**
How are troops using the Widget in the field today?
Are there better ways to use the Widget?
How can the Widget be modified, upgraded, or improved?
Systems and Analyses Center: Divisions

- **Technology**
  - Science & Technology (STD)

- **Program**
  - Operational Evaluation (OED)
  - System Evaluation (SED)

- **Force**
  - Strategy, Forces, & Resources (SFRD)
  - Cost Analysis & Research (CARD)

- **Operations**
  - Joint Advanced Warfighting (JAWD)
  - Intelligence Analyses (IAD)
  - Information Technology & Systems (ITSD)
Science Divisions
Objective advice on science and technology issues related to national security
Insight into technology trends and the impact of emerging advances on national security missions
Rigorous technology readiness assessments and independent perspectives on technology risks and mitigation strategies

SAMPLE ISSUES

Threat Detection Systems
Intelligent Tutoring Systems
Injuries Potentially Caused by Non-Lethal Weapons
Food Security in India, China, and the World
Computation and Modeling Applied to Ceramic Materials
Evaluating Systems and Acquisition Management
Evaluating Science and Technology Issues and Operational Effects
Providing Technical and Analytic Support for Testing
Supporting Contingencies, Commands, and Operational/Force Planning

SAMPLE ISSUES

B-52 bomber force size
Launch architecture for defense and intelligence space payloads
Navy investment in mine countermeasure systems
European-based missile defense sensors and interceptors

Degrees by Discipline

Physics & Chemistry 36%
Engineering - Aero/Astro, Electrical, Chemical, Materials, Mechanical 41%
Computer Science & Information Systems 9%
Math, Statistics & Operations Research 12%
Strategic Intelligence 2%
Securing the cyber supply chain/cybersecurity

Cybersecurity for the Defense Industrial Base (DIB) and government

Information sharing and content understanding

Cyber operations, including business IT

Cyber science and technology

SAMPLE ISSUES

Software Vulnerability Detection, Test, and Evaluation

Mining Measured Information from Text

Smart Card Authenticated Sessions Using Proxies

Enterprise Level Security

In-Use and Emerging Disruptive Technology Trends
Operational Evaluation Division
BEST & WORST NEW TANKS

IMPROVED ARMOR: NEW TECHNOLOGY THAT SAVES LIVES

Research
Design
Plan
Observe
Analyze
Report

Degrees by Discipline

- Physics 30%
- Engineering 30%
- Math, Statistics & Operations Research 14%
- Chemistry 9%
- Computer Science 3%
- Economics, Social & Political Sciences 7%
- Business Administration/Management 2%
- Humanities 1%
- Material Science 3%
- Biology 1%
Strategic Divisions
Chemical-Biological-Radiological-Nuclear Defense

Human Capital Management
  Military Force Structure, Benefits and Retention Analysis

Defense Resource Management
  Strategic Materials, Defense Industrial Base

International Affairs
  Arms Markets, Security Partnerships

SAMPLE ISSUES

Security Dialogues with China

Foreign Language, Regional, and Cultural Proficiency

Korea's Chances in the 21st Century

Global Defense Posture
Linking new concepts and new technologies to a military context
Moving from concept to reality in the military environment
Exploring military options through structured analysis

SAMPLE ISSUES
A Decade of Afghans Improving Their Lives
Policing in Afghanistan
The Battle for Fallujah
Tactical Electric Power Management
Power Budget Burdens of the Warfighter and Squad
Counterterrorism
Measurement and signals intelligence
Surprise technology
Cyberspace operations

SAMPLE ISSUES
Security Risk Management Response to Emerging Threats
Violent Extremism and the Electoral Cycle in Africa
Technical Report for the Price and Purity of Illicit Drugs
Global Coverage in the U.S. Intelligence Community
Evaluate cost for pending acquisition programs
Examine resource allocation policies
Improve resource allocations processes
Support Anti-Terrorism by Fostering Effective Technology (SAFETY) Act

SAMPLE ISSUES
Military Healthcare Benefit Design and Delivery
Active-Reserve Force Planning
Cost Growth of Major Defense Acquisition Programs
Multi-year Procurement Strategies
Scratch
Advertisement Blurb

Join the YPPDO for a presentation by Sabrina Cales (Institute for Defense Analyses, University of Wyoming PhD, Yale Postdoc) focusing on her transition from astrophysics into the world of data-driven evaluation of military systems. Sabrina is a research staff member at the Systems Analysis Center at Institute for Defense Analysis (IDA) a Federally Funded Research and Development Center (FFRDC), where she designs test concepts, uses statistical techniques to analyze their results, and provides input to reports that inform the Office of the Secretary of Defense and Congress of the effectiveness and suitability of various U.S. military programs. By ensuring that these systems actually work, this oversight role helps save taxpayer's dollars and more importantly the lives of our sailors, marines, airmen, and soldiers. The presentation will cover Sabrina's think-tank journey; the differences between academia and think-tank analyst; the IDA interview process; analysis topics she has recently leveraged; and resources to help you gain a better understanding of the world of systems evaluation.
Questions to Keep in Mind (YPPDO Suggestions)

https://yppdo.yale.edu/information-speakers

• How did you decide to transition from academia to your current field?
• What is your field/industry and your job function?
• How do the skills you learned in your PhD/postdoc extend to your current work?
• How did your PhD help prepare you for this role?
• How did your PhD not help prepare you for this role?
• Do you have advice on how those interested in your field can prepare?
• Is it possible for people with various scientific backgrounds to transition to your industry?