from academia import research_staff

A Talk Sponsored by Yale Physics Professional Development Organization (YPPDO)

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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

Undergrad

UCR College of Natural & Agricultural Sciences

Grad

University of Wyoming

Postdoc

Universidad de Concepcion

Yale University

Offers

ipac

Caltech

Amherst College

Interviews

IDA Institute for Defense Analyses

Data Science Companies

Other Defense Orgs

Legend:

Career Track

Life Track

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

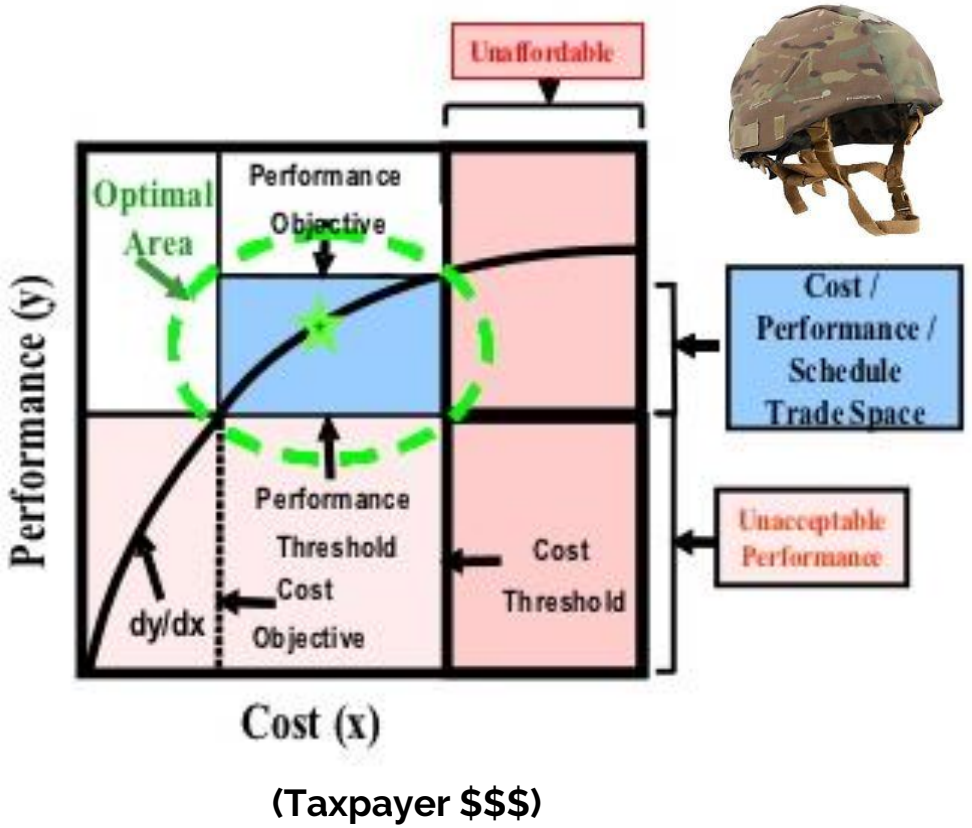
Work-life balance

- **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

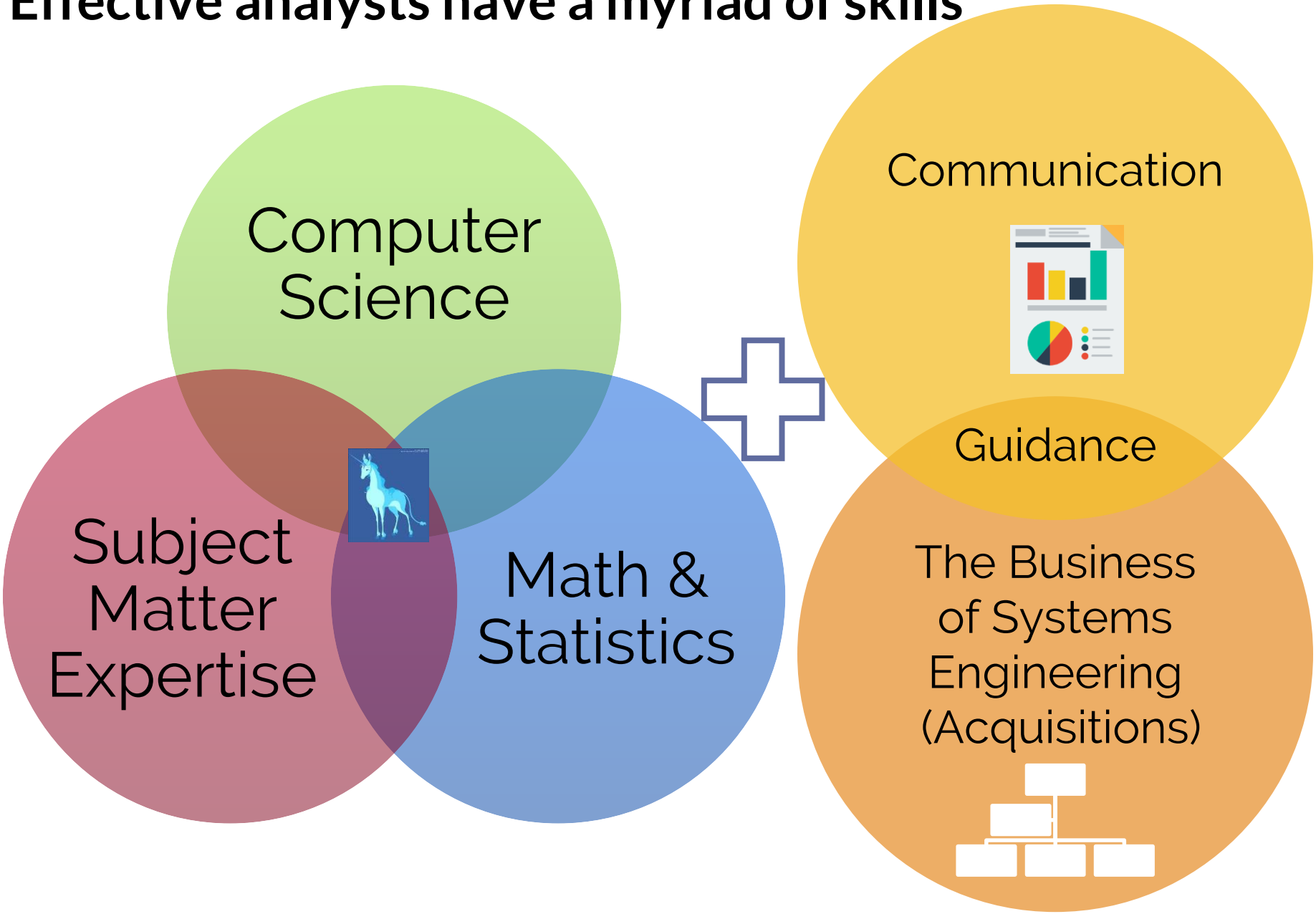
Other terms for "Operational Test and Evaluation" include:

- Engineering Statistics
- Systems Evaluation
- Operations Analysis
- Operations Research
- Systems Analysis

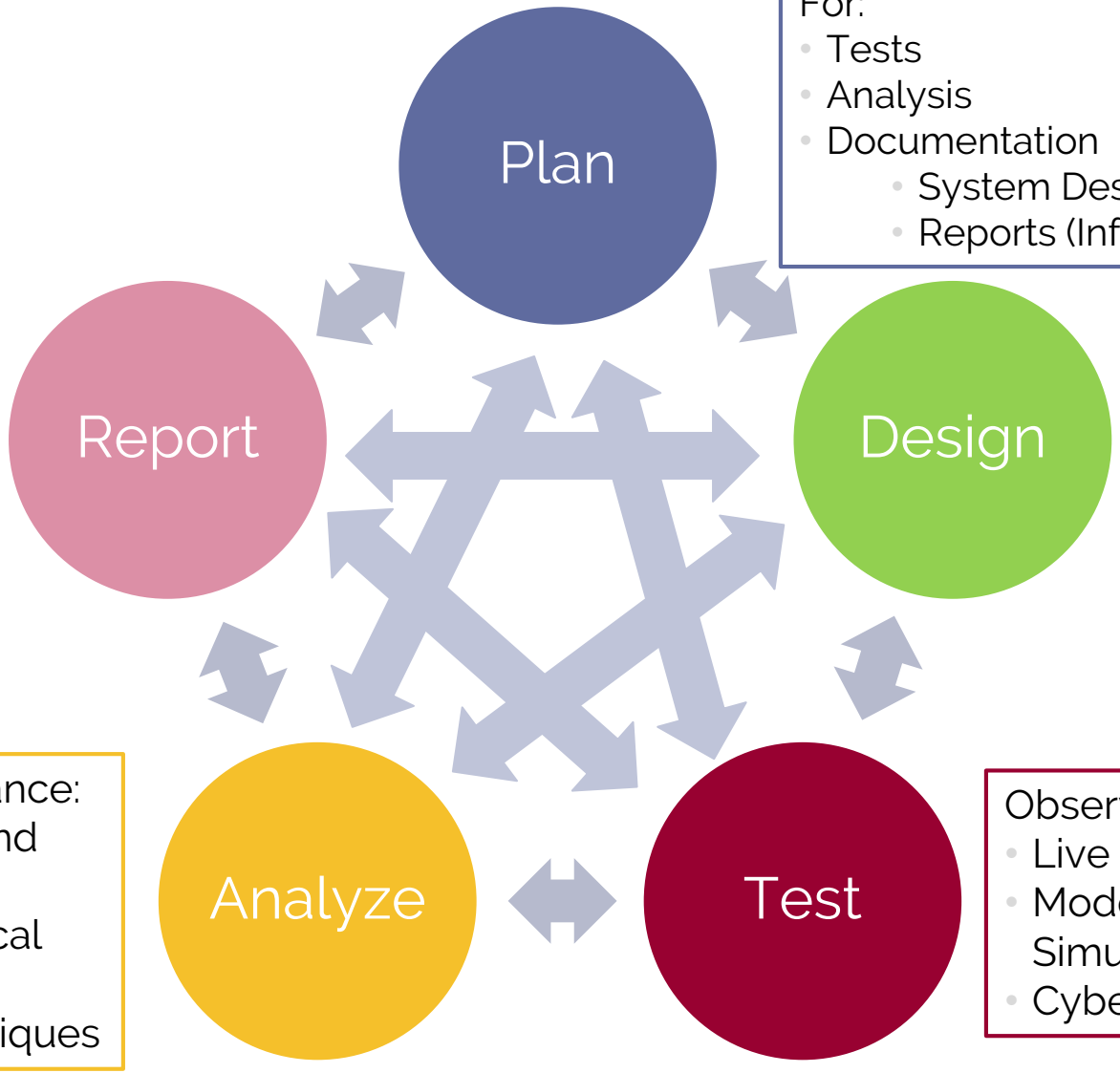


Oversight is important and socially responsible.

Effective analysts have a myriad of skills



My role as a research staff member (analyst)



For:
- Tests
- Analysis
- Documentation
  - System Description (Info in)
  - Reports (Info out)

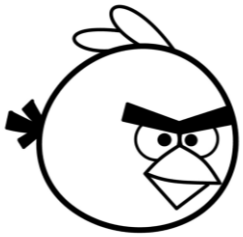
Choose:
- Optimal Experimental Test Design (DOE)

Observe:
- Live Test
- Modeling and Simulation
- Cybersecurity

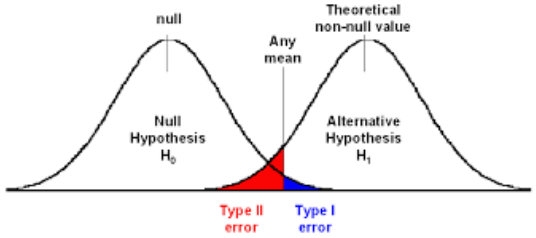
System Performance:
- Effectiveness and Suitability
- Modern Statistical and Machine Learning Techniques

On:
- Test observations
- Issues observed in the Process
- System Performance

The concepts and skills I learned during my PhD/postdoc experience extend to my current work



```
/**
* Code Readability
*/
if (readable()) {
    be_happy();
} else {
    refactor();
}
```



Physics

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

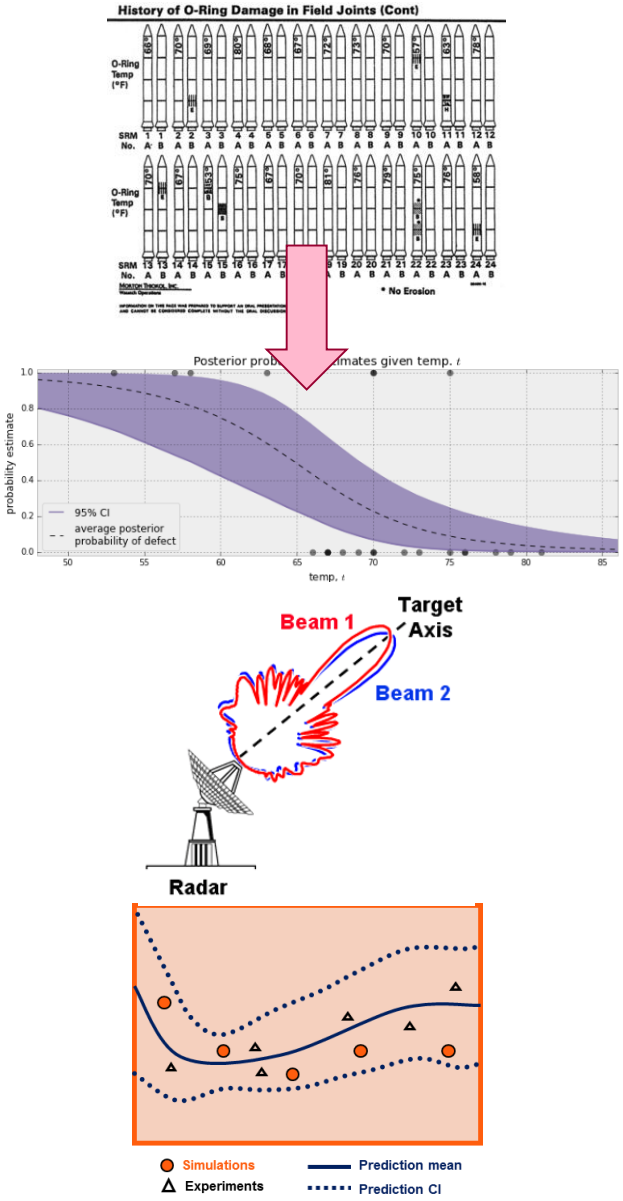
Computer Science

- 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

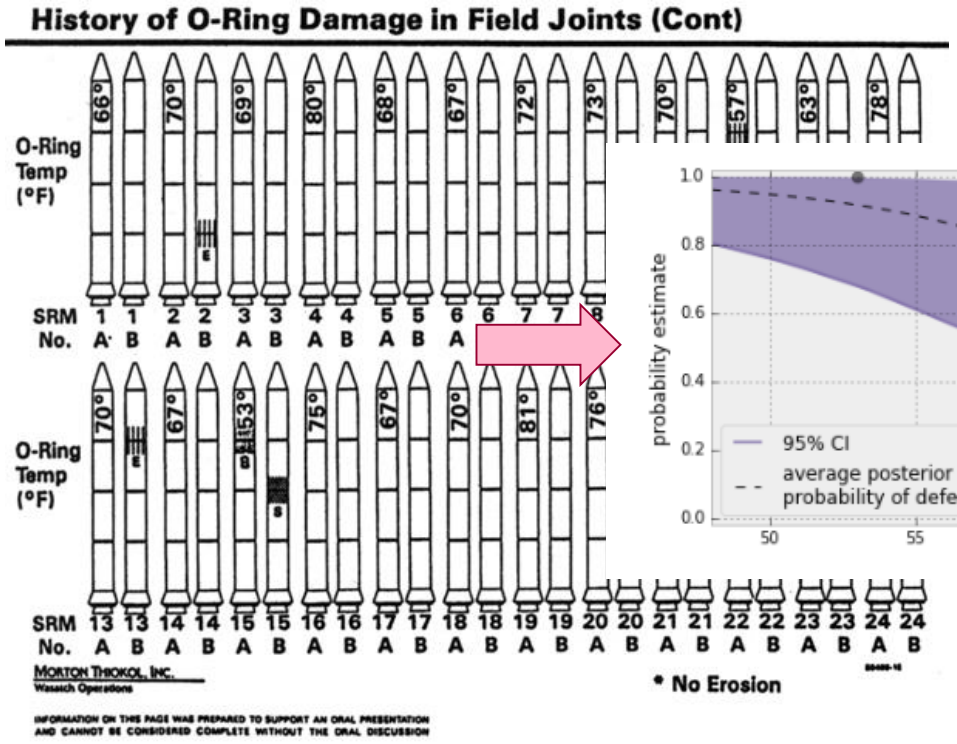
Technical Program and Military Knowledge

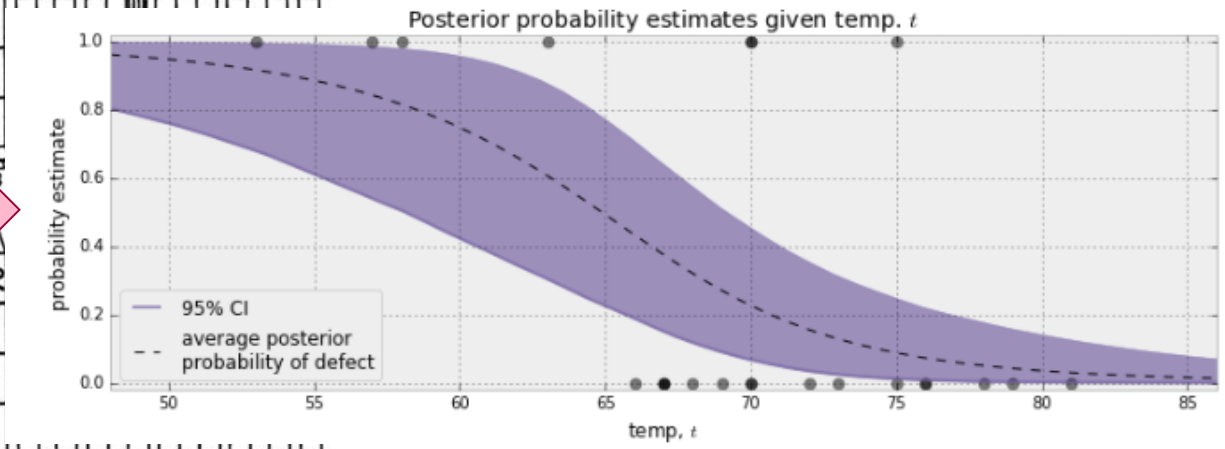
- Coworkers are Subject Matter Experts
- Radar Course
- DOD and IDA 101 Seminars

Statistics and Techniques

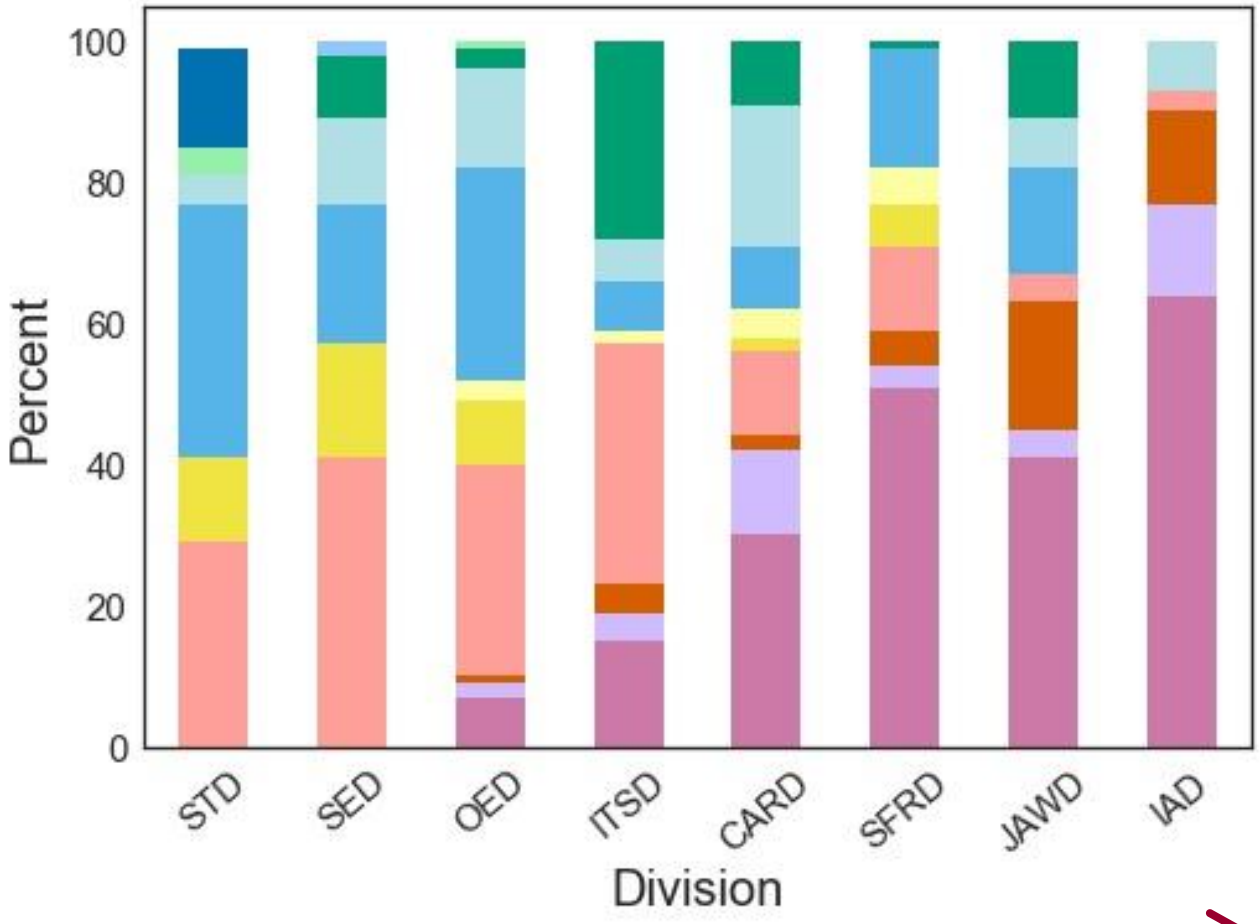
- Work closely with Statisticians
- Design of Experiments
- Reliability
- Modeling and Simulation
- Machine Learning

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



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

STD	Science and Technology Division
SED	System Evaluation Division
OED	Operational Evaluation Division
ITSD	Information Technology & Systems Division
CARD	Cost Analysis & Research Division
SFRD	Strategic Forces Research Division
JAWD	Joint Advanced Warfighting Division
IAD	Intelligence Analyses Division

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

Time	Meet	Notes
9:00a - 9:30	Human Resources	Benefits
9:30 - 10:10	Dr. Steven Rabinowitz	Your host, our resident recruiter
10:10 - 11:00	Interview 1 with potential teammate or task leader	Meet and greet
11:00 - 12:00p	Presentation	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
12:00 - 1:30	Lunch	Relax, have lunch with several potential co-workers, ask questions about IDA and life in DC
1:30 - 3:00	Technical Panel Discussion	Our chance dig deeper into you technical abilities, your chance to learn more about life at IDA and living in DC
3:00 - 4:00	Interview 2 with potential teammate or task leader	Meet and greet
4:00 - 4:45	Mr. Robert R. Soule, Division Director	What does IDA/OED do? Why IDA? Any questions you have.
4:45	Dr. Steven Rabinowitz	Final comments, say thanks

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&cws=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?

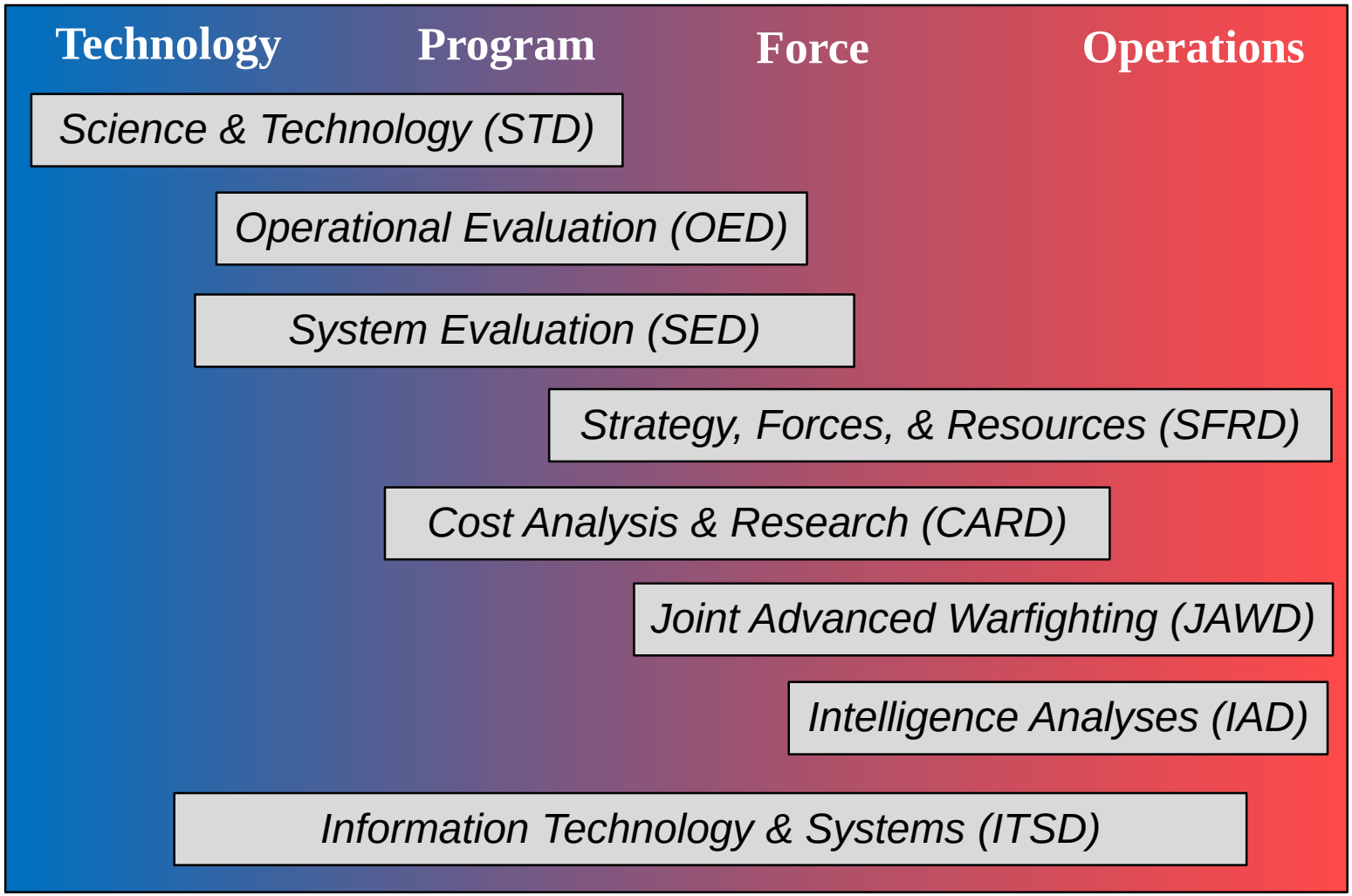
Operations

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



Science Divisions

Science & Technology Division

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

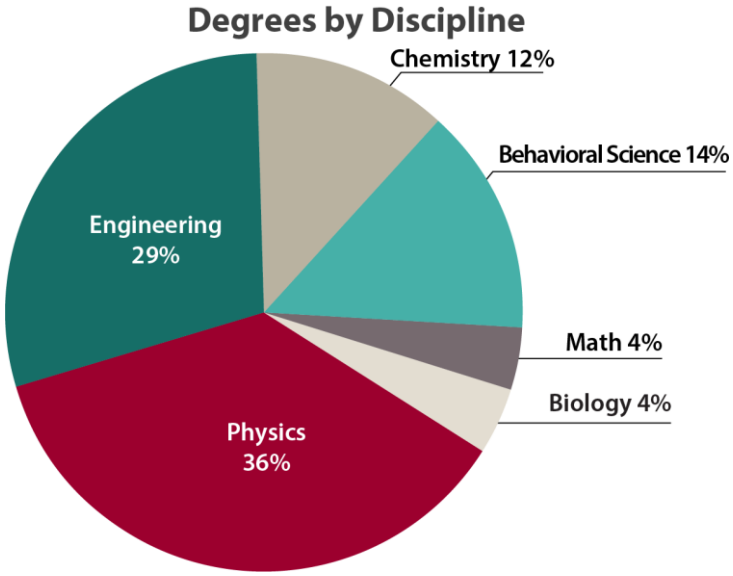
Threat Detection Systems

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



Technology Program Force Operations

System Evaluation Division

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

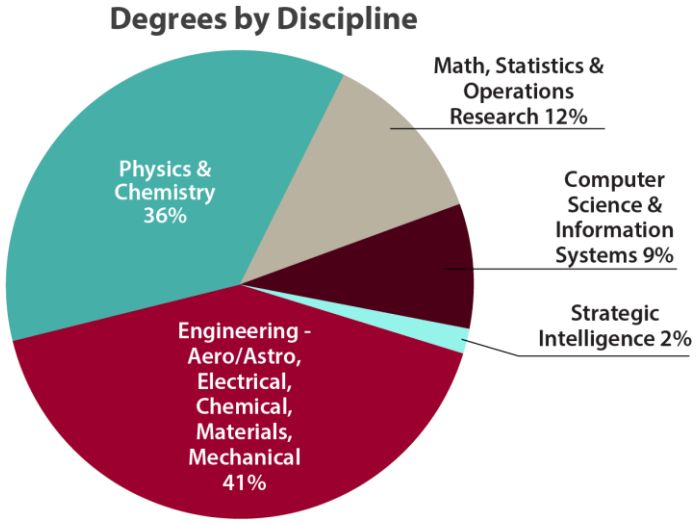
***SAMPLE* ISSUES**

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~~



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

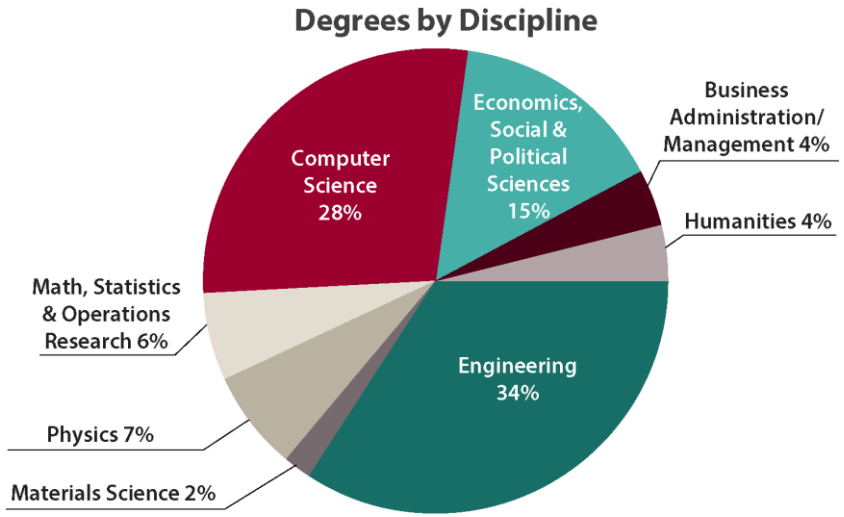
Software Vulnerability Detection, Test, and Evaluation

Mining Measured Information from Text

Smart Card Authenticated Sessions Using Proxies

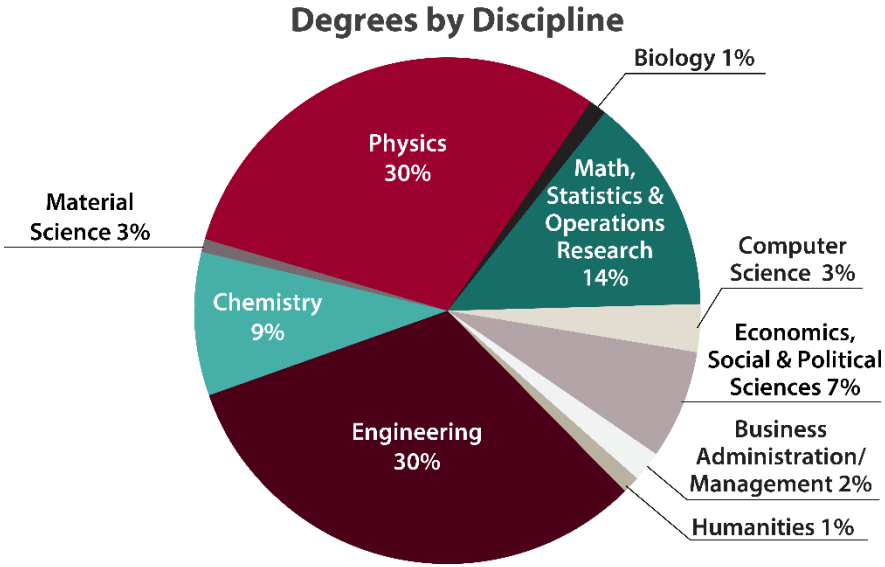
Enterprise Level Security

In-Use and Emerging Disruptive Technology Trends



Operational Evaluation Division

Research
Design
Plan
Observe
Analyze
Report



Strategic Divisions

Technology Program Force Operations

Strategy, Forces, & Resources Division

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

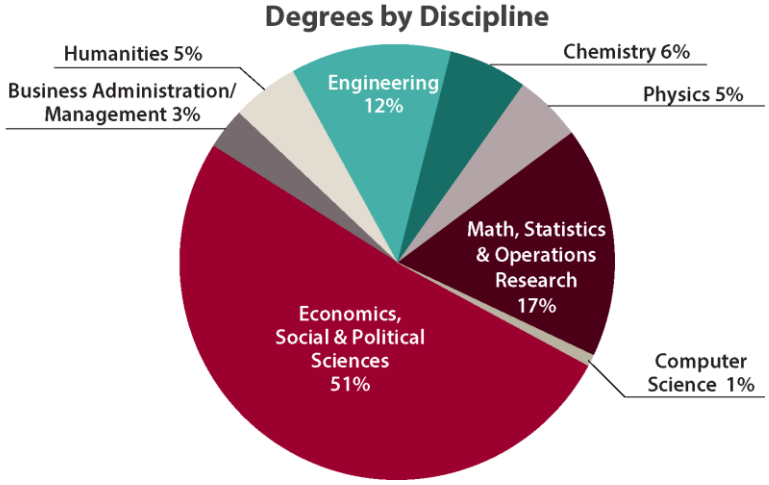
SAMPLE ISSUES

Security Dialogues with China

Foreign Language, Regional, and Cultural Proficiency

Korea's Chances in the 21st Century

Global Defense Posture



Technology Program Force Operations

Joint Advanced Warfighting Division

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

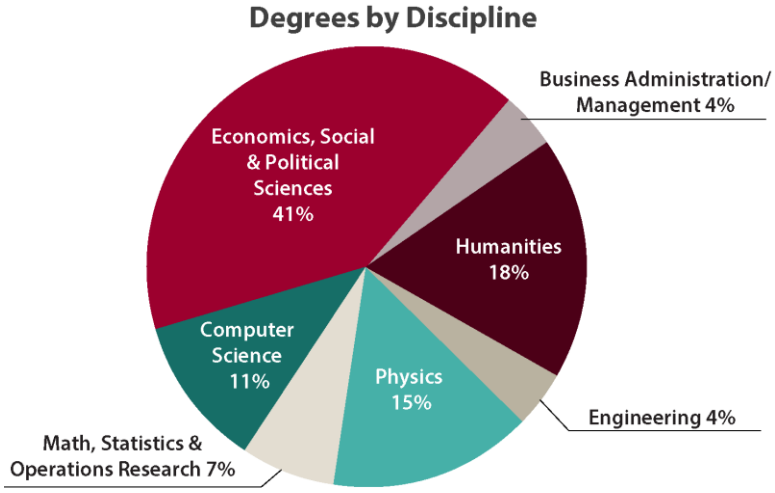
A Decade of Afghans Improving Their Lives

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

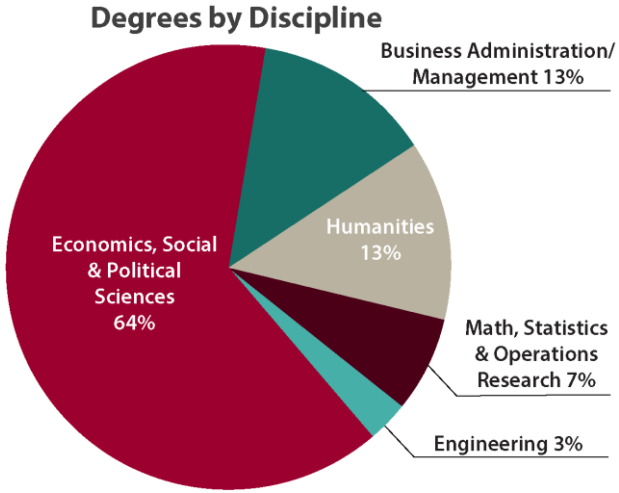
SAMPLE ISSUES

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

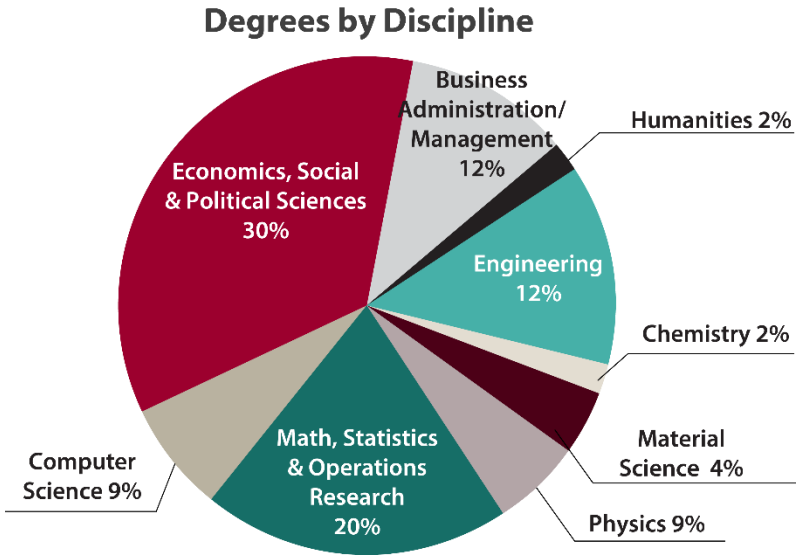
SAMPLE ISSUES

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?