

# Technical communication in my work life ... and a few other thoughts

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# Outline

- Who am I?
- Aspects of technical communication
- Resources
- Questions

# My education and career path

- **B.S. – Mathematics and Physics, Muhlenberg College, 1988**



- **Ph.D. – Applied Mathematics, University of Virginia, 1993**

- summers 1989, 1990: NASA Langley; summer 1991: Argonne



- **Mathematics & Computer Science Division, Argonne National Laboratory**

- DOE Distinguished Postdoctoral Fellow, 1993-1996

- 1997: Assistant computer scientist

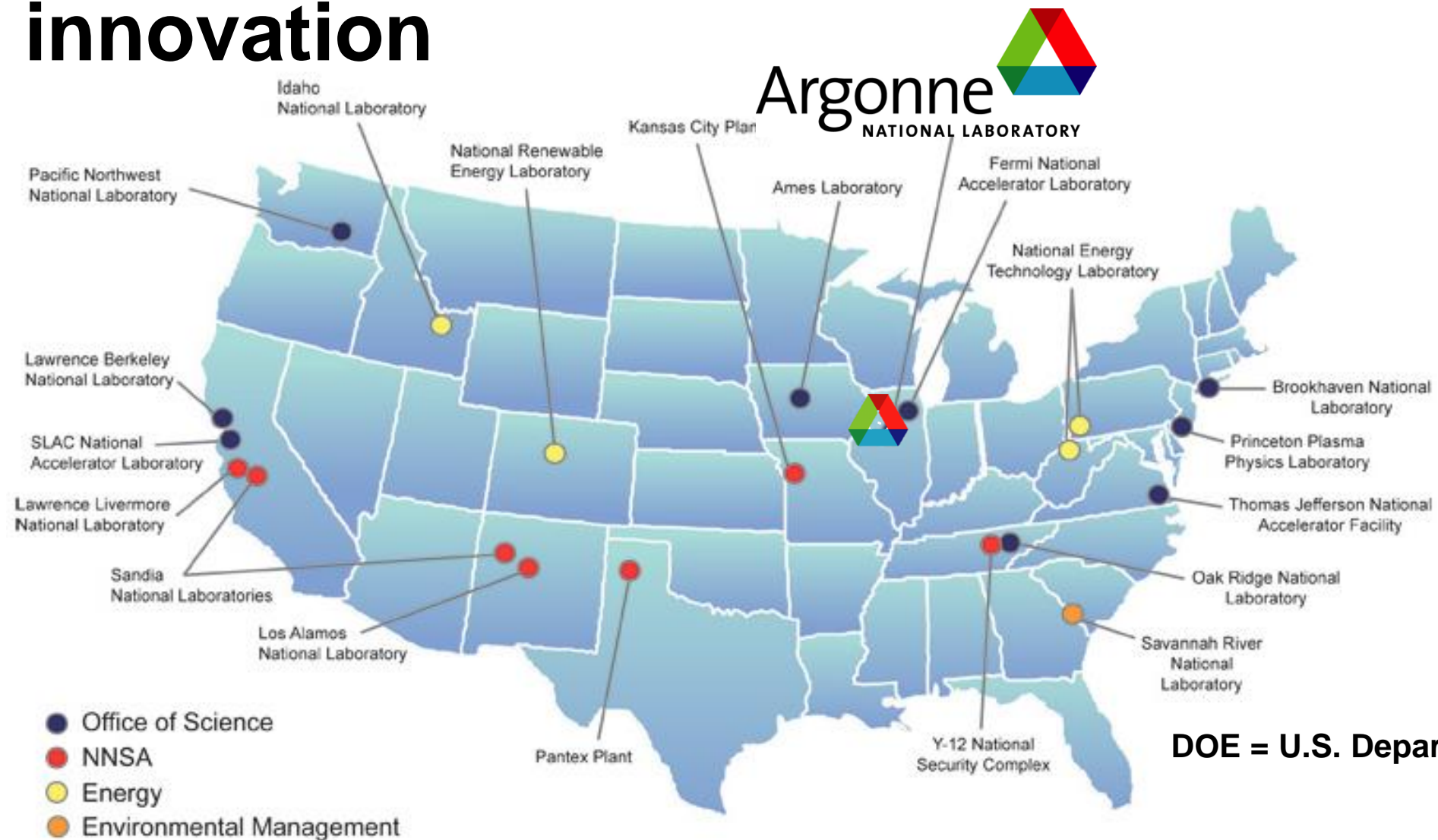
- 2001: Software engineer, senior software engineer

- 2006: Computational scientist

- 2012: Senior computational scientist



# DOE national laboratories: Leaders in science and innovation



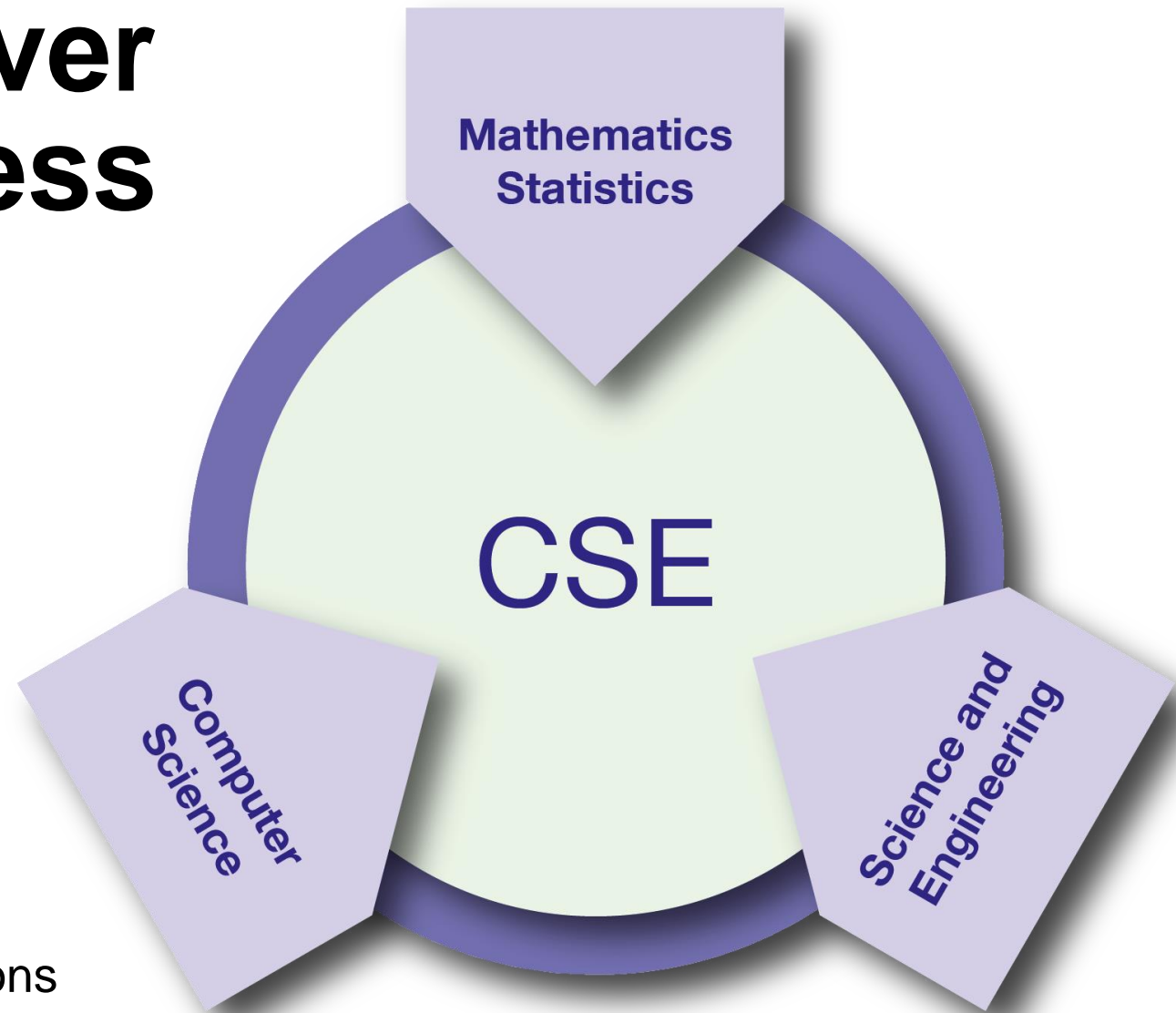
DOE = U.S. Department of Energy

# CSE: Essential driver of scientific progress

## CSE = Computational Science & Engineering

Development and use of computational methods for scientific discovery

- all branches of the sciences
- engineering and technology
- support of decision-making across a spectrum of societally important applications

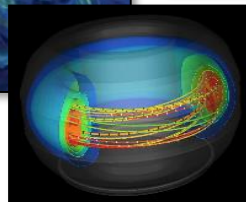
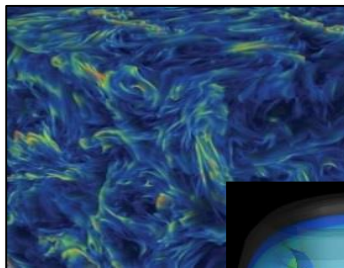
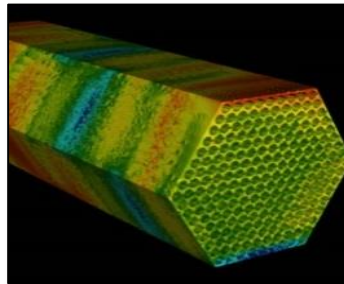


Ref: *Research and Education in Computational Science and Engineering*, Rde et al, SIAM Review, Aug 2018, <https://doi.org/10.1137/16M1096840>

# Extreme-scale computational science

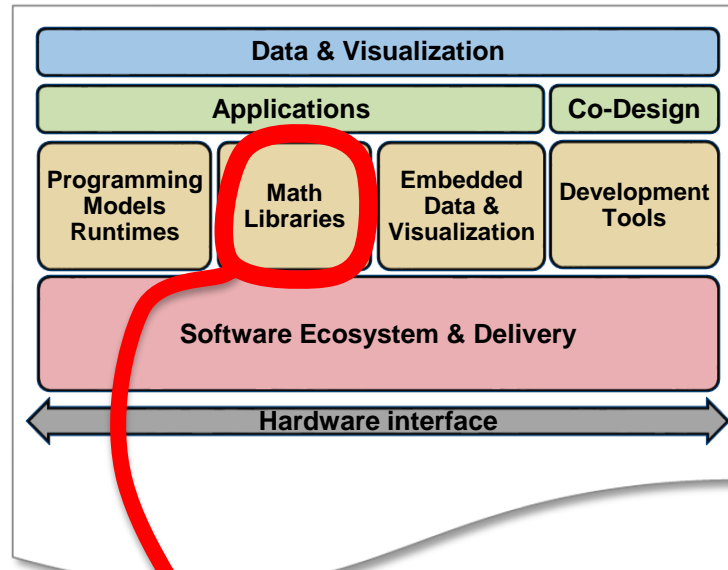
## Application Development

Science and mission applications



## Software Technology

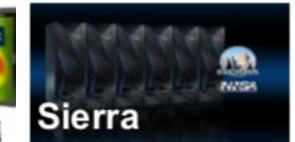
Scalable software stack



**Focus of my work: math libraries + software productivity and sustainability**

## Hardware and Integration

Relationships: facilities with AD/ST, with vendors



# Essential skills for high-performance CSE

- Expertise in focus area(s) of applied math
  - Interest in collaboration across disciplines
    - domain sciences & engineering, computer science
- Software
- Technical writing and presentations
- Communication across disciplines
- Collaboration and teamwork

**All require:**

**Effective technical communication!**

# Some aspects of technical communication

## • Technical writing

- Resume/CV, statement of accomplishments
- Papers/reports
  - preprints, articles in journals, conference proceedings
  - reports to stakeholders & funding agencies, community documents about opportunities/challenges
- Proposals
  - seeking funding for new projects
- Articles
  - blogs, institutional newsletters, newspapers for professional societies
- Reviews of papers, proposals, etc.

## Explaining your work to others

- experts in your field
- across disciplines
- broader community

## • Presentations

- At meetings, conferences, workshops, reviews, webinars, tutorials, ...



# Some aspects of technical communication

- **Collaboration & teamwork**

- Project meetings
  - agendas, group discussion, decisions, action items
- Planning:
  - Email, calendars, spreadsheets, tools (Google docs, Confluence, JIRA, etc.)

**Communicating  
with project  
members**

- **Software**

- Source code documentation, example code
- Webpages, user support (email, issue tracking)
- Documents
  - design, requirements, policies, users manuals
  - Github issues, pull requests

**Software is  
how we collaborate  
in CSE**

# Presentation resources

- Chris Anderson, TED Talks curator
  - [https://www.ted.com/talks/chris\\_anderson\\_teds\\_secret\\_to\\_great\\_public\\_speaking?language=en](https://www.ted.com/talks/chris_anderson_teds_secret_to_great_public_speaking?language=en)
- Nancy Duarte
  - [https://www.ted.com/talks/nancy\\_duarte\\_the\\_secret\\_structure\\_of\\_great\\_talks?language=en](https://www.ted.com/talks/nancy_duarte_the_secret_structure_of_great_talks?language=en)
  - <https://www.duarte.com>
  - Great info and **Diagrammer** (free tool for diagrams): <https://diagrammer.duarte.com>

What type of diagram are you looking for?

Identify the relationship. Choose from categories below.



FLOW: LINEAR



FLOW: LOOP



FLOW:  
MERGE/DIVIDE



FLOW:  
PARALLEL



JOIN: HOOK



JOIN: OVERLAP



SEGMENT:  
DONUT

# ***Good Choices for Great Careers in the Mathematical Sciences, Mac Hyman, SIAM AN08***



<https://www.pathlms.com/siam/courses/5156/sections/8017>

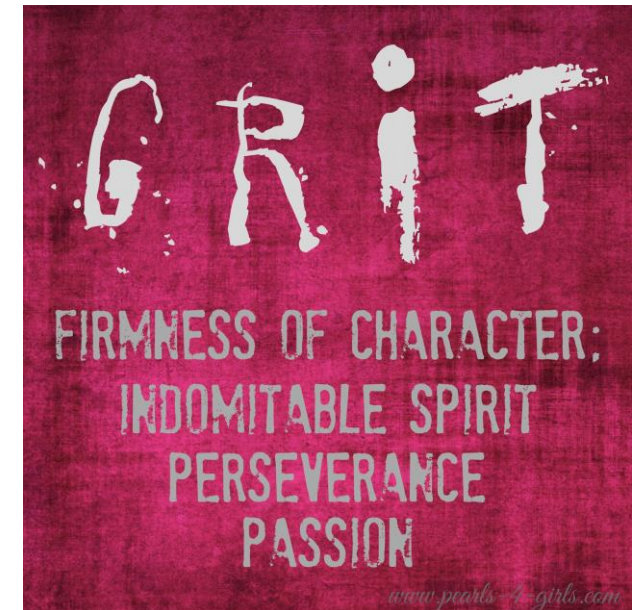
# A Talent becomes a Strength through Knowledge, Skills, and Expertise

- **Building your strengths based on your talents is a key to becoming the best in the world on something about which you are passionate**
- **First, identify a strength that benefits from your talent**
  - **Knowledge**: Take courses, read books, watch videos, and seek out experts to build a solid foundation for your talent
  - **Skills**: Use your knowledge to develop skills that stretch your breadth of knowledge and extend your depth of understanding to skillfully apply your talent
  - **Expertise**: Nurture your talent by gaining expertise in applying the skills in which you excel

# Grit: Perseverence and passion for long-term goals

Research by Angela Lee Duckworth, Univ of Pennsylvania

- **“Grit is sticking with your future — day in, day out, not just for the week, not just for the month, but for years — and working really hard to make that future a reality.”**
- **“Grit is living life like it's a marathon, not a sprint.”**
  - **“I don’t think people can become truly gritty and great at things they don’t love. So when we try to develop grit in kids, we also need to help them find and cultivate their passions. That’s as much a part of the equation here as the hard work and the persistence.”**



**TED Talks Education, April 2013**

[http://www.ted.com/talks/angela\\_lee\\_duckworth\\_the\\_key\\_to\\_success\\_grit](http://www.ted.com/talks/angela_lee_duckworth_the_key_to_success_grit)