Career Talk
Sandia / GT PREFER

Patrick M. Widener (Ph.D. CS, 2005)
Principal Member of Technical Staff
Center for Computing Research
Sandia National Laboratories

Sandia National Laboratories

Exceptional

service

in the

national

interest

U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

Computing at Sandia

- Computing is important in almost every Sandia field
- Original development of computing capabilities supported NW stockpile assurance & modernization
  - Basic CS research for exascale computing – architecture, OS, storage
  - World-class simulation and mechanical/chemical modeling codes & libraries
- We realized these capabilities were broadly applicable
  - Simulation of fusion reactions, combustion research, explosive effects, epidemiology
  - Data analytics for external and internal customers
- Computing helps make Sandia the first choice for solutions to national security engineering issues
  - Chelyabinsk meteor flight/impact modeling
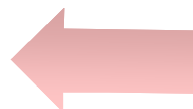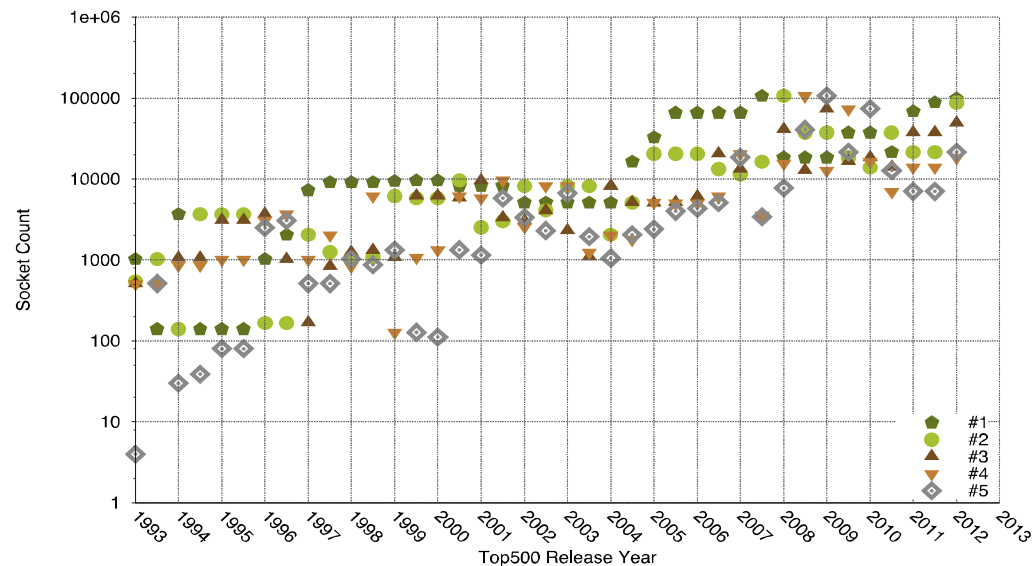 - Russian satellite shootdown analysis

My career path to Sandia

- I started at Sandia in 2012
  - … but I had lots of experience with Sandia before I joined as tech staff
- My timeline
  - Ancient history – MCS degree, several years as professional software developer for companies that no longer exist
  - Ph.D. in 2005, College of Computing
  - Postdoc / Research Asst Prof at University of New Mexico
    - Lots of interaction with Sandia staff and projects
  - Research Asst Prof / Sr Research Scientist at Emory
    - Dept of Biomedical Informatics – big data problems, large scale analysis
  - Tech Staff at Sandia
    - Started in a different part of the lab
    - In Sandia's Center for Computing Research since Oct 2013
    - Research Assoc Prof at UNM CS
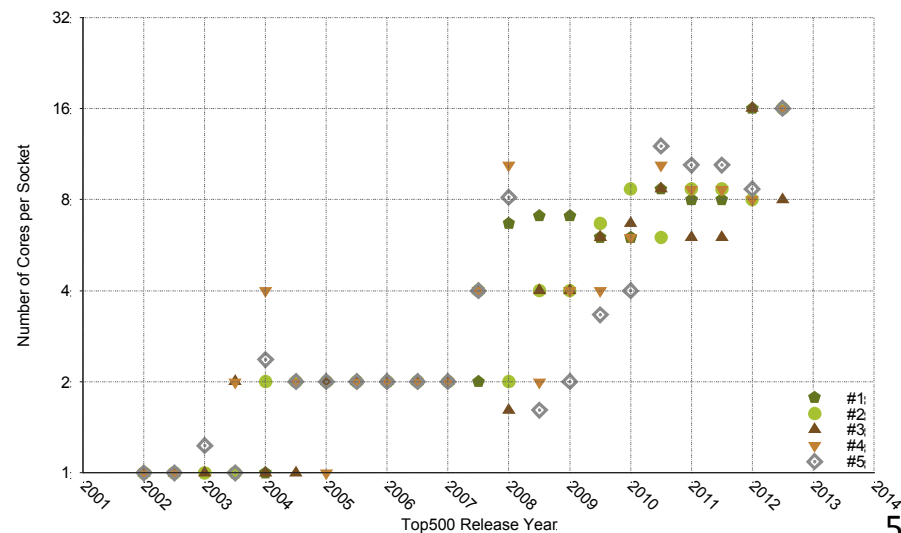
What I get to do

- Research interests
  - Operating systems, high-performance computing
  - Big data, data analytics, workflows
  - Resilience, storage, I/O
- Chase money
  - From DOE, DOD, IC, internal, NSF
  - 6 submitted proposals last year (tough funding environment!)
  - Partner with academics, other labs
- Build things, break them, write about it
  - Get to publish regularly
  - Have to publish regularly
  - Collaborations with academics, advise students
- Lather, rinse, repeat

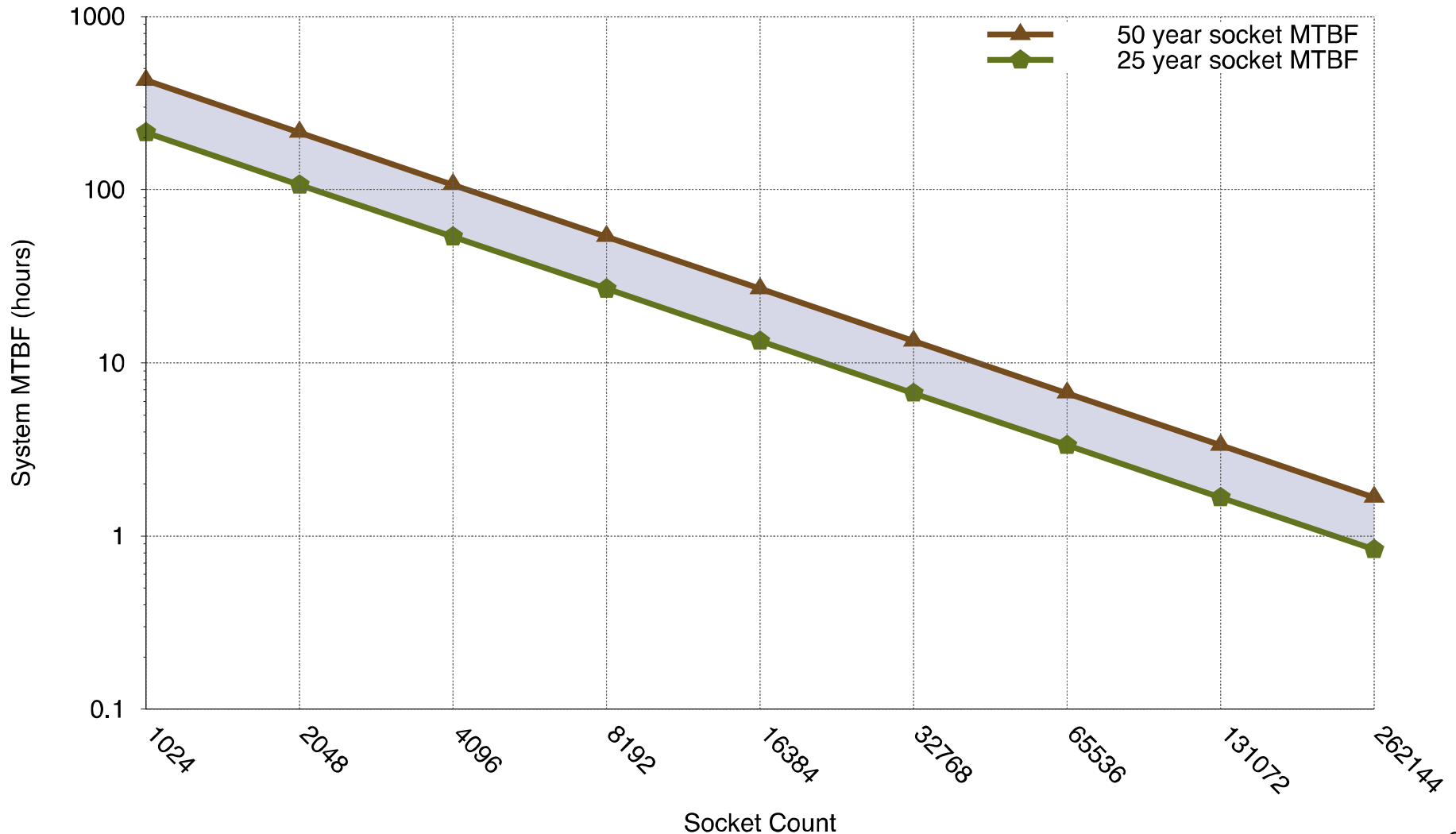# HPC resilience matters because scale/complexity matters

Systems are getting larger

Each node is getting more complicated

5

...therefore failures are becoming more common

Project snapshot – HPC resilience

- What happens when failures happen faster than recovery?
- 8-lives research group on HPC resilience methods
- I've helped build a simulator that explores resilience behavior at extreme scale (256Ki cooperating processes)
- Involves the whole research lifecycle – funding search, code development, testing, submit paper, get rejected, revise paper, publish
  - Collaborate with academics, mentor students
- Our research directly influences exascale system design ➔ scientific productivity ➔ mission success ➔ national security

What's my path forward?

- Continue my research activity, explore new areas
  - As long as its relevant to Sandia, I have considerable freedom
- Management?
  - "Here's a suite of applications that all work together."
  - Technical management in basic research at Sandia
- Or stay on technical staff
  - Distinguished Member of Technical Staff
- Many Sandians have moved back and forth between management and technical staff