TerraPower Perspective

Securing a Strong Workforce for the Next Generation of Reactors

ANS Education, Training & Workforce Development Division

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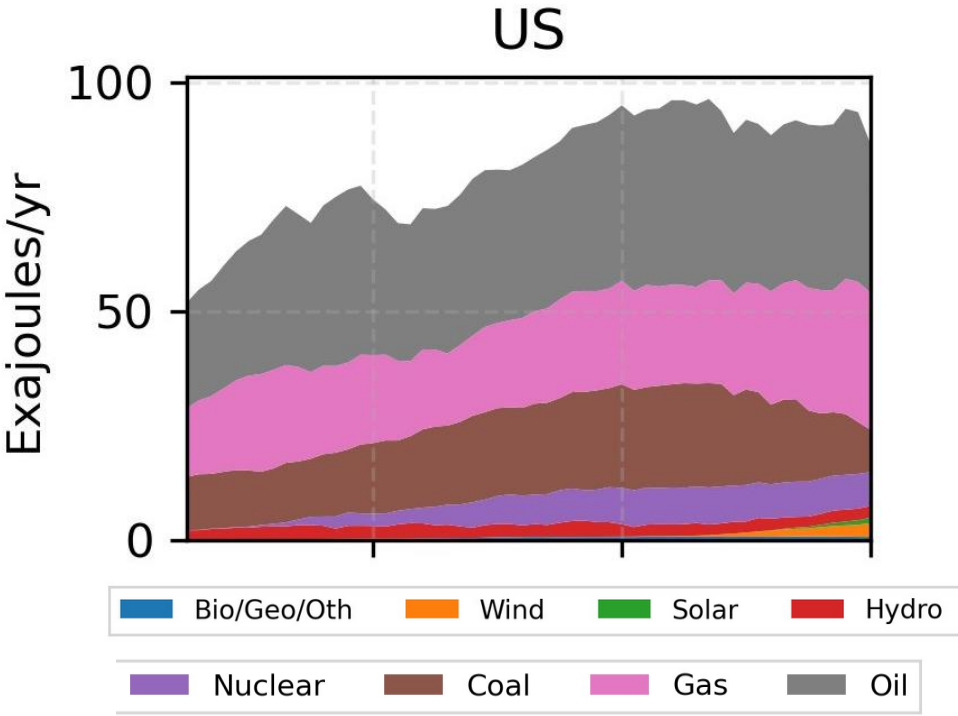
The Challenges

- All: Deeply decarbonizing merely 50% of US energy with nuclear requires >**500 new GW-scale plants**
- Nuclear licensing, nuclear cost estimating
- TerraPower: Need some rare subspecialities: alkali metal and molten salt equipment and chemistry, actinide chemistry



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What is TerraPower doing to secure a future workforce?

- Working on getting new nuclear built! 😉
- Construction: partnering with nationally-known construction contractor
- Operations: expect to source from Navy and nuclear utilities as usual
- Internship program
- On-the-job training
- Community outreach
- Outreach to universities
- Attempt to reduce the overall need for specialization
  - Decouple nuclear island from energy island
- Efficiencies through automation

Photo by Karl Pauls

Universities: we could use more intersectional knowledge

- Dominant challenges in nuclear are related to Construction/Project Management:
  - Set up the project team to be co-aligned with success
  - Finish the design before you start construction
- Would love to see more partnerships and research between:
  - Nuclear and civil depts on **construction**
  - Nuclear and mechanical depts on **equipment development & testing**
  - Nuclear and business management deps on **megaproject management**
- Maybe make room by reducing transport methods research 😢?
- Managing change
- Big shortage of nuclear-knowledgeable cost estimators

Universities: Deploy realistic reactor engineering simulators

- Fill gap left by reduction of research reactors
- Help build systems knowledge
- Build intuition between PWR, BWR, LMR, GCR, and MSR
- High fidelity not as important as broad-scale intuition
- Could help with expanded outreach

Interesting question from a Googler

How can you inspire interested students to choose a nuclear specialization given the perceived sensitivity of the value of nuclear skills to politics or accidents?

Options:

- Emphasize transferability
- Develop more nuclear specialty minors or certificate programs embedded in related fields (ME, EE, law, business)
- Assure bright future for nuclear
- Improve overall sentiment and public image

Engineering Depts: Software Development

All modern engineers will interact with custom data and software.
Thus, engineering curricula today must include exposure to software carpentry:

- Regular expressions
- Database systems
- Command line
- Version control systems
- Scripting
- Software design practices
- Documentation systems
- Continuous integration systems

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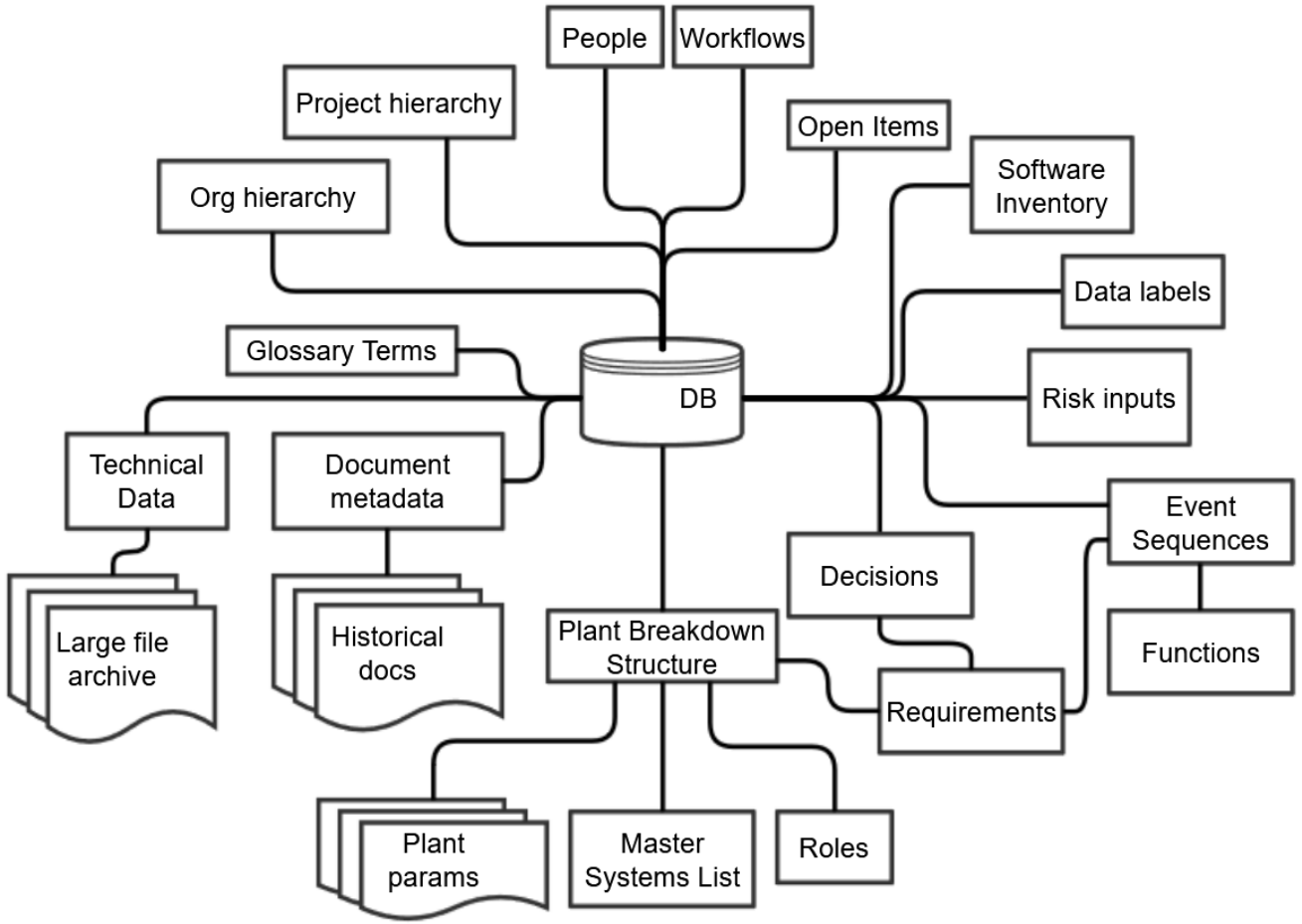
# special pattern to deal with FORTRAN-produced scipats without E,
SCIPAT_SPECIAL = re.compile(r"([+-]?\d*\.\d+)[eEdD]?([+-]\d+)")
```

Many recent engineering grads are weak when it comes to really *using* a computer

Emphasize the value and methods of data centricism

- Managing data can either:
  - Consume large fractions of your time, efforts, and attention
  - Enlighten and mobilize your project in the face of inevitable changes
- TerraPower is working to implement data-centric lessons learned by EPRI and IAEA TECDOC-1651
- Would appreciate more emphasis on systematic data management in universities



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What do we think Governments could do?

- Public/private partnerships in technology demonstration 👍
  - Could advance enabling equipment in addition to full reactor programs
- Find more ways to get markets to *properly* value 24/7 low-carbon energy
- Factor in the climate and health risks of *not* building nuclear plants into regs
- Establish more data management standards (along the lines of the EPRI PIM model)
- Establish "open source" QA implementing procedure templates and forms
- Historical technical reports e.g. in OSTI and Hathitrust are absolute treasure troves.
  - Please continue scanning and serving historical documents
  - Please continue providing access to ongoing progress
- Limited access to useful tools impedes ability to train and collaborate (e.g. RSICC). Re-evaluate value of locking down implementations of well-known methods as appropriate.