ENGINEERING
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Who are we? Communicating our intellectual focus and value to others

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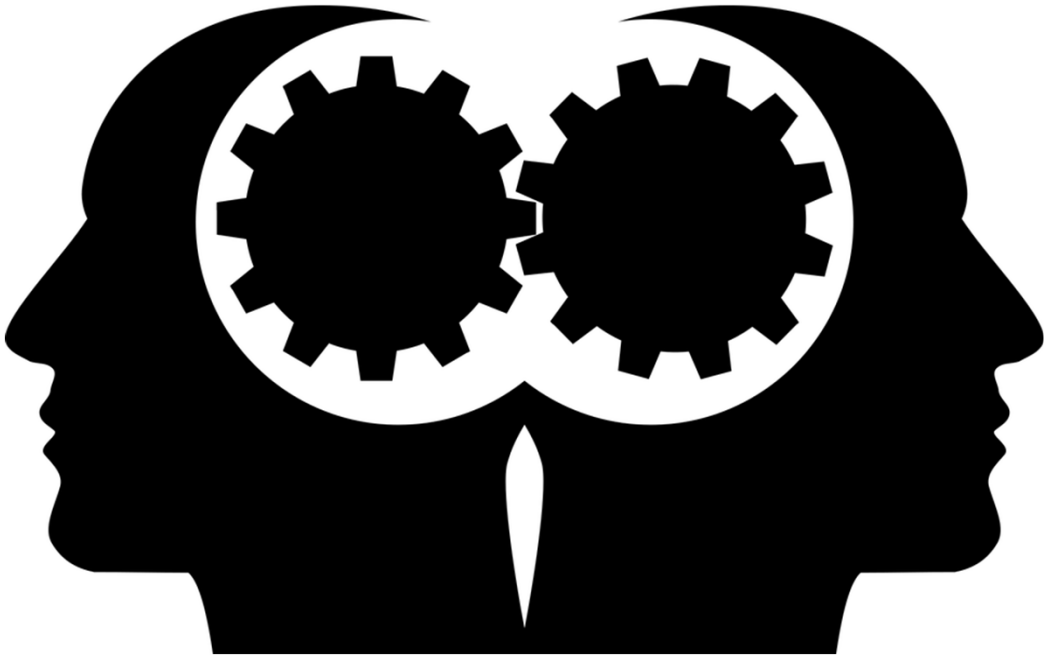
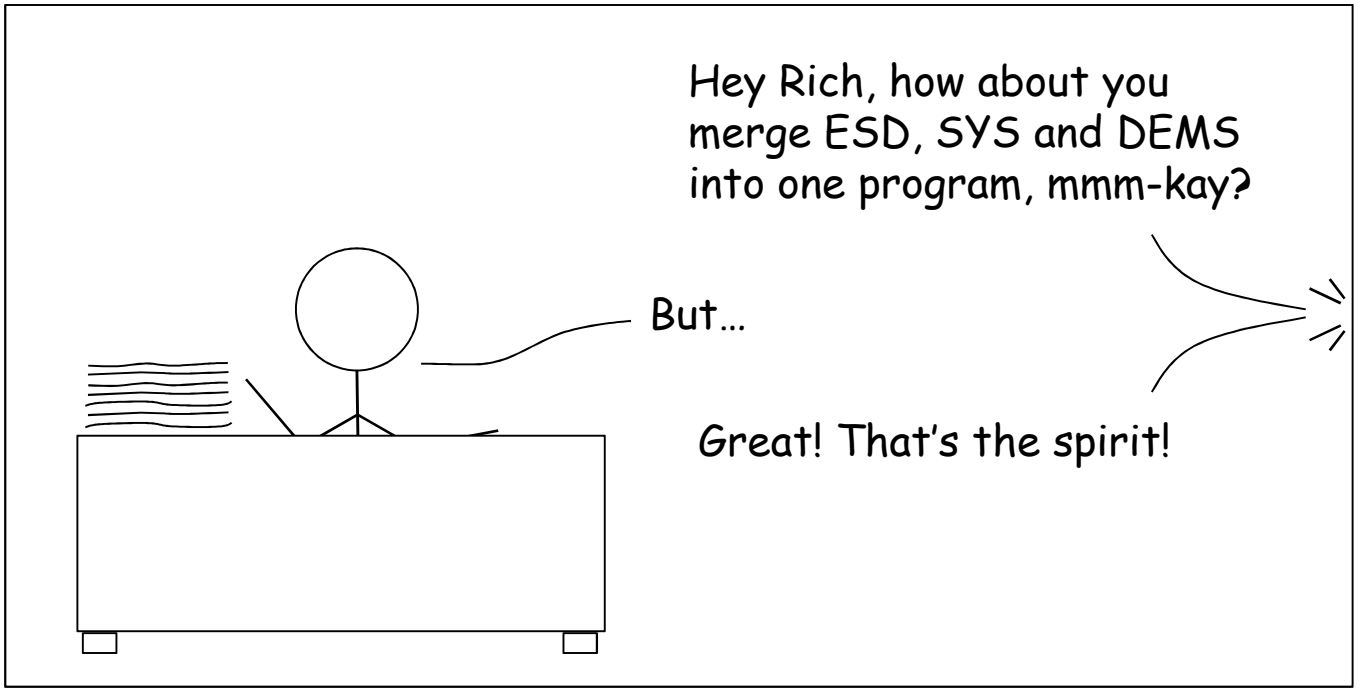


Arlington, VA…early 2017



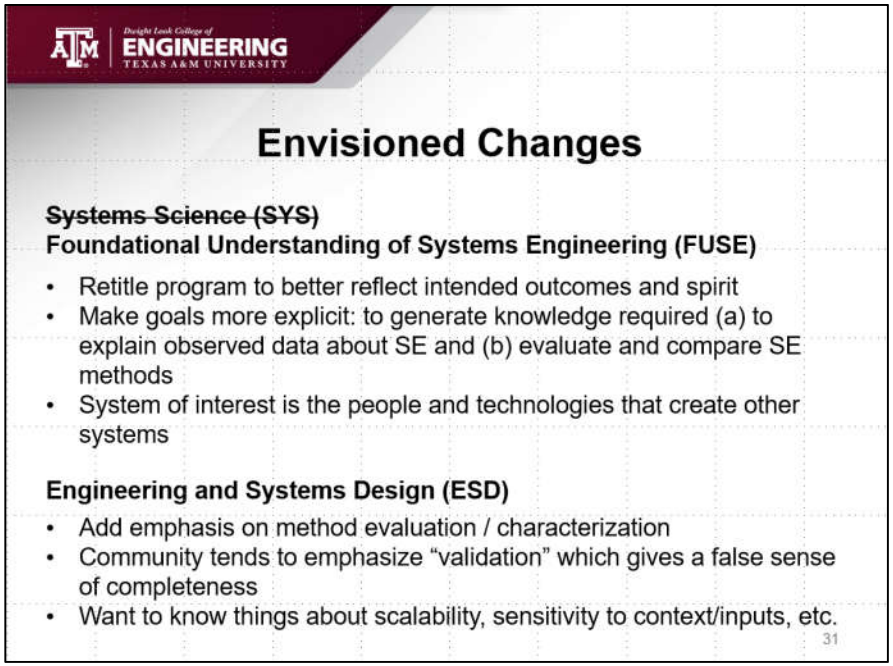
Apologies to Randall Munroe and XKCD

Going in to NSF, a three-way merger was not what I had in mind

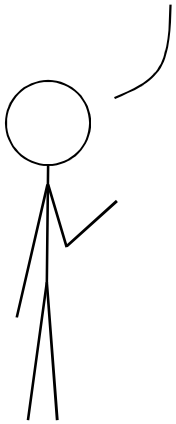
Plan was to further differentiate the three programs, SYS and ESD in particular

Interviewed largely on ideas for what to do with SYS—slide to the right was followed by three more on SE research

A slide from my NSF interview talk



Okay, so let's just make the new program the superset of the predecessor programs…



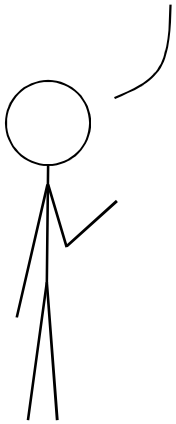
Engineering Design and Systems Engineering (EDSE) Program

Fundamental research to advance the disciplines of engineering design and systems engineering

Scientific inquiry leading to improved knowledge about:

- Theoretical foundations of the disciplines
- Effective practical methodology

Okay, so let's just make the new program the superset of the predecessor programs…



Engineering Design and Systems Engineering (EDSE) Program

Concerned with advancing knowledge about the development of engineered materials, devices, products, processes, platforms, and systems.

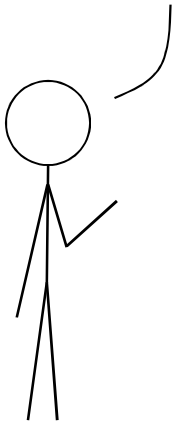
Engineering Design (ED):

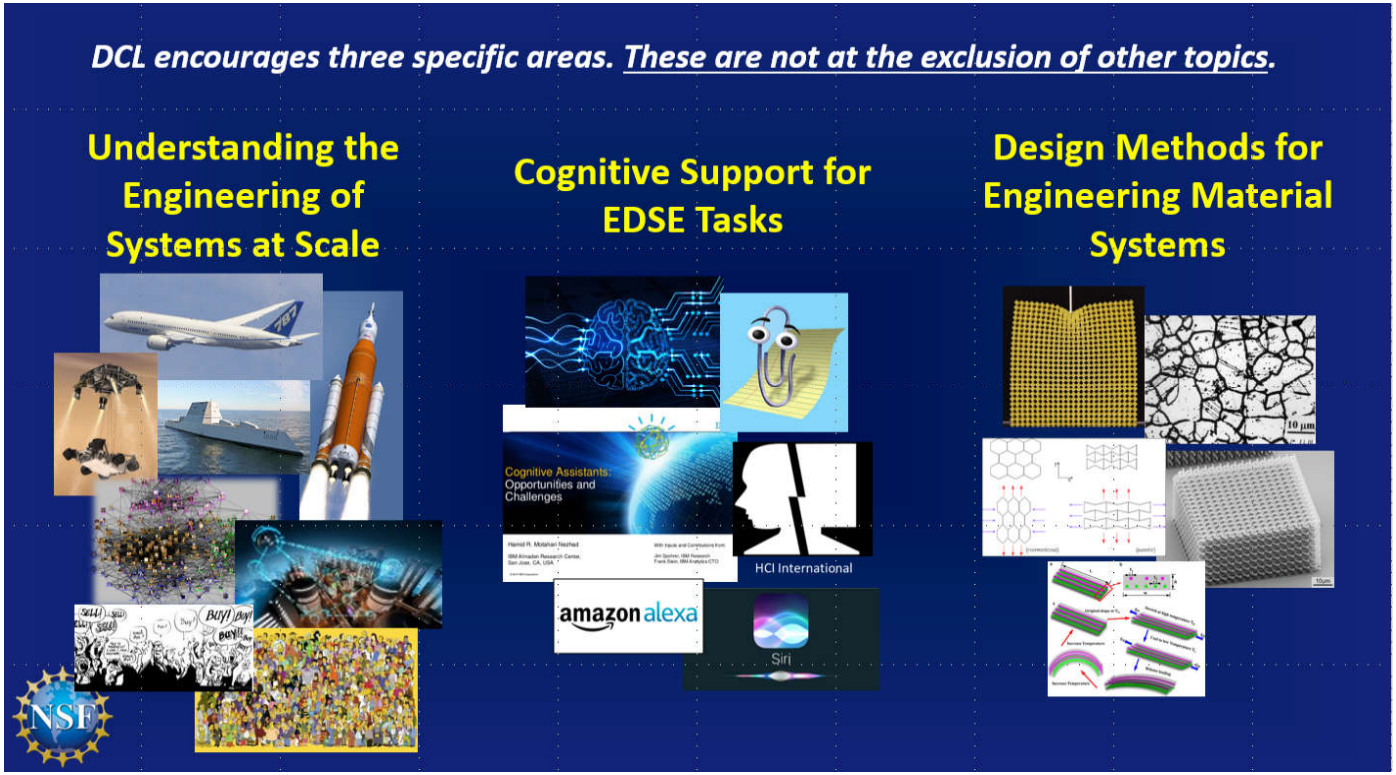
- For one or more engineers
- Defined in terms of functionality of steps (to define problem, to identify concepts, etc.)
- Usually do not emphasize management of the process
- Usually do not discuss explicitly how to deal with integration and coordination issues

Systems Engineering (SE):

- For MANY engineers (often >10k+)
- Always multiple disciplines
- Decomposition of problem and subsequent integration information and of solutions is a driving concern
- Coordination of effort among many engineers is a driving concern
- Process management is an emphasis

Okay, so let's just make the new program the superset of the predecessor programs…





Two Unresolved (in my mind) Issues

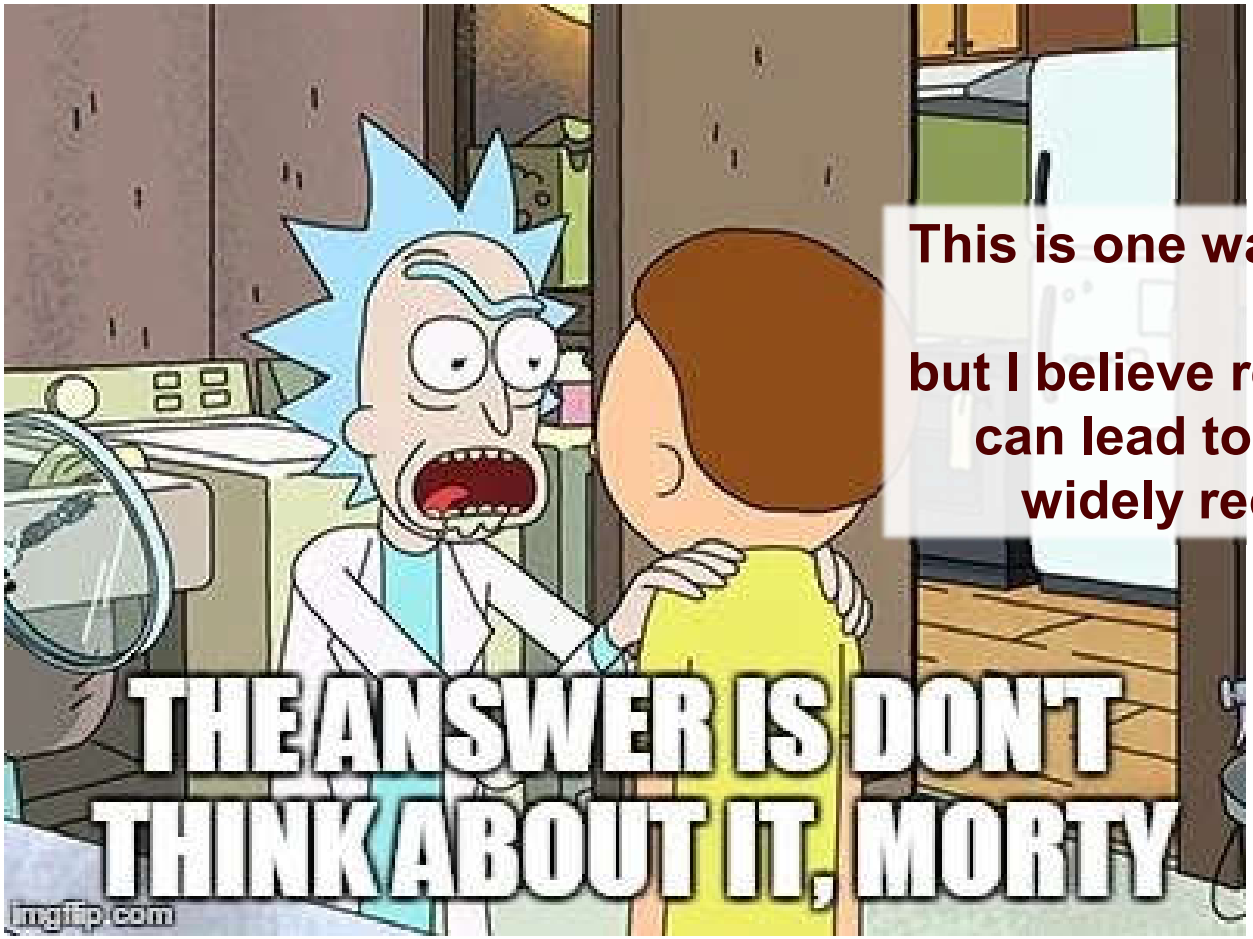
Intellectual Identity

- EDSE program, as currently described, is just the superset of ESD, SYS and DEMS research*
- Is there anything that relates us beyond an NSF program element code†?
- What is the unifying thread of EDSE research? What do we all do that is similar?
- What is the "object of study" for EDSE research?
- Are we even a single research community?

Impact Identity / Recognition

- "Middleware" problem
- Our discoveries build on more fundamental results from math, science, etc.; fundamental results get cited relatively (to us) heavily and recognized for this
- Our discoveries enable many others to do great things; they get recognition
- E.g., science journalists, bloggers & vloggers focus on the most fundamental results or the most applied (direct impact on society or easily-understood tech advancement)

* I had reasons at the time, but I think we need to move on now
† 072Y, in case you were wondering

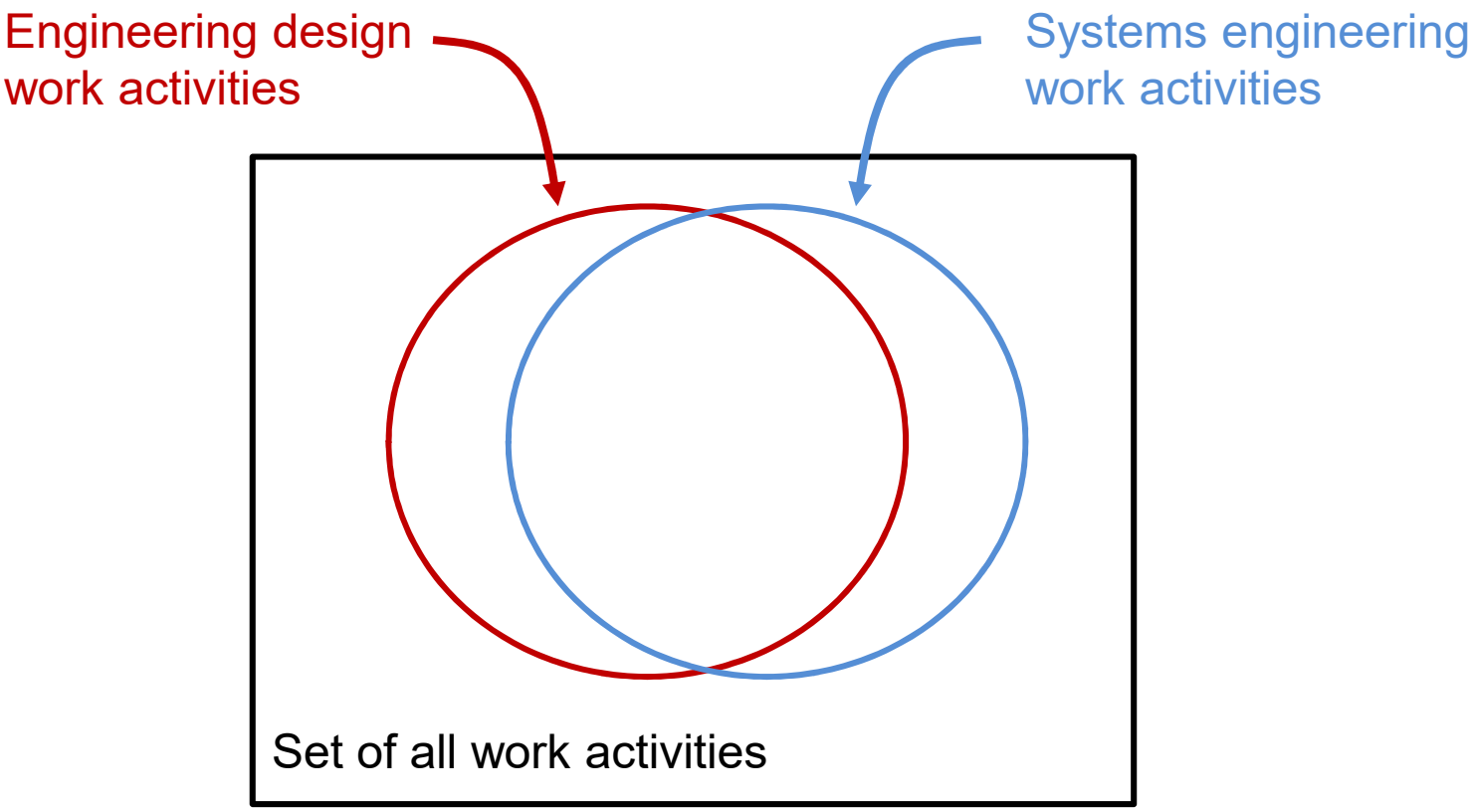


This is one way to go, I suppose…

but I believe reframing our identity can lead to a larger and more widely recognized impact

Idea: We are a community of researchers who study and improve how engineers do their work

- Design and systems engineering involve many work activities (idea generation, information modeling, data analysis, decision making, coordination, modeling & simulation, optimization, etc.)
- Individually, we each study/improve a subset of these
- Collectively, we study/improve the discipline(s)



My mental model

Idea: We are a community of researchers who study and improve how engineers do their work

- Consistent with past and current EDSE research
- Relatable
- Clarifies that there is an engineering focus
- Clarifies the immediate impact of our accomplishments
- Generalizes beyond ED and SE
- Avoids heavily overloaded terms (e.g., innovation, design, systems)
- Will never be “solved”
- Can connect to broader societal narratives (e.g., future of the workplace)
- Timely – see NSF’s 10 Big Ideas and FW-HTF solicitation
- May allow us to present a more unified front on several issues
- May promote new synergistic collaborations (within and beyond existing community)

Consider the difference

"I create methods that a team of engineers can use to coordinate their efforts during an engineering project."

"I study ways other people can look for innovative design concepts to their design problems"

"I create methods to optimize the performance of multidisciplinary systems."

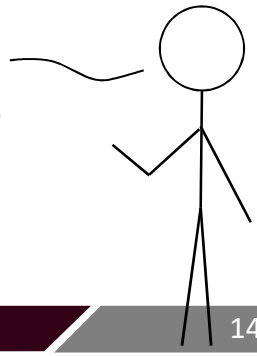
"I improve the effectiveness of engineers at their jobs"

- Impact is direct
- The WHAT not the HOW
- Presents opening to discuss further details about HOW

We are a community of researchers who study and improve how engineers do their work

- This is just one idea
- Simultaneously addresses questions about intellectual and impact identity
- Change in narrative more than the underlying research mission
- Several advantages, but I can think of potential limitations too

Let's talk about it.
What do you think?



Thank you

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