

# SE Research

## What for?

## How to do it?

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# The Underlying Challenge of Research

- Research is variously understood
- Research discovers new knowledge
- Many systems engineers have a background in engineering or science and continue their view of research from there
- The problem:
  - Useful knowledge is embedded in practical situations – many confounding factors
  - Usual methods for validating knowledge abstract phenomena from their situation
- Most engineering research follows quantitative scientific methods
  - Is this a good thing?



# Fields of Knowledge Needed for SE

- SE combines the contributions of various disciplines (engineering and others) to deliver appropriate and effective systems
- This work demands methods which are both:
  - Similar to traditional engineering methods, and
  - Rather different methods
- Research methods need to address the various kinds of knowledge needed to enable activity
- Knowledge fits two forms
  - Know that
  - Know how



# Forms of Knowledge

- Know that
  - This kind of knowledge is about description of what is
  - Therefore enables description of phenomena
  - Focus of know that is NOT enabling activity



# Forms of Knowledge

- Know that
  - This kind of knowledge is about description of what is
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- Know how
  - This kind of knowledge is about enabling activity
  - Know how relies on real knowledge of relevant phenomena situated in their environment



# Research Method Choices

- SE research should support practice
- Know that type research is easy to publish
  - Conforms to the framework of scientific knowledge
    - But is not particularly useful in enabling action because it describes things in an abstracted manner
- Know how type research is harder to publish because it is more likely to be situationally relevant (not universal)
  - Therefore appears not to be of broad interest
  - Also less concerned with the development of theories to describe things

