SEMAT Position Statement

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Overview

1st My “philosophy” for SE and SEMAT

2nd Some urgent issues in SE Method and Theory

Philosophy for SEMAT

Engineering applies science to real world problem solving

No theory of its own - relies on theories in other, more fundamental disciplines

Relevant established theories

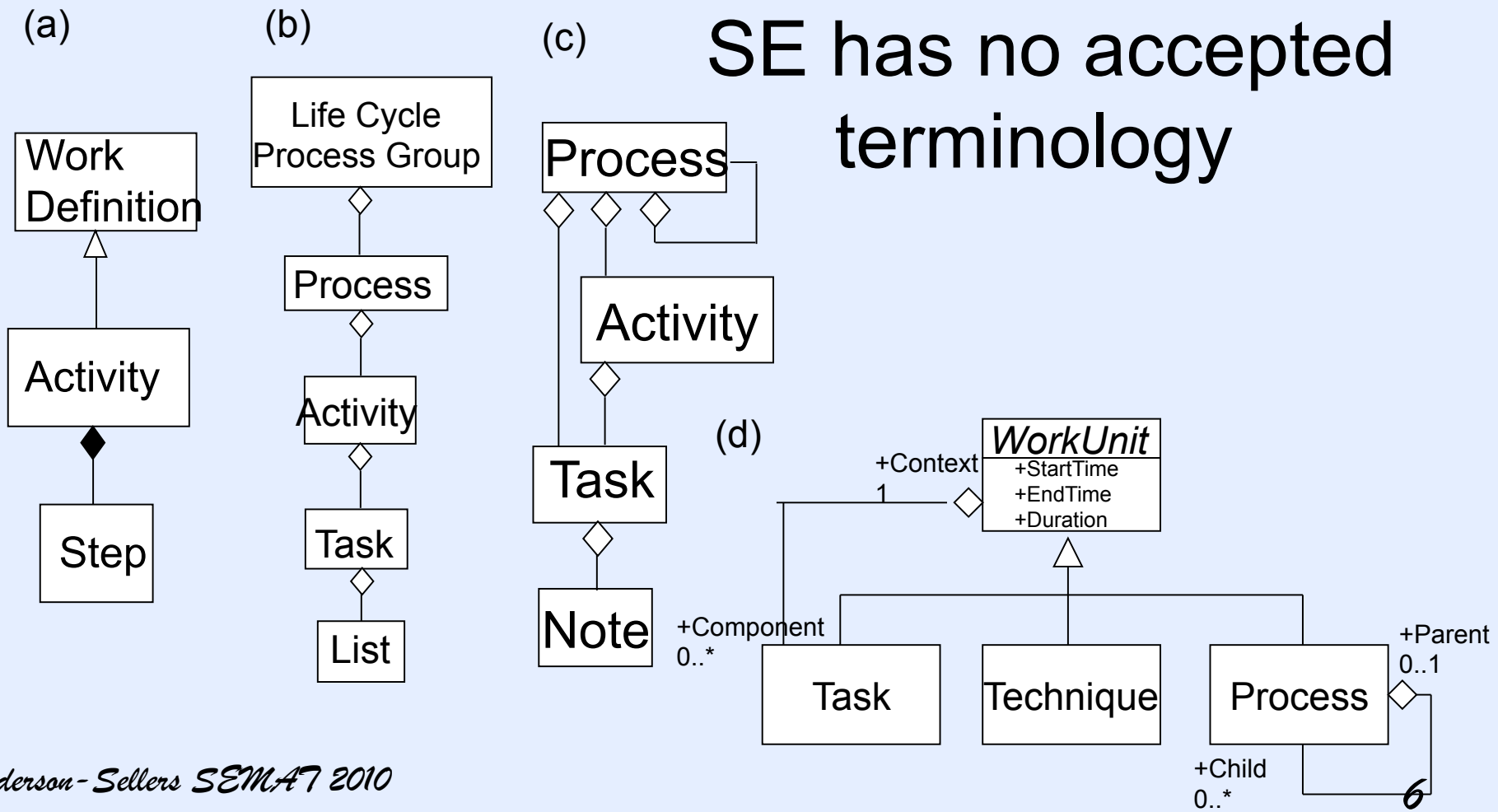
- Category and set theory: mathematics
- Estimation theory: statistics and signal processing
- Measurement theory: mathematics
- Systems theory : ecology and meteorology
- Organizational theory: behavioural psychology
- Operational research: mathematics

Perils of ignoring theories

Ignorance of existing theories is dangerous

Tacoma Narrows Bridge collapse – a civil engineering lesson!

SE has no agreed set of concepts



SE has no accepted terminology

In practice

- What is frequently called a *process* is just a set of ordered steps (a.k.a. procedure)
- Problem with many current ISO software engineering standards. (Arguably a process also includes resources, people etc.)
- Move away from Tayloresque factory processes to flexible processes that consider local situational context (risks, skills, culture etc.)

SE – still a proto-discipline

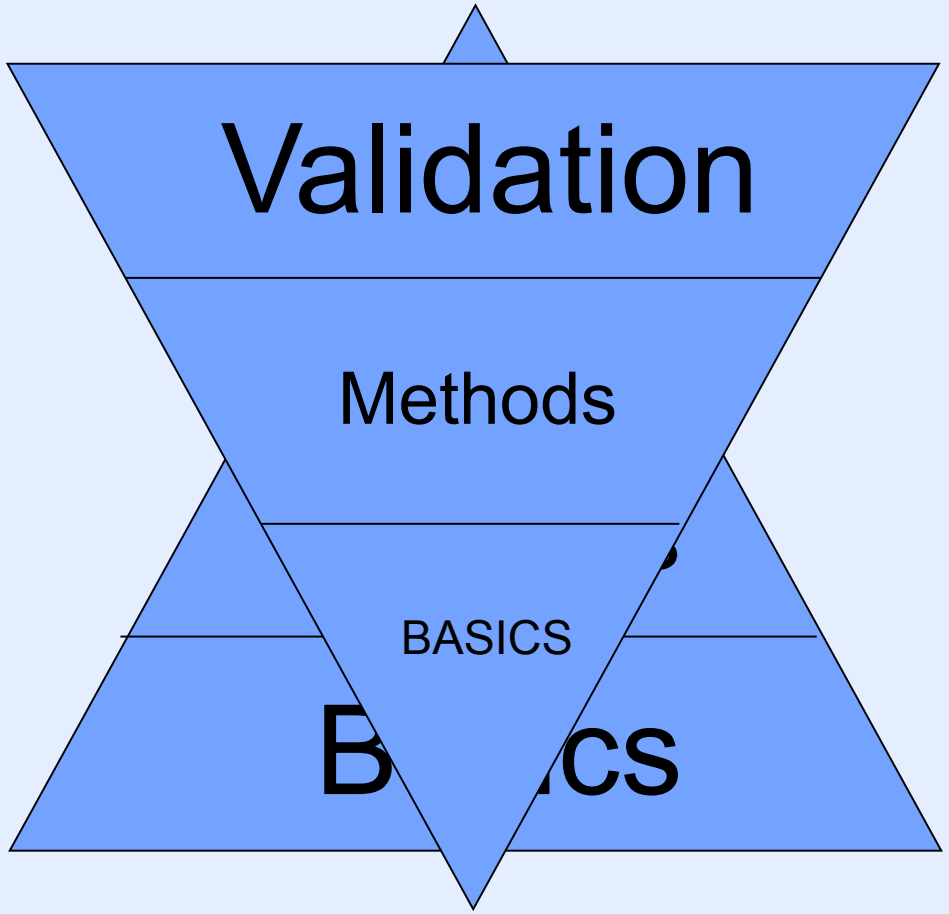
SE – today is

- an empirically-based proto-discipline
- has almost no data

Analogy can be drawn with the state of in business and management BEFORE their quality revolutions

SE Method and Theory

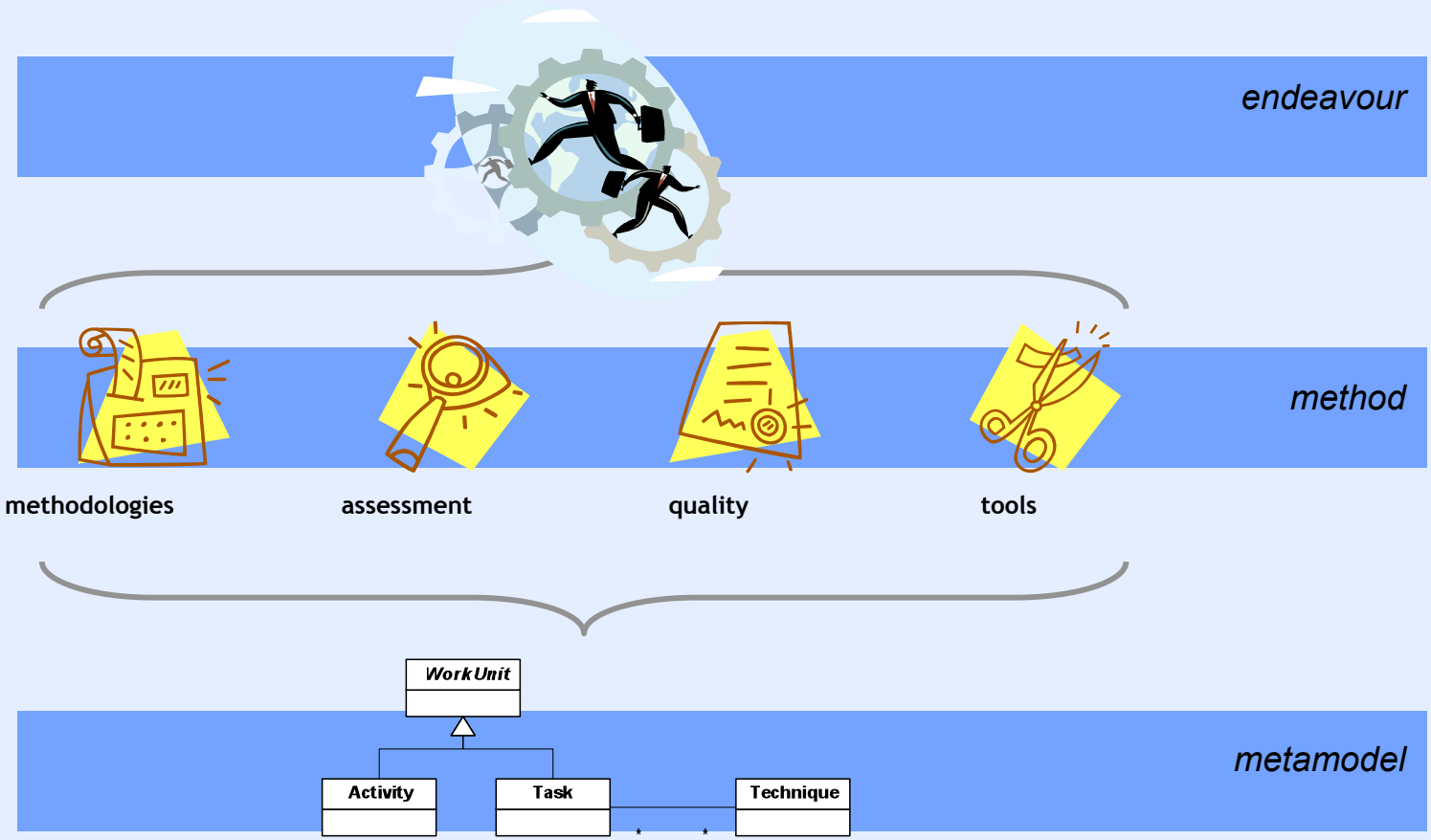
- My proposal
- Quantify and codify



Start with basics

- Basics layer has a reliance on logic and mathematics - e.g. set theory, category theory, VDM
- Measurement framework is a vital element
- Concepts (the “kernel language”) depicted using formal mathematics or less formal visualizations based on this e.g. ontological structures, metamodels

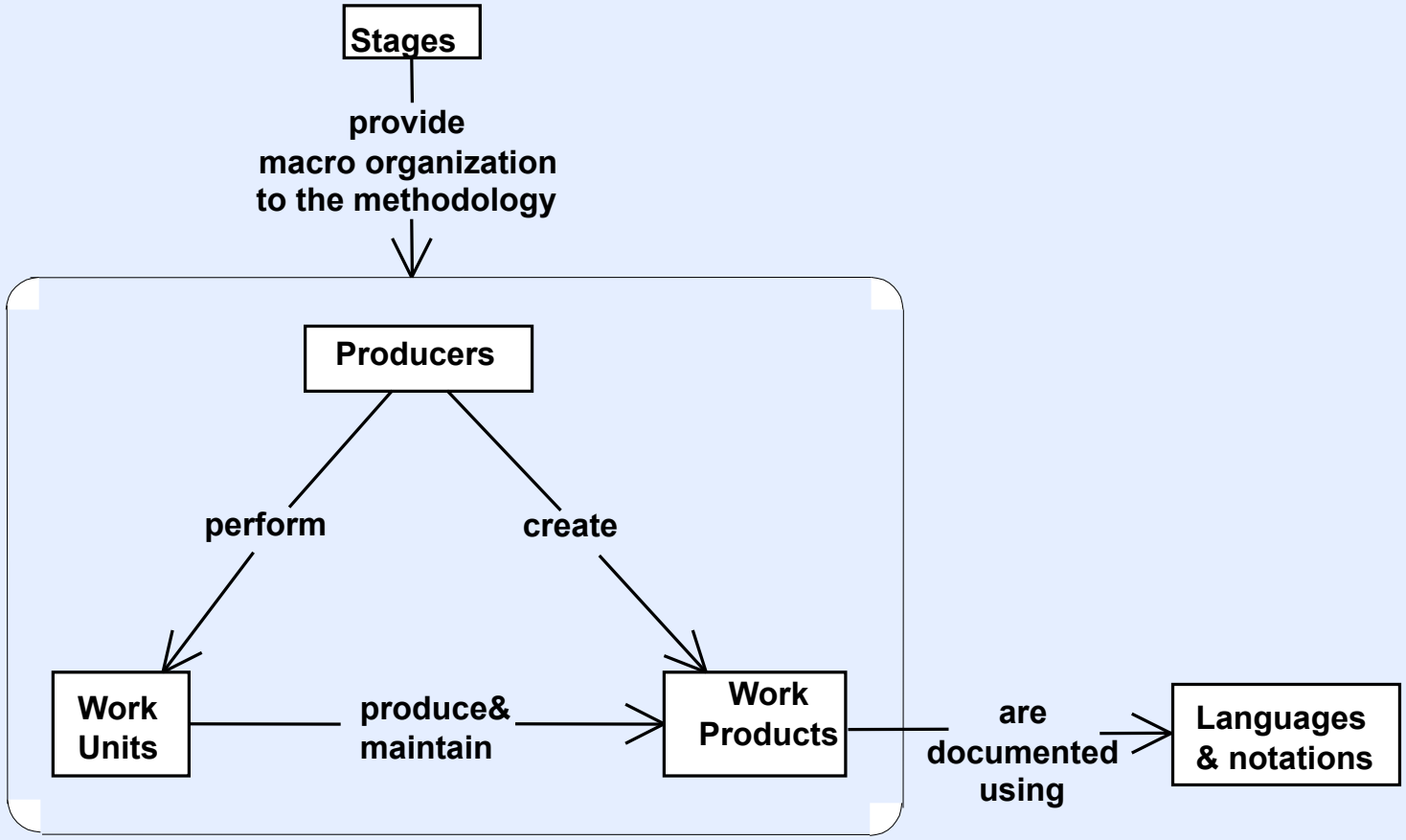
Detour to metamodelling (one option)



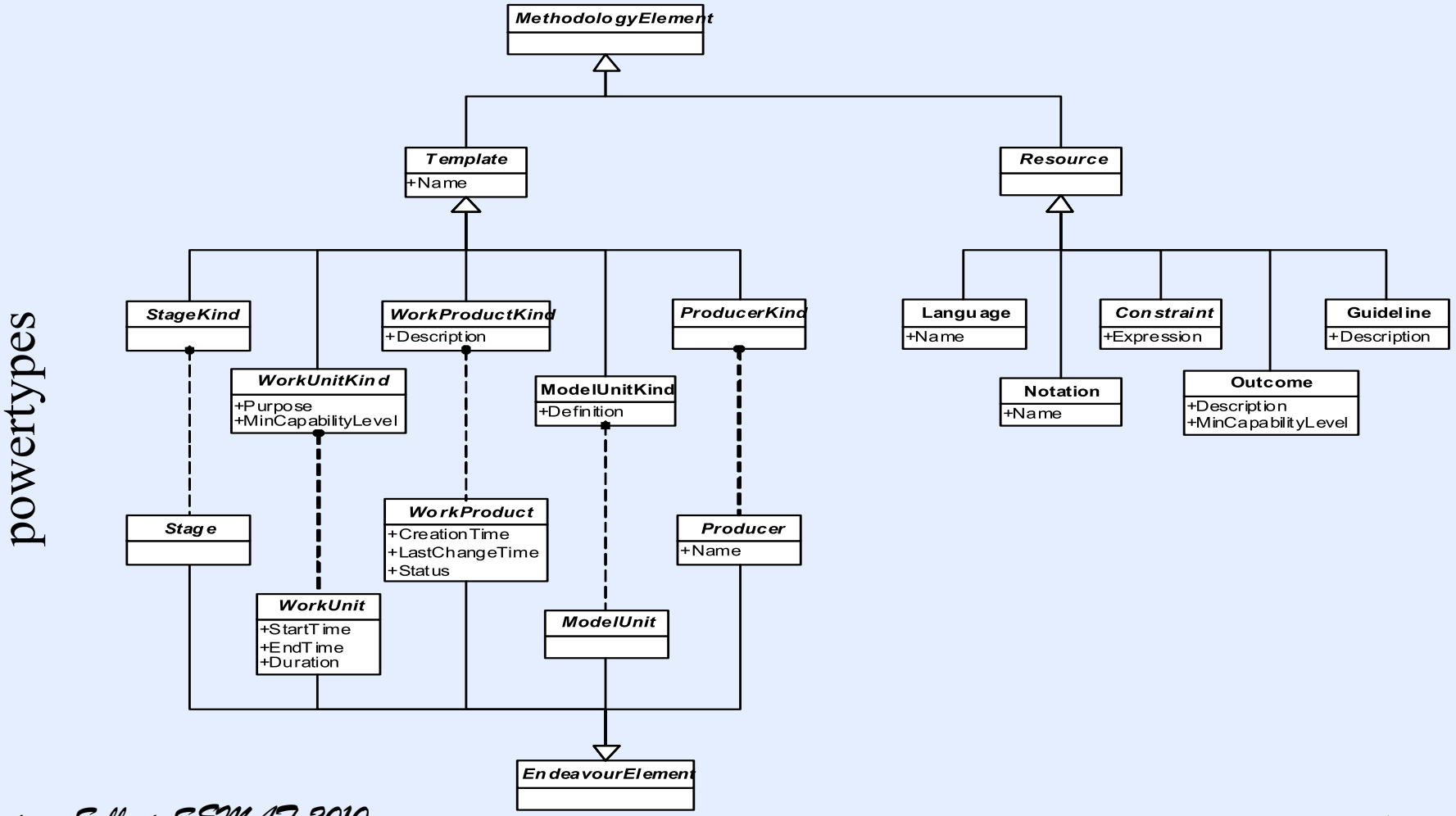
A metamodel

- is simply a model (of models)
- is often the core of CASE/CAME tools. Thus, implicitly accepted by users as being a “rule set”
- can provide an extensible framework across multiple abstraction levels

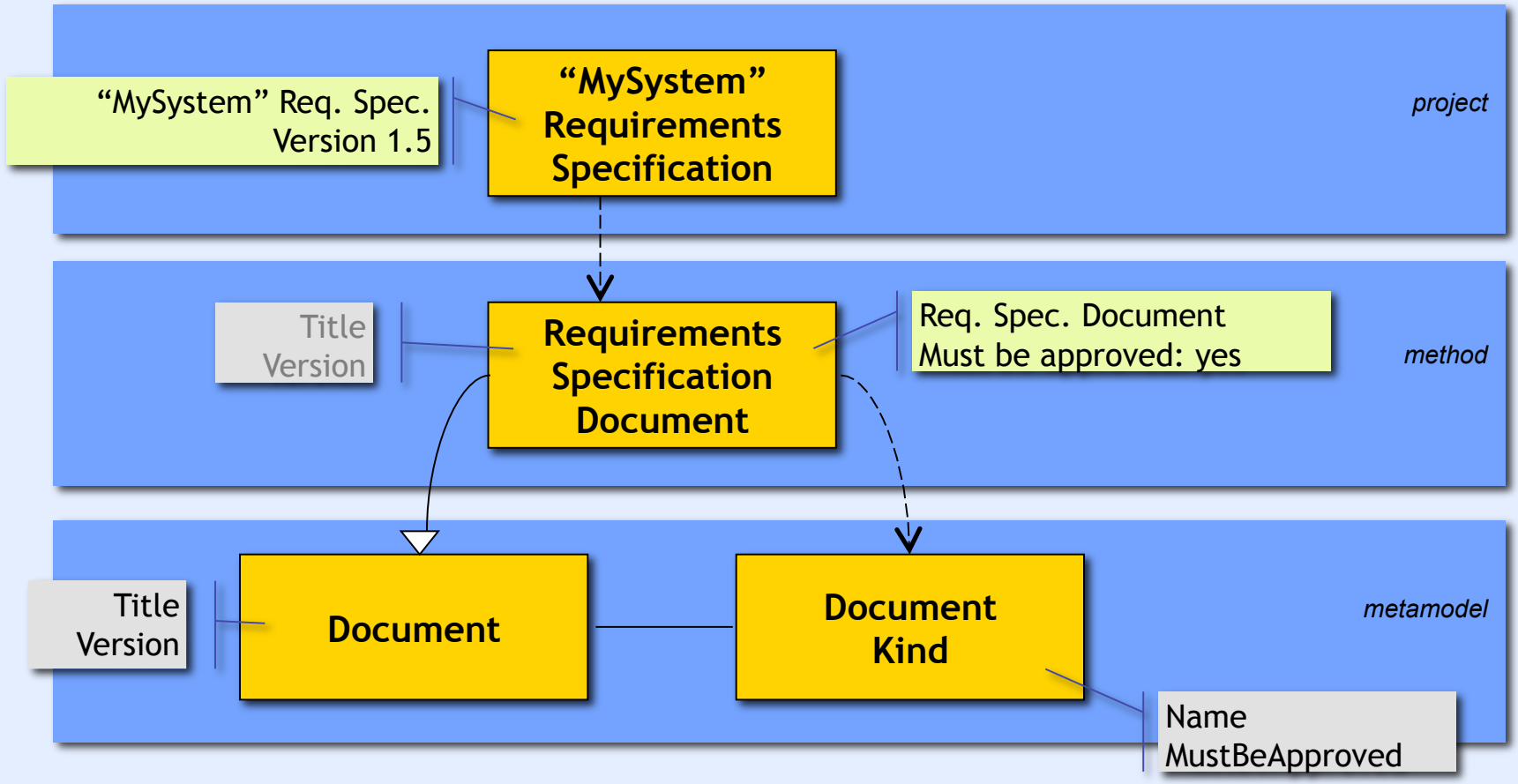
A simplified architecture



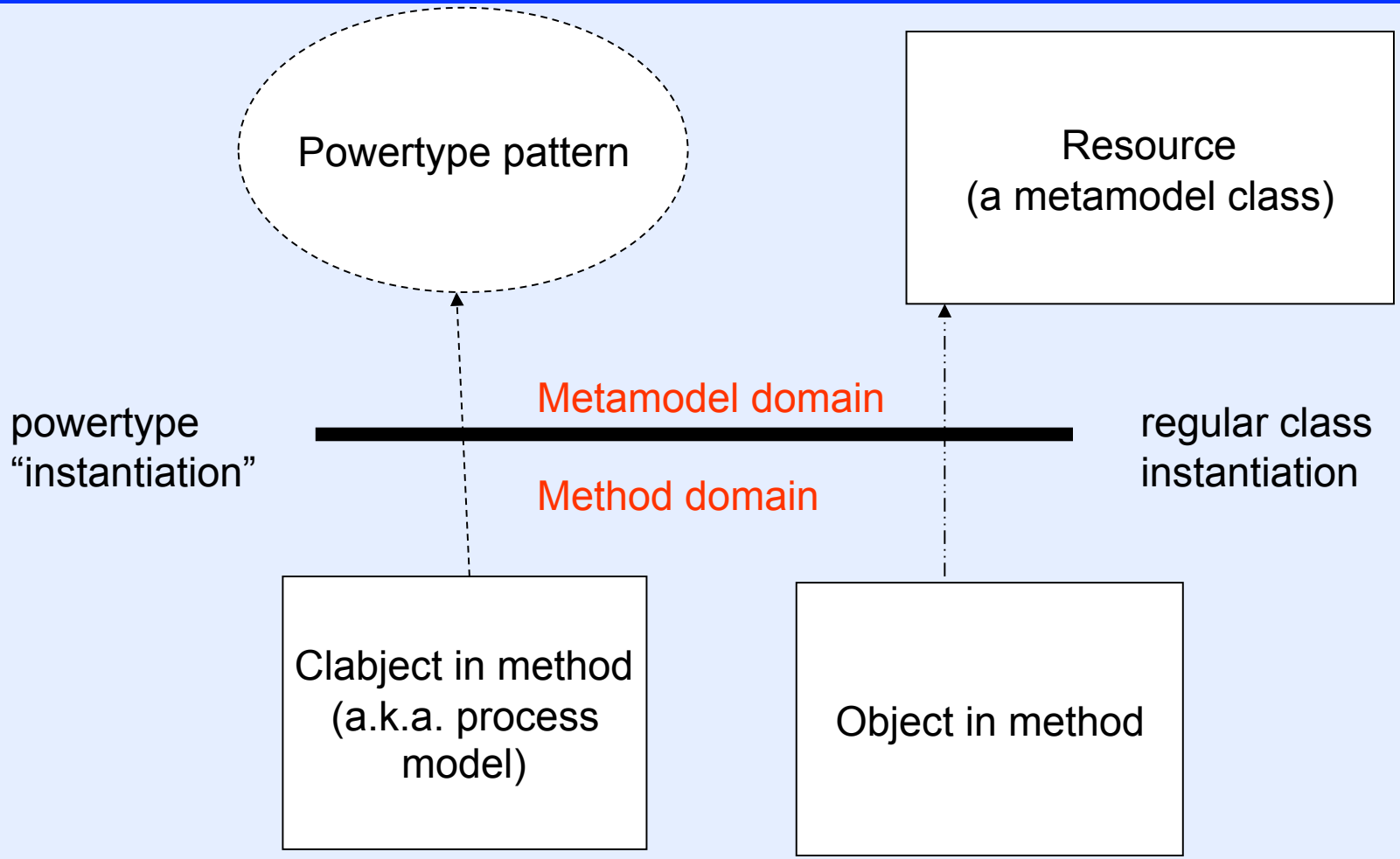
The ISO/IEC 24744 metamodel



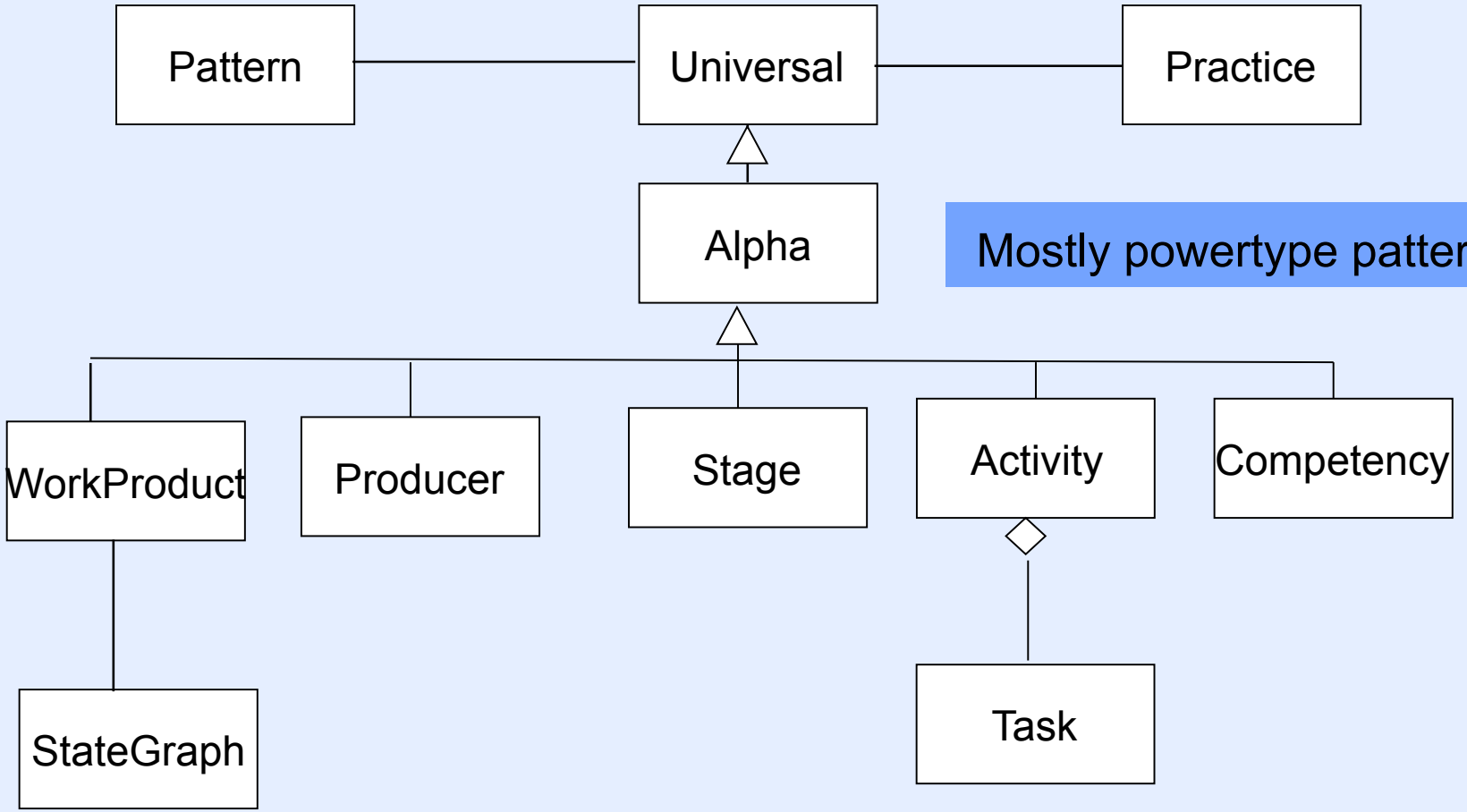
Powertypes solve non-transitivity



More simply



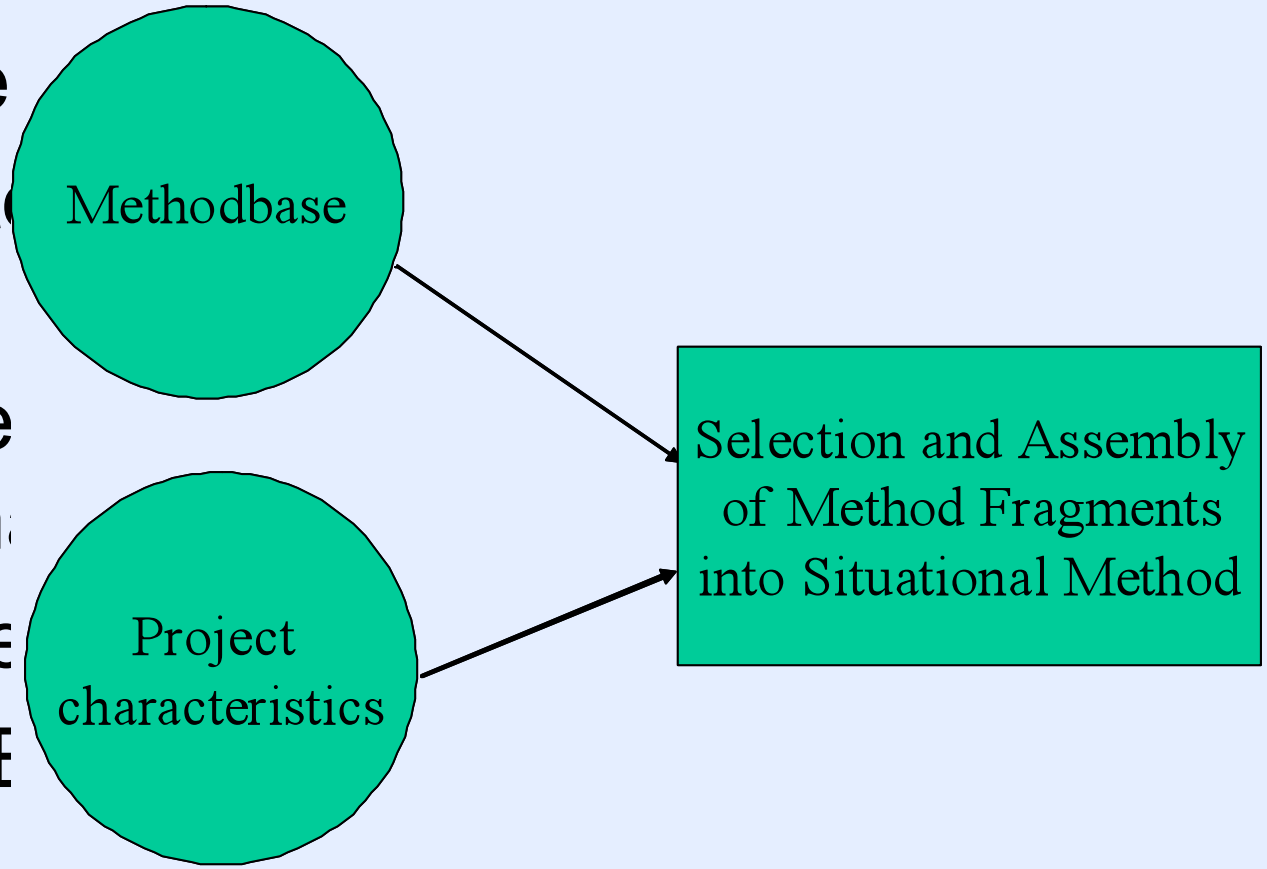
Part of a possible SEMAT metamodel



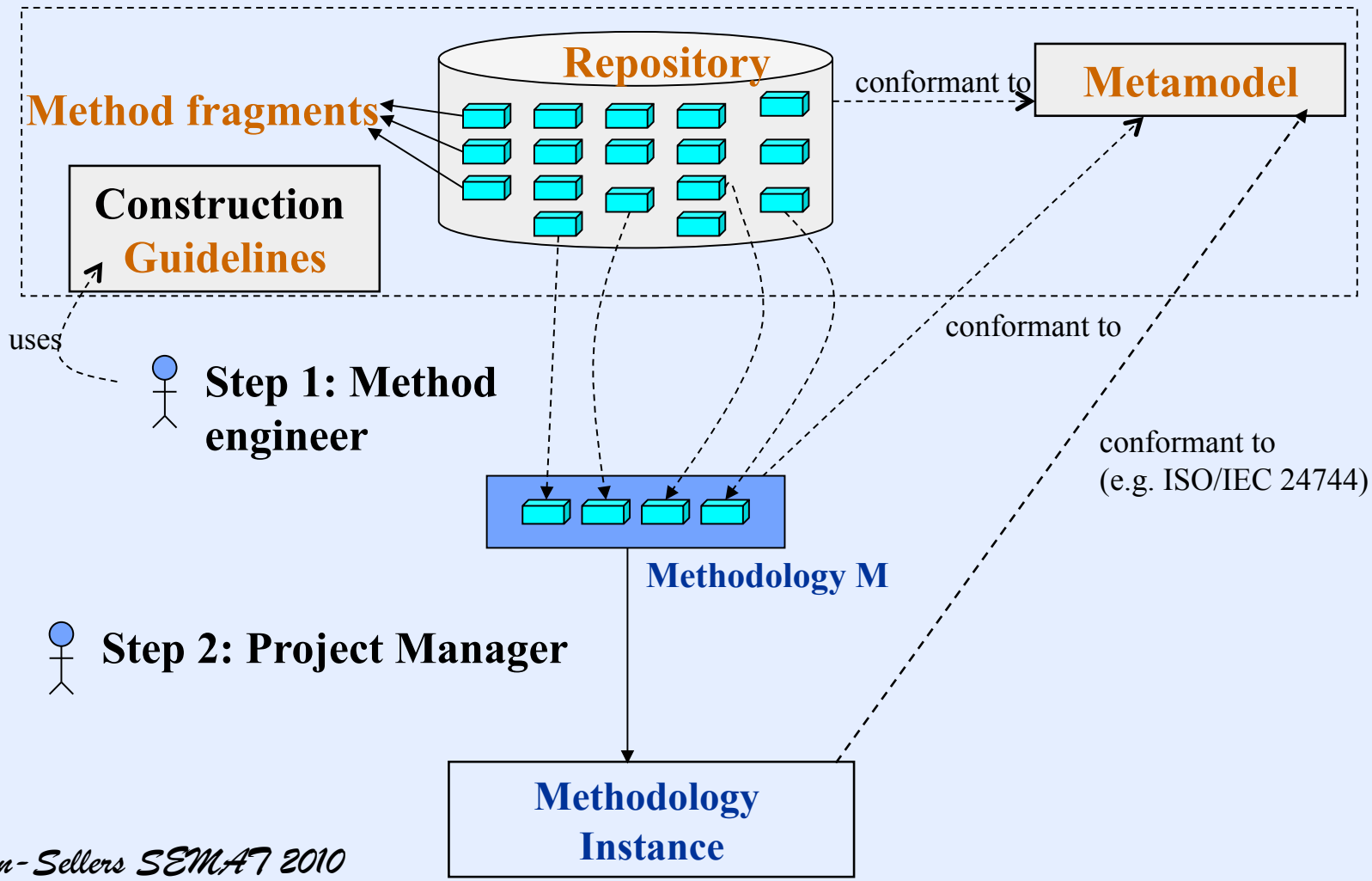
Ensure “Risk/Uncertainty” & “Quality” included

Having established the basics

- How to create
- Best candidat
  Engineering
- SME uses me
  to be conform
- Ontological de
- Detour to SME



SME in a nutshell

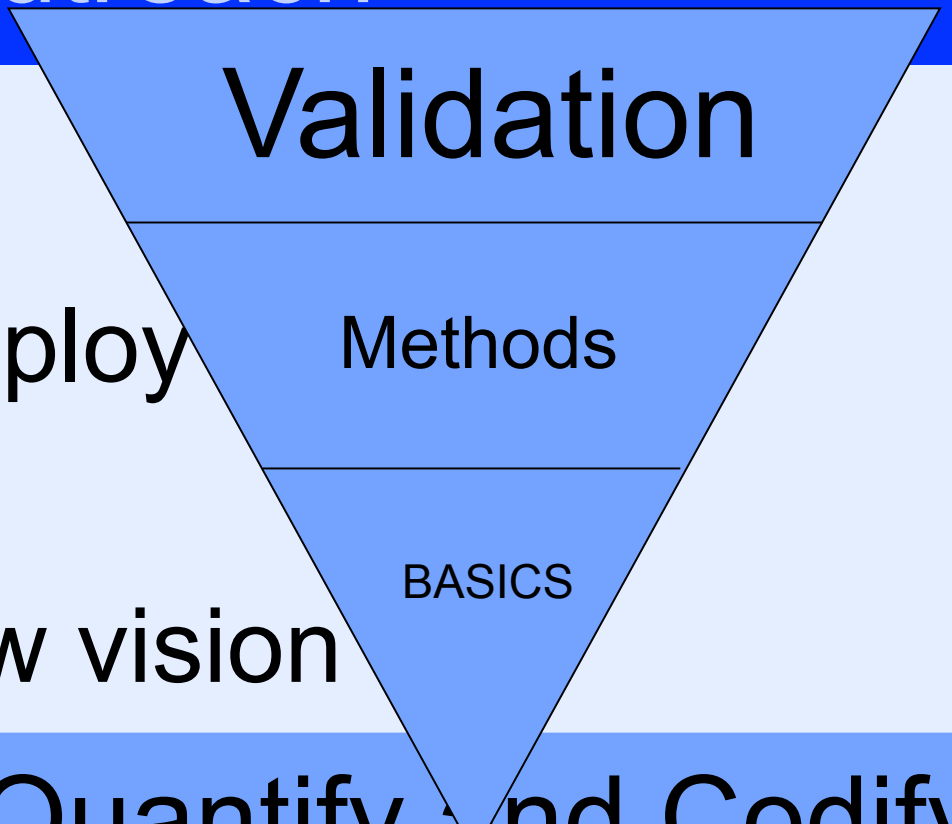


Level 3 is also vital

- Engineering disciplines are observationally-validated
- Good quality data are vital to provide empirical evidence for “good practice”
- Accept validated concepts into “body of knowledge” (link to SWEBOK)
- Eschew “proof by assertion” – common today in SE

Outreach

- Agree and employ
- Propagate new vision



"Quantify and Codify"