Systems Engineering Course Research Methods; Framework

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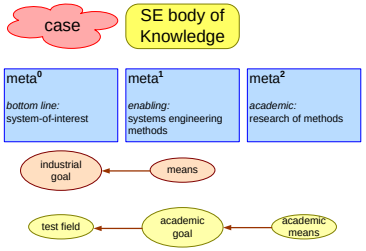
Abstract

This module shows a framework for shaping and executing applied research, and offers guidelines for the various steps.



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Colophon

This course is a joint development of

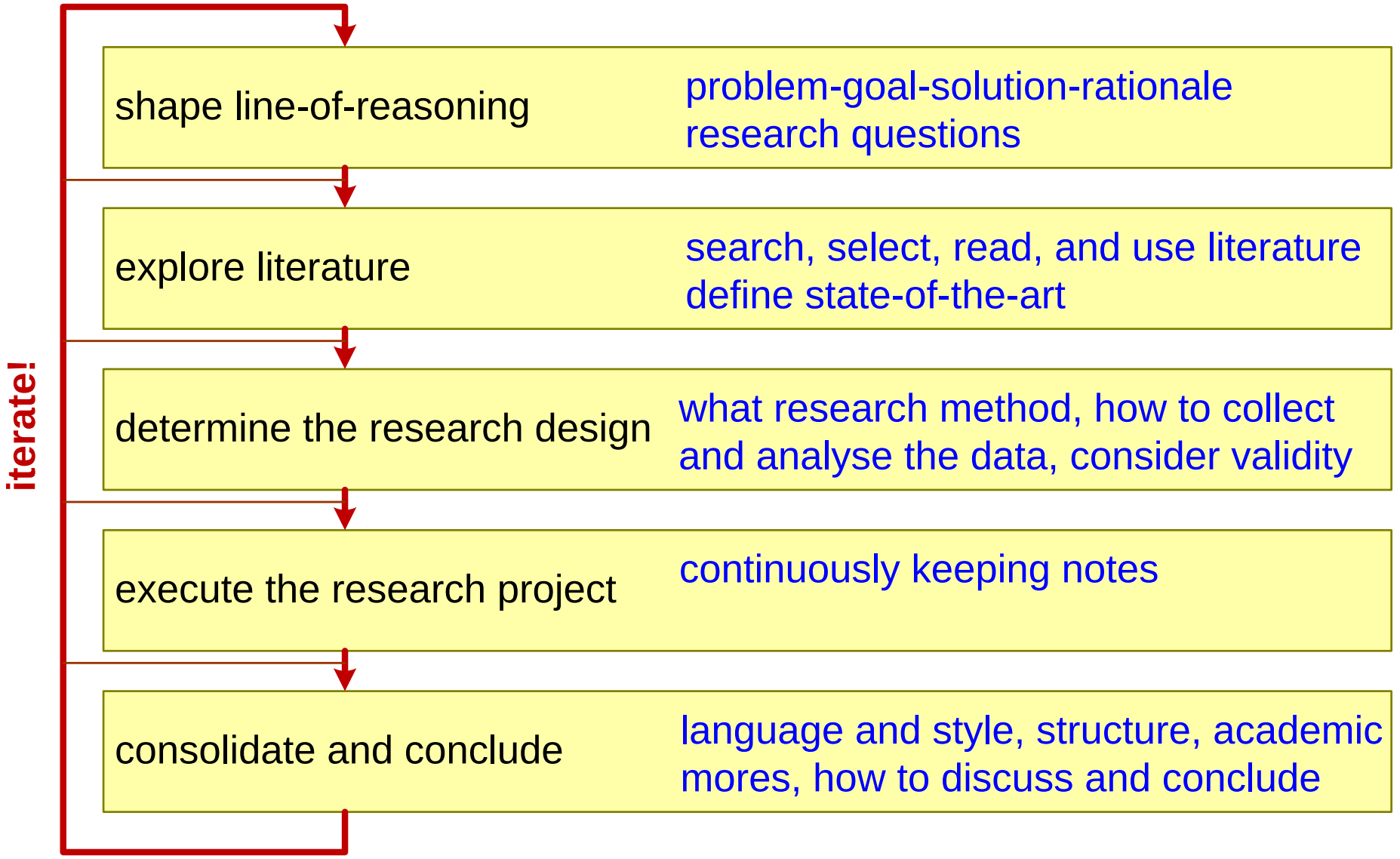
Kristin Falk

Satya Kokkula

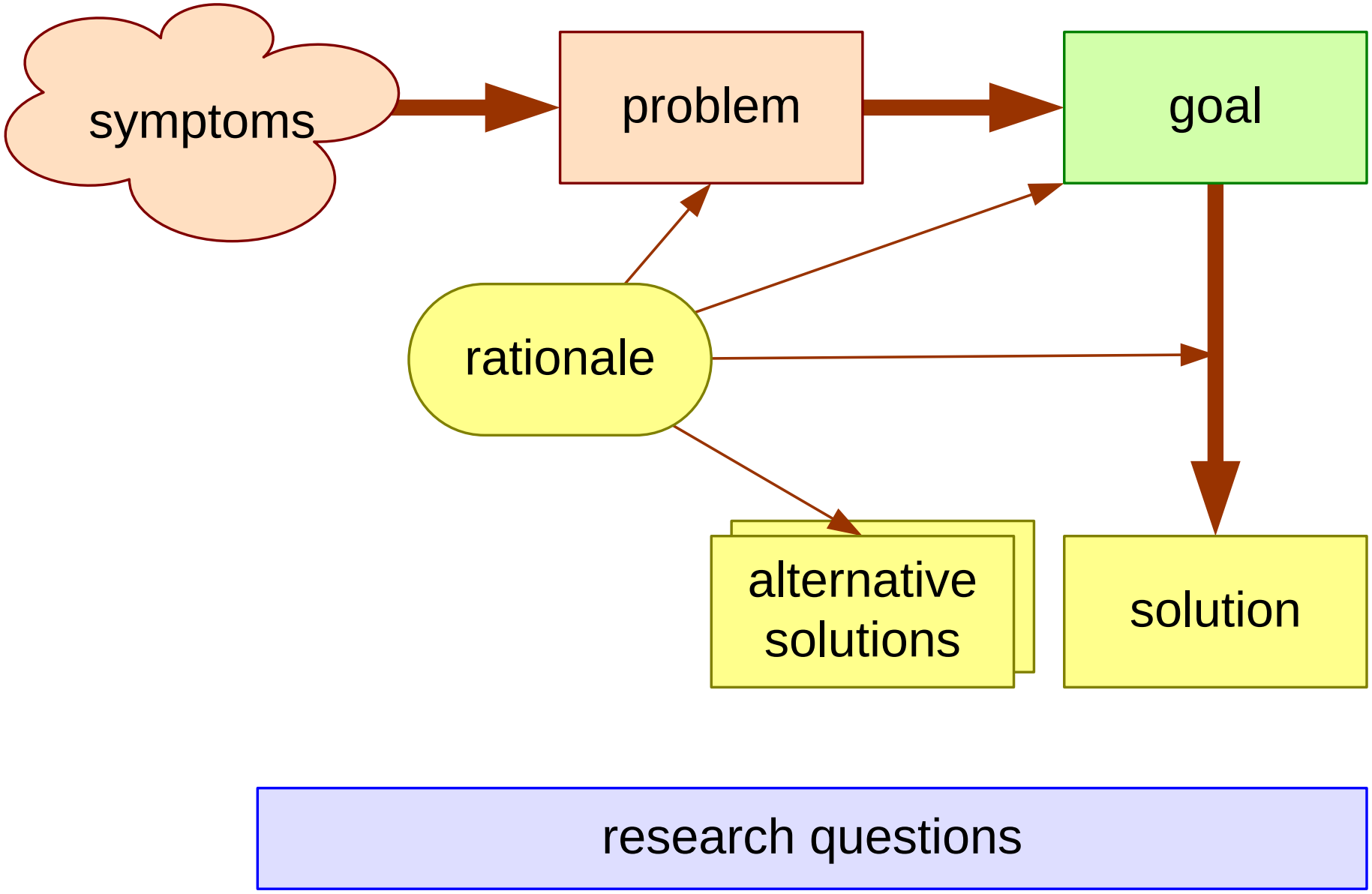
Elisabet Syverud

and Gerrit Muller

Applied Research Framework



Line of Reasoning

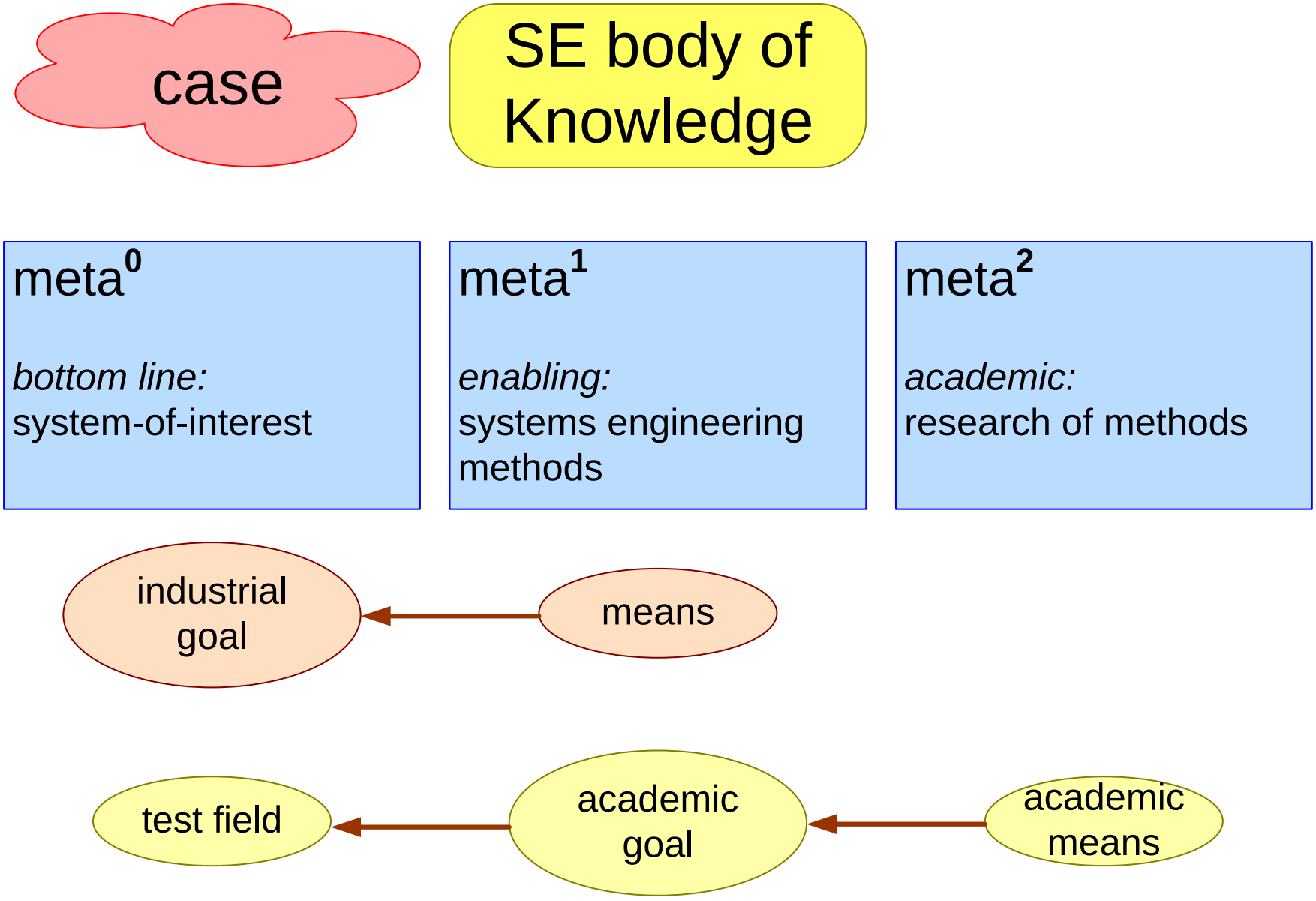


Multiple Levels of Academic Abstraction

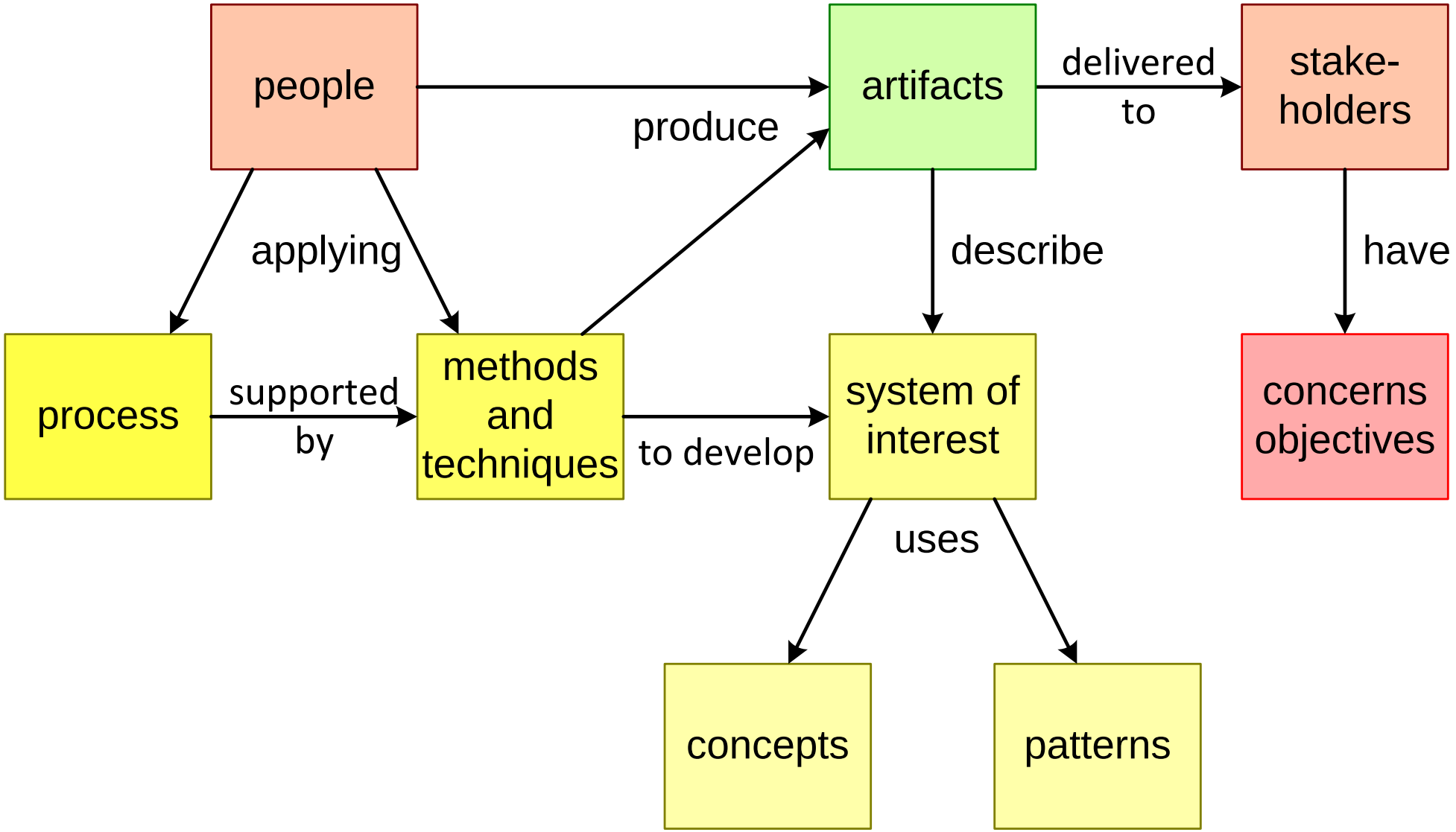
SE body of Knowledge

meta^0	meta^1	meta^2
bottom line: system-of-interest	*enabling:* systems engineering methods	*academic:* research of methods
work over system missile production line turbine package control system tie-in system	stakeholders and concerns ConOps operational needs need statement needs into requirements SMART requirements concept selection partitioning and interfaces documenting the architecture knowledge management conceptual modeling budget based design integration and verification plan design of qualification program	measuring experimenting modeling surveys interviews refering to literature argumenting

Industrial versus Academic Perspective



Research Context



Some Terminology

Formalisms languages/syntax: for example, differential equations, timed or hybrid automata, finite state machines, et cetera

Models instantations of formalisms to understand, explore, optimize or verify specification or design

Techniques to get the required information from models: e.g. performance

Methods to provide guidelines how to use formalisms, create models, use techniques and apply tools

Tools to support efficient application of formalisms, techniques and methods