

The Science of Computing and the Engineering of Software

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Science  Engineering

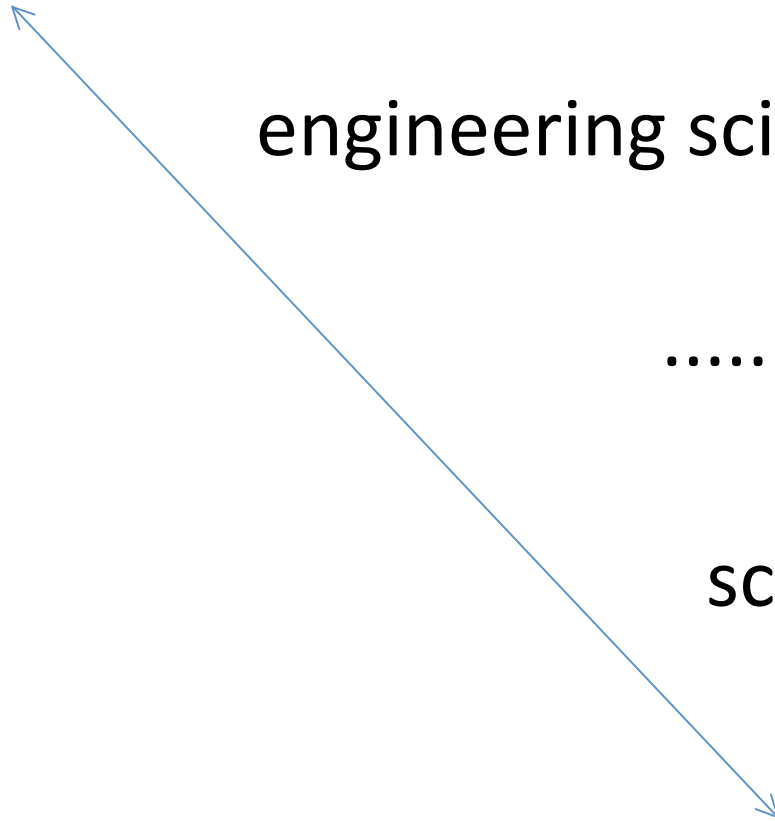
- pure scientist

engineering scientist

.....

scientific engineer

practicing engineer



Science  Engineering

- long-term

- short-term

Science Engineering

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- idealism

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- compromise

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Science



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- formality
- correctness

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- specificity
- amalgamation
- diversity
- best practice
- intuition
- dependability

The Science of Computing

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 - what does a program do?
 - how does it work?
 - why does it work?
 - how do we know?

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by split into modules with defined interfaces
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by theory of program semantics
 - how do we know?
by calculation and proof

Science delivers results

- as a software engineering toolset covering all phases of software development
 - specification, design, coding, testing, modification, evolution, ...

integrating the services of

- program analysers, type checkers, theorem provers, code generators, test case generators, ...

Domain Models

- describe the real world
 - ... things, people, requirements, constraints
- in natural language,
- with diagrams, pictures, examples,
- and mathematical or logical formulae
 - where appropriate.
- Compare scientific ontology, knowledge based systems, common sense reasoning (Cyc) ...

Specification and design patterns

- Cover a range of alternative designs
 - listing the necessary decisions
 - and the criteria for taking them
- Well-structured for generality/specificity
- Supported by tools
 - Development environments, animators, analysers and code generators....

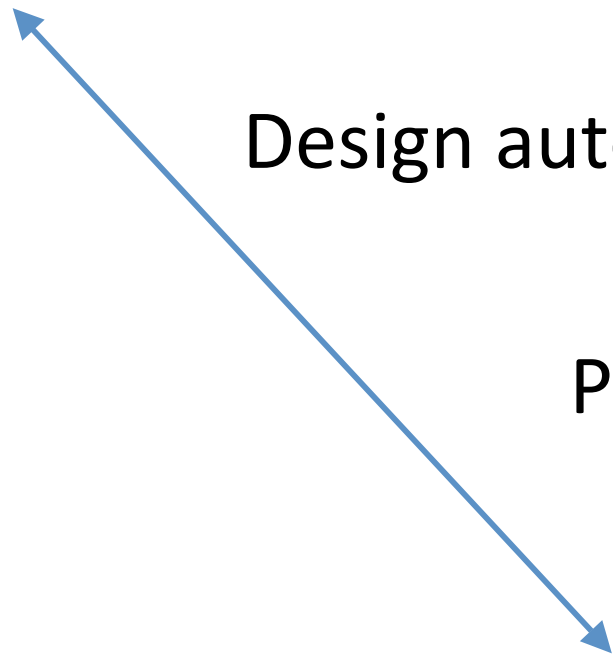
Technology transfer

Science of correctness

Design automation

Program analysis

Engineering of dependability



One day ...

- Software will be the most reliable component of every product which contains it.
- Software engineering will be the most dependable of all engineering professions.
- Because of the successful interplay of research
 - into the science of programming
 - and the engineering of software