Why Information Technology is not Science, and why it matters

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Outline

1. Which paradigm?
2. Problems of 'scientism'
3. Answer A: Different types of theory
4. Answer B: Design theory
5. Questions for further work

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1. Which paradigm?

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Knowledge Area Examples

Science Paradigm	Applied Paradigm (e.g. Information Technology)
▪ Gas Laws	▪ Relational database theory
▪ Theory of relativity	▪ Methodologies (systems development, OO, ...)
▪ Learning theories	▪ Architectural principles of systems, software
▪ Institutional theory	▪ Guidelines for strategic IS management
▪ Cognitive psychology	▪ IT Governance

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Argument

The IT research paradigm should be one of an applied discipline which concerns the design and construction of IT-related artifacts and interventions in the world.

main Focus

(Other applied disciplines including management, accounting, medicine, architecture, engineering, economics.)

We should not uncritically adopt our models of research from the science paradigms, either physical or social science.

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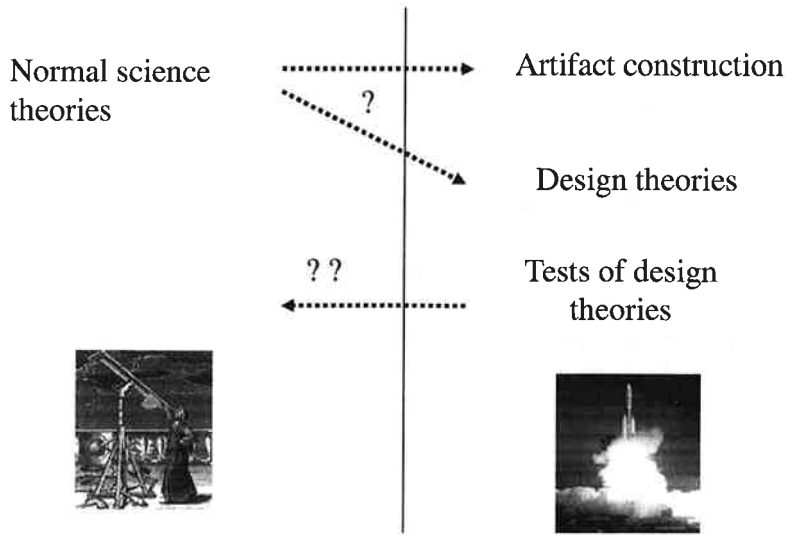
Interaction between normal science and design science



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Examples of work in the design paradigm

- Much (most) computer science and software engineering
- Eric van Heck and colleagues – 'Making Markets'
- Iversen et al.(2004). Developed a process for managing risks in software development – action research studies (MISQ, 28,3, 395-434)
- Basili et al. - Copyrighted approach for bridging the gap between business strategy and software development
- Peter Weil et al. at MIT – work on IT governance
- Much other work – often not labelled as "design work"

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2. Problems of 'scientism' paradigm

- Pre-occupation with idealized views of science
- Aim for legitimacy through 'being scientific'
- Don't regard design theory as legitimate form of theory (as in "where's the theory?")
- In Inf Sys:
  - pre-occupation with debates about positivism vs interpretivism (largely irrelevant)
  - Grab-bag choice of theory to underpin Inf Sys work
  - Lack of focus on outcomes and things in the real world that can be manipulated to achieve these outcomes when doing normal science-type work

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- Teaching inappropriate research methods (not including ones to do with design approaches)
- Theories/models investigated that do not lead well to design knowledge (eg TAM in Inf Sys)
- Lost opportunity for identifying what really defines ICT disciplines
- Lack of relevance of much IT work to real problems
- Insufficient thinking about what 'design research' really means and how to practice it

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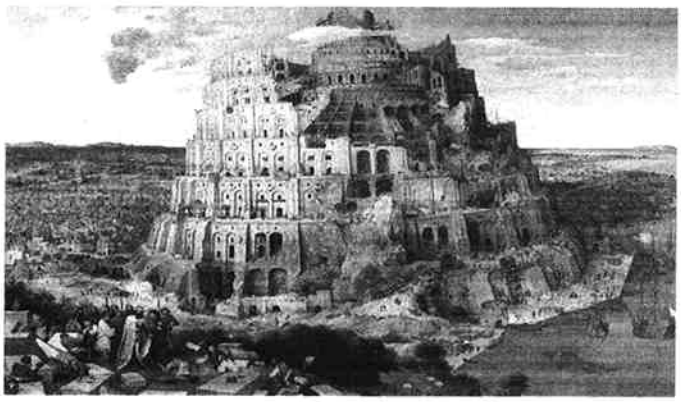
3. Answer Part A: Recognize different types of theory



Allowing communication within a common framework

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Types of theory

Different types:

- **I – Theory for analysing**
- **II – Theory for explaining**
- **III – Theory for predicting**
- **IV – Theory for explaining and predicting**
- **V – Theory for design and action**

Gregor, S. (2006). The nature of theory in information systems, MISQ, 3,30, 611-642.

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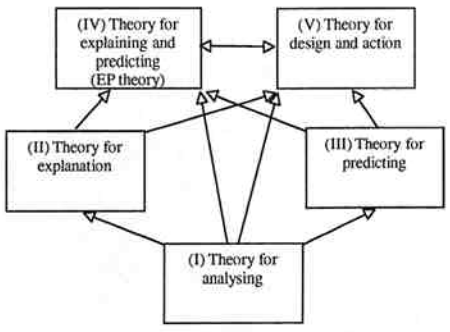

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Type I – Theory for analyzing

- Says "what is"
- Needed when little known about a phenomenon.
- Can be (a) analysis/descriptive (b) classification (c) construct measurement

Examples:

Iivari, Hirscheim, Klein (2000) – framework for classifying ISD methodologies

Work on ontologies

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Type II – Theory for explanation

- Says "how", "why", "when" , "where"
- Similar to some work in interpretivist paradigm
- Can be:

  (a) for enlightenment, sensitizing at a high level

  (b) For explaining particular case(s)

Example:

Orlikowski (1992) – structurational model of technology – high level of generality

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Type III – Theory for predicting

- Says "what will be"
- Can have precise prediction without understanding eg in predicting business activity
- Examples:

Moore's Law (1965) – relationship between number of computer components per chip and cost over time

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Type IV – Theory for explaining and predicting

- Says "what is", "how", "why", "what will be'
- Common view of theory in sciences
- Some may term "positivism" but does not necessarily entail quantitative methods, naïve realism or strong determinism
- Propositions may be probabilistic
- Examples:
  - Weber – Theory of representation, systems theory

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