Two Really Different Traditions of IS

- **C-IS**
  - Defines itself as branch of Computer Science
  - Computational paradigm, engineering science
  - Focus: representation and construction of IS as designed artefact
  - Perspective: inside IT, inside-out

- **M-IS**
  - Defines itself as branch of business school research
  - Empirical research paradigm, social science
  - Focus: organizational and managerial variables surrounding IT employment
  - Perspective: outside IT, outside-in

IS: What are Key Issues in Defining the Field?

- What is the core object of IS research?
- Is it actually an independent scientific field?
- or just an amalgam of various other disciplines?
- What kind of interesting scientific results IS may be expected to deliver as a field?
- What are IS’ specific epistemic foundations and scientific methodology?
- “Rigour or relevance”?
- Is IS actually producing first principles and core theories about its subject matter?
- If so, what are these key insights?

Images of Science (1/2): Exact Sciences

- **Theory**
  - Formal math and its machinery
  - Fundamental “first” principles
  - Classical (Euclid as classical role model)
  - Modern: parsimony, Occam’s razor
  - Contrast with purely empirical, “phenomenological” models
  - Abstract, distant from directly observable reality
- **Experiment**
  - Validation by controlled observation & experimentation
  - Experimental method as core of scientific approach
  - Simulation as lab experiment
- **Engineering**
  - Just practical application of existing scientific knowledge
  - Assumption: knowledge transfer is linear value chain
  - Often overlooked: many steps between principles and test in observable reality

Images of Science (2/2): Social Sciences

- **Natural Science model**
  - Theory = (ideally) formal math and its machinery
  - “Quantitative” approach
- **Empirical research**
  - Validation by controlled observation and experimentation
  - Experimental method as core of scientific approach
  - Separation of context of discovery and justification (confirmation)
- **“Interpretive” Humanities model**
  - Theory = coherent conceptual system (in natural language)
  - “Qualitative” approach
  - Human as agent, subject
  - Knowledge as social construct
  - “Subjective” stance
      - Explanation, understanding
- **Empirical research**
  - Interpretation by observation, interview, text/observation and symbolic (inter)action analysis
  - Subject/Context-inclusive methodology as core of scientific approaches
  - Discovery and justification (confirmation) seen as cycle
The Design Science Discussion

- **(C)IS** (e.g., RE, Wieringa et al., Akkermans & Gordijn)
  - Engineering cycle is integral to IS
  - Q: designing itself not part of research? Evaluation?
  - A: (1) socio-technical (context); (2) design as claims to knowledge that are to be externally validated
- **(M)IS** (e.g., MISQ, Hevner et al.)
  - IS as design idea is novel discussion
  - Q: But made simply identical with Simon’s approach
  - A: (1) conceptualization and formalization of goals, business/social context, viewpoints; (2) interactive feedback loops between system and context


- Design as (academically respectable) Science
- Design science as branch of Computing
  - Start points: OR (utility, decision, optimization), AI
- Design is (computerizable) Problem Solving
  - Goal seeking in state/possible world/solution space
- Specifically: Design is Search
  - Means-ends analysis & resource allocation
- Design problem (re-)Representation:
  - problem solving as representation change
- Design and Complex Systems Theory
  - Hierarchy, (near)-decomposability, generate-and-test
-Clients, stakeholders, society: p.m. (?)

Design Science: Why & Where Simon/MISQ Is Right

- Design as Science
  - Theory-based claims about “possible worlds” that can be computationally, theoretically/analytically, and empirically tested
- Computational theories of design phenomena are possible
- Involves Complex Systems theories
  - To lead to theories of problem-in-context
- Novel contributions to science in general
  - Drop unrealistic assumptions (full optimality, rationality)
  - Still techniques that work (heuristic reasoning, intelligent systems)
  - Approximating methods that reduce complexity
  - Hierarchical leveling, near-decomposability, spacetime scale/ordering, problem re-representation/transformation, etc.
- To: theories of information as problem-solving-in-context

Design Science: Why & Where Simon/MISQ Is Wrong

- Design is NOT (just) Computing
  - Ignores DOMAIN context + engineering science and its [much more concrete] contributions (e.g., Pahl & Beitz, Hubka & Eder, etc.)
- Design is NOT (just) Problem Solving
  - Ignores needs/requirements as Problem Formulation (e.g., Smethers, &Value; problem itself is to be explored extensionally)
- Design is NOT (just) Search
  - Ignores (1) knowledge-based PSM methods knowledge (2) “holistic” solution knowledge (e.g. patterns, templates, catalogs, …)
- Design is NOT (just) formal or quantitative methods (OR, social empirical science “variable talk”, KR logics)
  - Ignores qualitative methodology and reasoning (case study, field observation, scientific argument, conceptual/ontological analysis, …)
- Design science is NOT (just) remote from real people in real world outside science/academia
  - Client/customer / human factors / etc: Simon/MISQ tend to ignore reflective practice views and issues (e.g. Argyris & Schön)

Does IS Have Any Real Scientific Achievements?

- List of established principles rather implicit, but can be made explicit
- Social (“soft”) factors dominant in success (“hard”) IT systems
- IS/IT as “socio-technical” problem analysis and solving
- Complex cross-boundary systems thinking and theory
- Distinction conceptual level vs. computer program level
- Conceptual model-based thinking, ontology
- Value of diagrammatic visual formalisms (ERD etc.)
- Architecture notion, Patterns
- Contributions to innovation, from DB to web SOA
- Also shows the shortcomings of IS as a field
  - Many principles OK but very (rather: too) general
  - Shallow- & narrowness: lack of specific and integrated theory
  - Lack of validation in the field
  - IS knowledge claims often not actionable enough

Q to Ask to the IS Community: What kinds of results?

- Information representation: syntax (OK) – semantics (yes) – pragmatics (hm): from statics to system dynamics
- Analysis of IS context is essential and central (e.g. requirements)
- Interaction IT technology – social lifeworld researched, but too one-sided in IS (but no other discipline really works on it)
  - Why is (M)IS so defensive? Will never work
  - Clients, stakeholders, society: p.m. (?)