Reconsidering current approaches in eServices innovation, design and research

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Service innovation

- (Mobile) Broadband services
  - However, no real broadband services
  - Mobile services: walled garden versus Open Mobile Internet
- ICT enabled Service innovation and design, however
  - Healthcare, i.e. EMD
  - Financial services, payment services, insurance
  - Content industry, Triple play, new service concepts are lacking, DRM
  - SME's lagging behind
- Issues
  - Policy limited attention for services innovation, while 70% of economic growth and increase in labor force is service based
  - ESB-article: network formation and orchestration for service innovation, knowledge sharing: academic and professionals (community of practice), and definition of competence centers for service engineering

Service design

- Product design, formalized
  - Fundamental engineering, system engineering, total design, concurrent engineering and Quality Function Deployment
- Service Blueprinting (Shostack, 1984)
  - Assess impact of new service on organization
  - Visualization of process
- Service System Planning (Normann, 2000)
  - Focus on service system components
  - Checklist based
- Service concept (Goldstein et al., 2002)
  - How and what of a new service

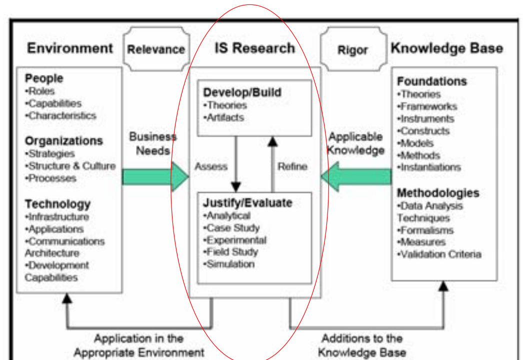
Example tools and projects Service design

- MuCHQFD
  - Development of multi-channel service design methods (Simons)
- STOF
  - Context aware mobile service bundle design in the safety and health care sector (Frux: Haaker et al., 2004, 2006)
- Tools for service orchestration and service composition (Janssen, Gortmaker, Feenstra)
- Consent Decider
  - Interdomain user profiling and Privacy control architecture design (Eldi, Daskapan)
- ICT and crisis management (simulation, design, user tests)

Service design and IS research

- Design science:
  - Process and product (artifact)
  - Build and evaluate
- Behavioral science
  - Develop
  - Justify

Hevner, A., S. March, J. Park, & S. Ram (2004). Design Science in Information Systems Research, *MISQ*, Vol 28, no 1, pp. 75 -105



Source: Hevner, A., S. March, J. Park, & S. Ram (2004). Design Science in Information Systems Research, *MISQ*, Vol 28, no 1, pp. 75 -105

Design Research (1)

Table 2. Design Evaluation Methods	
1. Observational	Case Study: Study artifact in depth in business environment
	Field Study: Monitor use of artifact in multiple projects
2. Analytical	Static Analysis: Examine structure of artifact for static qualities (e.g., complexity)
	Architecture Analysis: Study fit of artifact into technical IS architecture
	Optimization: Demonstrate inherent optimal properties of artifact or provide optimality bounds on artifact behavior
	Dynamic Analysis: Study artifact in use for dynamic qualities (e.g., performance)
3. Experimental	Controlled Experiment: Study artifact in controlled environment for qualities (e.g., usability)
	Simulation – Execute artifact with artificial data
4. Testing	Functional (Black Box) Testing: Execute artifact interfaces to discover failures and identify defects
	Structural (White Box) Testing: Perform coverage testing of some metric (e.g., execution paths) in the artifact implementation
5. Descriptive	Informed Argument: Use information from the knowledge base (e.g., relevant research) to build a convincing argument for the artifact's utility
	Scenarios: Construct detailed scenarios around the artifact to demonstrate its utility

Source: Hevner, A., S. March, J. Park, & S. Ram (2004). Design Science in Information Systems Research, *MISQ*, Vol 28, no 1, pp. 75 -105

Design Research in IS
Strengths

- Problem solving oriented
- "Tangible"
- (Potential) highly relevant
- (Potential) multi-disciplinary
- Innovative
- Trigger for additional / revised / new theory

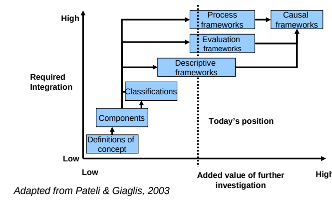
Design Research in IS
Caveats

Table 1. Design-Science Research Guidelines

Guideline	Description
Guideline 1: Design as an Artifact	Design-science research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation.
Guideline 2: Problem Relevance	The objective of design-science research is to develop technology-based solutions to important and relevant business problems.
Guideline 3: Design Evaluation	The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods.
Guideline 4: Research Contributions	Effective design-science research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies.
Guideline 5: Research Rigor	Design-science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact.
Guideline 6: Design as a Search Process	The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment.
Guideline 7: Communication of Research	Design-science research must be presented effectively both to technology-oriented as well as management-oriented audiences.

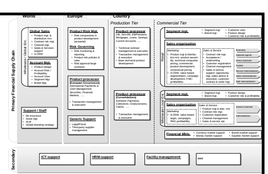
Design Research in IS
Weaknesses (1)

- Lack of existing theories, models and concepts on
  - design as process
  - design methods and
  - design artifacts
- Used design models are descriptive, seldom explanatory
  - For instance work on business model design



Adapted from Pateli & Giaglis, 2003

Design Research in IS
Weaknesses (2)



- If based on models
  - Difficult to communicate due to different views on reality (multiple stakeholders interests)
    - Too complex
    - Too abstract
    - Multilayered
  - Ambiguity in evaluation metrics
    - PKI's versus standardized metrics
    - Effectiveness, affectivity, innovativeness, agility, but also user satisfaction
  - Implicit assumptions about values – no rigid underlying theory

Design Research in IS
Weaknesses (3)

- Research design

O1	Xe	O2
O3	Xc	O4
	Xe	O5
	Xc	O6

Xc: placebo or no intervention..

How to deal with iterative character of design, and feedback loops..

- Internal validity issues
  - Standardized measurement tools are lacking for design
    - MISQ 2001-2006: 103 scales; EIS: 70 scales
    - Only scale: Short and long term outcomes of IS design
  - Mainly Adoption, Implementation, Use, Effect
  - SERVQUAL: post hoc
- Limited external validity of results
  - Small number of simulation runs or test cases
  - What is acceptable in Product Design (N=6) is not acceptable in IS research

Multiplicty in research

Combination of behavioral and design science required in multi-actor IS Research

Theory - Empiricism

- Multi-theory
- Multi-method
- Multi-trait
- Multi-level
- Multi-moment

Theory - Practise

- Multiple perspective: behavioral social science (hypothesis based) approach and design (engineering) approach
- Focus on DESIGN, adoption, implementation, use and effect of IS in and between organizations

eService Design and Engineering

- Multi-disciplinary
  - behavioral, organizational, economics, policy/regulation, and engineering sciences
- Multi-actor perspective: producers (services value web) as well as consumers
- Multiple design objects
  - Methodologies, tools, Architectures, web services, components
- Explicit Value driven
  - Reliable, secure, trust, universally accessible
- Goal oriented

- Process approach - Iterative multi-method design and evaluation
- Action research

Challenges for the IS community

- Relevance and impact through large multi-disciplinary projects
- Socio-technical system knowledge acquisition through combined behavioral and design research
- Theory on design as process, on design methodology, and on design as artifact