Understanding Systems Development in Practice: The Utilization of Methodologies

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Introductory Remarks on IS Research
• Information systems are a socio-technical phenomenon
• The spectrum in IS research reaches from design-oriented to socio-theoretical approaches
• My interest here is in systems development informed by knowledge management, quality management (software process improvement) and the adoption and diffusion of IT-related process and product innovations
• My focus therein is on systems development (and design), but not on products (artefacts), but the process:
• Systems development as a socio-technical phenomenon can be approached with socio-theoretical approaches and research methods (e.g. Structuration Theory or Actor Network Theory or …)
  (f.ex. Action case, Case study, Action research, Collaborative research)

Systems Development
An integrative framework by Sambamurthy & Kirsch (2000) understands the information systems development process as being defined by 7 core concepts:

Information systems development processes in organizations are the tasks undertaken to construct a computer-based information system, and the management of this effort, by a group of stakeholders with agendas, who engage in transactions over time with an institutional context by applying structure to their work with a set of tools and methodologies, and who judge outcomes of their efforts and act accordingly

How helpful is such a definition?

Background I
Arguments for adopting and using ISD methodologies (Avison & Fitzgerald, 1995; Fitzgerald 1998):
• accurate recording of requirements
• enabling to monitor progress
• provision of systems within an appropriate time limit at acceptable cost
• securing well documented systems easy to maintain
• enabling identification of changes as early as possible
• enabling delivery of systems liked by the relevant parties
• framework for the use of techniques and resources at the right time in the development process
• possibility for developers to specialize and for process standardization
• facilitation of interchangeability of developers

→ methodologies are often not used as intended
  - developers question the purpose of the methods and techniques
  - express a need for a different kind of support for their work

Background II
Research suggests a disparity between the way methods are formally described and the way in which they are used in practice:

• The basic assumptions are questionable: is ISD a manageable, linear, unique, repeatable and rational process (Truex et al., 2002)?
  – Rituals to give the impression of a rational process
    (Robey & Marcus, 1984; Stohrman, 1992)
  – Social defence (Wassell, 1996)
  – Symbols, but too structured to be of assistance
    (Nandhakumar & Avison, 1999)
  – Selective and pragmatic use
    (Bansler & Badar 1993; Fitzgerald, 1998; Madson & Kautz, 2002)
  – No or little support for domain knowledge, fluctuating requirements, communication break downs (Curtis et al., 1988)
  – Highly dependant on introduction process (Kautz & McMaster, 1994)

Research Approach, Questions & Method
• Provide scientific and empirical documentation of methodology utilization
• Understand how information systems development methodologies are used in practice
• Understand what does affect methodology use in practice
• Based on a case study in three development projects in a large Danish software Company
• Twelve, semi-structured interviews analysed with the Grounded Theory approach
Case Organization
A large Danish software company with customers in the private and public sector
- a quality assurance program and general development process with ISO-9001 certification
- two types of projects:
  - maintenance projects, which maintain and extend or improve the functionality of systems already in use.
  - development of new systems or the re-implementation of older systems using new technology.
- several formal methodologies with guidelines developed by a method support department
  - structured and object-oriented techniques
  - a waterfall model inspired development scheme,
  - ideally project management chooses from these when a new project is constituted
  - component-based development methodology with a CASE tool

Results
Universality, Confidence, Experience, Co-determination, Introduction
• Universality
  - Existing systems cannot be re-modelled without paying respect to the methodology they were developed in
  - Sequential methodologies cannot be used to develop large and complicated systems (alternatives are sought)
  - Technical platforms and development tools influence methodology applicability and choice

Results
Universality, Confidence, Experience, Co-determination, Introduction
• Confidence
  - Adjusting the methodology to provide interface prototypes to visualise progress and create security for the developers and the customers
  - Leaving the official methodologies which f.ex. under time pressure can not deliver is considered unsafe and frustrating
  - Using official methodologies to give management security

Results
Universality, Confidence, Experience, Co-determination, Introduction
• Experience
  - Experienced developers use their domain knowledge in many situations instead of the prescribed methods
  - The ability to overview the application domain enables them to analyse and design the systems without having to go through formal step by step guides
  - New methodologies are not adopted, when a new methodology is introduced – only more tools and techniques are put in the tool box
  - Inexperienced developers become dependent on experienced ones

Results
Universality, Confidence, Experience, Co-determination, Introduction
• Co-determination
  - Leads to motivation, responsibility and an attitude to show that the chosen way of doing things works well
  - Leads to methodological change
  - Less formalized structures of methodologies appeal to developers and underline their for more freedom in their work

Results
Universality, Confidence, Experience, Co-determination, Introduction
• Introduction
  - Limited training, education and explication jeopardize methodology uptake
  - Close co-operation with the method support department facilitates introduction and uptake
Relating the Themes

- Universality, Complexity, Experience, Freedom of Choice:
  Methodologies are adjusted in action; no universally applicable methodology exists
- Confidence, Complexity, Symbolism:
  Methodologies are used symbolically

- Complexity, Change, Confidence:
  Methodology utilization moves towards incremental methodologies
- Explicitness, Experience, Involvement:
  Methodology adoption depends on management support, explications and co-operation