

The Equipment nature of ‘the so-called’ IT Artifacts – Holistic ontology based IS design principles

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The Problem:

A Dominant logic to develop IT artifact (and it's limitation)

- **The principle of 'fit-logic' between:**
 - End-users' environment (the 'social')
 - Bundles of technical 'properties and functions' (the 'material')
- **In fit-logic, IS design is highly dependent on:**
 - Creating '*instrumental problems*' from users environment
 - Converting *ends* to constraints
 - *Means* to command variables (sometime, literally to computer coding variable)



Two main problems of fit-logic approach

- **Typical User environment**
 - Full of articulation of local knowledge and practice, cognitive artifacts (workarounds) and inconsistent work practice
 - formal representation of end-user's problem cannot be easily translated to a simple means to end relationship'
- Meaning of IT system: User vs. IS designers definition
 - IS designers see systems as bundles 'functions and properties' expected to be used by users
 - Whereas, for users, IT is co-constituted with 'social practices and users' identities' for successful 'business practice'



The knowledge gap addressed:

- **The obvious:**

- 1) The entanglement between ‘the social and the material’**

- IS design literature have developed different notions such as social construction ([Bijker, 2010](#)), situated entanglements, ([Orlikowski, 2005](#)), imbrication ([Leonardi, 2011](#)), assemblages ([Latour, 2005](#))
- In other words, “the ontological status of IT-in-use” ([Riemer and Johnston, 2013b](#)) is a well-recognized

- 2) The fit-logic has been the prominent orientation in designing information systems ([Hovorka and Germonprez, 2009](#)), ([Truex et al., 2000](#)), ([Schön, 1999](#))**

- **The Underdeveloped research:**

- IS design logic that bases ‘the social and the material’ entanglement
- An IS design that gives an “account for a reality that has not yet occurred” ([Germonprez, Hovorka et al. 2007](#))



The rationality behind the ‘fit-logic’ of IS design—the Cartesian worldview

- Cartesian worldview:
 - Ontological stance of dualism that detaches the ‘world and the knowledge of the world’
 - the ‘social and the material’ are distinctively defined independently as ‘subjects’ and ‘objects’
- Epistemological source of dualism
 - Externality
 - Value neutral and Determinacy



The Holistic worldview

- Holism worldview:
 - Ontological stance where there is no break between ‘the world and the knowledge of the world’
 - The ‘social and the material’ are defined as whole, ones they start to interact

- Epistemology of Holism
 - Context
 - Practice



Epistemological comparison of Dualism and Holism ontology

Nature of Epistemology	Dualistic ontology	Holistic Ontology
Knowledge Type	<i>Value neutral and deterministic</i>	<i>Contextual</i>
Method of knowledge claimed	<i>Externality</i>	<i>Practice</i>



Dualistic input for IS design

- **Assumption:** about Users' problem domain
 - Knowledge about the problem domain without “ignoring any of its features” is feasible.
- **Assumption: nature of such knowledge**
 - It is possible to translate Users' environment to bundles of technological properties
 - Knowledge can be developed to be an instrumental problem



Heidegger's framework of Users' Holistic interaction modes

- Ready to hand mode of interaction (everydayness intelligibility)
 - Everydayness of activities
 - Holistic structure of an artifact – called equipment
 - “Taking-them-for-granted” use of artifacts
- Present at hand mode of interaction
 - *a conscious attention to artifacts*
 - *a scenario where artifacts are broken and causes our routine work to be ‘temporary disturbed’, which is referred to as un-readiness-to-hand*

The application of Holistic vs. dualistic traditional to four main IS design steps

- 1) Defining problem domain and user requirement**
- 2) Formal representation of user requirement**
- 3) Abstractions to computer representation**
- 4) Development of objects and properties**



The application of Holistic vs. dualistic traditional to four main IS design steps

1) Defining problem domain and user requirement

Holistic Tradition	Dualistic Tradition
Daily interaction is full of knowing-in-action or tacit knowledge	The main purpose of defining problem domain is to derive goal oriented 'ends'.
Such tacit knowledge has no criteria or rules from which a system analyst can derive instrumental goals or ends	Defining task domain and user requirements, designer's concern is finding 'problems' and formulating them as a "structure of goals"

- Holistic approach for Step 1 = Worksystem Articulation



The application of Holistic vs. dualistic traditional to four main IS design steps

2) Formal representation of user requirement

Holistic Tradition	Dualistic Tradition
<p>Ends can be confusing and conflicting</p> <p>problem setting is an important step to design computer systems, "it is not in itself a technical problem" (Schön, 1999), hence does not require a technical methods and terms.</p>	<p>system analysts are expected to have a well-formulated problems and formal representation of user requirements</p> <p>System analysts use complicated IS jargons and methods to state problems</p>

- Holistic approach for step 2 = Worksystem representation



The application of Holistic vs. dualistic traditional to four main IS design steps

3) Abstractions to computer representation

Holistic Tradition	Dualistic Tradition
<p>Computer structure are limited in nature and ill-prepared for accommodating breakdowns.</p> <p>Acknowledge the possibility of breakdown, thus focusing on the <i>processes</i> of structural coupling rather than <i>producing</i> goal oriented artifact</p>	<p>Computer structures are fully equipped to develop objects, properties, and application domains that fulfill all user-requirement expectations.</p>

- Holistic approach for Step 3 = Principle of breakdown



The application of Holistic vs. dualistic traditional to four main IS design steps

4) Development of objects and properties

Holistic Tradition	Dualistic Tradition
The improvement of holistic domain of application is considered to be the goal and technological properties and objects	Successfully automating or computerizing existing worksystem with technological properties and objects

- Holistic approach for Step 4 = Principle of System Thinking



Holistic IS design principles	Description	Applicable IS design dimensions
The principle of worksystem articulation	<p>Articulation of worksystem history includes local knowledge and practice.</p> <p>Both problems and solutions are in the worksystem.</p> <p>System Analysts should work in the domain of application.</p>	Defining problem domain and user requirement
The principle of worksystem representation	Representation of worksystem is not a 'technical problem' in itself.	Formal representation of user requirement
The Principle of breakdown	<p>Structural coupling.</p> <p>Hermeneutic methodology.</p> <p>Breakdowns as a revealing best practices opportunity.</p> <p>Application of domain space anticipates potential breakdowns.</p>	Abstractions to computer representation
The Principle of System Thinking	<p>Holistic domain of application.</p> <p>Best practices and domain of applications are continuously emerged.</p> <p>Developing 'equipment' instead of properties and objects.</p>	Search procedures



Research Design of this paper

- **Subjects:** Moodle, an open source course management system (moodle.org) implemented in Mid Sweden University, Sweden.
- **Moodle:** 1500 teachers and 13,055 students in three campuses using Moodle learning system. Moodle, currently managing about 250 courses
- **Tools** – Conducted in-depth interviews with *Moodle champions* (10 participants - 8 Moodle champions, 2 Moodle developers) in the period of five month.



Evaluation Process

Research question: Evaluation of the adoption of the new LMS

Evaluation: ‘content analysis’ ([Klein and Truex, 1995](#)) of end-user’s response regarding their initial and long term use of Moodle software

1) Interviews were transcribed and uploaded to Atlas.ti

2) First level coding at conversation level

3) After finalizing the coding process, read the coded sentences iteratively to merge pattern key words from 2nd step. Four categories emerged.

4) Finally, we have determined logical relationships of end-user’s mode of appropriation to our IS design principles



Results of the case study

Categories	Descriptions	Examples
<i>Learning process</i>	Users continue to discuss functionalities. User's participation to the new system subsidized as ready to hand gets its way.	"We are concentrated on just get up and running. Starting to see new things, we didn't have time yet".
<i>Familiarity</i>	User's look for familiarity in the new system that was possible to do in the old work system.	"I would like to have something similar to WebCT, since it felt home".
<i>Work arounds and breakdowns</i>	Users continue to use workaround in the face of breakdowns.	"There are several people who do workarounds. I have it as well, which I created before long time ago, from WebCT limitation, but I continue using it, in fact I adopted my old solution the new system. Workaround stick longtime may be even though you don't need them anymore".
<i>worksystem</i>	User's look for the application of different functions to their worksystem and even to their existing workarounds. Technology is becoming 'equipment' and withdrawn from attention, and tune with the existing worksystem.	"I think the system fits, I don't see any problem in the production of the software, but I think there is a need to make some changes to in the organization".

Some examples that reflect Users' Holistic adoption activities

- **Worksystem articulation:** *“So there are a lot of things when it comes to routines, not only here but inter-department worksystem” (Tagged004)*
- **Worksystem Representation:** *“Grading in excel file or importing to excel file feels like more at home. I used to do that before in WebCT as well, so it is continued process. May be it is also feels good that you have the grades in your file inside your computer, so that you can manipulate the work as you want” (Tagged001)*
- **The Breakdown of systems:** *“One of the biggest thing for me is sending a reports, gets some updates for the report, as it is not working good in the moodle. Especially, when it comes to new files and you want to read comments and give comments on it, then it can be hard to do that.” (Tagged005)*



Discussion and Conclusion

IS design steps/dimension	Dualistic IS design principles	Holistic IS design principles
Defining problem domain and user requirement	Problems exist in worksystem and solution are in IS knowledge base. Domain space is definable as a collection of operational ends. Worksystem can be analyzed in Present at hand mode.	Both solution and problems are in the worksystem. Best practice is emergent and tacit. System Analysts should work in the domain of application.
Formal representation of user requirement	Creating instrumental problems. IS jargons and methods. Imposing boundaries.	Defining problems is not a 'technical problem' in itself, search procedure is. Worksystem representations.
Abstractions to computer representation	Impoverished possibilities of modeling and representation of breakdown and workarounds. Providing solution to improve IT systems	Structural coupling. Hermeneutic methodology. Breakdowns as a revealing best practices opportunity. Providing solution to improve work system.
Search procedures	Fit logic Creates blindness. Present at hand domain of application. IT artifacts, instantiations, methods and constructs.	Holistic domain of application. Target to improve worksystem. Application of domain space anticipates potential breakdowns. Equipment



What Next?

- Our continuing research precedes along several paths in that:
 - Explore the relationship between users' conceptual artifact (workarounds) toward re-defining domain of application
 - Taking back the focus of IS research from 'IT artifacts' to 'human everydayness' activities
 - Users' continuous re-designing of their own environment, thus 'secondary design' ([Germonprez et al., 2011](#))



Questions/Comments ?

