Bewitched, bothered, and bewildered: The concept of ‘infrastructure’ in CSCW

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CSCW’s interventionist program

• **Computational regulation** of coordinative practices, i.e. by means of causal mechanisms

• **Design for actual work practice**, not just design for **nominal tasks**: Concern with the unity of planning, execution, handling contingencies, etc.

• **Mechanical regulation of practices**: Issues of the local and the global, in the context of mechanical regulation

• Hence our interest in infrastructures
Agenda

- Pedigree of the notion of ‘infrastructure’:
  - Kling et al.
  - Star et al.
  - Hanseth et al.
- Bewilderment and, perhaps, settlement
- CSCW vs IS: Trying to sort things out
  - ‘Practice’ and ‘technology’
  - ‘Practice’ and ‘infrastructure’
‘Infrastructure’
Infrastructure #1: Kling et al. (1987-96)

• Research problem: Understanding ‘computing as social action’, predicting impact of computing

‘What influences the adoption of new computer-based technologies? How are particular computer-based technologies ordinarily used? What are the social consequences of using computer-based technologies?’ (Kling, 1987)

• ‘Infrastructure’:: aspect of ‘context’ of computing, e.g., skilled staff, other equipment (Kling, 1987)

• ‘Infrastructure is a useful concept in analyses of computing support — it denotes all the resources and practices required to help people adequately carry out their work (Kling, 1987; Kling & Scacchi, 1982). Infrastructure for computing refers to a variety of organizational arrangements for supporting computing, including recharge systems and purchasing procedures, as well as the human resources […]’ (Jewett & Kling, 1991)
Infrastructure #2: Leigh Star et al. (1994-2002)

- Research problem: ‘the ambiguous nature of tools and technologies for different groups’ (Star & Ruhleder 1996).

- Aim: Making the invisible visible

- ‘Information infrastructures provide the tools—words, categories, information processing procedures—with which we can generate and manipulate knowledge. They also reify particular configurations of work practice by shaping the world within which tools can be used.’ (Bowker & Star, 1995)

- Standardization as ‘politics of reinforcement’

- ‘infrastructure is a fundamentally relational concept. It becomes infrastructure in relation to organized practices’ (Star & Ruhleder, 1996)

- ‘Infrastructure’ as techniques as well as conventions, concept, e.g., classification schemes, standards, terminology.

- Infrastructure:: Something like the politics of categories
Infrastructure #3: Hanseth et al., 1996-2013

- Research problem: understand distributed and evolutionary development of ‘information infrastructures’
- ‘The notion of [information infrastructure] is elusive, as are such basically synonymous terms like “info-bahn,” “information highway,” “electronic highway”’ (Hanseth et al., 1996)
- ‘Infrastructure’: computer networks and services with emphasis on their heterogeneity and complexity (Hanseth et al., 1996)
Bewilderment

• Infrastructure #1: context of computing
• Infrastructure #2: techniques and, especially, conventions
• Infrastructure #3: computing in context
'Infrastructure' in ordinary usage

- French military engineering, early 20th century: 'infrastructure':: foundation, soil under pavement
- In modern English usage: large-scale socio-technical facility, typically with a network topology
  - Something spanning disparate entities
- In CSCW literature:
  - Typically enabling technical systems or services: Internet, WWW, 'CSCW infrastructures'
  - Typically relatively generic, or domain-independent
'Infrastructure’, a tentative settlement

- Technical facilities spanning disparate practices, possibly for the purpose of regulating local coordinative practices
  - ‘Any working infrastructure that serves multiple communities of practice simultaneously, be these within a single organization or distributed across multiple organizations’ (Bowker & Star, 1999).
- The point of the metaphor in our area: not just the physical structure but the structure as the result of ongoing construction and maintenance work (‘the work to make the network work’)
- Hence, issues of
  - Large scale, escapes local reach
  - Inertia due to cost of large-scale installed base
  - Heterogeneity of use
  - Distributed, evolutionary, open-ended
‘Practice’
The demonstrations and proportions found by the purely speculative mathematician ‘between surface lines and imaginary bodies and separated from matter do not respond so perfectly when applied to material things’, because the concepts with which the mathematician works ‘are not subject to those impediments which by nature are always conjoined to the matter that is worked on by the mechanic.’ (Quoted by Rossi, 1962)
‘Everyone will readily agree that there are few artists who can dispense with the elements of mathematics. [But] in many situations knowledge of these elements would actually hamper an artist if, in practice, the precepts of mathematics were not corrected by an extensive knowledge of physical circumstances; such as location, position, irregular figures, materials and their qualities, elasticity, rigidity, friction, consistency, duration, as well as the effects of air, water, cold, heat, dryness, and so forth. It is clear that the elements of academic geometry constitute only the simplest and least complex elements of workshop geometry.’
'One calls a conceptualization of *rules*, even of practical rules, a theory when these rules, as *principles*, are thought of in a certain generality and thus have been abstracted from a multitude of *conditions* that nonetheless necessarily influence their *application*. On the other hand, one does not call just any operation a praxis; rather, only such a purposive endeavor is considered a praxis that is taken to be attained by following certain generally accepted *principles* of procedure.'
‘Practice’ vs ‘theory’

• ‘Theory’ or ‘rules’ as abstracted from practical experience: ‘general principles’

• But when applying ‘principles’, the contingencies, from which the principles were abstracted, still have to be faced

• Practice not just any activity but activity as governed by ‘general principles’
In other words...

1. A practice is a *regular* activity
2. But the regularity is *normative* (‘general principles’)
3. I.e., a practice is *normatively regulated contingent activity*
4. Practices differ from one another by the *body of rules* that governs them
5. Practices are *upheld*, taught, reconsidered, and, sometimes, transformed or abandoned

• ‘Practice’ is an activity-concept: practices are performed

• A culture etc. is acquired, a practice is mastered through learning: practicing

• Practice is a species of activity: regularly occurring, rule-governed activities
‘Practice’ vs ‘technique’

• To master a practice, i.e., being able to apply a theory under conditions of various circumstances, presumes **mastery of a range of techniques**.

• A new technique **may**, but does **not necessarily**, transform the practice in which it is applied.

• One technique may be substituted by another.

• A technique may be applied by multiple practices
‘Practice’ and ‘infrastructure’
Intersecting practices

• Division of labor as source of systematic intersection
  • Serially divided practice (specialized techniques)
  • Complex practice (division of conception and execution)
  • Family of practice (similarity of rules)
• Infrastructure in CSCW:
  • Issues of regulating local practices: imposing order?
  • Issues of enabling technologies?
  • We have to make up our minds...
‘Infrastructures’ in CSCW vs IS

- **Infrastructure in CSCW**: Issues of regulating local practices:
  - Coordinative practices: Nomenclatures, classification schemes, temporal orders
  - Coordination technologies: document systems, workflow systems, etc.
  - Key issue: Following rules under conditions of contingency

- **Infrastructure in IS**:
  - Overarching technical etc. structures as sources of contingent intersection
  - Issues of managing the interplay btw. the local and the global in systems development (politics, market, organization…)
Bewitched, Bothered & Bewildered

Whatever happened to our sexual relations?

They didn't even send a Christmas card this year.

Dorothea des Forges