ICS 221

Workflow

Situated Action, Process, and Activity Theory

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ICS 221
WQ 2001

Workflow: A Interdisciplinary Perspective

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"Today, workflow researchers have come to realize that the technology must address issues that span anthropology, ethnography, organizational psychology, sociology of office work, as well as computer science technology [Nutt, p. 277]."

Workflow Related Papers

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- Nutt, G. The Evolution Towards Flexible Workflow Systems, Distributed Systems Engineering, Vol. 3, No. 4, December 1996, pp. 276-294
- Engeström, Y. When is a Tool? Multiple Meanings of Artifacts in Human Activity, Chapter 8, Learning, Working and Imagining, Painettu Kirjapaino Oma Ky:ssä, Jyväskylässä, 1990, pp. 171-195.

What is a Workflow System?

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"provide robust means for supporting situated work in a distributed environment [Nutt, p. 276]."

Basic Workflow System Organization

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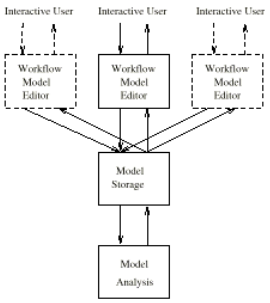

Nutt, p. 280

Modeling Example: Nutt

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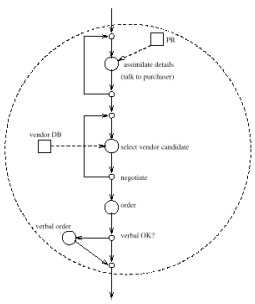
Nutt



Modeling Example: Osterweil

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```
procedure MultiUserModel is
begin
loop while not done
      case CurrentApproach is
            when TopDown =>
                  if NeedRoot then
                        Post(CreateRoot);
                  elseif NeedChildren then
                        SelectNodeToElaborate(CurrentNode);
                        if LockedBySomeoneElse(CurrentNode) then
                              raise LockViolation;
                        elseif (NotLocked(CurrentNode) then
                              Lock(CurrentNode);
                        endif;
                        if Complete(CurrentNode) then
                              UnLock(CurrentNode);
                              Repost(CurrentNode);
                        else
                              CreateChildren(CurrentNode, CurrentNodeSet);
                              loop for Node in ChildNodeSet
                                    Post(Node);
                              endloop;
                        endif;
                  else
                        SelectNodeToEdit(CurrentNode);
                        if Complete(CurrentNode) then
                              UnLockNode(CurrentNode);
                              PostOrSubmit(CurrentNode);
                        else
                              -- test lock and set posting as above
                              EditNode(CurrentNode);
                        endif;
                  endif;
            when BottomUp =>
                  ...
            when Arbitrary =>
                  ...
      endcase;
endloop;
end MultipleUserModel.
```

Modeling Example: Shukla/Nardi/Redmiles

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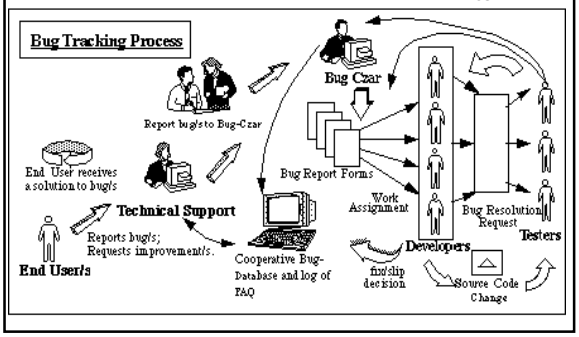

Modeling Example: Robbins/Redmiles

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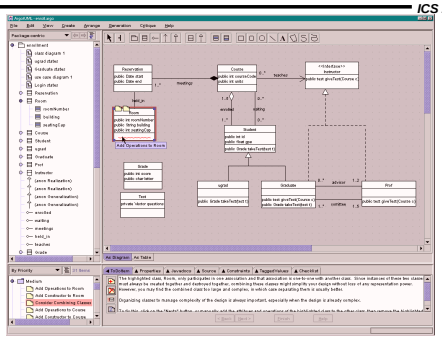

Modeling Example: Robbins/Redmiles Checklist as a Process / Workflow Model?

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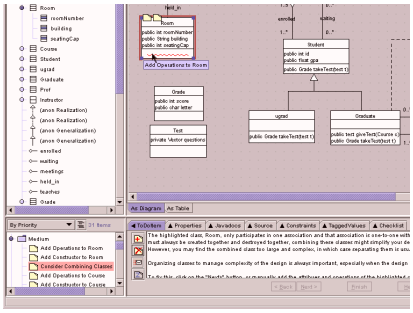

Modeling Example: Kantor/Redmiles Email categories as workflow?

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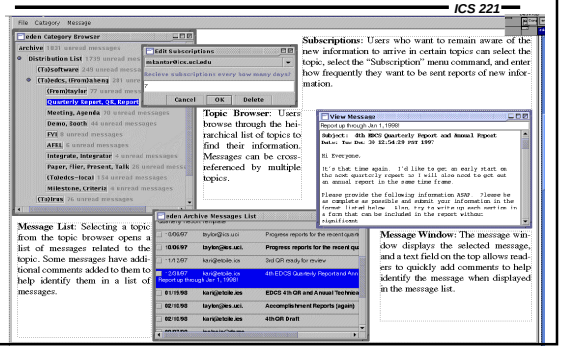

Dimensions of Workflow Systems

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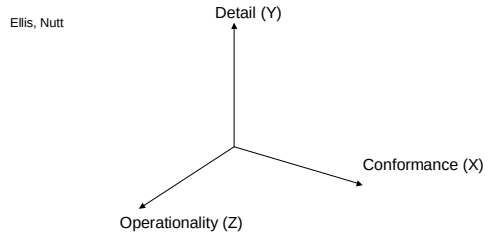

Examples of the Dimensions

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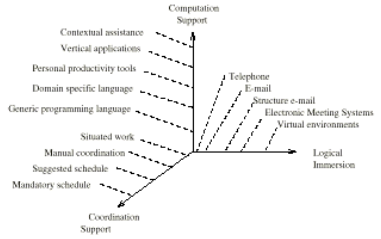
Nutt



Issues in Workflow Enactment

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- The Nature of the Specification
  - distributed programming or human collaboration
- Work Specification
  - How much detail?
- The Social Model
  - The degree of mismatch between an organization and a model of work?

Manifestations of the Issues: Why Workflow Fails

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- Too Prescriptive
- Too Vague
- Exception Handling
- Change
- Workflow as fiction
- Loss of informal information
- Loss of informal processing

Suchman: Plans and Situated Actions
Cambridge University Press, 1987

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- Plans

  "The alternative view ... is that while the course of action can always be project or reconstructed in terms of prior intentions and typical situations, the prescriptive significance of intentions for situated action is inherently vague."

Suchman
Three Aspects of Planning Models

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- Fundamental Planning Model (AI)
  - "plans are a constituent of pratical action, but they are constituent as an artifact of our reasoning about action, not as the generative mechanism of action [p. 39]."
- Speech Act Theory (Philosophy of Language)
  - while Searle's 'conditions of satisfaction' state conventions governing the illocutionary force of certain classes of utterance, he argues against the possibility of a rule-based semantics for construing the significance of any particular utterance."
- Shared Knowledge (Discourse Theory, Etc.)
  - "A background assumption, in other words, is generated by the activity of accountaing for an action when the premise of the action is called into question. But there is no particular reason to believe that the assmuption actually characterizes the actor's mental state prior to the act." p.47

Situated Action

"Every course of action depends in essential ways upon its material and social circumstances."

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- Plans are representations of situated actions
  - "The fact that we can always perform a post hoc analysis of situated action that will make it appear to have followed a rational plan says more about the nature of our analyses than it does about our situated actions." [p.52]
- Representations occur when breakdowns occur
  - When a tool (medium) becomes "unready-at-hand," then reasoning with rational representation takes place (see also Schoen).
- Objectivity is contextual
  - "Objectivity is a product of systematic practics ... The source of mutual intelligibility is not a received conceptual scheme, or a set o fcoercive rules or norms, but those common practices that produce the typifications of which schemes and rules are made. The task of social studies, then, is to describe the practices ..." [p. 58]

Activity Theory

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- Focus: *Activity in Context*
- Methods of Study: *Ethnographic*
- "Theory": *Hegel, Marx & Engels, Vygotsky, Engeström, Kuutti, Nardi, …*

Activity Theory Features and Benefits

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- Identify the stakeholders in the process.
- Ensure that technology is designed to benefit the user.
- Work toward alignment between users' rewards and business needs.
- Work toward alignment between the rewards of the designers of the device & the business needs.

Engestrom's Activity System Model

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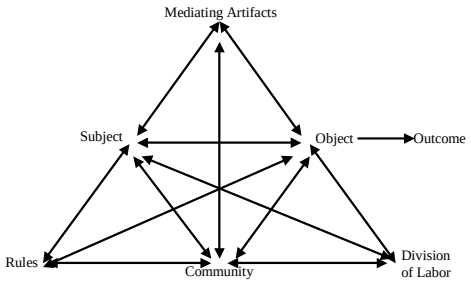

Knowledge Authoring Activity System Model

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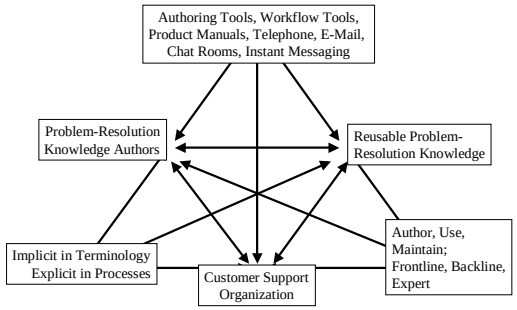

"What" Artifacts

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Intended to contribute directly to the object.

- Tools
  - SW Applications, Telephone, Manuals
- Signs
  - Language, Models, Metaphors
- Common means
  - Group meetings, classes, seminars

"How" Artifacts

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Intended to support the use of "what" artifacts

- Procedures and rules
  - Documented Process, ISO 9000
- Norms
  - "Quiet Time"

"Why" Artifacts

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Intended to motivate achievement of the object.

- Explanatory Models
  - Process Models, Organizational Charts
- Decision-Rationale
  - Documentation
- Motivational Communications
  - Corporate Strategies

"Where-to" Artifacts

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Intended to motivate evolution.

- "Practices of the Few"
- Mission/Vision/Purpose
- Business Process Re-engineering

Case Study

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- Problem-Resolution, Knowledge Authoring for Customer Support
  - Subset of software application support
  - Subset of authored knowledge (textual documentation)

Methodology

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- Ethnography as a method for collecting data
  - Semi-structured and open-ended informal interviews
  - Participant observations
  - Access to tools and documents
- Activity Theory as a means to analyze the data and provide results

Contradictions, Conflicts and Tensions

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- "Putting out the fire NOW!"
- Playing ambassador
- Such activities in conflict with the objective of documentation

Intervention and Impact

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- Means of intervention and impact
  - Sharing observations through briefings, one-on-one sessions, technical reports, "white" papers
- Scope of impact
  - Specific groups such as sponsors and the knowledge-management strategy initiative
  - Team meetings such as support desk group

History of Collaboration Technology

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- 70's
  - precise steps, order
  - need flexibility
- 80's
  - elaborate mathematical models
  - need flexibility
- 80's
  - simple, domain independent tools
  - need organizational knowledge

History of Collaboration Technology (con't)

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- 90's
  - flexibility (EUM), organizational knowledge
  - COTS integration, user comprehension
- 00's
  - virtual reality, agents
  - ???