Working through Technology
Representation, Mediation, Translation, (Mis-) Interpretation ?

Individuals, Communities, Politics, Technologies..

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"The Computer as a Communication Device"
Licklider, Taylor, and Herbert (1968)

. ..... several insights as to the possible future role of computers as communication devices for people. They saw the computer not only as a repository of information, or a simple conduit for "information", but as a medium that could be used to dynamically transform this information, and to help people to **share their view of the world with others through joint manipulation of each person's personal models of the situation.**
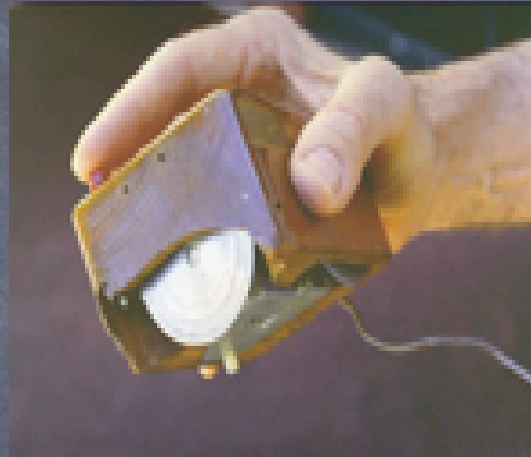
Evolution of Humans & Tools ?
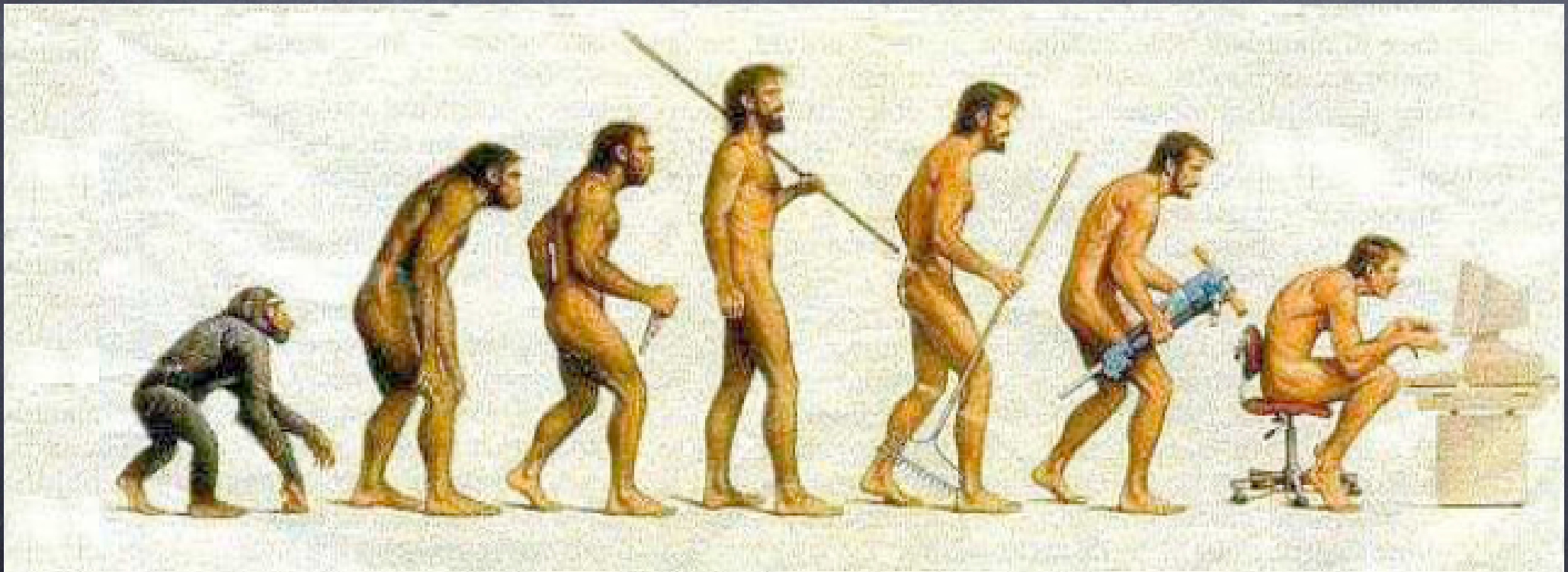
Human Augmentation, not Substitution
e.g. Doug Engelbart's mission...

Report: Augmenting Human Intellect (1962)

First Mouse

But many other
firsts as well....

Talk Outline

A review of some lessons learned about the human-technology relation, specifically focusing on the human, social, organizational and societal aspects of human use and non-use of technologies

Artefacts in Use - Appropriation, Tailoring..

My own background - Computing & Psychology, Human Factors, HCI, PD, IS, CSCW, Interaction Design, Social Dimensions of New Technologies...

Attempts at "Border Crossings"

Bowker, Star,Turner, Gaser (1997) - "The Great Divide"
Social Science, Technical Systems and Cooperative Work: Beyond the Great Divide. New Jersey: Erlbaum.

Themes
Heterogeneity
Negotiation and Division of Labour
Politics of Formalization - notations, representations
Translation - struggles
Working Together
Boundary Objects - fundamental ambiguity of objects
Conventions and Routines
Ethics & Global Responsive Thinking
Problems of Reifications

Understanding Organizations

Problems with standard rational model

    March - (ir)relevance of information, information as

        signal and symbol, garbage-can model, reduced

        role of decision-making per se

Importance of "Sense-making" vs "Problem-solving"

    Karl Weick's work on "sense-making" in

        organizations

Importance of language, conversation, debate

Shift towards ethnographic studies of work

"Information Ecology" (Davenport, '97)

Early work on process innovation, business process re-engineering -More recent work, emphasis on human side - "human-centered information management"

Machine Engineering Approach

Information is easily stored on computers – as "data"

Modelling computer databases is the only way to master information complexity

Information must be common throughout an organization

Technology will improve the information environment

Information Ecology Approach

Information is not easily stored on computers – and is not "data"

The more complex an information model, the less useful it will be

Information can take on many meanings in an organization

Technology is only one component of the information environment and often not the right way to create change

Creating Common Information Spaces

"A CIS encompasses the artefacts that are accessible to a cooperative ensemble as well as the meaning attributed to these artifacts by the actors...Objects must thus be interpreted and assigned meanings, meanings that are achieved by specific actors on specific occasions of use. "

Importance of **interpretation** in human activities

identify **source** of information...

   Why? bias discount....

identify **context** of information

   Why? need for full interpretation

problem of **visibility** of information production
need for transparency...but also for bounds....

Outline

- HCI - User-centred design (UCD), Usability..

- PD - participatory methods, mutual learning..

- CSCW/GDSS - group support, coordination tools..

- (Social Software - tagging, folksonomies, ..)

- Implications?

Usability -The "infamous" Florida Butterfly Ballot

Confusion over Palm Beach County ballot

Sun-Sentinel graphic/Daniel Niblock

Design & Usability

Stelton Thermos

Aesthetic Design & Usability

Alessi "Il Nonno"

Stelton Ashtray

Design & Use

Appropriation
&
Adaptation

Participatory IT Design

- Several strands of work...

- Enid Mumford (UK, socio-technical tradition)

- Kristen Nygaard (Norway, labour unions)

- 1990s - Participatory Design Conferences

- 2001 - Communities & Technologies...

- Web - Social Software Movement

PD Issues

- Mutual learning between researchers & users/community

- Develop a common language, using simple representations derived from their practice

- Future Workshops, Wallboarding, Forum Theatre...

- Supporting Community Networks...

PD Issues

- Technology as augmentation means, supporting local practices..

".. we need to treat Internet media as continuous with and embedded in other social spaces,..they happen within mundane social structures and relations that they may transform but ... they cannot escape into a self-enclosed cyberian apartness. "   (Miller & Slater, 2000, Pg.5)

CSCW Field

- Computer Supported Cooperative Work

- (Computer(Supported(Cooperative(Work))))

- Multidisciplinary field – sociologists, engineers

- The "work" to make things work

- Malleable, accessible, open representations

- Field studies of use of systems

- GDSS, Organizational Memory, Design Rationale,

Views on CSCW

"...an identifiable research field focused on the role of the computer in group work." (Greif, 1988)

" CSCW should be conceived as an endeavor to understand the nature and characteristics of cooperative work with the objective of designing adequate computer-based technologies. " (Bannon & Schmidt, 1989 (1991))

"CSCW is neither solely a tool or technology business, not just a new way to study computer impact on the work place. Instead, in CSCW, equal emphasis is put on the distinctive qualities of co-operative work processes, and on questions of design: how to mould computer technology to fit into and support these work processes. Due to the prominent role placed on the process of design, the issue in CSCW is not just how the work process is currently organized, but also how it could be organized." (Lyytinen 1989)

The Need for Articulation Work

" Every real world system is an open system: It is impossible, both in practice and in theory, to anticipate and provide for every contingency which might arise in carrying out a series of tasks. No formal description of a system (or plan for its work) can thus be complete. Moreover, there is no way of guaranteeing that some contingency arising in the world will not be inconsistent with a formal description or plan for the system. […] Every real world system thus requires articulation to deal with the unanticipated contingencies that arise. Articulation resolves these inconsistencies by packaging a compromise that 'gets the job done,' that is closes the system locally and temporarily so that work can go on. "

Gerson, Elihu M. and Susan Leigh Star (1986): Analyzing due process in the workplace. ACM Transactions on Office Information Systems, vol. 4, no. 3, July 1986, pp. 257-270.

"sharing" information..

Issues

Technical - interoperability, access, ...

Organizational - procedures, roles, rewards etc

Social/Cultural - norms, communities of practice, local meanings...

"each functional department has its own set of meanings for key terms. [...] Key terms such as part, project, subassembly, tolerance are understood differently in different parts of the company."

Savage (1987)

Groupware = Technologies to support information sharing in groups/ ensembles

E.g. GDSS's, Lotus Notes, The Coordinator,...

Office Automation Models

- There is a constant temptation for designers to confuse the models with an underlying reality.

- The models impose an ordering on people and or events, often unilaterally.

- The models are difficult for "users" to understand and thus preclude people from appropriating and re-working the model in situations of use.

- The models often do not define their basic concepts adequately.

- Emphasis appears to be on model form and elegance over actual coverage and practicality or usefulness.

- Emphasis is on "determinism" at the expense of "interpretation" in work processes.

- The models embody an inappropriate correspondence theory of truth, and thus make the untenable assumption of a specifiable, one-to-one, decontextualized relationship between an instruction and the action that satisfies it.

Electronic Meeting Systems

Nunamaker, J., Dennis, A., Valacich, J., Vogel, D. & George, J. (1991) Electronic Meeting Systems to Support Group Work. CACM, 7,40. *- developmental and empirical work at Univ. of Arizona.*

CASE: T. Bikson (1996) Groupware at the World Bank. In C. Ciborra (ed.) Groupware & Teamwork: Invisible Aid or Technical Hindrance? Chichester: John Wiley& Sons.)

CRITIQUE: Bannon, L. (1997) Group Decision Support Systems: An Analysis and Critique. In Proceedings, 5th European Conference on Information Systems, Cork, vol.1, pp. 526-539.

Electronic Meeting Systems - Benefits

allows information to be captured quickly using the system during brainstorming

since the input is anonymous, there is equal opportunity for participation by all at the meeting, unencumbered with power or status differentials

the system purportedly enables larger group meetings to be effective through control of the process

the system permits the group to choose between a variety of techniques

the system offers access to external information sources so that can be utilised in the group decision process more easily and effectively

the system supports development of an organizational memory, by keeping a record of the inputs of the participants during the meeting, and of the choices made.

use of the system in a number of organizations have lead to significant productivity gains based on much shorter lead times for getting decisions made in large groups through use of the system.

Electronic Meeting Systems - Problems

- Differing ontologies & epistemologies ignored

- Politics of meetings, decisions, information ignored

- Importance of Talk discounted

- Nature of Work Groups problematic

- Empirical methodologies questionable

- Anonymity not always beneficial

Electronic Meeting Systems

GDSS have focussed on collecting unit elements, organizing and arranging these units, and voting or ranking them...relate only to (2), 3, 4 of problem-solving /decision-making environment -

1. Recognition of need or problem ->
   2. generation of evaluative context
     3. evaluation of actions/consequences ->
      4. selection of action

"this work devalues the process during which decision makers collect information about the ambient operative environment and construct the context for delineation and evaluation of options." (Whitaker)

CSCW – A challenge to certain (G)DSS perspectives on the role of decisions, information, and technology in organizations?

In P. Humphreys, S. Ayestaran, A. McCosh, B. Mayon-White (Eds.) Decision Support in Organizational Transformation. London: Chapman & Hall,1998.

"Decisions in organizations involve an ecology of actors trying to act rationally with limited knowledge and preference coherence; trying to discover and execute proper behaviour in ambiguous situations; and trying to discover, construct, and communicate interpretations of a confusing world."

James March, 1991

Semantic Communities, Ontological Drift

Different groups, professions, and subcultures embody different perspectives. They communicate in different "jargon". Much of this cannot be translated in a satisfactory way into terms used by other groups, since it reflects a different way of acting in the world (a different ontology and epistemology). Distinct groups of this sort will be referred to as semantic communities. The problem is not resolved by promoting the necessity of open communication -- since this assumes the different groups can be framed in a single semantic world. The meaning of terms is not transparent across groups.. (Robinson & Bannon, 1991)

Making sense of each other...

"In addition to sharing knowledge about each other, and whatever it is they are doing together, actors .... struggle to make sense of each other and do work to help generate the kinds of recognisable contexts for common sense to be achieved from one moment to the next. ...the problem facing people in interaction is never simply one of shared knowledge or overlapping interpretive grids. No matter how much people know in common, they must still work at constructing the environments that their mutual knowledge leads them to expect, and any relaxation of this effort can have disastrous consequences. People never know exactly how to make sense of each other. " (McDermott, Gospodinoff, & Aron (1978)

GDSS- World Bank Case Study

CASE: T. Bikson (1996) Groupware at the World Bank. In C. Ciborra (ed.) Groupware & Teamwork: Invisible Aid or Technical Hindrance? Chichester: John Wiley& Sons.

Data collection - semi-structured interviews, examination of documents
Spring 95 - 6 study visits, 15 people interviewed (2 years of system use)
  (Extended pilot period: May-Dec 93 (102 GroupSystems sessions)

Claim: system paid for itself, and positive user evaluations
importance of Meeting Facilitator Role & Technographer (IT support) role.

words of the division head "we got full participation, we have a record of the discussion, we dealt with sensitive issues....everyone thought it was very useful". (!)

GDSS- World Bank Case Study

problems of objective measures: "more (Ideas) is better" or "decision speed"
Is there a Hawthorne effect?

evolution of use: not much brainstorming or decision-making per se....more use by focus groups....

divergent thinking - generation of idea, alternatives, plans, solutions - helpful - concurrent input and anonymity...

convergent cognitive tasks - making decisions, resolving conflicts, allocating scarce resources less well supported ..role of facilitator is key.

Claim: " technology valuable as tool for understanding" !

GDSS- World Bank Case Study

technology can cause problems - surfacing of conflicts that are difficult to handle...tackle in diagnosis stage of meeting preparation interviews between facilitator and meeting organizer.

Positive outcomes of system use attributed to 3 nontechnological factors:
1) the nature & amount of learning & training that preceeded the offering of groupware for meeting support Bank-wide
2) a good meeting-plan with well-defined objectives
3) high-quality meeting facilitation by a neutral 3rd party

NB (many believed if same thoughfulness went into ordinary meetings, benefits of ordinary meetings would be equivalent!)

GDSS- Helsinki Prototype System

P. Maaranen & K. Lyytinen (1995) Designing Meeting Support Systems in a User-Centred Manner. ACM Group conf. (in ACM Digital Library)

"Negotiators do not want, in many cases to reveal their real preferences...some isues can be staked out for bargaining purposes only, without any real interest to achieve them."
personal factors (knowledge of technology, personal interest...)
group features (meeting protocols, group composition, process...role models..)
task features (nature of task, task importance, behavioral tactics..)

Roles - "we did not "softwire" meeting protocols enacted by different participant roles into the software..we let roles emerge..."
"impossible to map the CSCE meeting processes onto the linear probelm-solving oriented phase model (of GroupSystems)"
political and institutional factors played a decisive inhibiting role.."
".active forgetting required...not just organizational memory"

Organizational Memory Systems

" Tools for the responsive development and evolution of such a superdocument by many (distributed) individuals within a discipline-or project-oriented community could lead to the maintenance of **a 'community handbook,' a uniform, complete, consistent, up-to-date integration of the special knowledge representing the current status of the community.** The handbook would include principles, working hypotheses, practices, glossaries of special terms, standards, goals, goal status, supportive arguments, techniques, observations, how-to-do-it items, and so forth. An active community would be constantly involved in dialogue concerning the contents of its handbook. Constant updating would provide a 'certified community position structure' about which the real evolutionary work would swarm."

(Engelbart & Lehtman, '88)

the notion of "a uniform, complete, consistent, up-to-date integration" of the community knowledge is hardly realistic. Interpretative work remains to be done by the actors accessing the community handbook. It could indeed be a valuable resource for developing a "common information space" with other actors, but due to the distributed nature of cooperative work **the handbook will be necessarily incomplete and partial.**

Future Directions

- Need more variety...heterogeneity in our visions
- Need to be aware of limitations of all such visions...
- From UTOPIA to Topos, place, local settings
- Need richer understandings of our social world
- Focus on models, tools in use
- Observational studies of what's happening now..blogging, wikis, flickr, folksonomies..
- Emergent phenomena...mobbing...
- Top-down & Bottom-up approaches
- Need experiments, trials, with new artefacts ...more participative practices in design

Our inability to predict!

- No understanding of potential of microprocessors
- No understanding of PC potential
- No expectation re. Utility of e-mail
- No prediction re. Use of chat, bulletin boards, messageries
- No understanding of potential of Internet
- No awareness of Web potential
- No prediction of P2P phenomena - Napster, file sharing..
- No prediction of SMS text messaging popularity

Previous technology "revolutions"?

"I believe that the motion picture is destined to revolutionize our educational system and that in a few short years it will supplant largely, if not entirely, the use of textbooks.I should say that on the average we get about two percent efficiency out of schoolbooks as they are written today. The education of the future, as I see it, will be conducted through the medium of the (motion picture) ...where it should be possible to obtain one hundred percent efficiency.   Thomas Edison, 1922.

"The time may come when a portable radio receiver will be as common in the classroom as is the blackboard. Radio instruction will be integrated into school life as an accepted educational medium."   W. Levenson (1945)

There won't be schools in the future..I think the computer will blow up the school. That is, the school defined as something where there are classes, teachers running exams, people structured in groups by age, following a curriculum - all of that. The whole system is based on a set of structural concepts that are incompatible with the presence of the computer...   Seymour Papert, 1984.

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Thank You !