



Center for
**LifeLong
Learning
& Design**

University of Colorado at Boulder

**Wisdom is not the product of schooling
but the lifelong attempt to acquire it.
- Albert Einstein**

“Home Alone”

**Gerhard Fischer and Hal Eden
Spring Semester 2004
March 31, 2004**

source: Chapter 3 “Home Alone” in Brown, J. S. & Duguid, P. (2000) *The Social Life of Information*, Harvard Business School Press, Boston, MA.

Coping with Computational Environments (specifically HFAs)

Why is it so Hard?

“Distributed Computing means that I cannot get my work done, because a computer is not operational, whose existence I was not even aware of” (Butler Lampson)

- are things “just a click away?”
- **observation by Brown/Duguid:** *“the idea that the individualized technology of the information revolution will undo the massification produced by the technology of the industrial revolution underlies most such scenarios of disaggregation”*
- **view of some futurists:** *“information technology will help discover “Gemeinschaft”, the sort of small, local, community-based way of life broken down, according to some sociologists, by industrialization”*
- **hope:** *“the road to the future will somehow take us back to the simplicities of the past”*

Understanding Work

- **misunderstanding of intellectual, white-collar work**
 - the ideas of managers working remotely with information inevitably ignores the much more difficult, intangible, but inevitable face-to-face side of management, the management not of things or of information, but of people
 - compare this to virtual universities and virtual education
- **observation:** in the transition to home offices, these burdens pass from the social system, where tasks are shared, onto the lap of individuals
- **claim:** the desire to show that with a computer *one* person can do everything may look not forward but back to the stage in social evolution before anyone noticed the advantages of *division of labor*
- **social support environments for technology:** design needs to attend not simply to the frailty of technological systems and the robustness of social systems, but to ways in which social systems often play a key part in making even frail technology robust
- good design of **physical environments** can produce powerful learning environments
→ much of the power comes from incidental, informal learning (question: how do university environments support informal learning, e.g.: the Integrated Teaching and Learning Laboratory, the Discovery Learning Center)

Informal versus Formal Learning

Informal Learning	Formal Learning
unstructured	structured
discretionary, incidental, serendipitous	forced, planned, intentional
a group or joint activity	an individual activity
the goal is motivated from the learner's point of view	the goal is not well motivated from the student's point of view
the activity is captivating and fun	“fun” is not a relevant consideration
there are frequent “flow” experiences	there are seldom any “flow” experiences
the activities are self-paced	the activities are fixed, force-paced
the person has a choice of topic, time and place	the topics are fixed, as are time and place
the activities can be done throughout life in many environments	the activities are primarily restricted to ages 6-20+ in a schoolroom

Innovations → Large Demands for Lifelong Learning

- the weight of continuous product innovation can be unsupportable
- in the home, the only IT manager is the person who wants to spend time working with the tools, not on them
- desktop publishing / multi-media design = systems integrating all the tools that previously were distributed among authors, editors, copy editors, proofreaders, designers, typesetters and printers, each with their own embodied, inarticulate skill and judgement built out of experience
 - **Positive:**
 - * advantages associated with an unself-conscious culture of design
 - * an individual gains (at least potentially) tremendous freedom and control
 - * situation talks back to the owner of the problem
 - **Negative:**
 - * individual now lacks the experience and support that was distributed among those different roles (movie making)
 - * advantage of division of labor

Self-conscious and *Unself-conscious* Cultures of Design

source: Alexander, C. (1964) *The Synthesis of Form*, Harvard University Press, Cambridge, MA.

- **self-conscious culture of design:**

- design is taught academically, according to explicit rules
- specialists and division of labor
- failures have to be reported

- ***unselfconscious* culture of design:**

- design is learned informally, through imitation and correction
- the failure or inadequacy of an object leads directly to an action to change or improve it, e.g.: the owner of a house is its own builder
- the designers do not only make the form but they live with it
- the closeness of contact between designer and product allows constant rearrangement of unsatisfactory details

Innovation and Change

- telephone, television, automobile, air travel accelerated for a while (transforming society along the way) → then settled in a manageable rate of change, leading to a stable, predictable, reliable condition known as “lock-in”
- computers, biotechnology and nano-technology: are **self-accelerating** = products of their own enable them to develop ever more rapidly
- change that is too rapid will be divisive → **digital divide**
- **aging population**: getting tired of trying to keep up with the latest new gadget
- **law of disruption**: “social, political, and economic systems change incrementally, but technology changes exponentially”

Technology is Necessary, but Not Sufficient

Info-Enthusiasts think that the laws of Moore and Metcalfe will solve every problem

- **Gordon Moore (founder of Intel):** computing power will double every 18 months (for the same cost)
- **Robert Metcalfe (founder of 3M):** networks (phones, computers, people) dramatically increase in value with each additional node or user

Productivity Paradox

- decline in productivity from 1973 to 1990 despite massive investment in computers
- Tom Landauer: “The Trouble with Computers”, MIT Press, 1995
 - usefulness
 - usability
 - steep learning curves
 - hard- and software incompatibilities
 - organizational barriers
- possible explanation: it takes time for society to transform the well-established work practices (e.g., such as mass production) to a new digital tools of demassification
- social context for activity (supports informal learning)
 - pilot and co-pilot in the cockpit
 - EDC / PitaBoard (versus individuals working on their desktops in a distributed environment)

Massification ↔ Demassification

▪ massification

- **globalization and the age of uniformity:** fast-food restaurants, hotel chains,..
- **shared artifacts** serve as reference points and boundary objects for mutual understanding

▪ demassification

- **physical:** (1) technology moves from atoms to bits, and (2) artifacts to deal with information shrink dramatically
- **social:** design artifacts not just for broad masses of people, but to small groups and even to individuals
- **examples:** (1) the electronic, individually constructed newspaper (limited space of paper, first page items); (2) one TV per family → one TV per person

▪ massification ↔ demassification:

- individual and/versus social creativity
- division of labor, asymmetry of knowledge, and symmetry of ignorance

▪ claims:

- it is hard to share and coordinate practice if we don't share the same physical space
- it is almost impossible if we do not share the same objects

Efforts / Developments to Transcend “Being Home Alone”

- the "Nobel Prize Winner" argument: “Every school child will have access to a Nobel Prize winner — this was and is one of the selling points for the information superhighway
 - true (or will be true soon) at the level of technical connectivity
 - but:

- bringing communities-of-practice, communities-of-interest, and social networks together

- “low-density” populations in geographically limited areas
 - Experience Journal (children with cancer)
 - groups with specific disabilities → Web2gether

Distance Matters — Different Distances

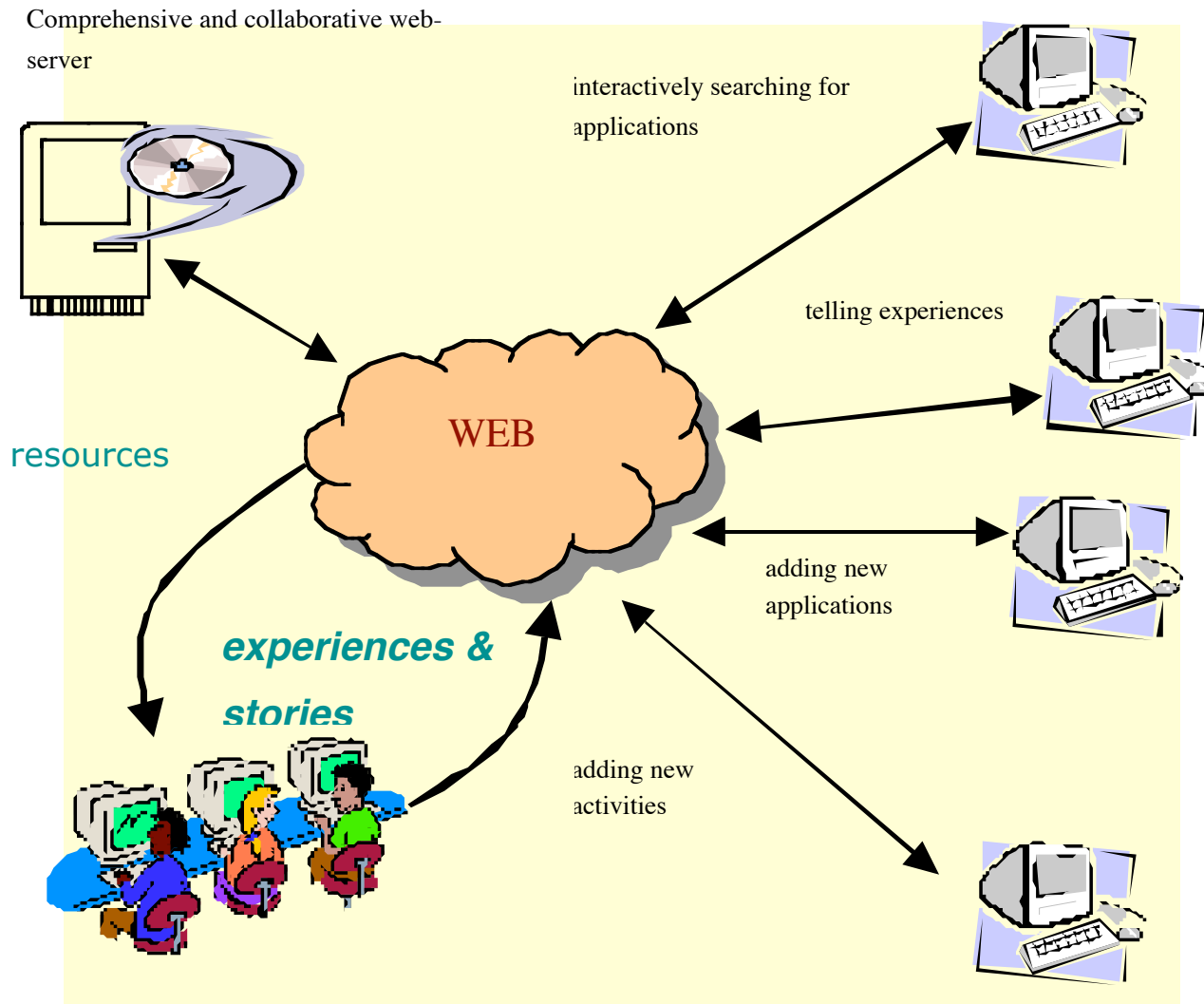
- ***spatial*** (*across space*), requiring support to link people at different physical locations
- ***temporal*** (*across time*), requiring support for asynchronous, indirect, long-term communication
- ***social*** (*across different communities of practice*), requiring support for common ground and shared understanding
- ***technological*** (*between persons and artifacts*), requiring knowledge-based, domain-oriented systems

Web²gether

Rogério dePaula and Anja Kintsch — CLever Project

- to allow a community of teachers and parents of cognitive disabled children to find software applications that are most relevant to their problem at hand
- to allow them to share and learn more about their practices, experiences, and knowledge
- key challenges:
 - to facilitate the formation of a community by understanding current social practices and networks amongst teachers and parents
 - to help them to create a mapping between their problems and potential solutions

Web²gether



Organizational Learning

- organizational learning focuses on recording knowledge gained through experience (in the short term), and subsequently making that knowledge available to others when it is relevant to their work (in the long term)
- workers are more than just procedure followers, they are constantly improvising → let people legitimately improvise
 - a threat: to work according to the rules
 - workers = creative humans
- create corporate/artifact memories where knowledge and improvisations can be captured and made part of the organizations collective knowledge base
- regard breakdowns as opportunities (IBM: communicate openly, reward people for acknowledging failure)
- claim: “Innovation is everywhere - the problem is learning from it” (John S. Brown)”

Principles for Helping Organizations Use What They Know

- capture a significant proportion of the knowledge that practitioners generate in their practice work

- develop a culture in which individuals see their efforts as part of the larger process of building the organization's capabilities
 - updating the organizational memory through new lessons gleaned from practice
 - updating the organizational memory through organizational reflection, in which the raw knowledge from practice is sifted, synthesized, and elaborated
 - delivering the knowledge in the corporate memory as it is required, in the form of performance support tools or training

- develop mechanisms to deliver and acquire knowledge that respect or, better, improve upon the work processes in which practitioners already engage