



Center for
**LifeLong
Learning
& Design**

University of Colorado at Boulder

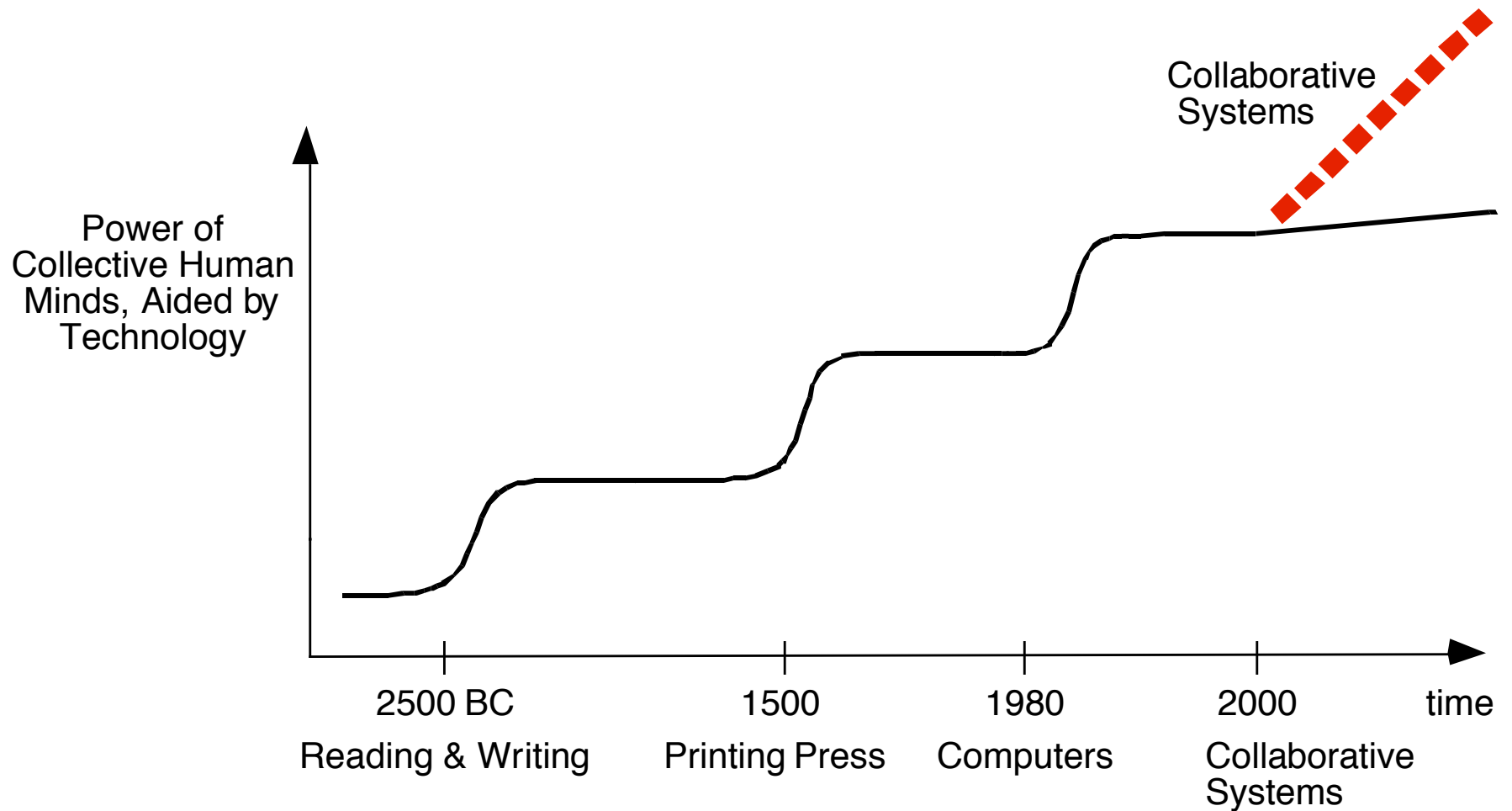
**Wisdom is not the product of schooling
but the lifelong attempt to acquire it.
- Albert Einstein**

Overview of Collaboration

**Gerhard Fischer and Hal Eden
Spring Semester 2005**

January 24, 2005

The Aided, Collective Human Mind – Exploiting the Social



Collaboration — With Whom?

- **ourselves** — e.g., capturing our thoughts of the past → reflexive CSCW
- **all stakeholders** — e.g., clients, designers, customers, users → symmetry of ignorance, communities of interest (CoI)
- **colleagues** — e.g., supporting long-term, indirect collaboration → collaborative work practices, design rationale
- **tools** — e.g., knowing which tools exist, how they can be used, how they can be tailored to our specific needs → high-functionality applications
- **domains** — e.g., domain abstractions (ontologies), standard examples → communities of practices (CoP), catalog examples, cases
- **critics and agents** — e.g., shared knowledge of the task at hand, information volunteering → intrusiveness, information volunteering

Distributed Intelligence

- **between:**

- **spatially** (across space)
- **temporally** (across time)
- **socially** (within communities of practices and communities of interest) → challenge: increase in socially shared cognition and practice — Wittgenstein: *“If a lion could speak would we understand him?”*
- **technologically** (humans and things/computational artifacts)

- **advantage of humans:**

- shared understanding
- background knowledge

- **advantage of things** (Ivan Illich,):

“a thing is available at the bidding of the user — or could be — whereas persons formally become a skill resource only when they consent to do so, and they can also restrict time, place, and methods as they choose.”

→ the “Nobel Prize Winner” fallacy

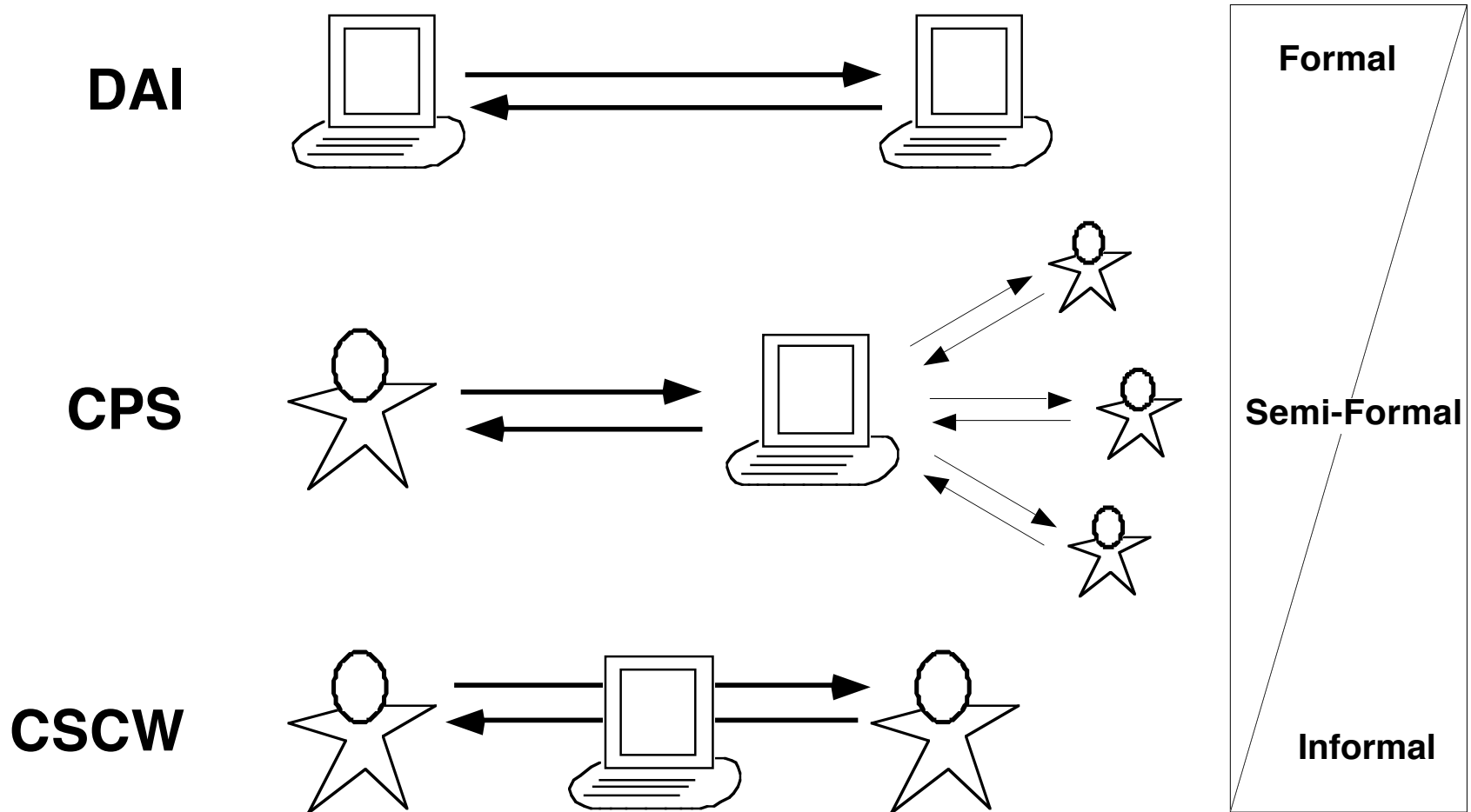
Classification of Collaborative Systems

- **Distributed Computing / Distributed AI (DAI)**
 - computers and computers
 - all information must be interpretable by computer

- **Collaborative (Design) Environments (CPS)**
 - computers and humans
 - mixture between interpretable and computer-mediated information structures

- **Computer-Supported Cooperative Work (CSCW) and Learning (CSCL)**
 - humans and humans
 - computer-mediated
 - most information is not interpretable by computers

Classification of Collaborative Systems



Two Major Approaches in Human-Computer Collaboration

Terveen, L. G. (1995) "An Overview of Human-Computer Collaboration," Knowledge-Based Systems Journal, Special Issue on Human-Computer Collaboration, 8(2-3), pp. 67-81.

- **complementary approach**

- based on the asymmetry between human and computer
- claim: the design of the collaboration is not only a problem of simulating human to human collaboration but of inventing engineering alternatives to interaction related properties

- **emulation or replacement approach** (for example: use of natural language, speech,)

- **collaborative human-computer systems require**

- to specify a division of labor between human and computer (what part of the task should be exercised by human beings and/or by the computer?)
- to design a communication protocol that can be used to coordinate and mutually enhance the efforts of the participants

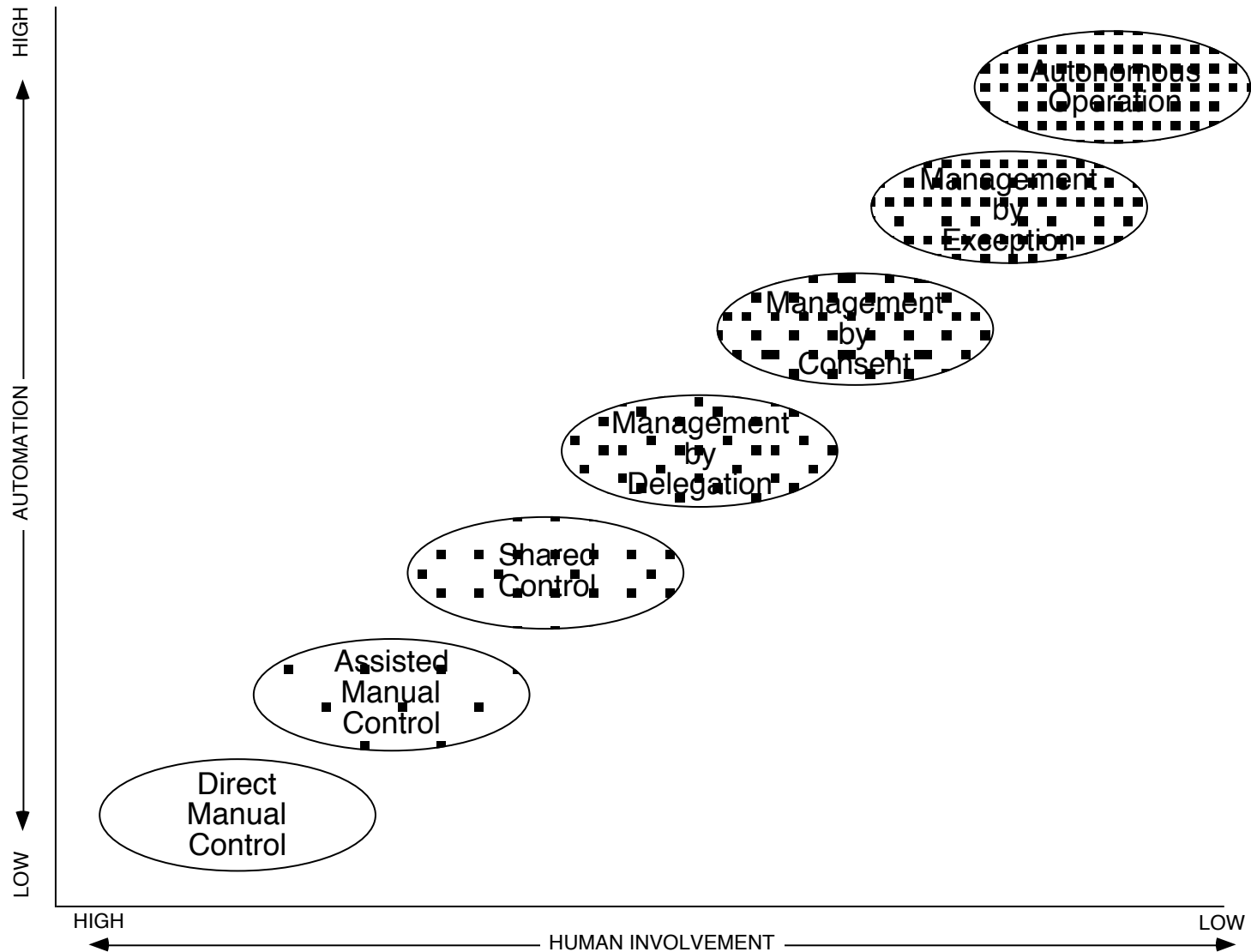
Example: Principles of Human-Centered Aircraft Automation

- **Premise:** The pilot bears the ultimate responsibility for the safety of any flight operation.

- **Axiom:** The pilot must be in command

- **Corollaries:**
 - to command effectively, the pilot must be involved
 - to be involved, the pilot must be informed
 - the pilot must be able to monitor the automated systems
 - automated systems must therefore be predictable
 - the automated systems must also be able to monitor the pilot
 - each element in the system must have knowledge of the other's intent

Dimensions of “Human-Centered Automation”



Supporting Indirect, Long-Term Collaborative Design

▪ why

- direct communication is impossible, impractical or undesirable
- communication is shared around artifacts and information space evolution
- designers need to be informed within the context of their work on real-world design problems

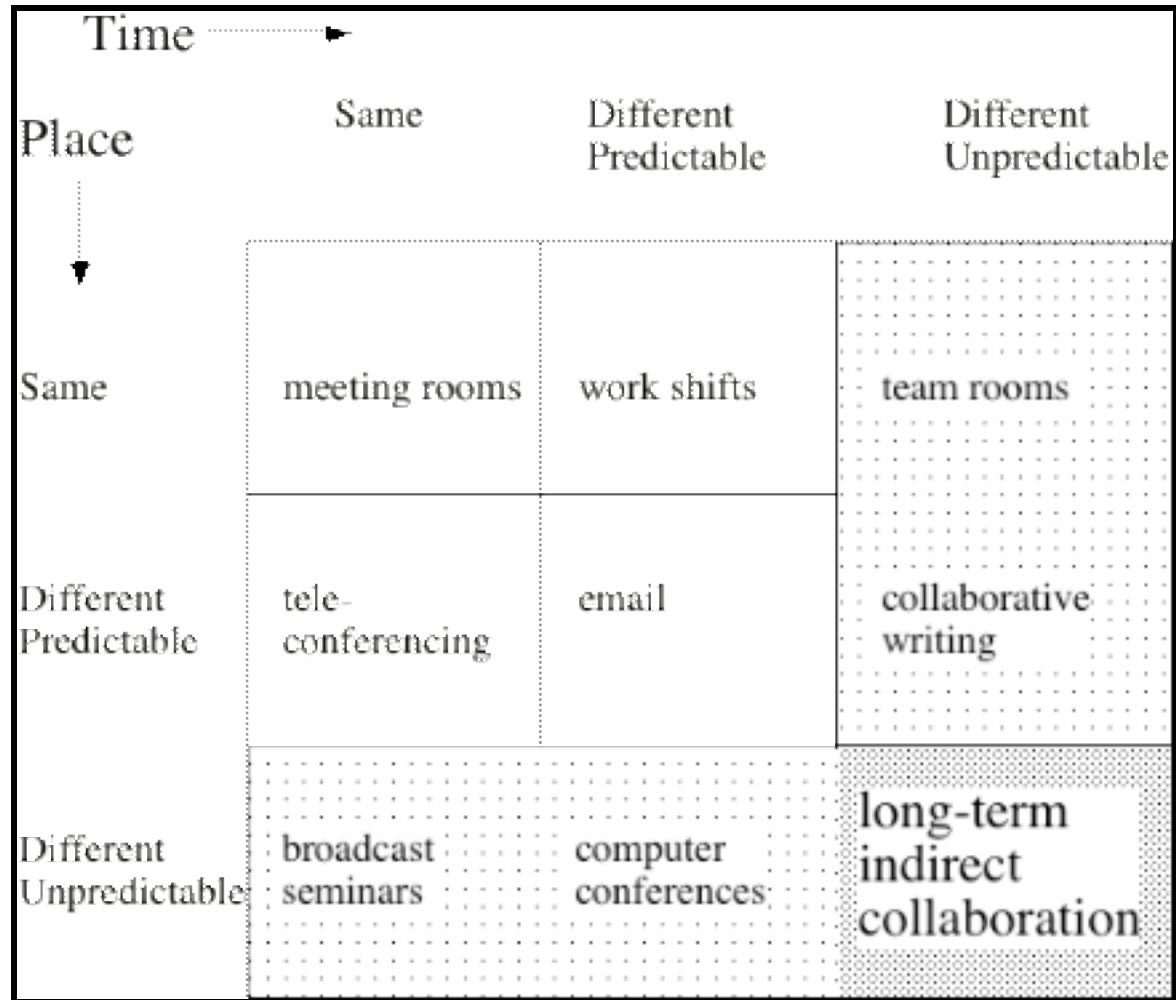
▪ lessons learned

- people do not know what they do not know → information delivery techniques need to complement information access techniques
- information access: browsing is not good enough in large information spaces and queries cannot be articulated → use the artifact itself as a query

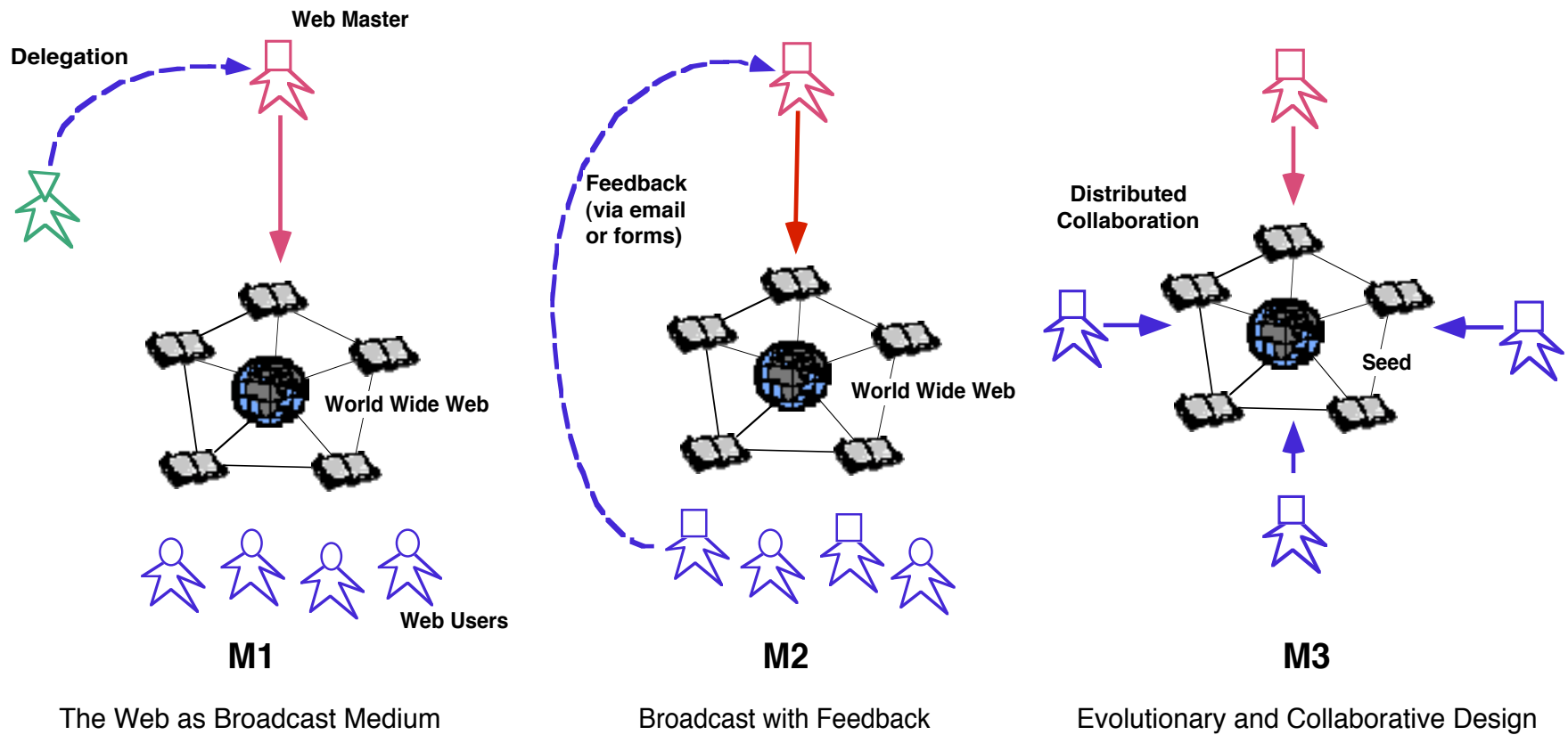
▪ more information:

G. Fischer, J. Grudin, A. Lemke, R. McCall, J. Ostwald, B. Reeves and F. Shipman: *“Supporting Indirect, Collaborative Design with Integrated Knowledge-Based Design Environments”*, Special Issue on Computer Supported Cooperative Work, in *Human-Computer Interaction Journal*, Vol. 7, No. 3, 1992, pp. 281-314

Different Dimensions of CSCW



WWW: From Broadcast to Collaboration Medium



Example of Shared Evolvable Information Repositories

- **DynaSites** at <http://Seed.cs.colorado.edu/dynasites.documentation.fcgi>
- **Swiki** (collaborative websites) → <http://swiki.cs.colorado.edu:3232/dlc/40>
- **Expert Exchange:** <http://www.experts-exchange.com/>
- **Place for Children:** <http://www.mamamedia.com>
- **Open Source — Eric Raymond → see:**
<http://www.tuxedo.org/~esr/writings/cathedral-bazaar/>
- **Open Systems = “*open source for the rest of us*”**

Open Systems

- **model: open source an intellectual paradigm requiring a new mindset**
 - an intellectual paradigm requiring a new mindset
 - objective: leverage is gained by engaging the whole world as a talent pool
 - from users/consumers → co-designers/active contributors

- **some examples of decentralized, evolvable information repositories**
 - open source: collaborative development of software
 - the scientific method/enterprise itself
 - insight: “software/knowledge is not a commodity to be consumed but is a collaboratively designed and constructed artifact”

- **some characteristics:**
 - evolutionary design of complex systems → seeding, evolutionary growth, reseeded (SER) model
 - success stories so far: with technically sophisticated developers (e.g., Unix Shell, Linux), not end-users

- **social capital and gift cultures:** social status is determined not by what you control but by what you give away

Self-Analysis of L3D as a Learning Organization

- homogenous versus heterogeneous computing environment
- collaborative work practices (power-user, local developers)
- jointly created and evolved information repositories:
 - Dynagloss
 - Endnote
 - Websites of Center, Research Project
 - Websites of Courses
- establish and share work practices and information:
 - information producers: “who do I tell?”
 - information consumers: “who do I ask?”

Reinterpreting Motivation at a Collaboration Level

- who is the beneficiary and who has to do the work?
- organizational memories: what will make employees want to share?
- people need to make explicit what they know and take the trouble to enter it into the system
- collaboration depends on a social and economic system which values altruism
 - capitalism is selfish
 - claim: “until the free distribution of knowledge is rewarded economically, there is little incentive for individuals and organizations to share information”

Questions about Collaboration

- how do we get people to **share**, and what should they share?
- what is the relation between **collaborative learning** and **individual learning**?
- what are **success stories** for collaboration?
- which kind of **processes and artifacts** are needed to support collaborative learning?
- learning **organization** (but: individuals learn) → how exactly does the organization learn?
 - collaborative work practices (complement each others knowledge)
 - external artifacts (products, processes, group memories)
- how much can we get a "free lunch" by **capturing and repackaging information that already exists**? (e.g., recommender systems (such as PHOAKS), extracting information from bookmarks, social network analysis.....)

References

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