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

Overview of Collaboration

Gerhard Fischer and Hal Eden
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Comments Drawn from Assignment 2

Min-Chieh: the skill “how to locate the knowledge you need efficiently when you need it” is a critical skill for a successful employee to survive in the fast pace society. I think the university should prepare students to develop this skill for their future.

Keisuke: my inability was efficiently covered by my group members. However, one drawback of this way of collaboration is that I might have lost the opportunity to acquire skills of communication-intensive part of user interface design process.

Mark: However, such systems are only as good as the information in them. In highly competitive environments it is hard to get people to share knowledge which they may view as a competitive advantage.

Comments Drawn from Assignment 2

Nathan and Lisa: Different people have different ways of thinking and approaching problems and other students benefit from being exposed to multiple approaches rather than just the one presented by professors in lecture. Also, working in teams allows everyone on the team to benefit from the strengths of the other team members while minimalizing the affect of weaknesses.

Cortney: The one point I don't agree with it Norman says, "The sin of plagiarization is not that it involves copying -- this should be rewarded -- but that it doesn't give credit for the originator."

Gary: There have been times when I have crammed for tests and shortly after forgotten what I've learned. However there are things that I study well in advance and forget as well because I rarely apply the idea.

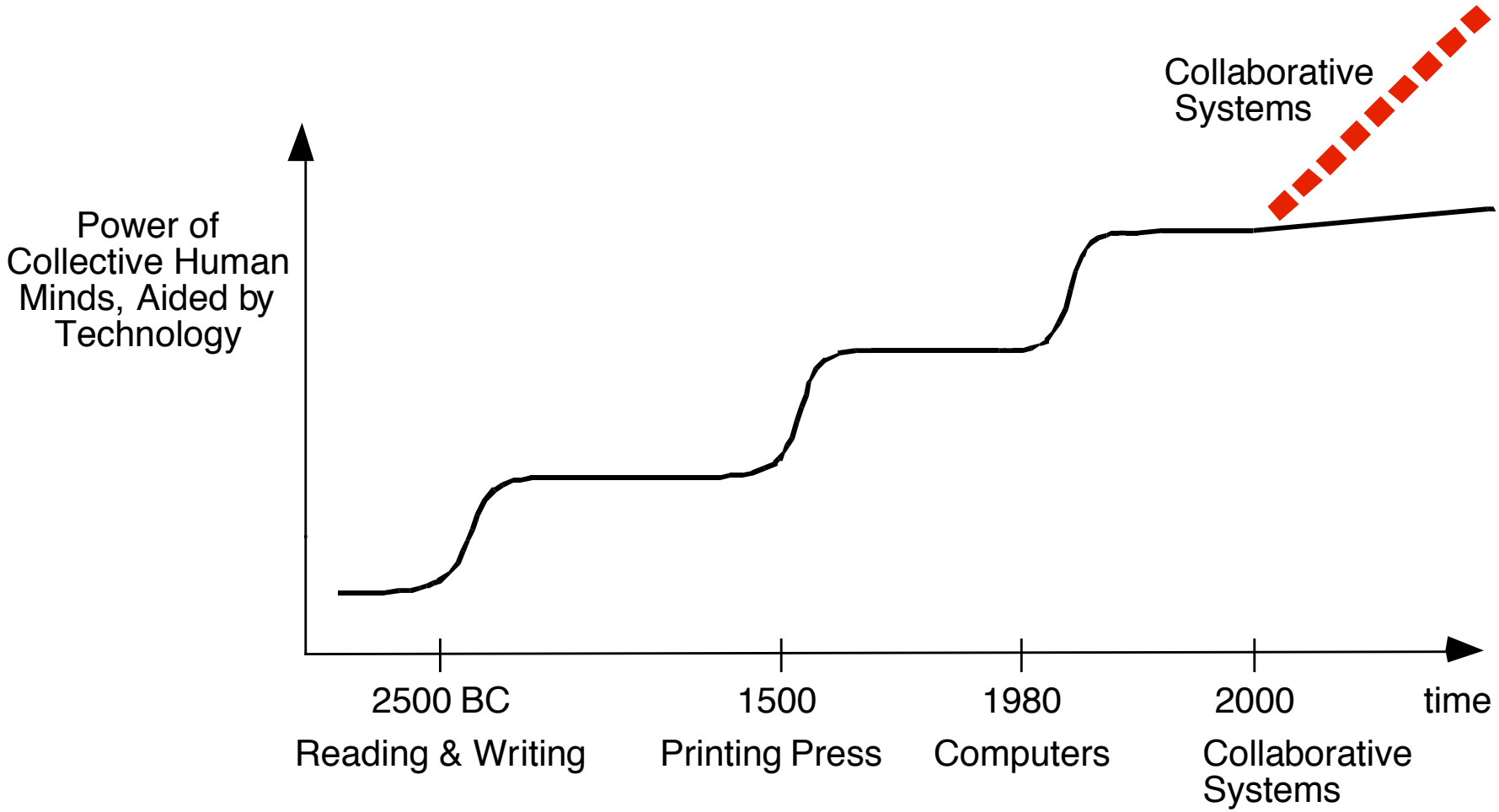
John — negative about collaborative activities: Sometimes people will rely too much on others (or other resources) and will become somewhat lazy

Comments Drawn from Assignment 2

Malte: Individual work and the ability to memorize is important however. I think there are subject matters in which this is more important than others. In learning a foreign language for example it is of little use to be able to known where to find a translation in a book or on the Internet, at least if one wishes to have a fluent conversation. There are many fields where speed is paramount and the ability to know where to look is not good enough. I would not want to go into a surgery where the doctor said he was a little fuzzy with human anatomy but knew how to find a source on it very quickly.

Laoleng: In the real world, no one person has all the answers to solve every problem, but rather as a group, it becomes possible to solve virtually any problem that may arise in the working world.

The Aided, Collective Human Mind — Exploiting the Social



Collaboration — With Whom?

- ***ourselves*** — e.g., capturing our thoughts of the past → reflexive CSCW, life histories
- ***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 (e.g.: software reuse), 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)
  - **conceptually** (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 ←→ 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

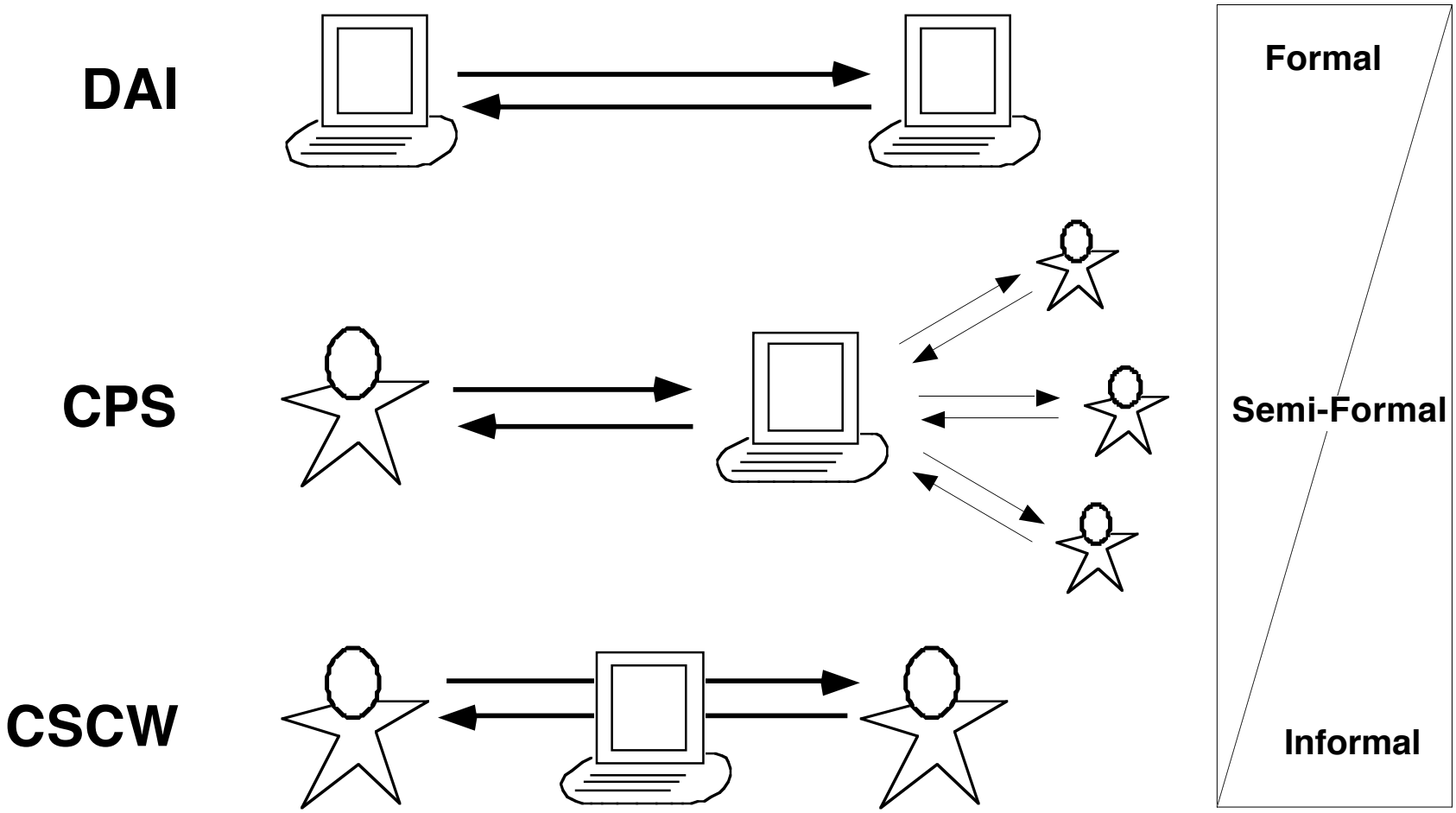
Classification of Collaborative Systems

- **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

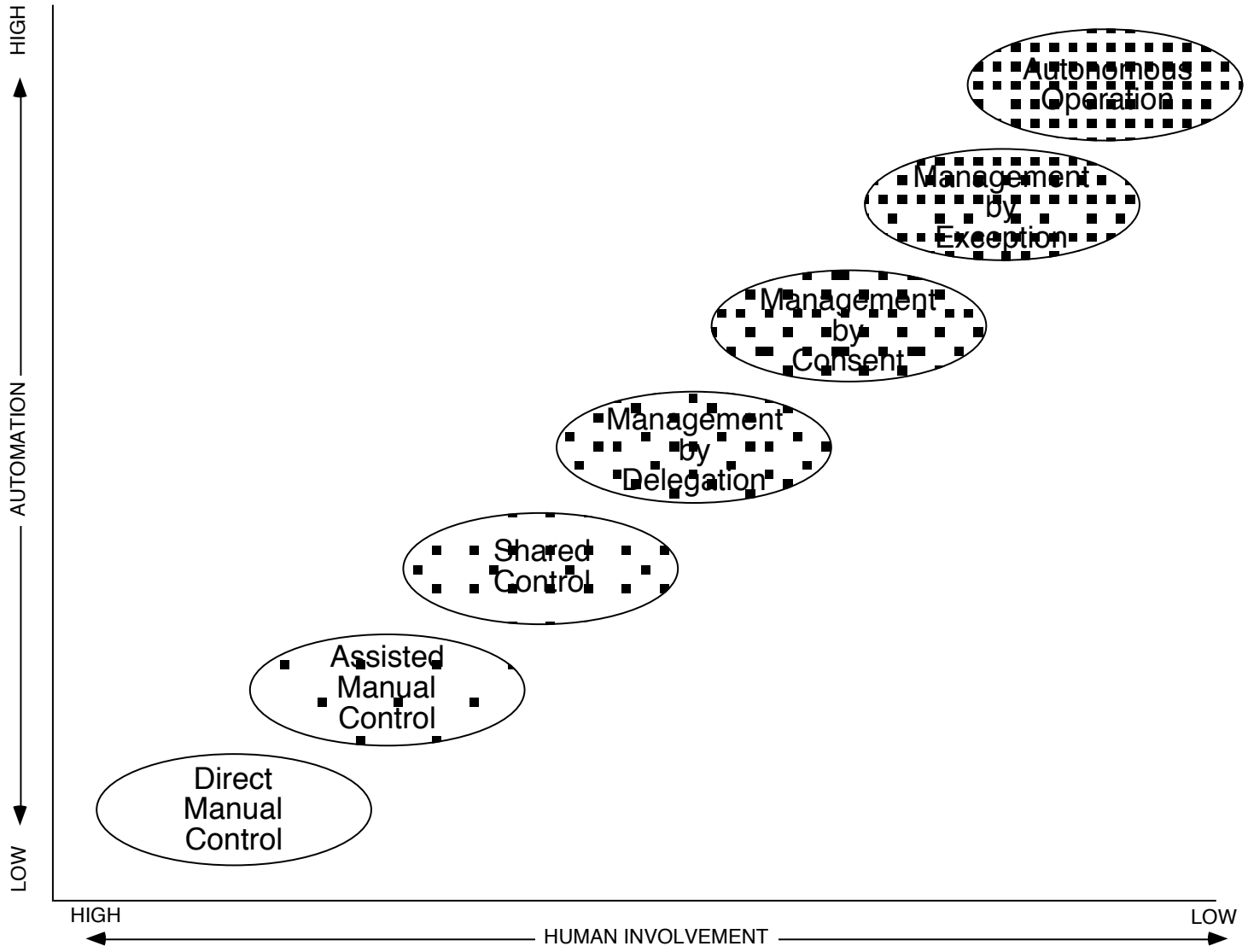
Example: Principles of Human-Centered Aircraft Automation

- **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"



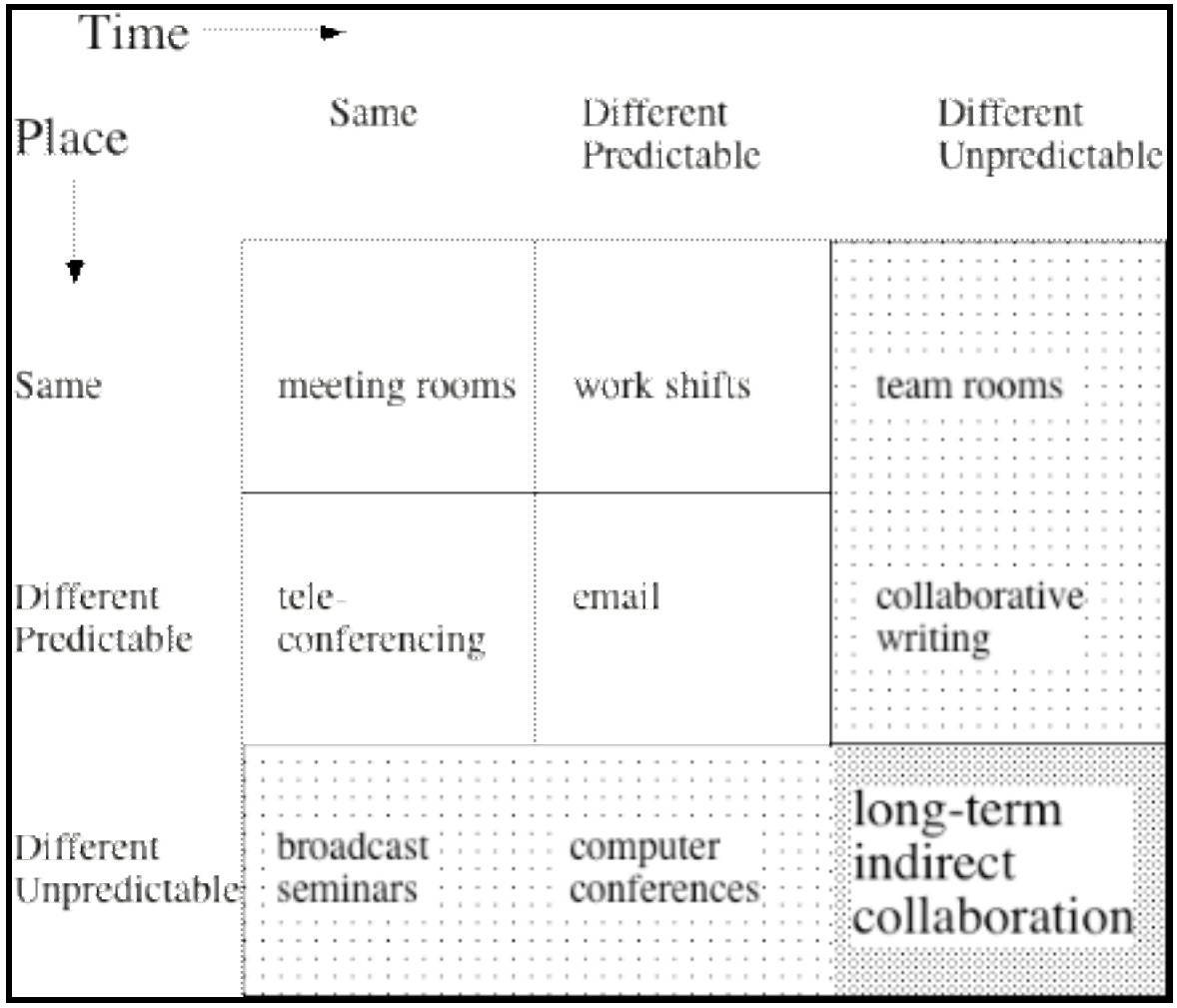
Supporting Indirect, Long-Term Collaborative Design

- **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

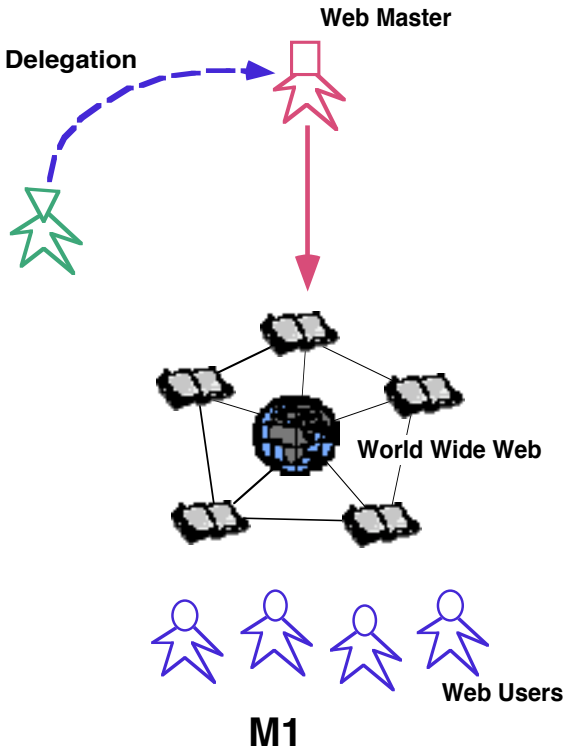
- **lessons learned**
  - people do not know what they do not know → information delivery techniques need to complement information access techniques
  - information access: browsing is not good enough in large information spaces and queries cannot be articulated → use the artifact itself as a query

- **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

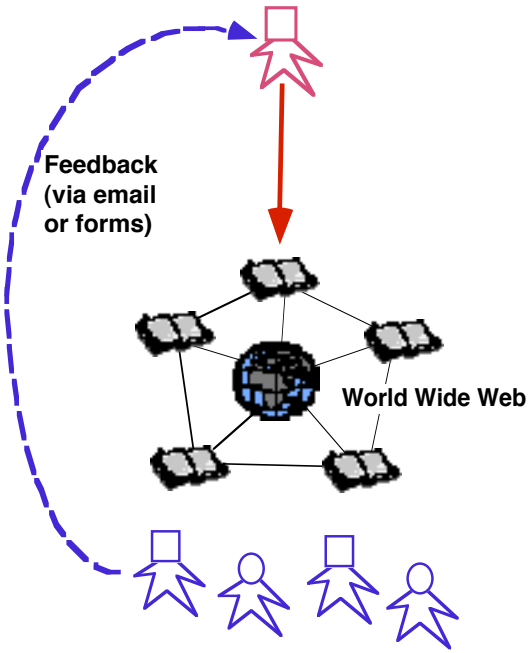


WWW: From Broadcast to Collaboration Medium



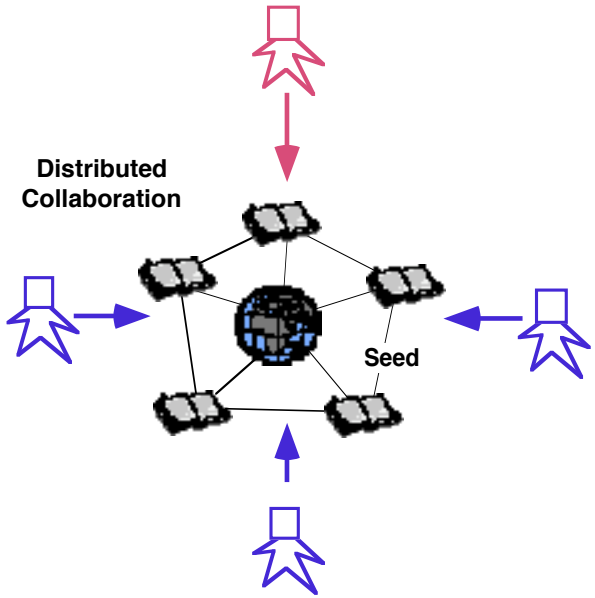
M1

The Web as Broadcast Medium



M2

Broadcast with Feedback



M3

Evolutionary and Collaborative Design

Example of Shared Evolvable Information Repositories

- **DynaSites** at http://Seed.cs.colorado.edu/dynasites.documentation.fcgi
- **Swiki** (collaborative websites) → http://l3dswiki.cs.colorado.edu:3232/dlc-2006
- **Expert Exchange:** http://www.experts-exchange.com/
- **News for Nerds:** **http://slashdot.org/**

Example of Shared Evolvable Information Repositories

- **Place for Children:** http://www.mamamedia.com
- **Wikipedia —** the free encyclopedia**: http://en.wikipedia.org/wiki/**
- **Open Source — for writings from Eric Raymond → see:**
  http://www.catb.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, reseeding (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”

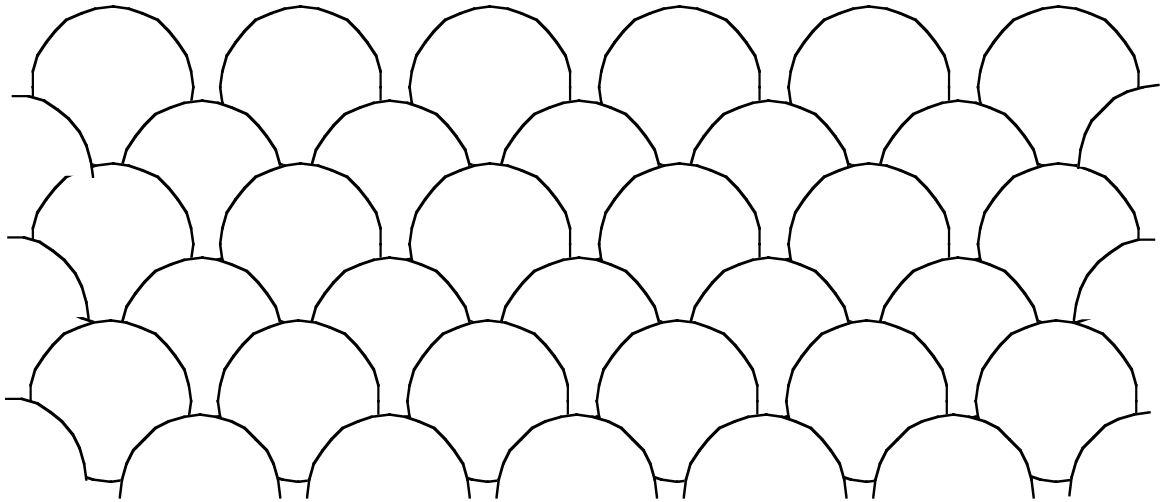
Questions about Collaboration

- 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., social navigation, extracting information from bookmarks, social network analysis.....)

Beyond the Individual Human Mind: Fish-Scale Model

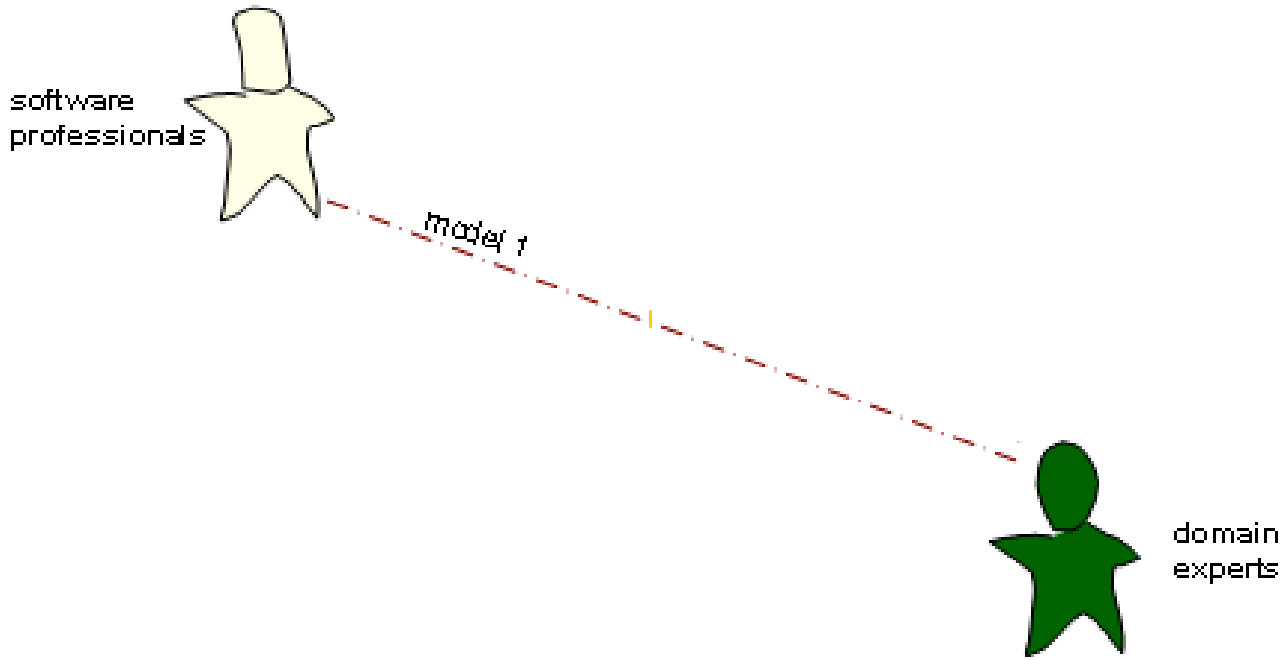
source: Campbell, D. T. (2005) "Ethnocentrism of Disciplines and the Fish-Scale Model of Omniscience." In S. J. Derry, C. D. Schunn, & M. A. Gernsbacher (Eds.), *Interdisciplinary Collaboration — An Emerging Cognitive Science,* Lawrence Erlbaum, Mahwah, NJ, pp. 3-21.

- the key to address complex problems is
  - **not** in *"Leonardos who are competent in all sciences"* or in "educating the *intellectual superhuman* who knows everything"
  - but to achieve ***"collective comprehensiveness through overlapping patterns of unique narrowness"***

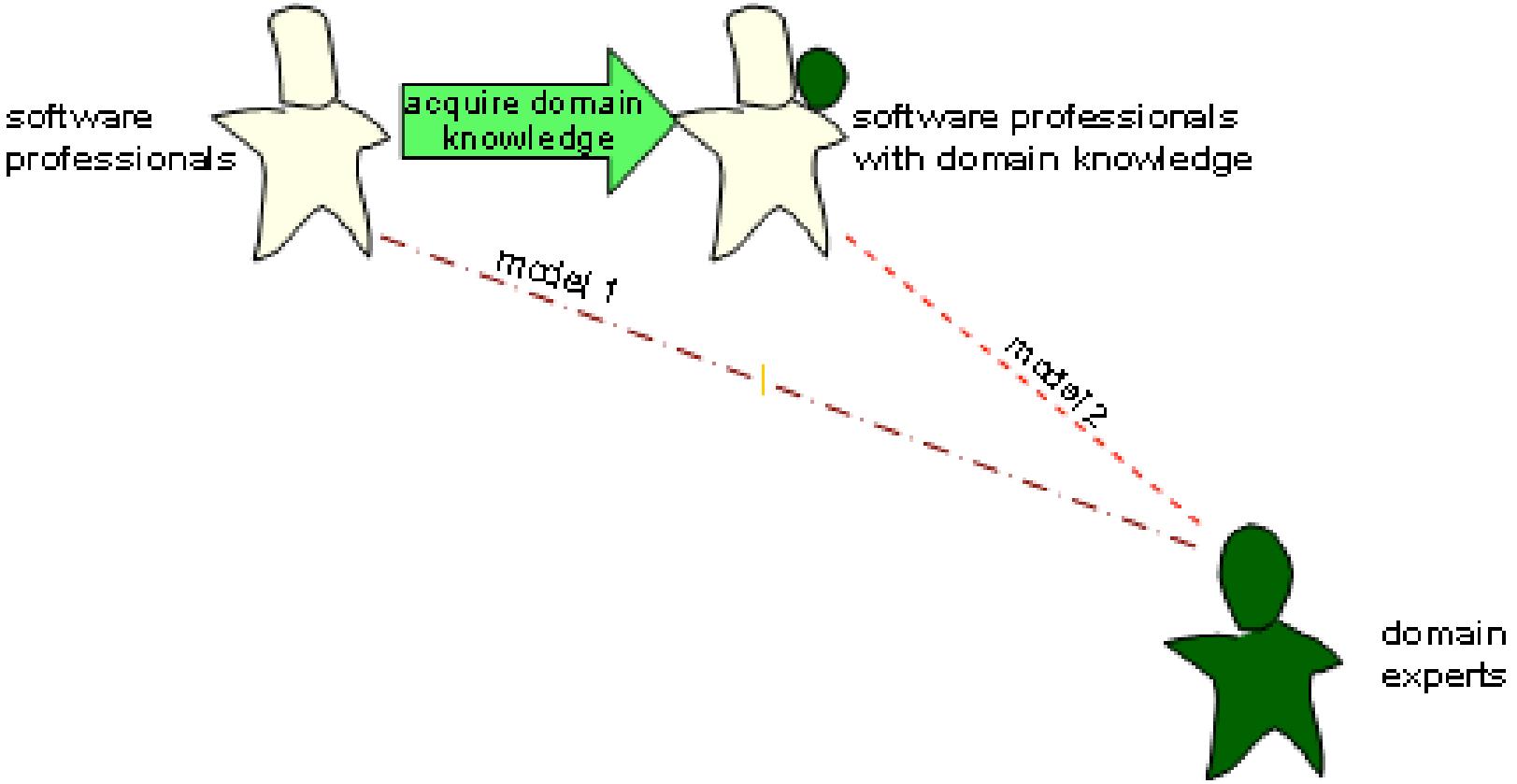


Education for Collaboration
—
From Reflective Practitioners to Reflective Communities

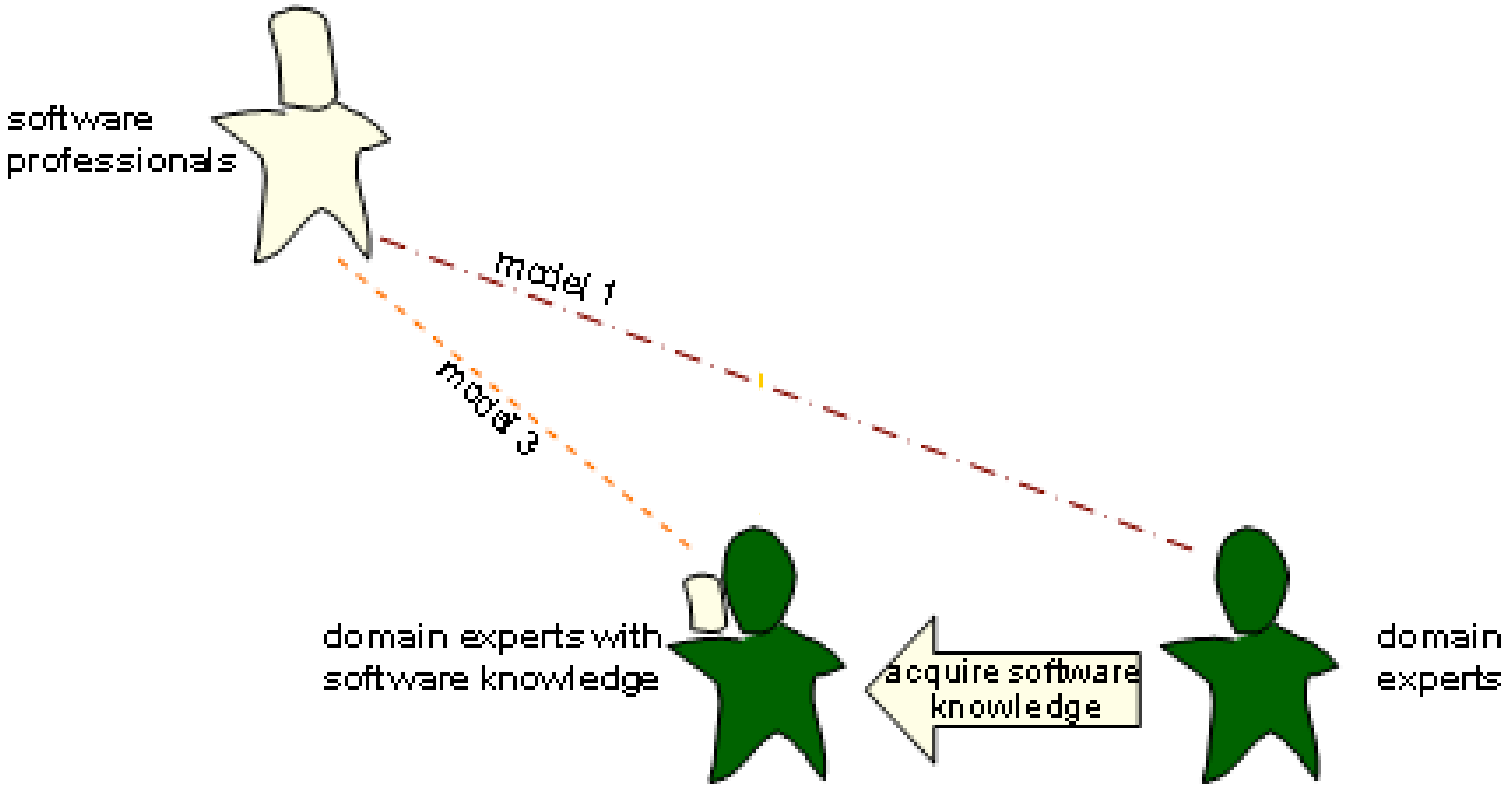
Large Conceptual Distance — Limited Common Ground



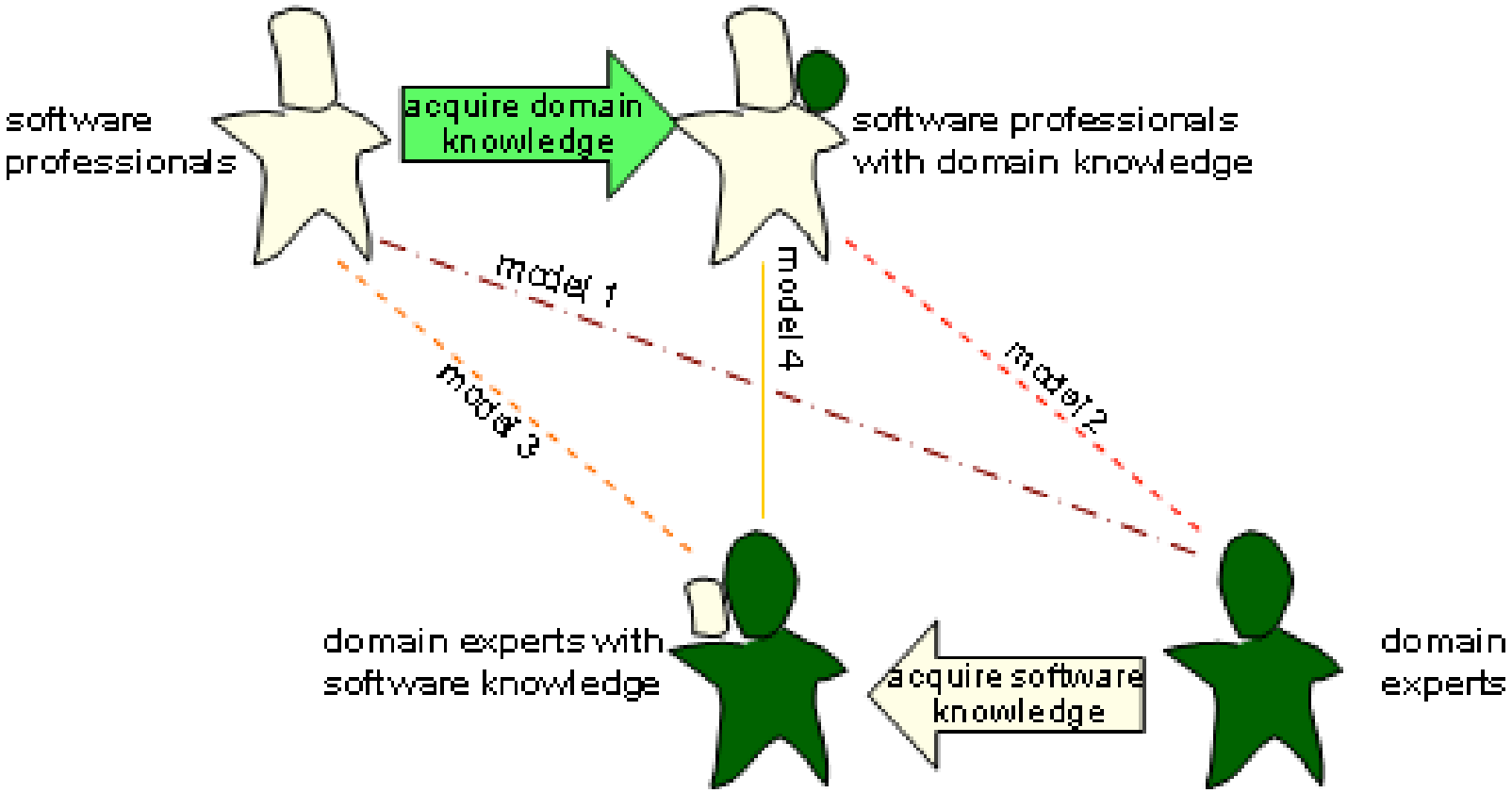
Software Professionals Acquiring Domain Knowledge



Domain Experts Acquiring Media Knowledge



From Reflective Practitioners to Reflective Communities



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