



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
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Comments Drawn from Assignment 2

Jason Held: I constantly collaborate as a student with other CS students, to make sure that they understand certain topics, and are able to use them when programming. In return, they do the same for me.

Brian Sax: The only place I have experienced the true impact of collaboration is at work

Praful Mangalath: I gathered from the essay that “finding” would be all that mattered— interpretation and evaluation are secondary
(<http://tinyurl.com/2fnp4b> - a blog discussing this article)

Jon Dormody: Collaboration creates buy-in and ownership to projects and ideas. Projects are more successful when more members of a team are bought into the vision and own parts of the project

Jessica Speir/Joe Zeles: Many projects would take considerable amounts of time to complete by ones self, but in groups, however, these projects can sometimes be quickly accomplished.

Comments Drawn from Assignment 2

Brian Brown: There are certain things everyone should just know on their own and it is unacceptable to ask your neighbor for the answer even if you do let everyone know that they told you the answer

Yingdan Huang: why and how can cooperation help? There are problems paralleled with cooperation as well. What are those problems and how to manage them? Without proof, it seems to me just some random pop-up idea

Tyler Brown: We must also realize the disadvantages of the current “team work” methods. Students can easily get by without having to do any work at all; their teammates simply pick up the slack.

Peng Shao: I have found that in industry, having smarts is only one of the many attributes that makes a desired employee – other important factors include diligence, adaptability, communication skills, a willingness to help others, patience, and a general lack of conceit.

Comments Drawn from Assignment 2

Dave Musson: grading circles, where by students are involved with the marking of assignments. This has been adopted in CSCI 4838 – User Interface Design

Andy Hoffner: Isn't success on the job as much about helping your co-workers, as it is about impressing the boss? What better way to motivate students to work with others than to have their grade based on how helpful the group finds their contributions?

Corey Davis: The only real additional efforts I ran into was when some of the members of the team/group lacked motivation to work and do their part.

Nick Todd: Academically, collaboration can be both frustrating and beneficial: beneficial when the group members each put in an equal effort in order to solve a problem and frustrating when the effort put in to the task is unequal

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)
- **technologically** (humans \leftrightarrow 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

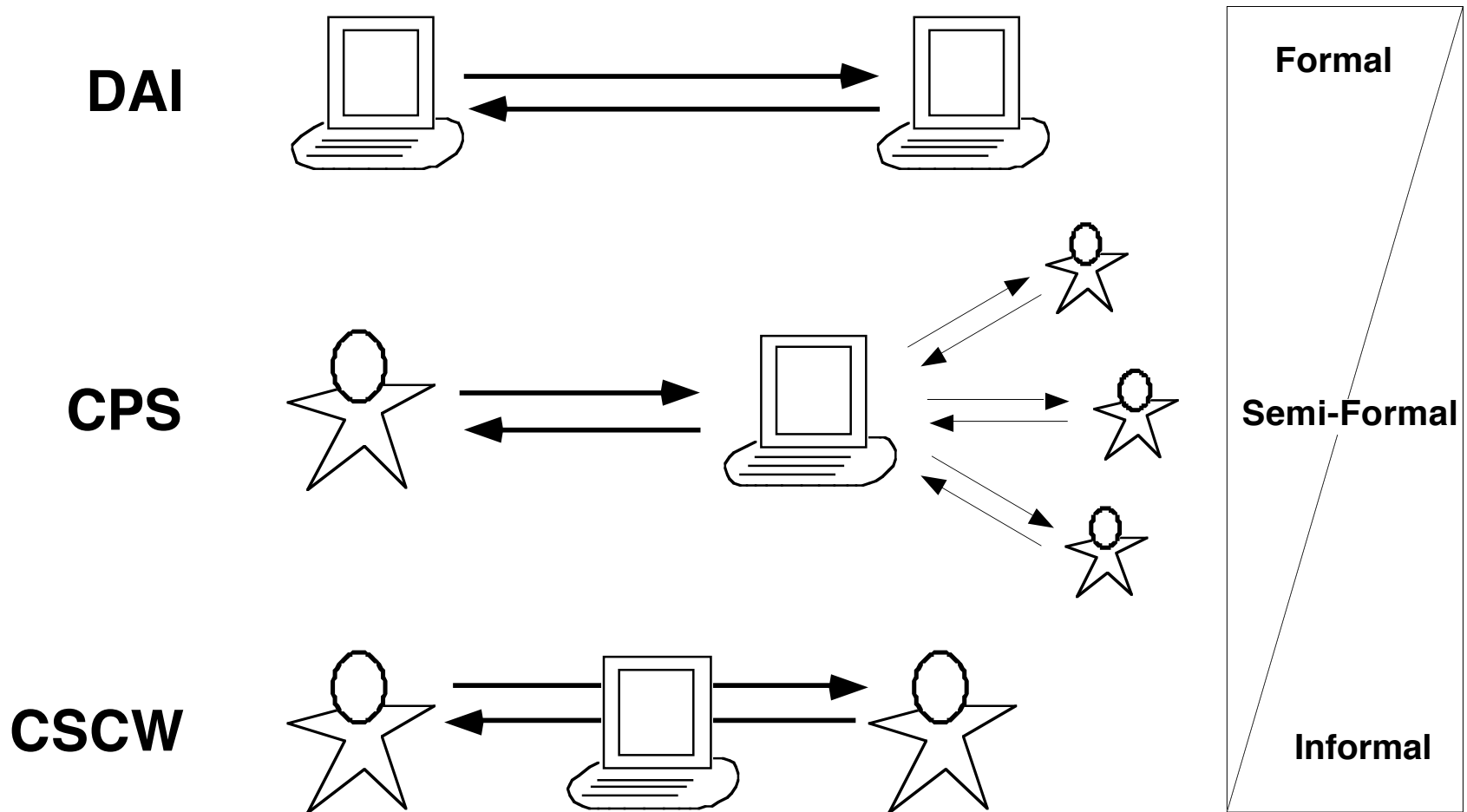
Classification of Collaborative Systems

- **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



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

		Time →		
Place ↓		Same	Different Predictable	Different Unpredictable
Place	Same	meeting rooms	work shifts	team rooms
	Different Predictable	tele- conferencing	email	collaborative writing
	Different Unpredictable	broadcast seminars	computer conferences	long-term indirect collaboration

Example of Shared Evolvable Information Repositories

- **Brian Brown: Google Docs and Spreadsheets**
- **Andy Hoffner: Apple Discussions**
- **John Bacus: 3D Warehouse**
<http://sketchup.google.com/3dwarehouse/>
- **Swikis** (collaborative websites used as course information environments)
- **Expert Exchange:** <http://www.experts-exchange.com/>
- **News for Nerds:** <http://slashdot.org/>
- **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/>

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”

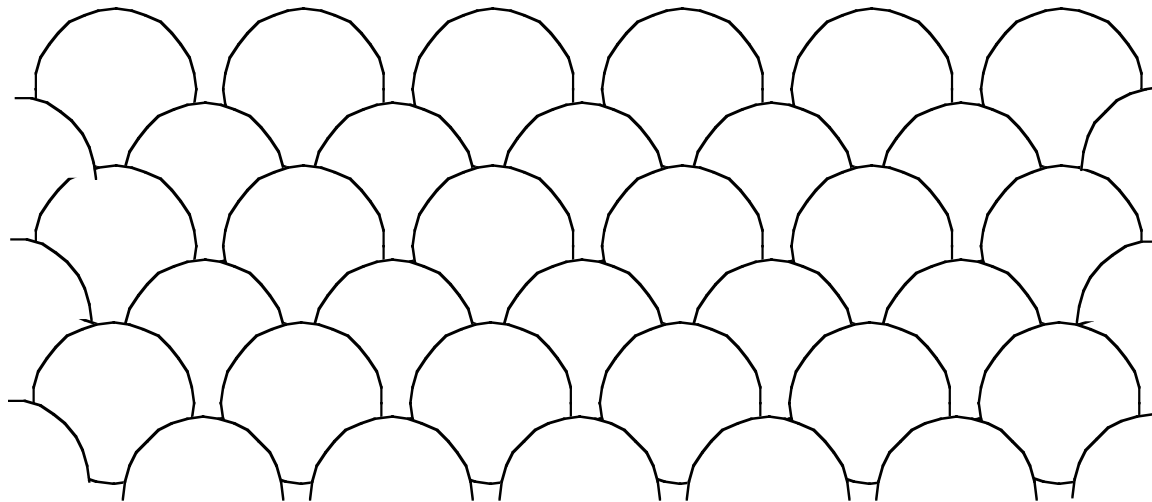
Questions about Collaboration

- 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.

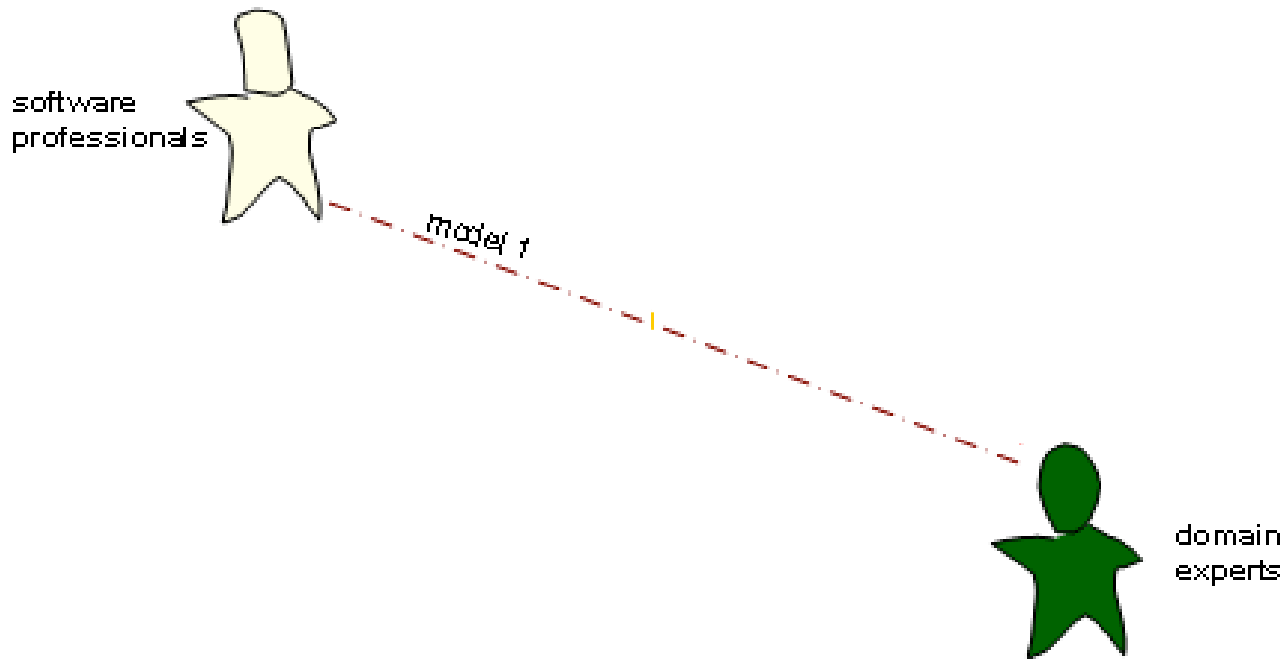
- the key to address complex problems is
 - **not** in "*Leonardos who are competent in all sciences*" or in "educating the *intellectual superhuman who knows everything*"
 - but to achieve "*collective comprehensiveness through overlapping patterns of unique narrowness*"



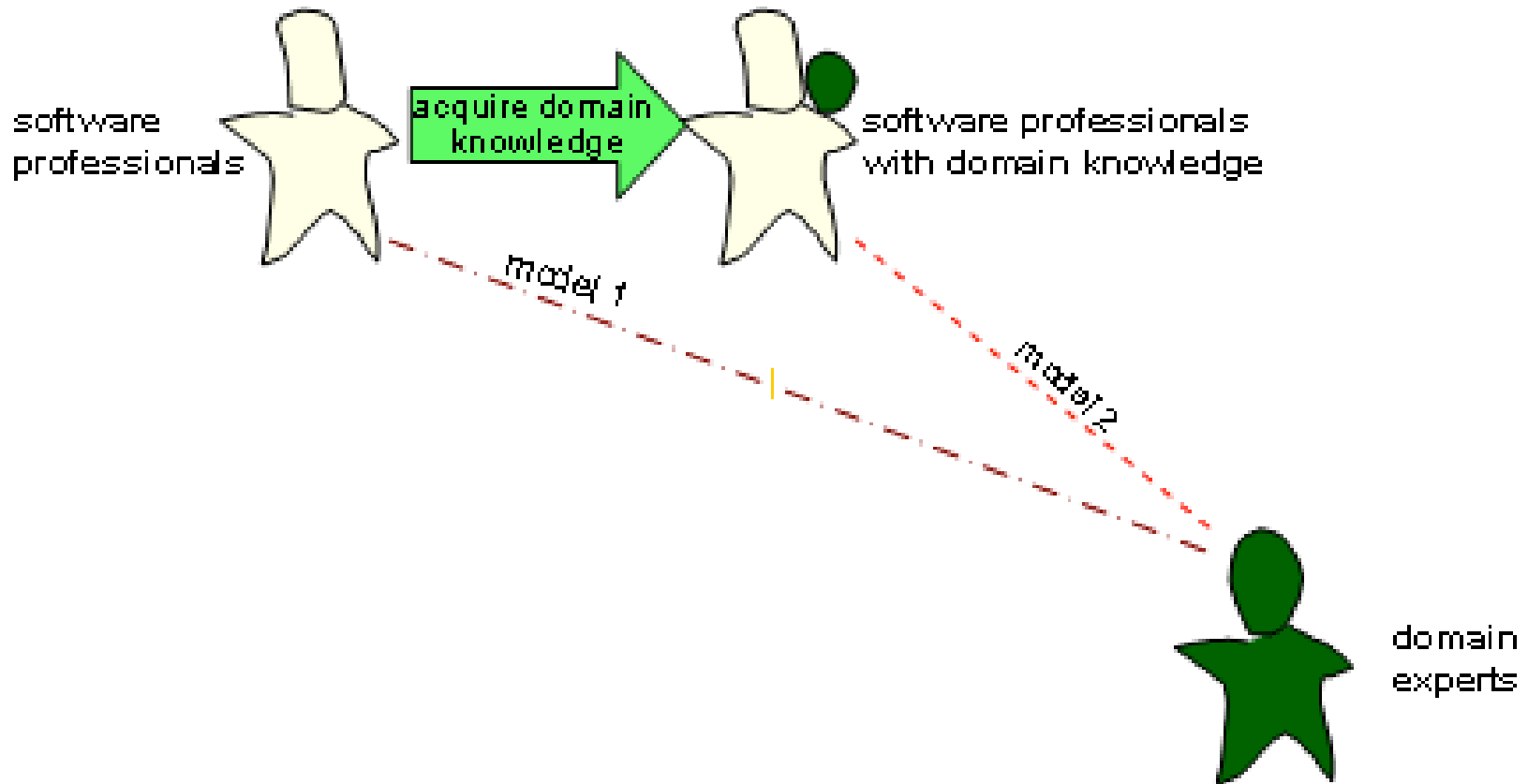
Education for Collaboration

— From Reflective Practitioners to Reflective Communities

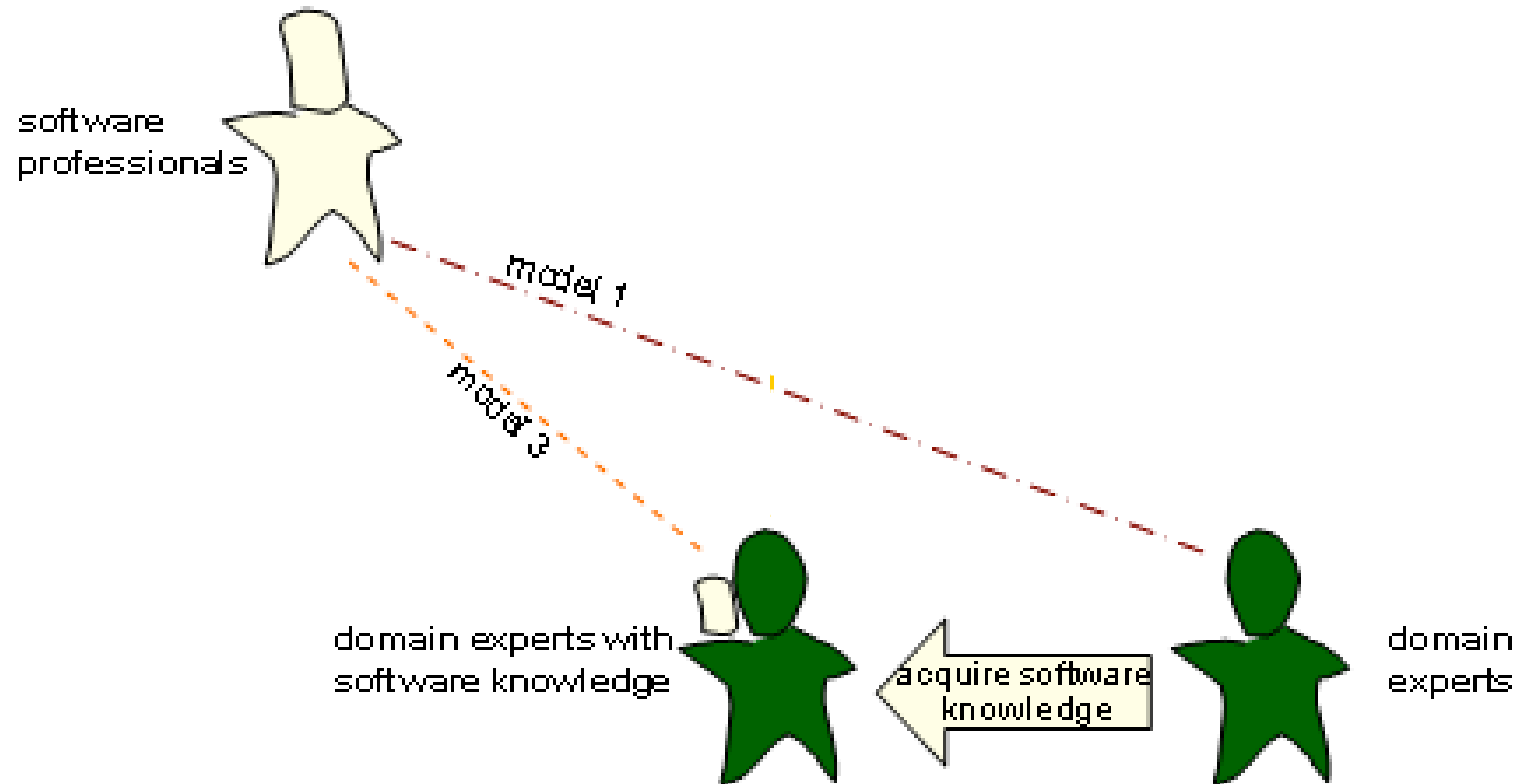
Large Conceptual Distance — Limited Common Ground



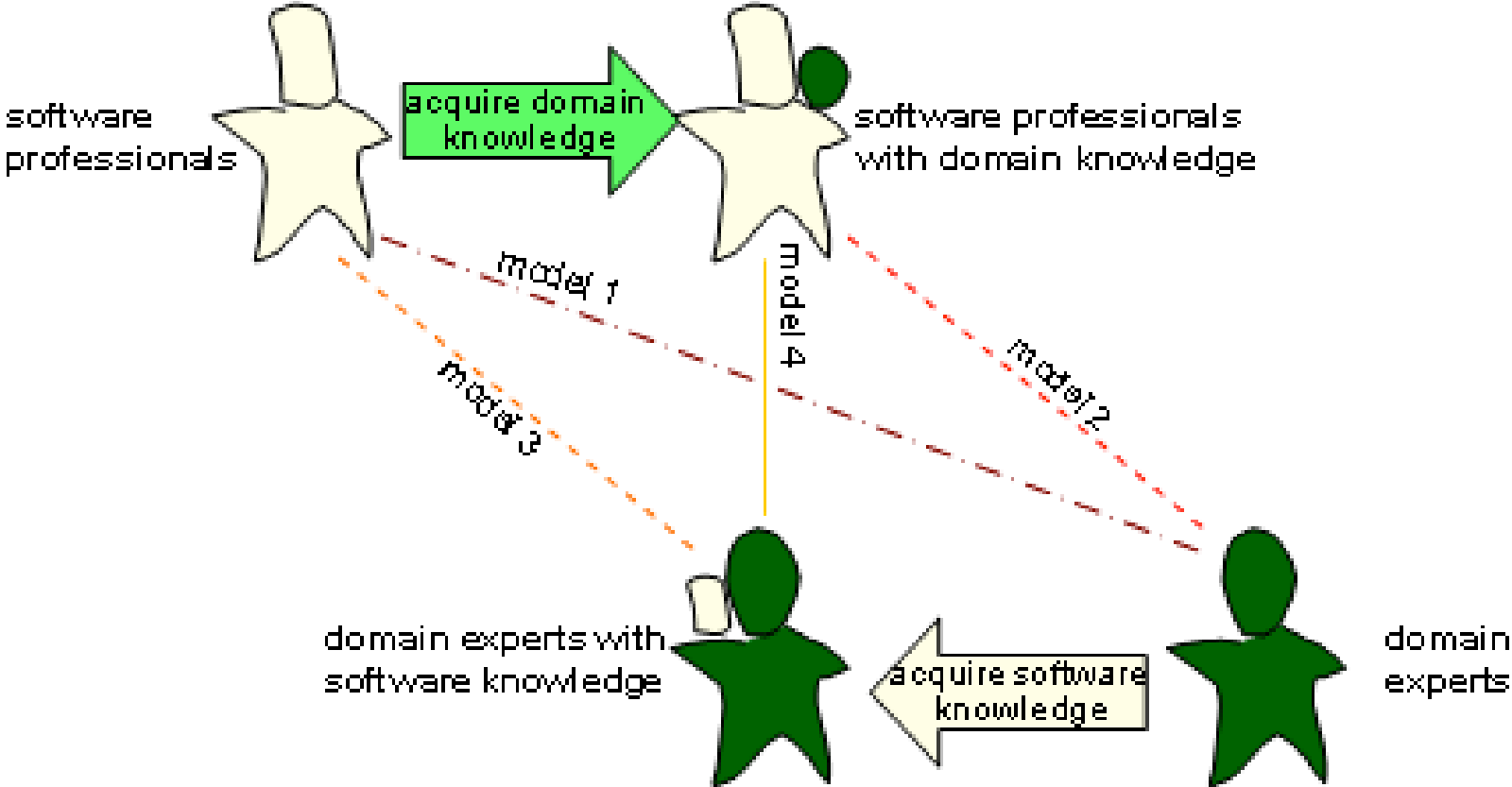
Software Professionals Acquiring Domain Knowledge



Domain Experts Acquiring Media Knowledge



From Reflective Practitioners to Reflective Communities



References

- Grudin, J. (1994) "Computer-Supported Cooperative Work: History and Focus," IEEE Computer, 27(5), pp. 19-26. Available at: <http://www.ics.uci.edu/~grudin/Papers/IEEE94/IEEEComplastsub.html>.
- Illich, I. (1971) Deschooling Society, Harper and Row, New York. (specifically: Chapter 6: "Learning Webs")
- Moran, T. P. & Carroll, J. M. (Eds.) (1996) Design Rationale: Concepts, Techniques, and Use, Lawrence Erlbaum Associates, Inc., Hillsdale, NJ.
- Nardi, B. A. (1993) A Small Matter of Programming, The MIT Press, Cambridge, MA.
- Resnick, L. B., Levine, J. M., & Teasley, S. D. (Eds.) (1991) Perspectives on Socially Shared Cognition, American Psychological Association, Washington, D.C.
- 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.
- Hollan, J., Hutchins, E., & Kirsch, D. (2001) "Distributed Cognition: Toward a New Foundation for Human-Computer Interaction Research." In J. M. Carroll (Ed.) *Human-Computer Interaction in the New Millennium*, ACM Press, New York, pp. 75-94.
- Dieberger, A., Dourish, P., Höök, K., Resnick, P., & Wexelblat, A. (2000) "Social Navigation: Techniques for Building More Usable Systems," *Interactions*, 7(6), pp. 36-45.
- Raymond, E. S. & Young, B. (2001) The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary, O'Reilly & Associates, Sebastopol, CA.