



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**

Beyond Binary Choices: Integrating Individual and Social Creativity

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Claim

“an idea or product that deserves the label ‘creative’ arises from the synergy of many sources and not only from the mind of a single person” — Csikszentmihályi

- The power of the unaided individual mind is highly overrated.
- Although society often thinks of creative individuals as working in isolation, intelligence and creativity result in large part from interaction and collaboration with other individuals.
- Much human creativity is social, arising from activities that take place in a context in which interaction with other people and the artifacts that embody collective knowledge are essential contributors.

Creativity

- ***historical creativity*** = ideas and discoveries that are fundamentally novel with respect to the whole of human history

- ***psychological creativity*** = *ideas and discoveries in everyday work practice that are novel with respect to an individual human mind or social community*
 - a capacity inherent to varying degrees in all people
 - needed in most problem-solving situations
 - knowledge workers and designers have to engage in creative activities to cope with the unforeseen complexities of real-world tasks

Creativity: four essential Attributes

- **originality** means people having unique ideas (mostly in the realm of *psychological creativity*) or applying existing ideas to new contexts
- **expression** — ideas or new applications are of little use if they are only internalized; they need to be *expressed and externalized*
- **social evaluation** — externalized ideas can take place wherein other people (with different backgrounds and perspectives) can understand, reflect upon, and improve them
- **social appreciation within a community** — rewards, credits, and acknowledgements by others (e.g., reward structures such as in a gift economy and a market economy) that motivate (or thwart) further creative activities

Individual Creativity

- creative individuals can make a huge difference — for example: movie directors, champions of sports teams, and leading scientists and politicians
- individual knowledge, imagination, inspiration and innovation are the bases for social creativity

▪ **Social Creativity**

- **the Renaissance scholar does not exist anymore** — the individual human mind is limited (“the great individual” → “the great group”)
- **distinct domain of human knowledge exist** → of critical importance: mutual appreciation, efforts to understand each other, increase in socially shared cognition and practice (source: [Snow, C. P. \(1993\) “The Two Cultures”, Cambridge University Press, Cambridge, UK](#))
- exploit the **“symmetry of ignorance”** (Rittel) as an opportunity
 - none of stakeholders can guarantee that their knowledge is superior or more complete compared to other people’s knowledge
 - to overcome the “symmetry of ignorance” → activated as much knowledge from as many stakeholders as possible with the goal of achieving mutual education and shared understanding

Thinking, Learning, and Working – The “Wrong” Image? “The Thinker” by Auguste Rodin



Individual **versus** / **and** Social Creativity

*“The strength of the wolf is in the pack,
and the strength of the pack is in the wolf.” — Rudyard Kipling*

- **social** (see John-Steiner, V. (2000) *Creative Collaboration*, Oxford University Press, Oxford)
 - Rodin's sculpture "The Thinker" dominates our collective imagination as the purest form of human inquiry — the lone, stoic thinker
 - the Western belief in individualism romanticizes this perception of the solitary process → the reality is that scientific and artistic forms emerge from the joint thinking, passionate conversations, and shared struggles
 - the mind — rather than driving on solitude — is clearly dependent upon the reflection, renewal, and trust inherent in sustained human relationships and empowerment / augmentation with media

- **individual:**
 - human collaboration is not only needed but central to social creativity
 - individuals participating in such collaborative inquiry and creation, need the individual reflective time depicted by Rodin's sculpture
 - without such reflection it is difficult to think about contributions to social creativity

Our Focus: Collaborative Design

- **design problems** are
 - **complex** → requiring **social creativity** in which stakeholders from different disciplines have to collaborate
 - **ill-defined** → requiring the **integration of problem framing and problem solving**
 - **have no (single) answer** → requiring **argumentation support**
 - **unique (“a universe of one”)** → requiring learning when **the answer is not known**
- **creativity** = learn new forms of activity which are not there yet

“In important transformations of our personal lives and organizational practices, we must learn new forms of activity which are not there yet. They are literally learned as they are being created. There is no competent teacher. Standard learning theories have little to offer if one wants to understand these processes.” — Yrjö Engeström

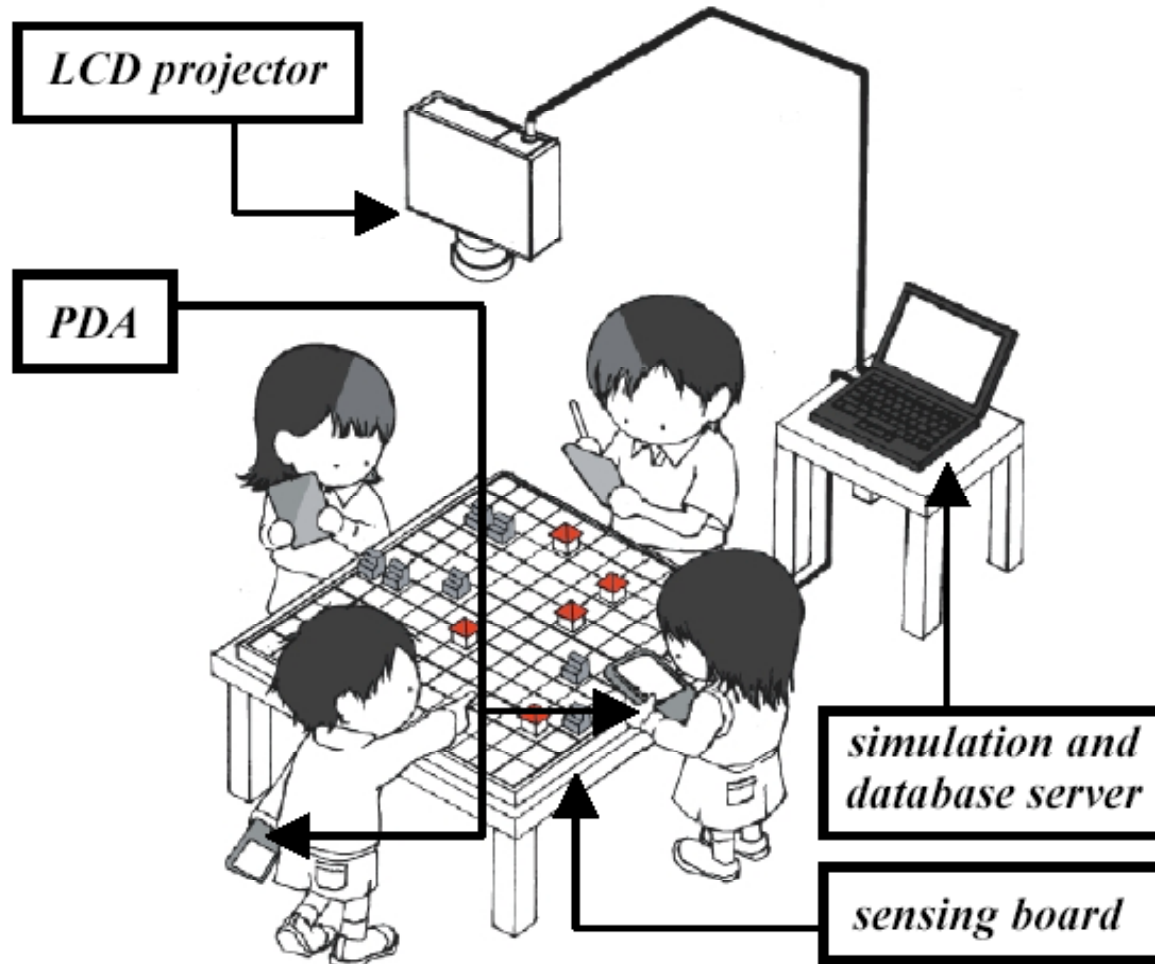
Support for Creativity Explored in System Development

	EDC	Caretta	Face Poiesis	CodeBroker
Domain	transportation planning; flood mitigation	urban planning	interactive art	open source software
Participants	diverse stakeholders	diverse stakeholders	artists	software developers
Collaboration model	explore symmetry of ignorance to construct new understanding	diversified exploration of solutions from multiple perspectives	creation, sharing, and evolution of digital images	division of tasks according to interest and knowledge
Boundary objects	shared representation in a construction space	shared problem	shared painting	source code
Process model	conjecture, refutation, and discussion	short cycle of alternating individual reflection and group discussion	crossing of <i>pixema</i> assigned by artists according to each one's sensibility	parallel individual development with punctuated integration
Meta-design support	adaptable to new environments	enabling personally meaningful solution	supporting co-creation with <i>pixema</i> exchange	offering a participation platform
Integration of individual and social creativity	face-to-face discussion in a shared construction space	intuitive integration of shared space and individual space	individual creativities are expressed by <i>pixema</i> , and different <i>pixema</i> are synthesized in new paintings	individual code leverages others' codes, and individual code is integrated back into the whole system

Creativity Support by the Envisionment and Discovery Collaboratory

- individual interaction with computational artifacts ⇔ shared interaction, supporting interaction with others through the computational artifacts as a shared medium
- individual agendas ⇔ creation of shared focus
- reliance on explicit knowledge ⇔ bringing out tacit knowledge
- expert tools ⇔ providing access to design for people with different perspectives and from various backgrounds
- dependence on model monopolies ⇔ creating boundary objects and support for epistemological pluralism
- reliance on high-tech scribes ⇔ supporting meta-design

Overview of *Caretta*



Caretta: Integrating Personal and Shared Spaces

- objective: the smooth integration of individual and social creativity; individual creativity drives social creativity, and social creativity triggers further individual creativity
- technological support for individual creativity: Personal Digital Assistants (PDAs)
- technological support for social creativity: SensingBoard
- tools for supporting individual creativity and social creativity are separated physically (between the board and PDAs) and seamlessly integrated virtually

Distance “Spatial Dimension” — Voices from Far Away

- bringing spatially distributed people together: supports the shift that **shared concerns rather than shared location** becomes the prominent defining feature of a group of people interacting with each other
- allows more people to be included, thus **exploiting local knowledge**
- success model: **open source communities**
- transcending the barrier of spatial distribution is of particular importance in **locally sparse populations** → addressing this challenge is one of the core objectives of our research work in the CLever project
- but: **distance matters** (see: Olson, G. M., & Olson, J. S. (2001) "Distance Matters." In J. M. Carroll (Ed.), *Human-Computer Interaction in the New Millennium*, ACM Press, New York, pp. 397-417.)

Distance “Temporal Dimension” — Voices from the Past

- design processes often take place over many years, with initial design followed by extended periods of **evolution and redesign**
- importance of
 - design rationale
 - redesign and reuse (“complex systems evolve faster if they can build on stable subsystems” (Simon))
- **reflexive CSCW** = environments supporting the same individual user, who can be considered as two different persona at points of time that are far apart (see: Thimbleby, H., Anderson, S., & Witten, I. H. (1990) "Reflexive CSCW: Supporting Long-Term Personal Work," *Interacting with Computers*, 2(3), pp. 330-336)

Meta-Design

- **meta-design** = how to create new media that allow users to act as designers and be creative
- **why meta-design?**
 - design as a process is tightly coupled to use and continues during the use of the system
 - address and overcome problems of closed systems
 - transcend a “consumer mindset”

Some Important Aspect of Meta-Design

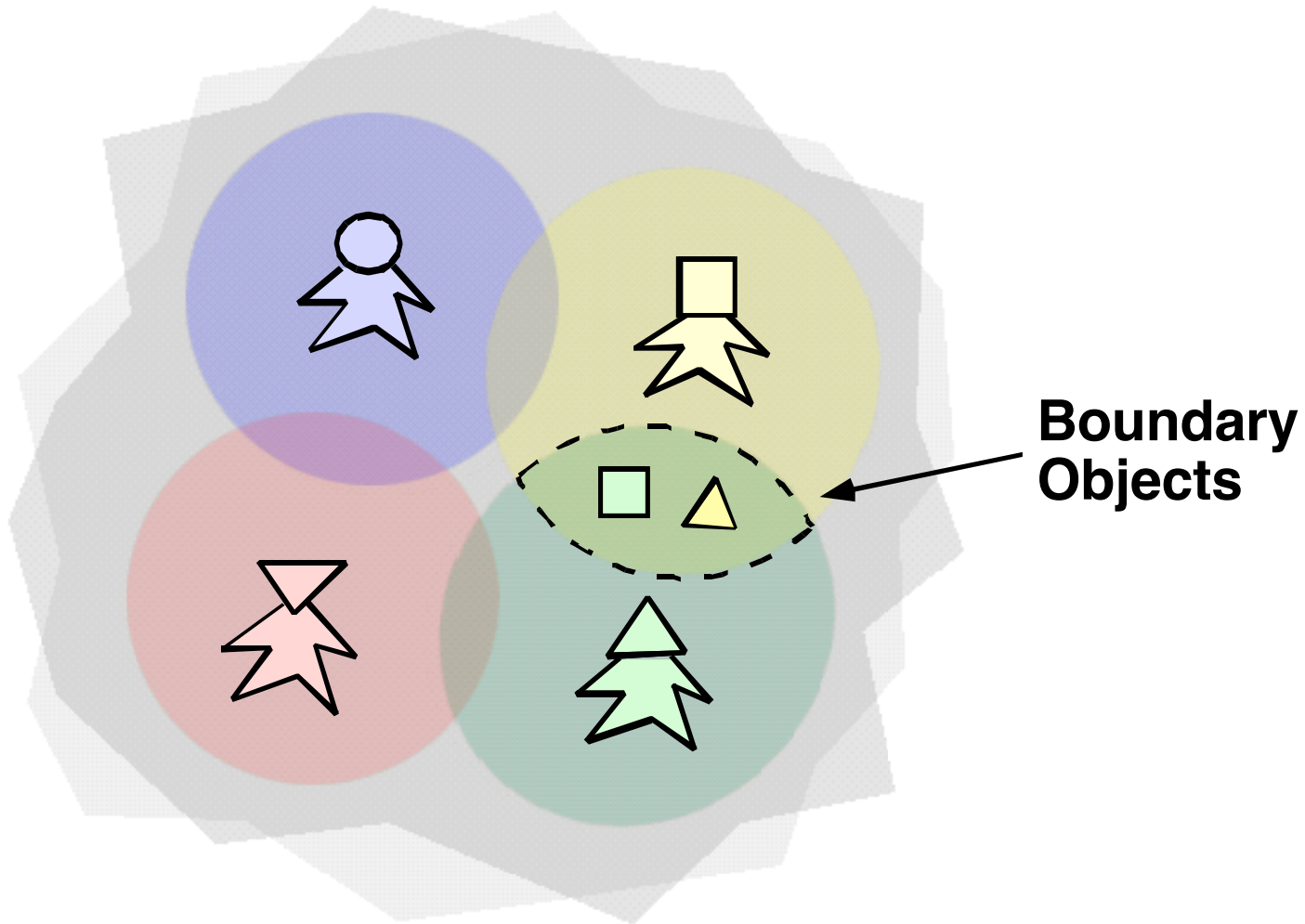
- **underdesign** at design time (not meaning less design but creating open design options) → give control to the owners of the problems
- **socio-technical environments** supporting meta-design must
 - support emerging, unintended, and subversive uses, not just anticipated ones
 - not be too resistant to being torn apart and reconceived
 - not only build new technologies but seed new practices, new genres, new communities
 - avoid that most of the design intelligence is forced to the earliest part of the design process, when everyone knows the least about what is really needed
 - address the challenge of not suppressing or getting rid of the emergent, but make it the focal point of design

Distance “Conceptual Dimension” – Voices from Collaborators

- ***Communities of Practice (CoPs)***, defined as groups of people who share a professional practice and a professional interest

- ***Communities of Interest (Cols)***, defined as groups of people (typically coming from different disciplines) who share a common interest, such as framing and solving problems and designs artifacts (Envisionment and Discovery Collaboratory)

Cols and Boundary Objects



Boundary Objects

“If a lion could speak would we understand him?” — Wittgenstein

- **boundary objects serve**
 - to communicate and coordinate the perspectives of CoPs brought together for some purpose leading to the formation of a Col
 - the interaction between users and (computational) environments

- perform a **brokering role** involving translation, coordination and alignment between the perspectives of different CoPs

- **examples:**
 - prototypes serve as boundary objects between developers and users in participatory system design

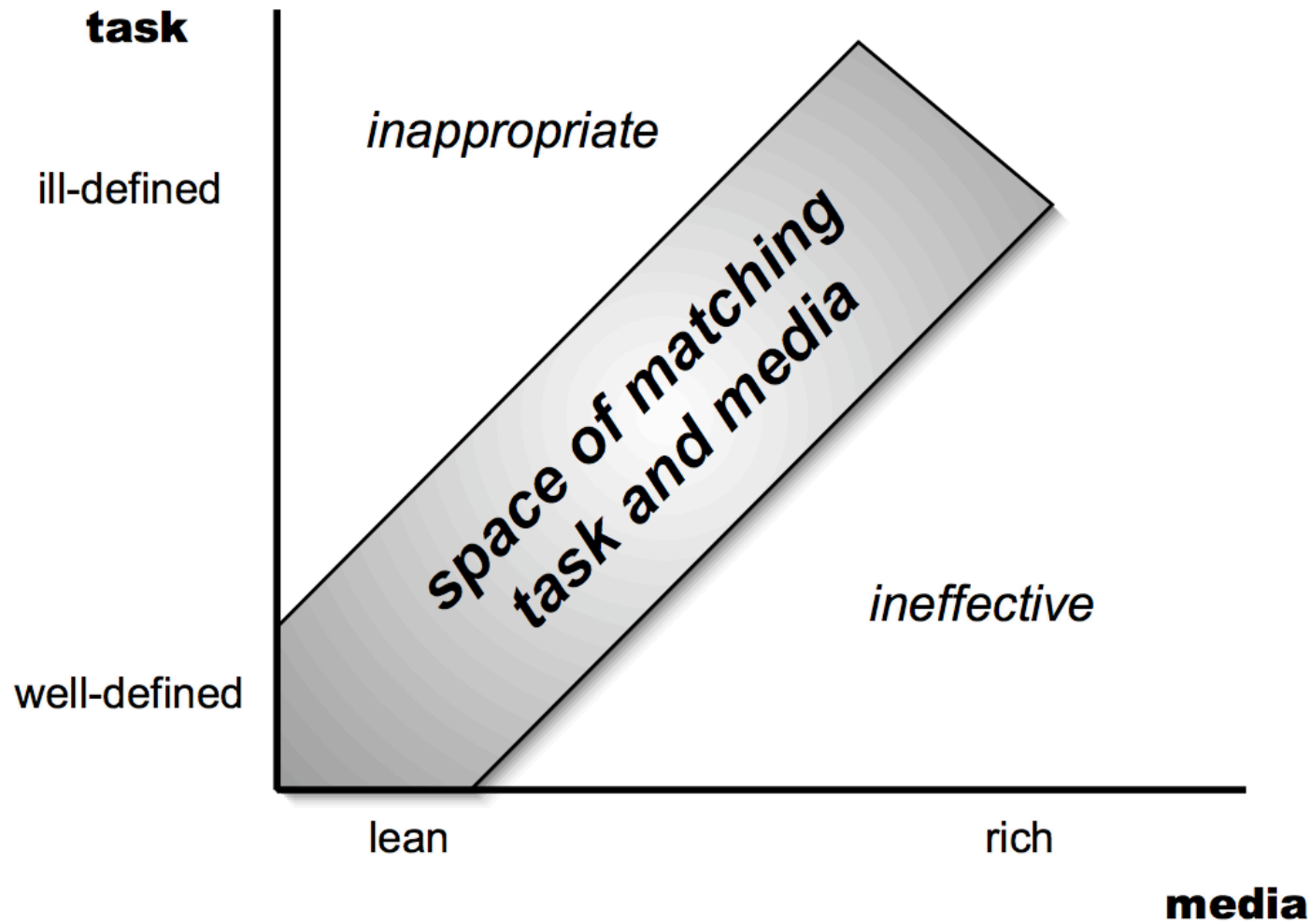
Distance “Technological Dimension”

*“You cannot use smoke signals to do philosophy.
Its form excludes the content”. (Postman, 1985)*

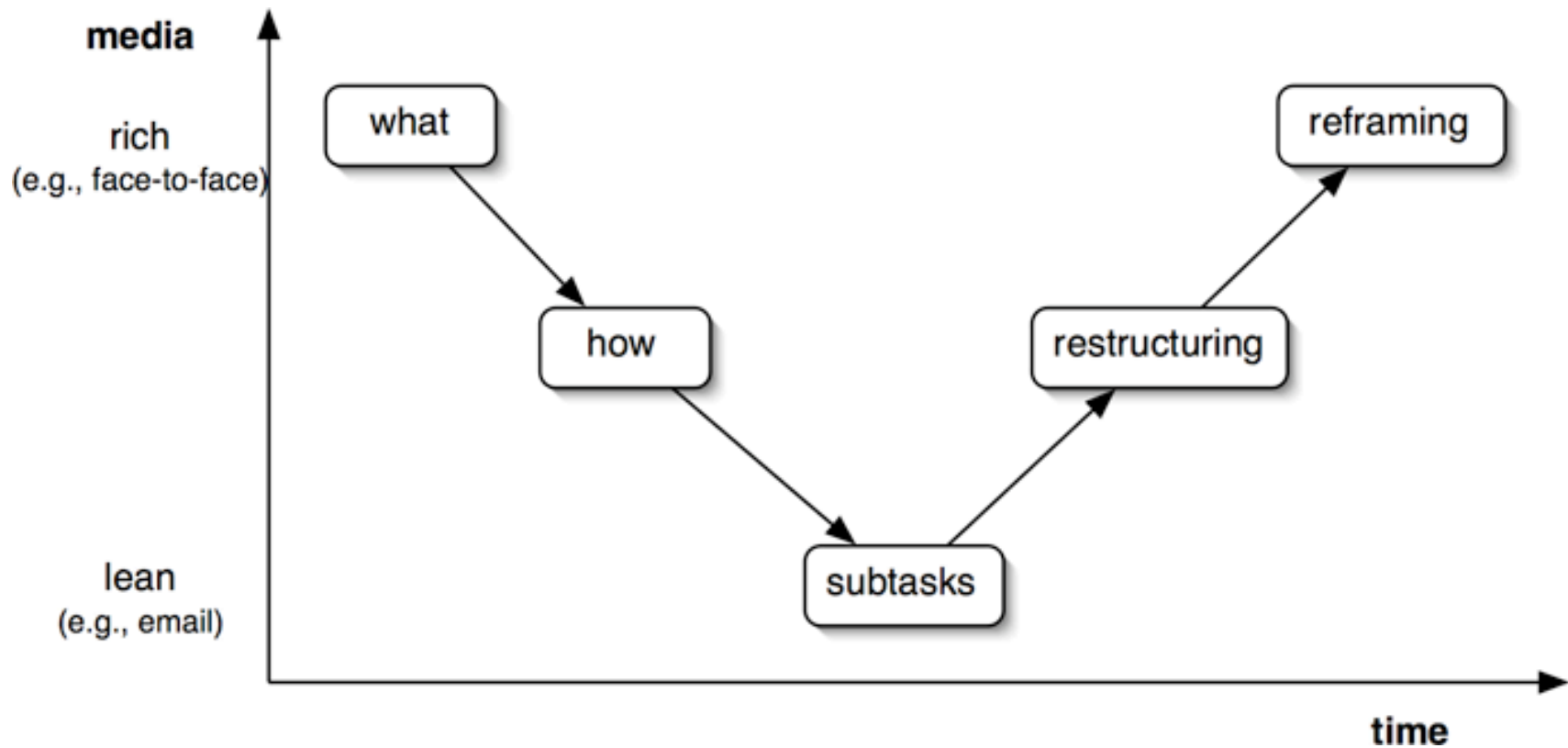
- **claim: there is no media-independent communication and interaction**
 - tools, materials, and social arrangements always mediate activity
 - the possibilities and the practice of design are functions of the media with which we design

- **some global objectives:**
 - media as extensions of human (McLuhan)
 - intelligence augmentation (Engelbart, Kay)
 - domain orientation to support human problem-domain interaction
 - beyond the desktop: pervasive and ubiquitous computing
 - digital fluency to make domain experts and users independent of high-tech scribes

The Media Space in Support of Social Creativity



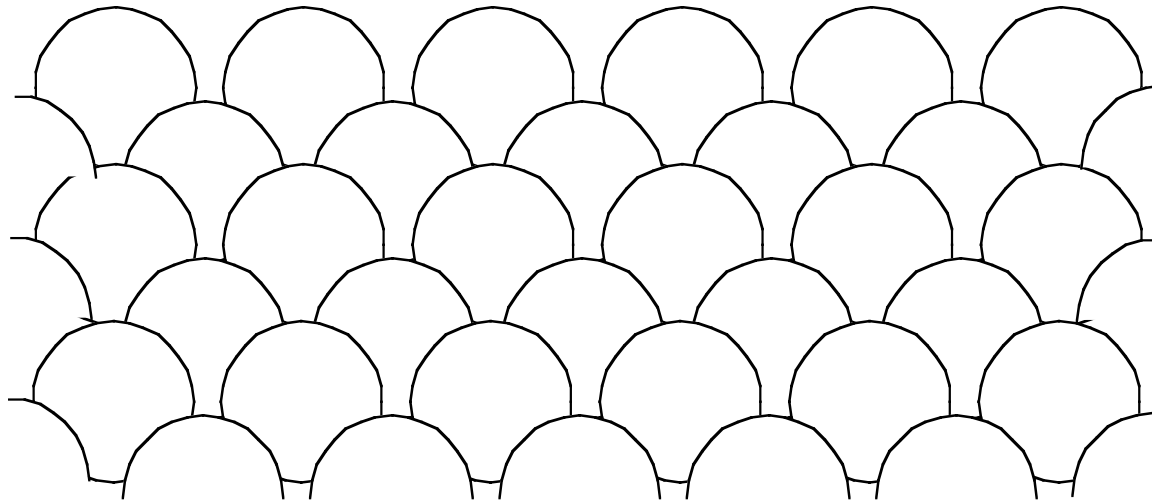
Covering a Wide-Spectrum of Activities with Media Integration



Beyond the Individual Human Mind: Fish-Scale Model

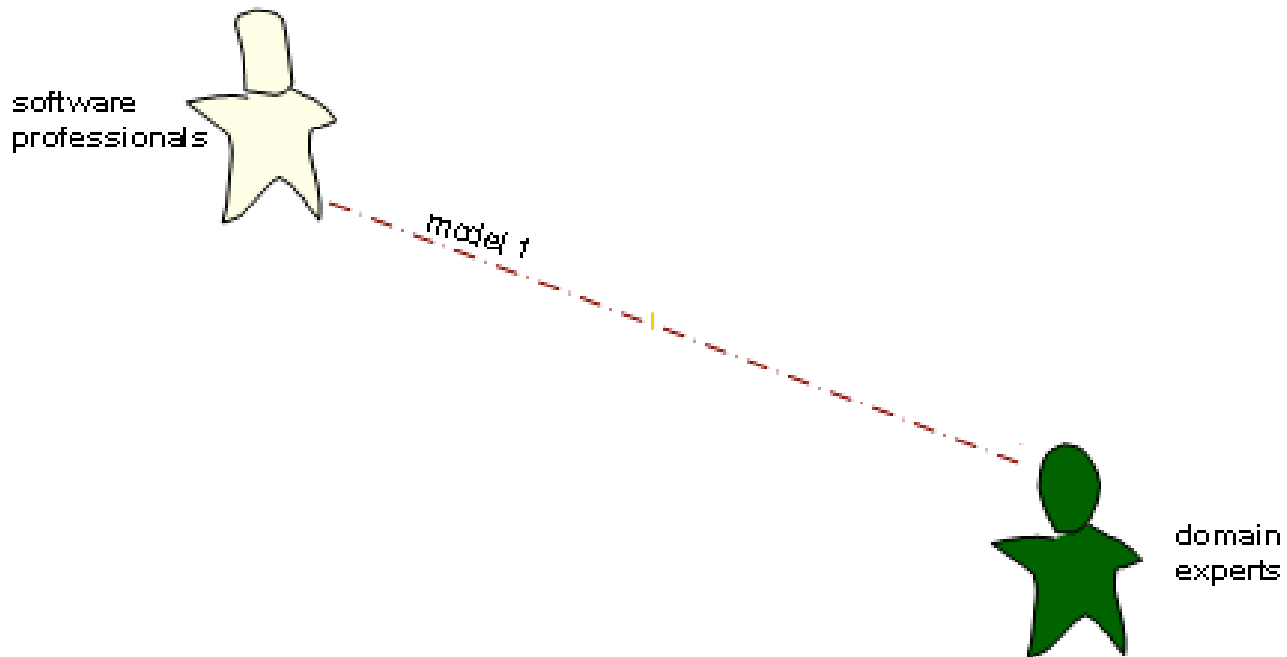
source: Campbell, D. T. (1969) "Ethnocentrism of Disciplines and the Fish-Scale Model of Omniscience." In M. Sherif, & C. W. Sherif (Eds.), *Interdisciplinary Relationships in the Social Sciences*, pp. 328-348.

- 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***"

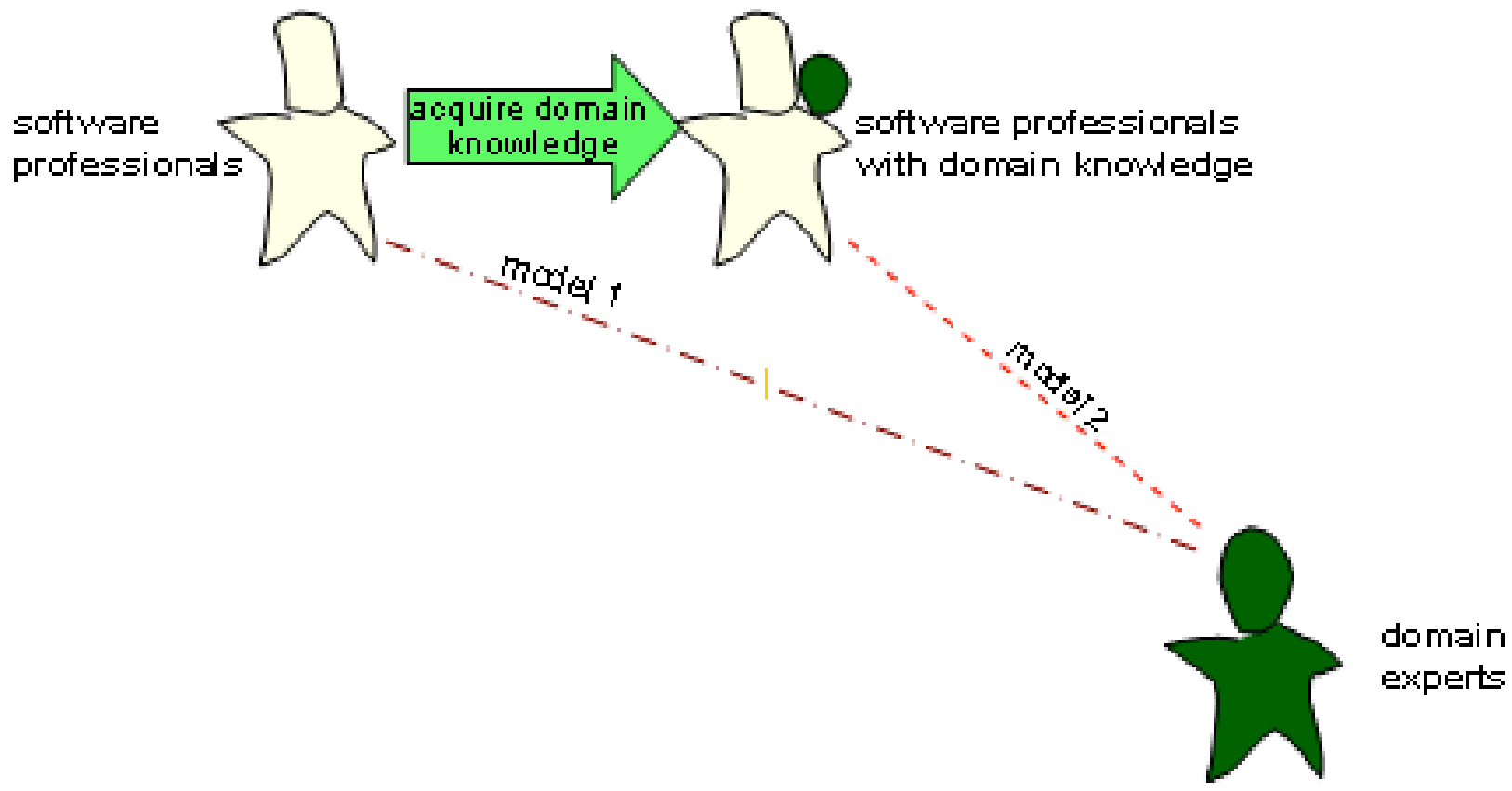


Beyond Reflective Practitioners (source: Schön, D. A. (1983) *The Reflective Practitioner: How Professionals Think in Action*, Basic Books, New York.)

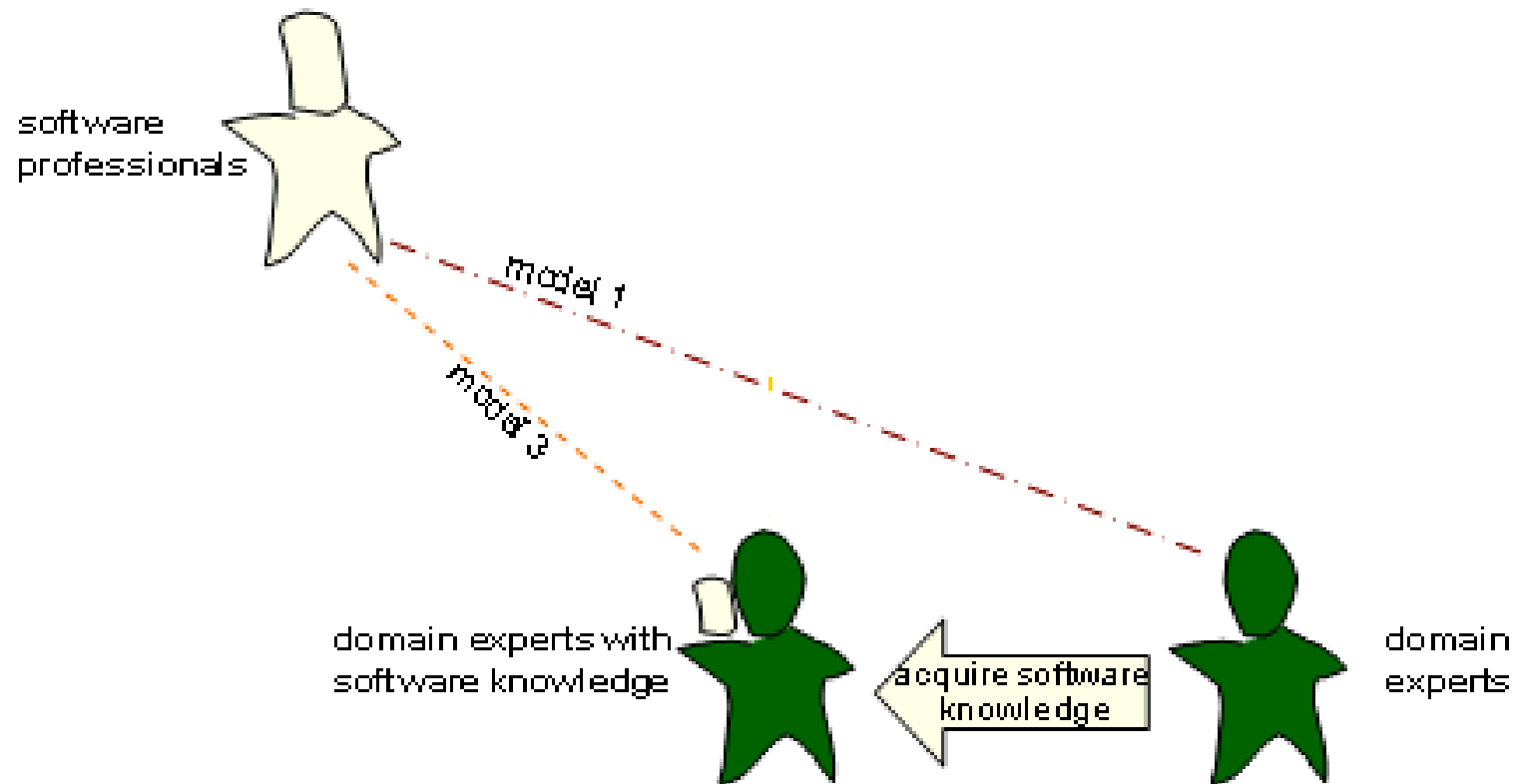
Large Conceptual Distance – Limited Common Ground



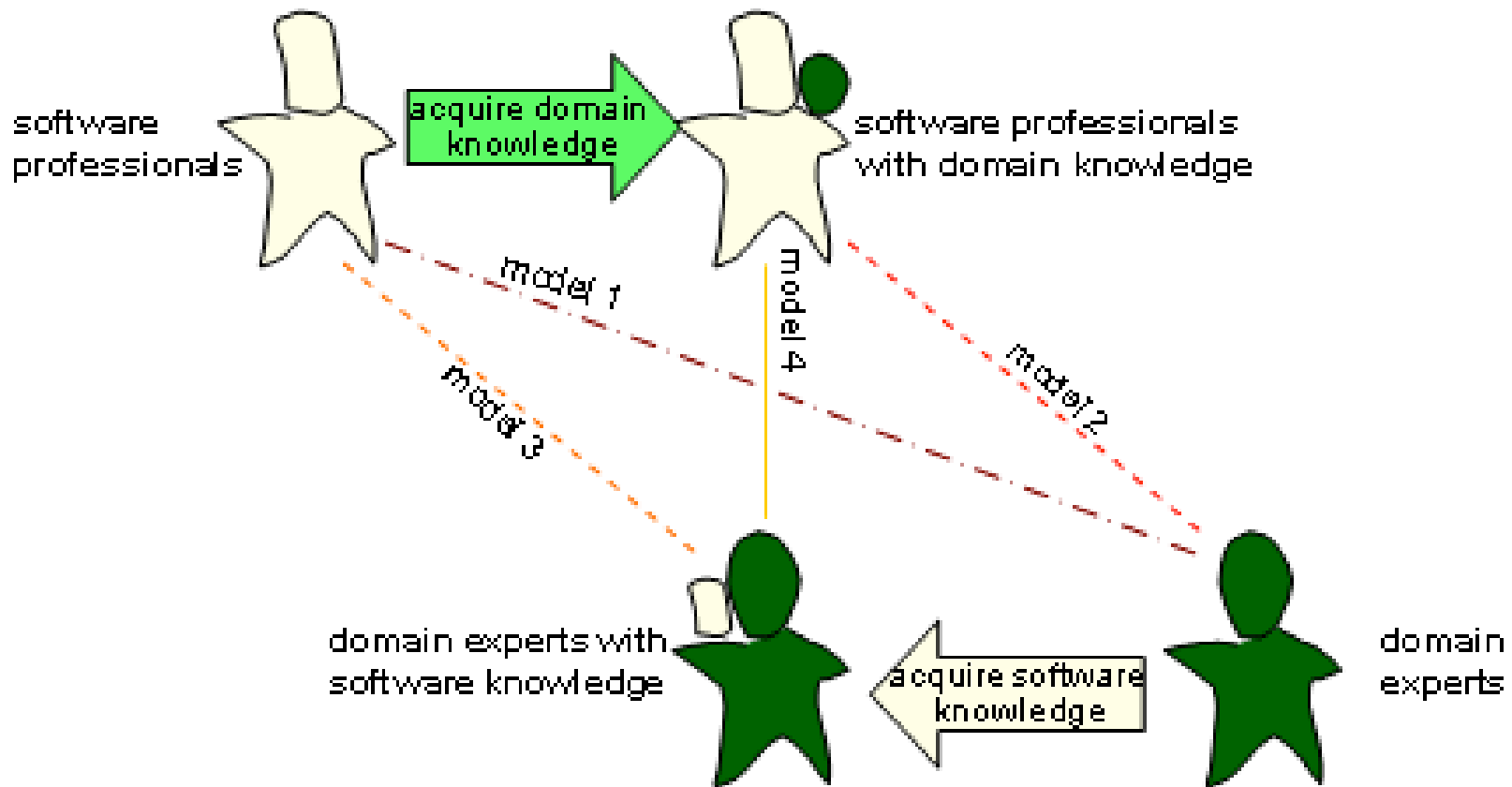
Software Professionals Acquiring Domain Knowledge



Domain Experts Acquiring Media Knowledge

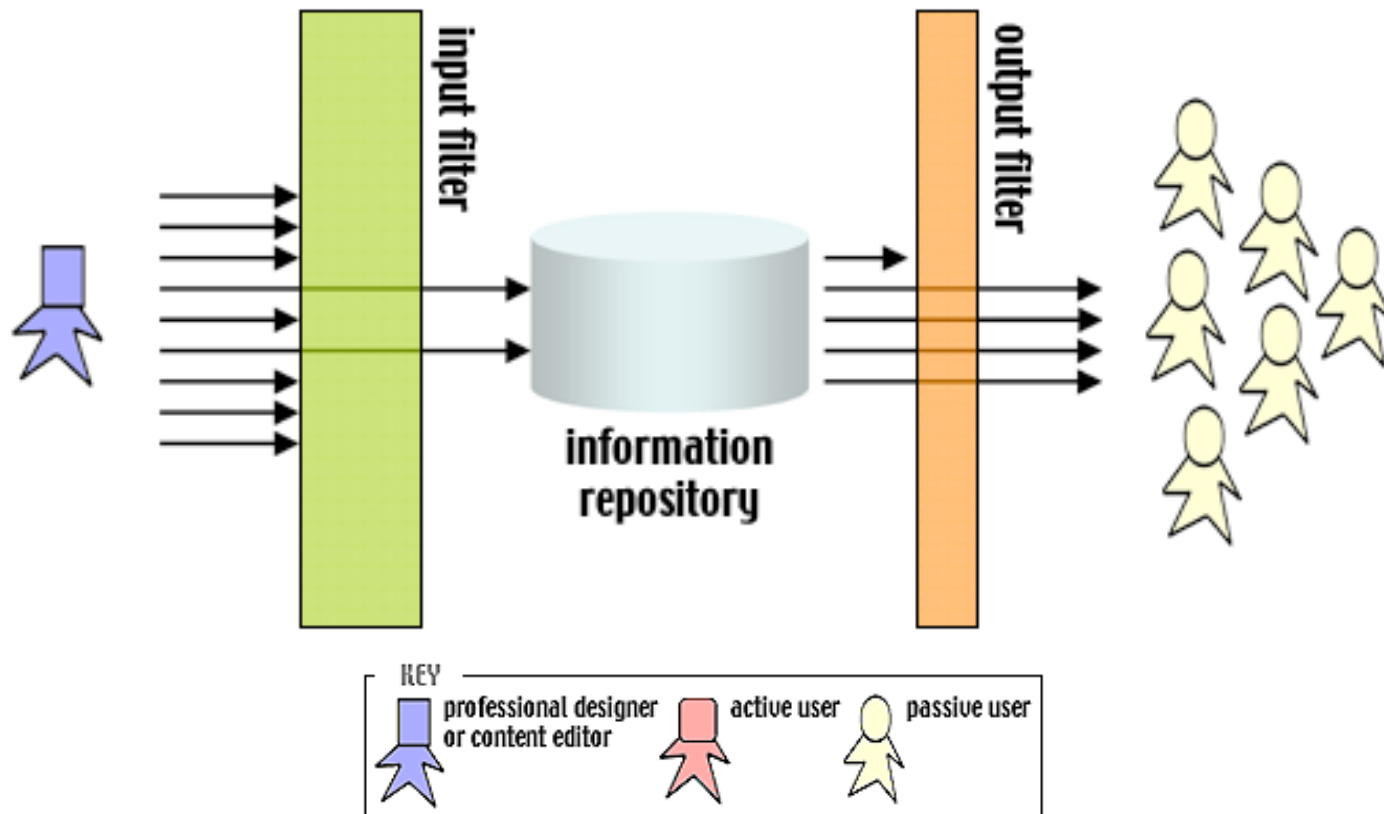


From Reflective Practitioners to Reflective Communities



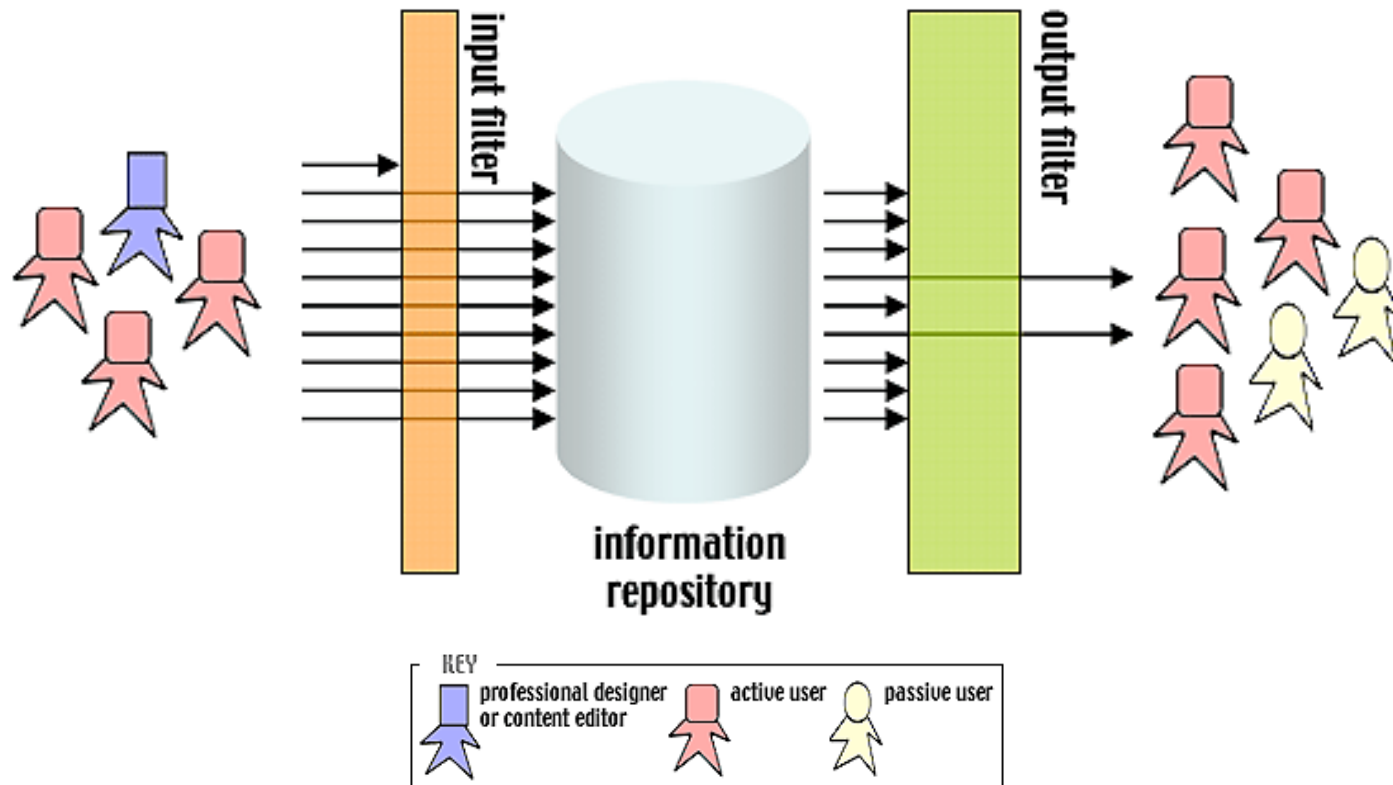
Producer/Consumer Models in a **Consumer Culture** (“Access”)

- Strong Input Filters, Small Information Repositories, Weak Output Filters
- Limitation: Making All Voices Heard

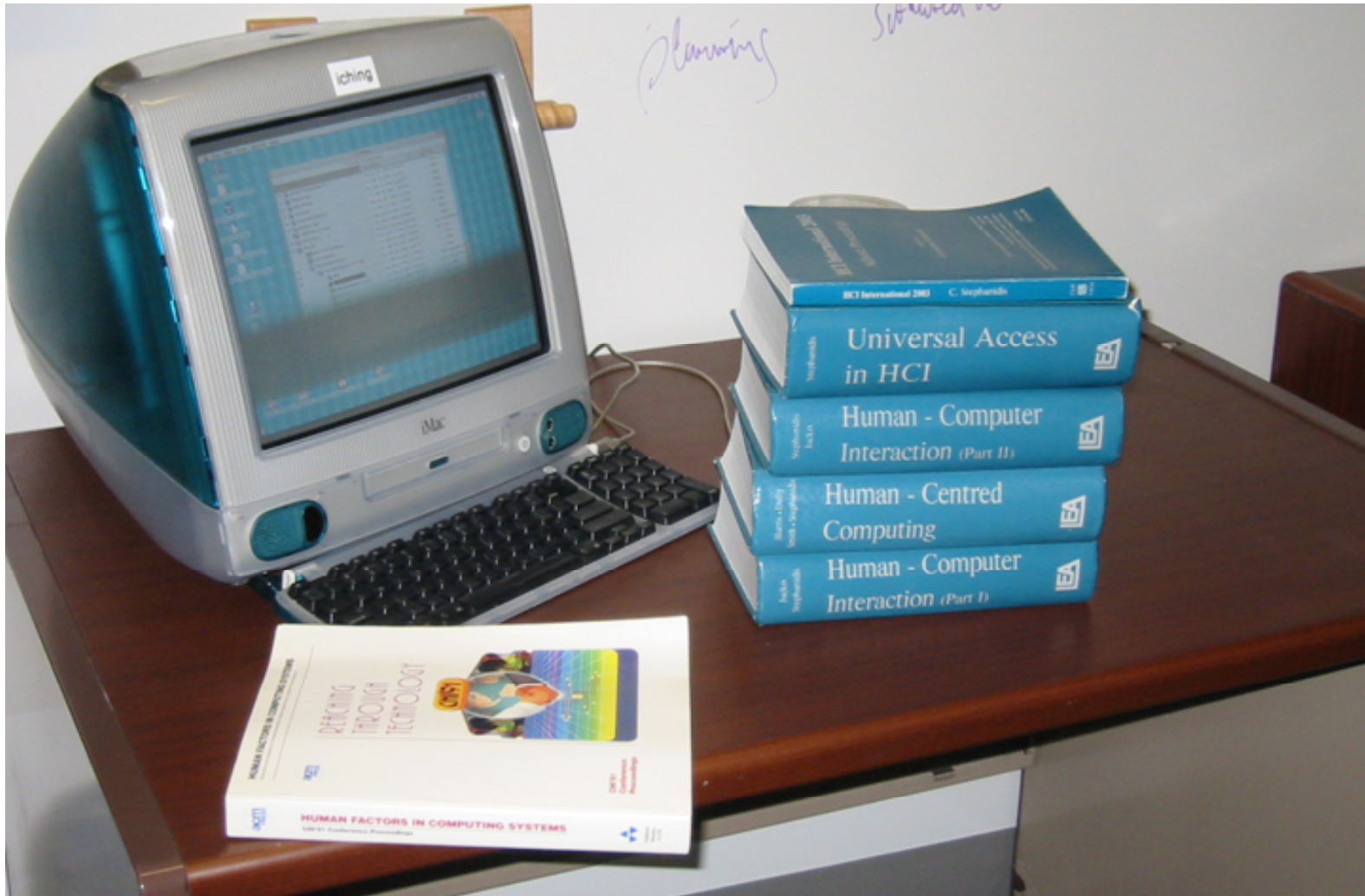


Producer/Consumer Models in **Design** Culture (“Informed Participation”)

- Weak Input Filters, Large Information Repositories, Strong Output Filters
- Limitation: Trust and Reliability of Information



Example: CHI conferences versus HCI International Conferences



Conclusions

- the complexity of design problems transcends the individual human mind, requiring communities to address them → leading to distances
- these distances are not only spatial, but also temporal, conceptual, and technological
- **a framework for social creativity:**
 - unaided, individual human mind → media-augmented social creativity to make all voices heard and integrate diversity
 - spatial distance → temporal, conceptual, and technological distances
 - design → meta-design
 - communities of practice → communities of interest
 - reflective practitioners → reflective communities