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

Transcending the Unaided, Individual Human Mind
—
Understanding, Fostering, and Supporting Cultures of Participation

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Outline

- Basic Message

- Context: “Building Bridges”

- A Framework for Cultures of Participation

- Examples:
  - Distributed Intelligence
  - Meta-Design
  - Social Creativity

- Research Challenges

- Implications and Conclusions
Basic Message: Beyond the Unaided, Individual Human Mind

Power of the collective human mind, aided by technology

Reading and writing  Printing press  Personal computer  Internet  Cultures of Participation

2500BC  1500  1980  1993  2008  Time

Socrates
Using Bridges
Building Bridges
"Bridge to Nowhere"

<<1.5 Mio Hits on Google, YouTube Movies, Wikipedia entry>>

- **controversy**: a proposed bridge to replace the ferry that currently connects Ketchikan, Alaska, to the Gravina Island's 50 residents, and the Ketchikan International Airport

- **projected cost**: $398 million

- Alaskan congressional delegation helped push for **federal funding**

- fierce opposition outside of Alaska → symbol of **pork barrel spending**
Using and Building Bridges

CSCW

social computing

Creativity

Participatory Design

using bridges

building bridges

HCI
Using and Building Bridges: Some of my Personal Efforts

- **transdisciplinary collaboration**
  - **with**: architects, urban planners, psychologists, educators, researchers and practitioners from the creative practices and from assistive technologies
  - **why**: “reality is not user-friendly” → real world problems do not fall into existing disciplines or existing organizational units

- **multi-sector**: academia, industry, and non-governmental organization (NGO)

- **mediation between HCI and a spectrum of related fields**: AI, Software Engineering, Design of Interactive Systems, Participatory Design, CSCL, CSCW, Creativity, ….

- **integration** of European and American research traditions
The Scandinavian Impact on HCI (and me)
unique contributions beyond the American Imperialism in HCI via CHI

- **Computers in Context**
  - movie from California Newsreel, 1987 (application areas: banking, newspaper graphic design, and jet aircraft maintenance) → **empowering users rather than deskilling them**
  - book “Computers and Design in Context” (eds: Morten Kyng and Lars Mathiassen), 1997 → **designers and users should join forces in the design of computer systems**
  - **Aarhus Conferences** (in ten years intervals)

  - “**System development is difficult not because of the complexity of technical problems, but because of the social interaction when users and system developers learn to create, develop and express their ideas and visions**”
  - Henderson, A., & Kyng, M. (1991) "**There's No Place Like Home: Continuing Design in Use**" → **inspiration for our work on meta-design**
The Scandinavian Impact on HCI (and me)

- Participatory Design (PD):
  - using and building bridges between designers and users
  - negotiation + co-creation + boundary objects + reciprocal learning
  - 1990: first PD conference in association with CHI in Seattle

  - using and building bridges between art and science and creative practices and information technologies
  - create socio-technical environments enabling interactions between different cultures (including the two cultures of art and science)
  - panel at NordiCHI’2008 on Wednesday
Frameworks for Effective, Large Scale, Distributed, Collaborative Efforts


Transcending the Unaided, Individual Human Mind
—

Distributed Intelligence (or Distributed Cognition)

- **claim:** distributed intelligence
  - **combines** “knowledge in the head” with “knowledge in the world”
  - **transcends** the traditional view that human cognition exists solely ‘inside’ a person’s head

- **forms of distribution:**
  - **human** ←→ **human:** across groups, teams, social networks, communities
  - **human** ←→ **artifacts:** between *internal* (memory, attention, executive function) and *external* (artifacts, tools) structures and resources
Distances and Diversity: Limitations or Opportunities?

- **spatial dimension**: shared location → shared concerns — *success model*: open source communities, Wikipedia

- **temporal dimension**: learning from the past — *success model*: reuse and redesign,

- **conceptual dimension**: exploiting symmetry of ignorance — success model: Communities of Interest
Differentiating Communities: Understanding and Fostering Different Cultures of Participation

- **Communities of Practice (CoPs):** homogenous design communities

- **Communities of Interest (CIs):** heterogeneous design communities

Meta-Design = Design for Designers

- **meta-design explores:**
  - cultures in which participants can express themselves and engage in personally meaningful activities

- **meta-design requires**
  - designers giving up some control at design time to contributors at use time

- **meta-design** provides a theoretical framework for cultures of participation and Web 2.0 technologies → for example: it blurs the distinctions
  - between consumers and producers → “prosumers”
  - between professionals and amateurs → “pro-ams”
Design Time and Use Time

key

- system developer
- user (representative)
- end user

- design time
- use time

world-as-imagined
prediction
planning

world-as-experienced
reality
situated action
What Do Meta-Designers Do?

- they use their own creativity to create socio-technical environments in which other people can be creative by creating
  - contexts and content creation tools rather than content
  - technical and social conditions for broad participation in design activities

meta-design examples: Web 2.0 Technologies supporting user-generated content
  - Wikis (Wikipedia)
  - Google-SketchUp + 3D Warehouse + Google Earth
  - Second Life
  - Open Source
SketchUp — a high-functionality 3D Modeling Environment
3D Warehouse: a Web 2.0 Environment

http://sketchup.google.com/3dwarehouse/

- **features:**
  - search, share, and store 3D models created in SketchUp
  - models include: buildings, houses, bridges, sculptures, cars, people, pets, …
  - download the 3D models to be modified in SketchUp
  - if the model has a location on earth → download it and view it in Google Earth

- **challenges:**
  - what will motivate people to participate?
  - participation requires acquiring skills in using SketchUp → create learning environments for SketchUp
3D Warehouse

- **Tsim Sha Tsui Clock Tower**
  - by [Google](#)
  - [View in Google Earth](#)

- **Figueroa at Wilshire**
  - by [Google](#)
  - [View in Google Earth](#)

- **1500 Walnut Street**
  - by [Google](#)
  - [View in Google Earth](#)

- **CPL Harold Washington Library Center**
  - by [Google](#)
  - [View in Google Earth](#)

- **Marriott Marquis**
  - by [Google](#)
  - [View in Google Earth](#)

- **Hearst Residence (Hearst Castle)**
  - by [Google](#)
  - [View in Google Earth](#)

- **Milwaukee Art Museum**
  - by [Google](#)
  - [View in Google Earth](#)

- **CitySpire Center**
  - by [Google](#)
  - [View in Google Earth](#)
CU Boulder in 3D
Downtown Denver in 3D
A Tiny Percentage of a Very Large Population
Social Creativity

- a great interest in recent years in the USA (and EU)


- new National Science Foundation (NSF) programs:
  - “Science of Design”
  - “Creativity and Information Technology (IT)”

- L3D’s research project in this area: “A Next Generation Wiki for Creativity and IT”; http://l3dswiki.cs.colorado.edu:3232/CreativeIT/
The CreativeIT Wiki

- Research Resources
- Discussion Forum
- Workshops
- Conferences
- Community Participants
- Gallery
- Success Factors Workshop
- MakaBlog
- NSF CreativeIT Program
- Exhibitions
- About This Wiki
Social Creativity

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

- the Renaissance scholar (who knows “everything”) does not exist anymore in the 21st century

- complex design problems are systemic problems; they seldom fall within the boundaries of one specific domain → they require the participation and contributions of several stakeholders with various backgrounds

- “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”
  — Mihaly Csikszentmihályi
A Socio-Technical Environment

Envisionment and Discovery Collaboratory (EDC)

- the EDC supports:
  - **collaborative design** (e.g. in: urban planning, emergency management)
  - **social creativity** → learning when no one knows the answer
  - **meta-design** → a version of SimCity in which content is generated by users

- the EDC and HCI
  - **Computer Science**: table-top, computationally enriched physical objects, visualization, integration
  - **Cultures of Participation**: Communities of Interest, emergence, boundary objects, reflection in action, reflective communities
The Envisionment and Discovery Collaboratory
Boulder City Council and University of Colorado Regents
Sketching Support in the EDC
Buildings Sketched into a Google-Earth Client
Fat-Pencil Technologies and Incremental Formalization
Emerging Insight: Illustrating Multiple Walking Distances
Integrating Individual and Social Creativity: Caretta
(collaboration with Masanori Sugimoto, University of Tokyo)
Research Challenges

- a Faustian Bargain: drawbacks of cultures of participation
- models for knowledge accumulation and sharing in different cultures
- “Long Tail” theory: making all voices heard
A Faustian Bargain: Drawbacks of Cultures of Participation

- **claim**: humans may be **forced** to cope with the burden of being active contributors in personally irrelevant activities → “Do-It-Yourself Societies”

- through modern tools, humans are empowered to perform many tasks themselves that were done previously by skilled domain workers
  - **advantages**: power, freedom, and control
  - **disadvantages**: forces people to act as contributors in contexts for which they lack the experience and broad background knowledge

- **claim**: cultures of participation lead to **collectivism** that is suffocating authentic voices in mass mediocrity (Jaron Lanier)
  - **collectivism**: involves coercion and centralized control
  - **collective action**: involves self-selection and distributed coordination
  - **examples**: Wikipedia ↔ KNOL
Model Authoritative underlying Consumer Cultures

- Strong Input Filters, Small Information Repositories, Weak Output Filters
- Limitation: Making All Voices Heard
Model Democratic underlying Participation Cultures

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

- **theory of the Long Tail**: our culture and economy is increasingly shifting away from a focus on a relatively small number of “hits” (mainstream products and markets) at the head of the demand curve and toward a huge number of niches in the tail.

- **main opportunity — digital artifacts**: computer programs, movies, books, 3D models of buildings, …. → as the costs of production and distribution fall, there is less need to lump products and consumers into one-size-fits-all containers.

- **hypothesis**: without the constraints of physical shelf space and other bottlenecks of distribution, narrowly-target goods and services can be as economically attractive as mainstream fare.
Exploiting “Long Tail” Opportunities in Business
Specific Examples of the Long Tail

<table>
<thead>
<tr>
<th>TOTAL INVENTORY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>* inventory in a typical store</td>
<td></td>
</tr>
<tr>
<td><strong>Rhapsody</strong></td>
<td>735,000 songs</td>
</tr>
<tr>
<td><strong>Wal-Mart</strong></td>
<td>39,000 songs*</td>
</tr>
<tr>
<td><strong>Amazon</strong></td>
<td>2.3 mil books</td>
</tr>
<tr>
<td><strong>Barnes &amp; Noble</strong></td>
<td>130,000 books*</td>
</tr>
<tr>
<td><strong>Netflix</strong></td>
<td>25,000 DVDs</td>
</tr>
<tr>
<td><strong>Blockbuster</strong></td>
<td>3,000 DVDs*</td>
</tr>
</tbody>
</table>
Exploiting the “Long-Tail” in Education

- **basic belief:** all people are interested in something (Viking Ships, Dinosaurs, gambling, ...............)

- **head — basic knowledge and skills:** learning to learn, learning on demand, preparation for future learning, soft skills, digital fluency, ...............

- **tail — personally meaningful problems:** interest and passion, self-directed learning and intrinsic motivation, interesting example → movie: “October Sky”

- **extensive coverage** needed for supporting the infinite numbers of interesting topics — will be facilitated by a “meta-design” culture
## Implications

### Implications for HCI Research of the Future

<table>
<thead>
<tr>
<th>layer</th>
<th>objective</th>
<th>requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>layer-3: motivation (“why”)</td>
<td>being interested and willing to participate</td>
<td>motivation, ownership, social capital, reputation economy</td>
</tr>
<tr>
<td>layer-2: knowledge and skills (‘how’)</td>
<td>being knowledgeable in order to participate</td>
<td>substantial learning effort</td>
</tr>
<tr>
<td>layer-1: infrastructure (“prerequisites”)</td>
<td>hard-and software</td>
<td>availability, access, usability, integration</td>
</tr>
</tbody>
</table>
Implications for Technology: Integration

(a) Interactive Table

(b) Google Earth and 3D Sketching

The Envisionment and Discovery Collaboratory

Phase 1: Discussion of land use and current route alignment

Welcome to the EDC Transportation Planning session. Please contribute your perspectives to the redesign of the bus route in the Gunbarrel neighborhood.

(c) Google 3D Warehouse

(d) Wiki of design information

Gerhard Fischer

NordiCHI Conference 2008
Implications for Learning and Education

- **a new synergy and hybrid model**: integrate basic knowledge and skills (head of the long-tail) and idiosyncratic interests and passion (tail of the long-tail) → create richer learning environments

- “**putting our money where our mouth is**”: application of our research to our teaching (“courses-as-seeds”)
Implication: Making Different Voices Heard

Batya Friedman

International Criminal Tribunal for Rwanda

- the **information heritage** for justice: design judicial records of genocide

- document the **personal** experiences, knowledge, wisdom and reflections of individuals

- design information systems to support **participation** of (1) Rwandans, (2) the international legal community, and (3) global citizens
Conclusion — Using and Building Bridges with Cultures of Participation

- the future is not out there to be discovered — it has to be invented and designed

- **Machiavelli:** “People who want to change institutions, have all those as their enemies who have done well under the old conditions”

- **Winston Churchill:** “This is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning.”