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

End-User Development and Meta-Design
—
Foundations for Cultures of Participation

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Acknowledgments

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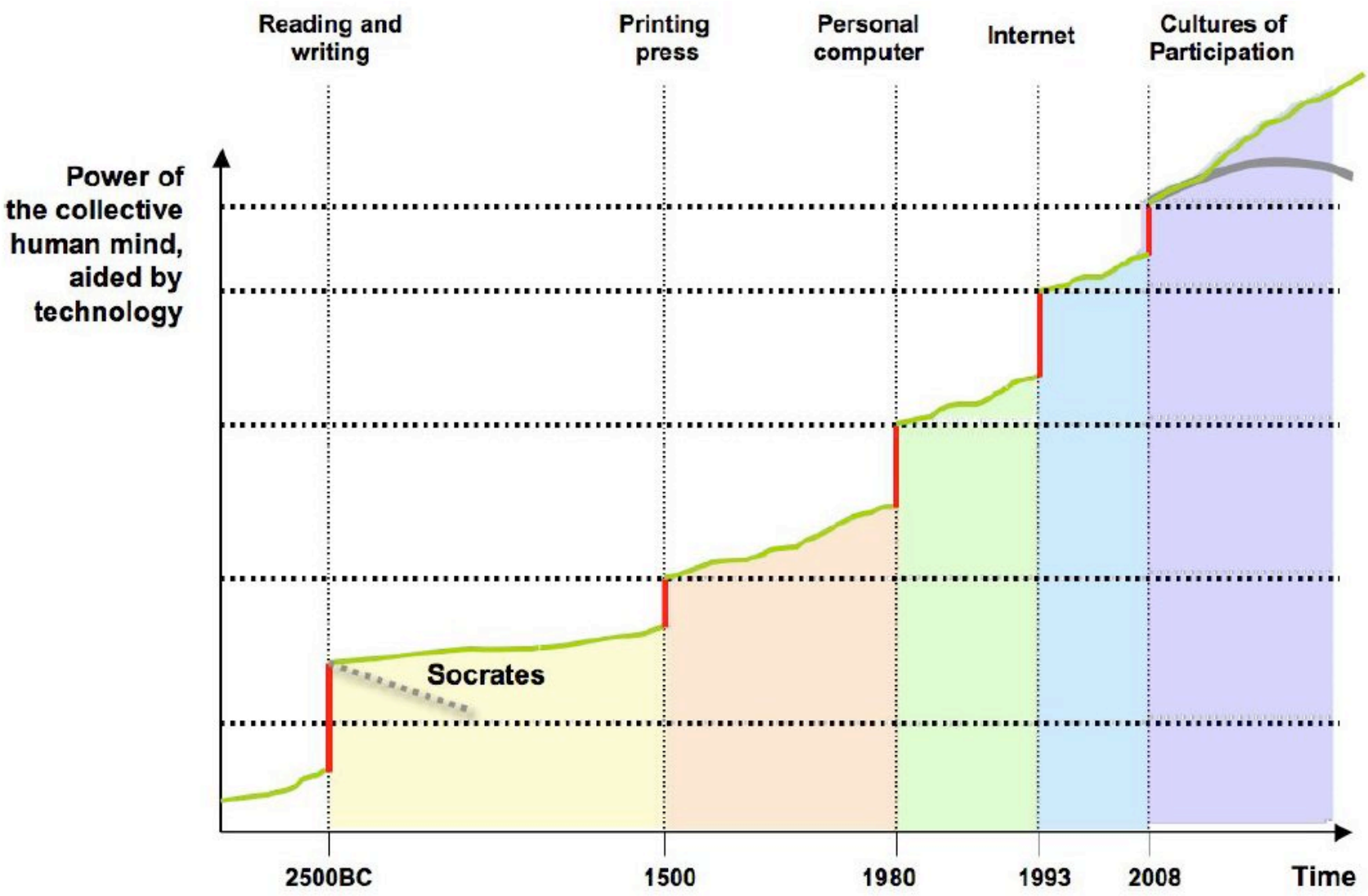
Outline

- **Basic Message**
- **Cultures of Participation**
  - End-User Development
  - Meta-Design
- **Examples of Innovative Socio-Technical Environments**
  - SketchUp + 3DWarehouse + Google Earth
  - CreativeIT Wiki
  - Envisionment and Discovery Laboratory
- **Research Challenges and Conclusions**

Basic Message: Beyond the Unaided, Individual Human Mind



Cultures of Participation

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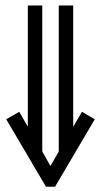
Fundamental Challenge and Opportunity

consumer cultures

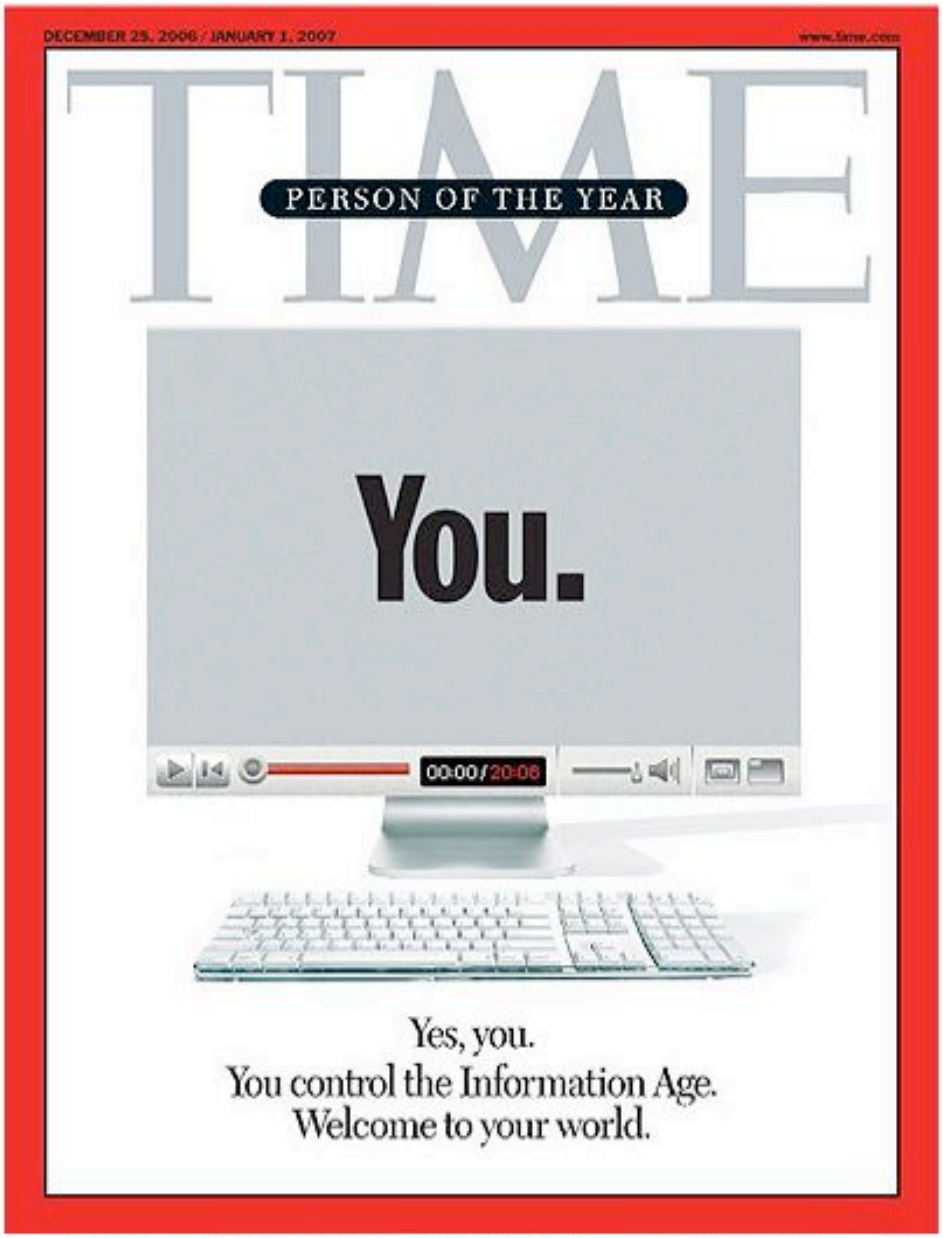
focus: produce finished goods to be consumed passively



cultures of participation

focus: provide all people are with the means to participate actively in personally meaningful problems

broad interest and attention: title stories in TIME and NEWSWEEK


DECEMBER 25, 2006 / JANUARY 1, 2007
www.time.com
TIME
PERSON OF THE YEAR
You.
00:00/20:06
Yes, you.
You control the Information Age.
Welcome to your world.


THE IMMIGRATION WAR • PANDA POLITICS
Newsweek
April 3, 2006 / $3.95
newsweek.msnbc.com
Putting
The 'We' in
WEB
NEXT FRONTIERS From MySpace
To Flickr and YouTube,
User-Generated Sites
Are Rocking the Internet

Domains and Concepts of Cultures of Participation

- **domains**
  - Web 2.0
  - Learning 2.0
  - President 2.0
  - Science 2.0
  - Digital Libraries 2.0
  - Electricity 2.0
  - **Controversial Things 2.0 (Pelle Ehn)**

- **concepts**
  - prosumers (= producers + consumers)
  - pro-ams (= professionals + amateurs)
  - user-generated content
  - hive mind
  - crowd sourcing

- **What is needed: an analytic model or conceptual framework**

Elements of an Analytic Model

- **understanding strengths**
  - to engage the talent pool of the whole world
  - to put owner of problems in charge
  - to make all voices heard

- **understanding weaknesses**
  - collective is not always better, loss of individuality
  - accumulation of irrelevant information, lack of coherent voices
  - companies offload work to customers → drawbacks of "Do-It-Yourself Societies"
  - customers lack the experience and the broad background knowledge to do tasks efficiently and effectively

- **understanding and analyzing success and failures models**
  - **Wikipedia** = the Drosophila for "cultures of participation"
  - **Encyclopedia of Life** = online reference source and database for every one of the 1.8 million species

Frameworks for Large Scale, Distributed, Collaborative Efforts

- **social production** → Benkler, Y. (2006) "*The Wealth of Networks: How Social Production Transforms Markets and Freedom"*
- **democratizing innovation** → von Hippel, E. (2005) "*Democratizing Innovation"*
- **mass collaboration** → Tapscott, D and Williams, A. (2006): *"Wikinomics: How Mass Collaboration Changes Everything"*
- **wisdom of crowds** → Surowiecki, J. (2005): *"The Wisdom of Crowds"*
- **Long Tail** → Anderson, C. (2006): *"The Long Tail: Why the Future of Business Is Selling Less of More"*
- **Web 2.0** → O'Reilly, T. (2006): *"What Is Web 2.0 - Design Patterns and Business Models for the Next Generation of Software"*
- **open source** → Raymond, E. S., & Young, B. (2001): *"The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary"*

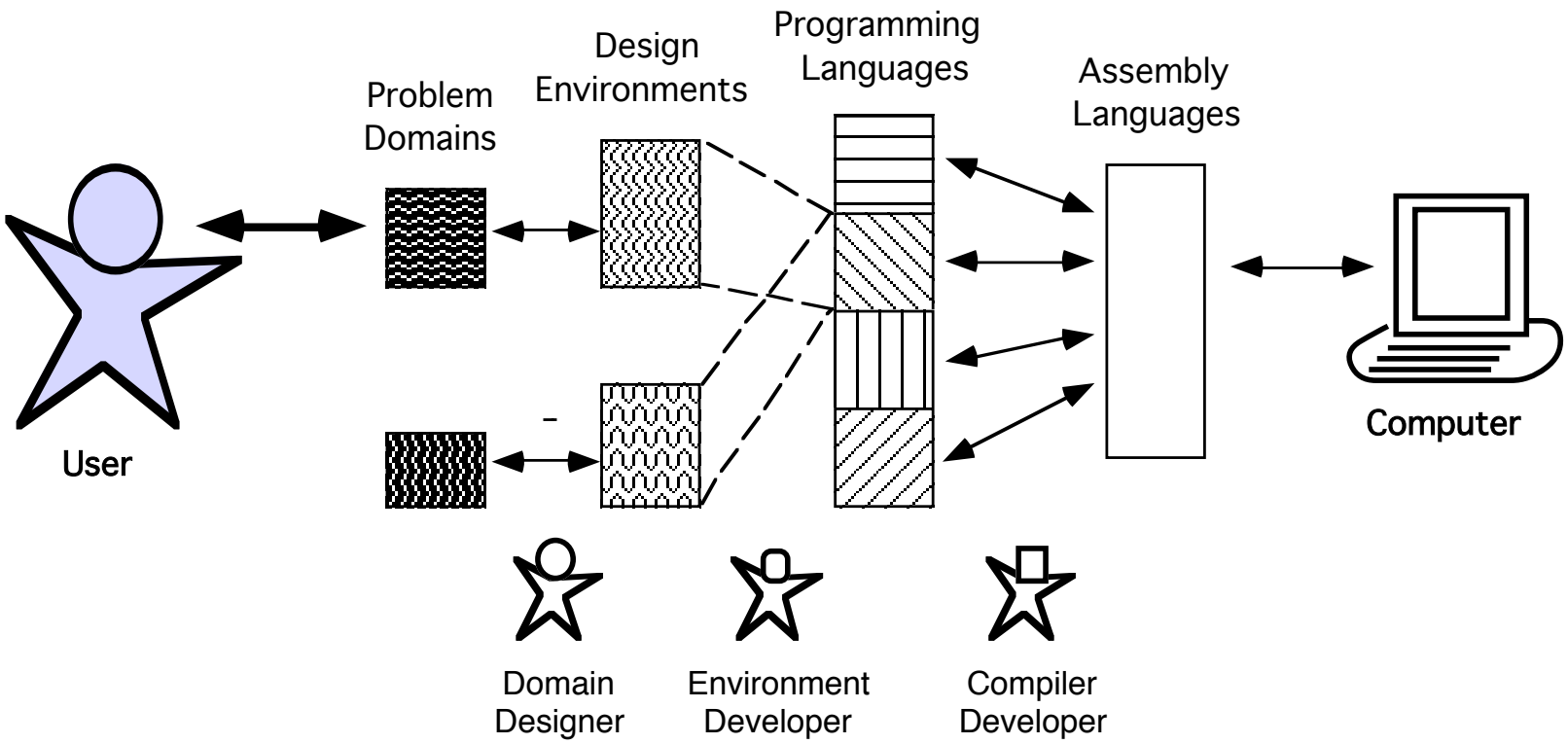
End-User Development (EUD)

- **Turing Tar Pit:** "Beware of the Turing Tar Pit, in which everything is possible, but nothing of interest is easy." (from objective to subjective computability)

- **The Inverse of the Turing Tar Pit:** *"Beware of the over-specialized systems, where operations are easy, but little of interest is possible."*

Domain-Oriented Design Environments (DODEs)

From Human Computer Interaction → Human Problem-Domain Interaction



Our Early History in EUD

- Fischer, G., & Girgensohn, A. (1990) ***"End-User Modifiability in Design Environments",*** Proceedings, CHI'90, Seattle, pp. 183-191.

- Girgensohn, A. (1992) ***"End-User Modifiability in Knowledge-Based Design Environments"***, Ph.D. Dissertation, CU Boulder

- Eisenberg, M., & Fischer, G. (1994) ***"Programmable Design Environments: Integrating End-User Programming with Domain-Oriented Assistance."*** Proceedings, CHI'94, Boston, pp. 431-437.

- Fischer, G., McCall, R., Ostwald, J., Reeves, B., & Shipman, F. (1994) ***"Seeding, Evolutionary Growth, and Reseeding: Supporting Incremental Development of Design Environments."*** Proceedings, CHI'94, pp. 292-298.

Putting Owners of Problems in Charge: a Necessity not a Luxury

—

An Interview with a Geoscientist at CU Boulder

- *I spend in average an hour every day developing software for myself to analyze the data I collected because there is not any available software.*
  → "reality is not user-friendly" and problems are unique

- *Even if there is a software developer sitting next to me, it would not be of much help because my needs vary as my research progresses and I cannot clearly explain what I want to do at any moment.*
  → ill-defined problems cannot be delegated

- *Even if the software developer can mange to write a program for me, I will not know if he or she has done it right without looking at the code.*
  → back-talk of the artifact under construction has to go back to the owner of the problem

Interview (continued)

- *So I spent three months to gain enough programming knowledge to get by. Software development has now become an essential task of my research, but I do not consider myself a software developer and I don't know many other things about software development.*

  → this geoscientist obviously is not just an end-user (or a "none-professional"; his software has thousands of lines and he has considerable programming skills

  → it is equally obvious that he is not a software professional and does not intend to become one

  → the number of end users creating software is far larger than the number of professional programmers.

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
  - a new understanding of **collaboration, motivation, and creativity**

- meta-design provides a **theoretical framework** for Web 2.0 technologies

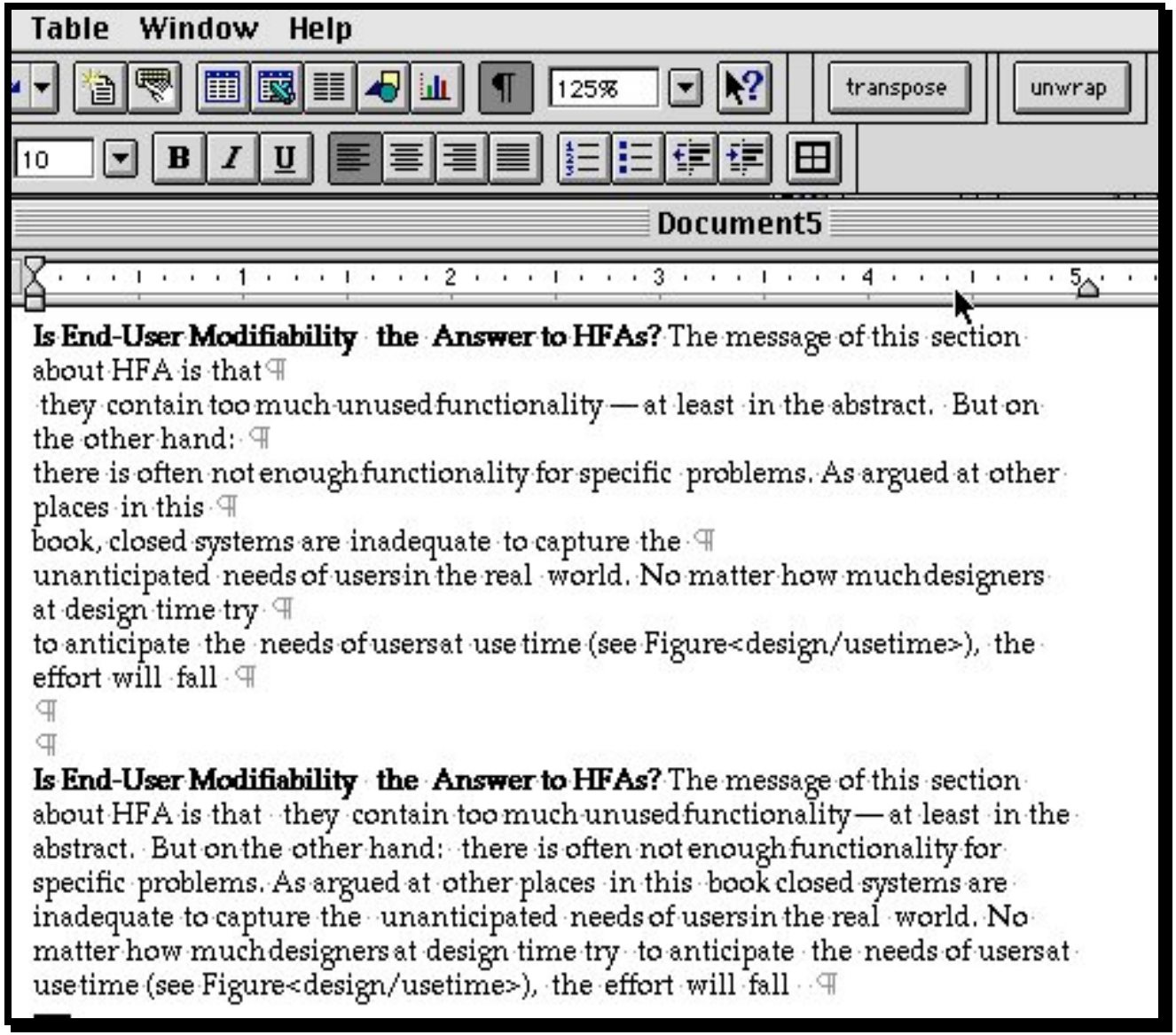
- meta-design enables **living memories / seeds** in which
  - artifacts, ideas, knowledge, products, experiences,
  - code / programs (= computer interpretable objects)

  can be collected, shared, analyzed, critiqued, rated, tagged, tried out in new context, and incrementally refined

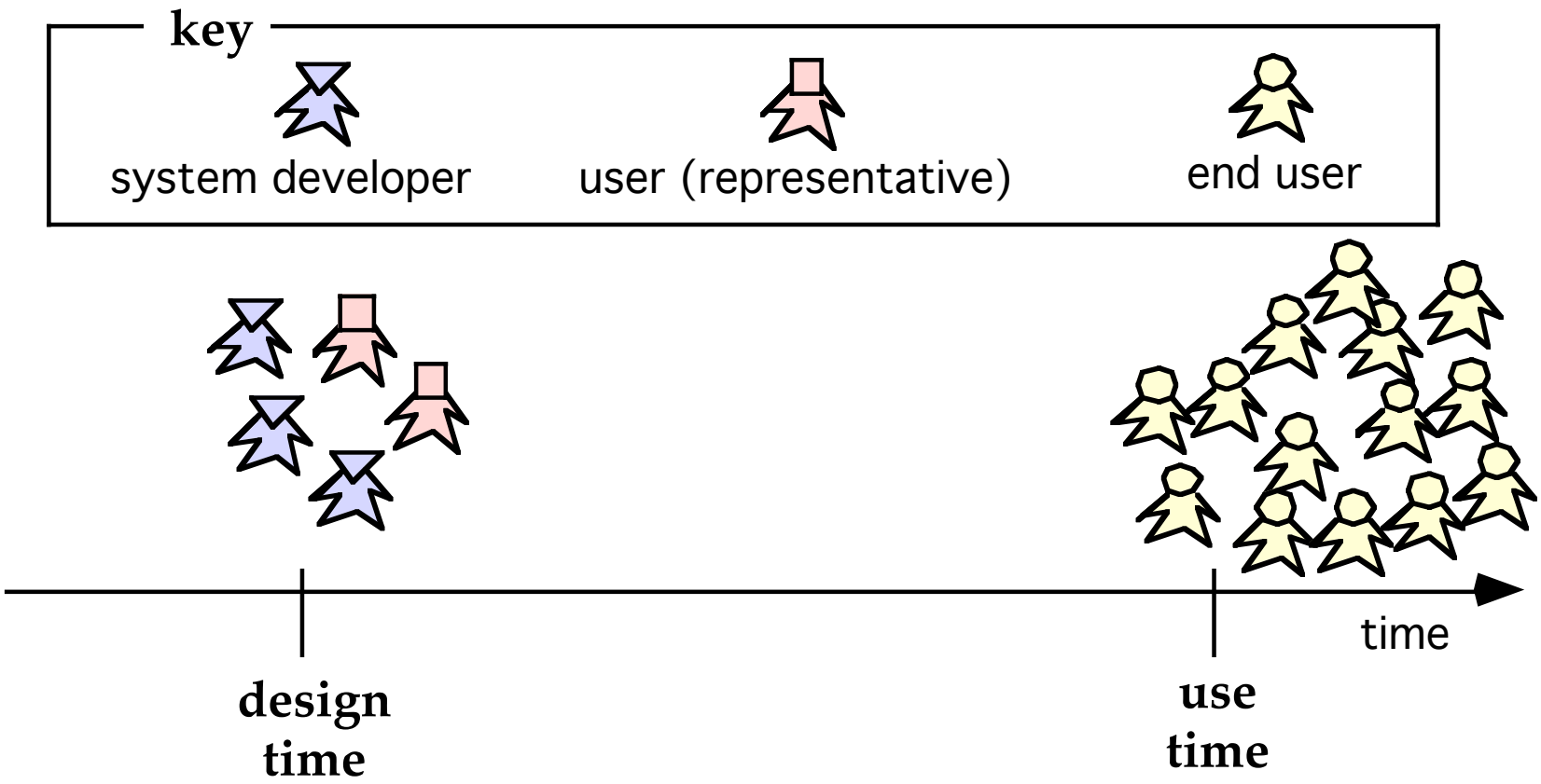
Meta-Design Concepts (in Microsoft Word): Users as Co-Developers

- ***tailor*** and ***customize*** the system by setting different parameters as their personal preferences
- ***extend*** and ***evolve*** existing information structures (e.g., menus, spelling dictionaries, auto-correct tables, …)
- write ***macros*** to create new operations (an example of "programming by example" or "programming by demonstration")
- create ***programs in VisualBasic*** to extend the functionality of the system
- ***share*** the user-defined extensions

A Macro for Unwrapping Text



Design Time and Use Time



world-as-imagined
prediction
planning

world-as-experienced
reality
situated action

Richer Ecology of Participation

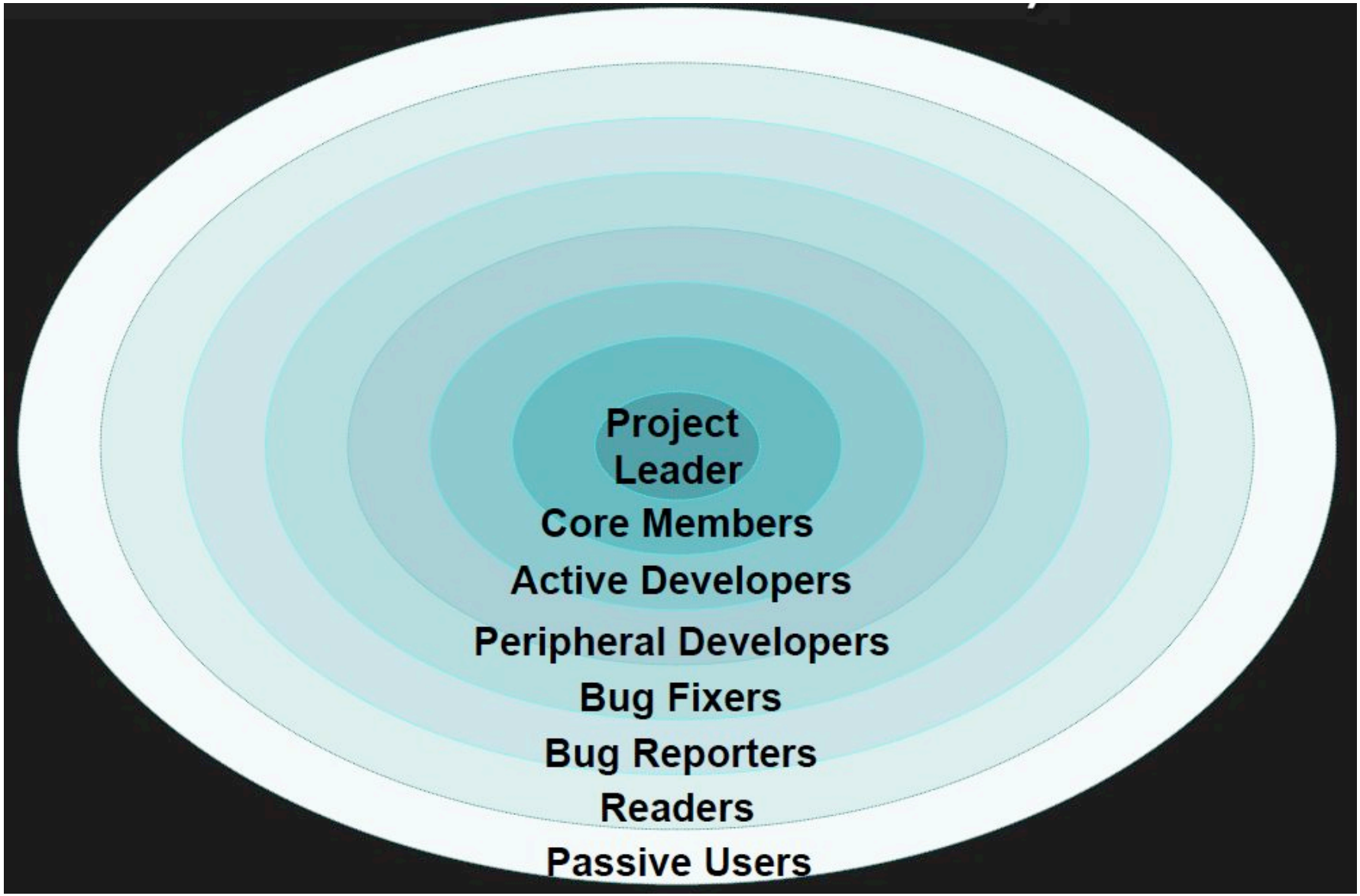
- ***in the past:***
  - software developers and users
  - producers and consumers
  - professionals and amateurs

- ***in the future: more roles***
  - producers, raters, taggers, curators, active users, passive users

- ***roles are distributed in communities:***
  - power users, local developers, gardeners

- ***challenge:*** *support migration paths with "low threshold, high ceiling" architectures*

Roles and Structures in Open Source Software Communities

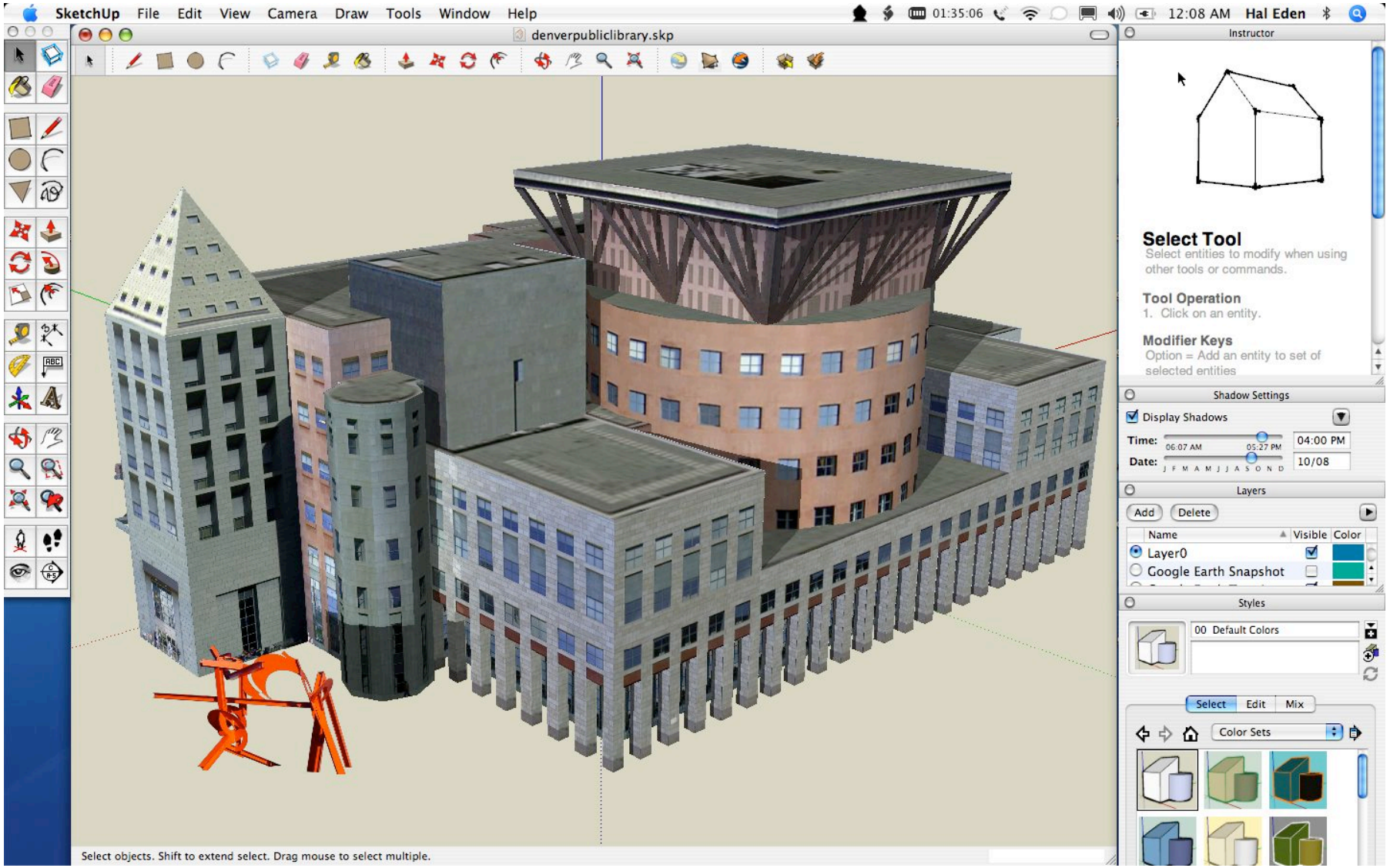


What Do Meta-Designers Do?

- 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
  - by creating **technical** and **social** conditions for broad participation in design activities
  - by supporting '**hackability**' and '**remixability**'

- **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
★★★★☆ (1 rating)
Tsim Sha Tsui Clock Tower,...
View in Google Earth

Figueroa at Wilshire
by Google
Albert C. Martin and...
View in Google Earth

1500 Walnut Street
by Google
This building located at 1500...
View in Google Earth

CPL Harold Washington Library Center
by Google
★★★★★ (6 ratings)
This monumental building,...
View in Google Earth

Marriott Marquis
by Google
This Hotel in Atlanta rises...
View in Google Earth

Hearst Residence (Hearst Castle)
by Google
★★★★★ (2 ratings)
San Francisco architect Julia...
View in Google Earth

Milwaukee Art Museum
by Google
★★★★★ (6 ratings)
The history of the Milwaukee...
View in Google Earth

CitySpire Center
by Google
★★★★★ (2 ratings)
Designed by Murphy/Jahn, Inc....
View in Google Earth

CU Boulder in 3D

Downtown Denver in 3D

A Tiny Percentage of a Huge Population → Large Number of Participants

The CreativeIT Wiki — http://l3dswiki.cs.colorado.edu:3232/CreativeIT/

A Socio-Technical Environment

Envisionment and Discovery Collaboratory (EDC)

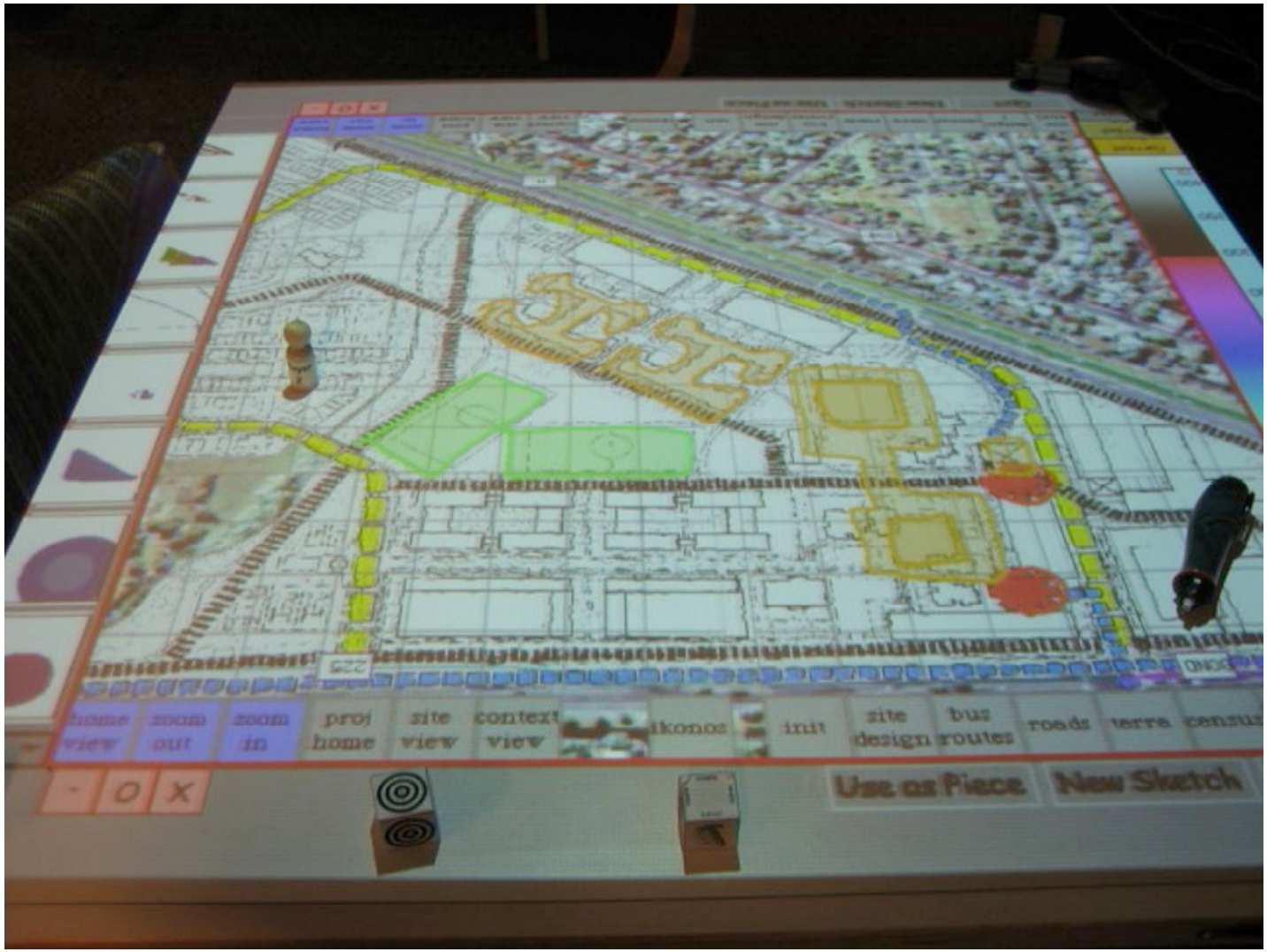
- **the EDC supports:**
  - **collaborative design** (e.g. in: urban planning, emergency management)
  - **social creativity** → learning when no one knows the answer
  - **meta-design** → a version of SimCity in which content is generated by users

- **with the EDC, we explore themes in:**
  - **Computer Science:** table-top, computationally enriched physical objects, visualization
  - **Cultures of Participation:** Communities of Interest, emergence, boundary objects, reflection in action, reflective communities

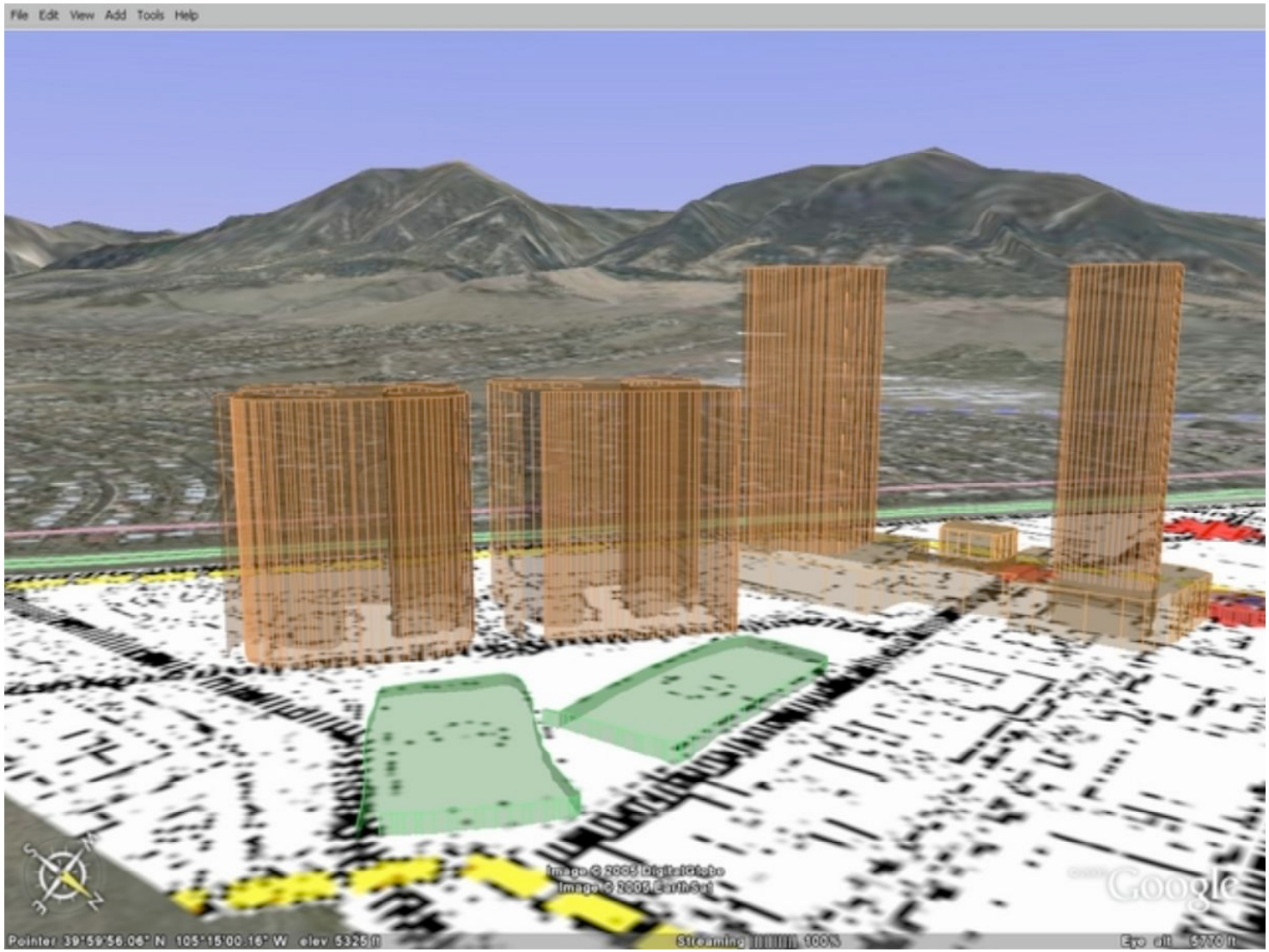
The Envisionment and Discovery Collaboratory

Boulder City Council and University of Colorado Regents

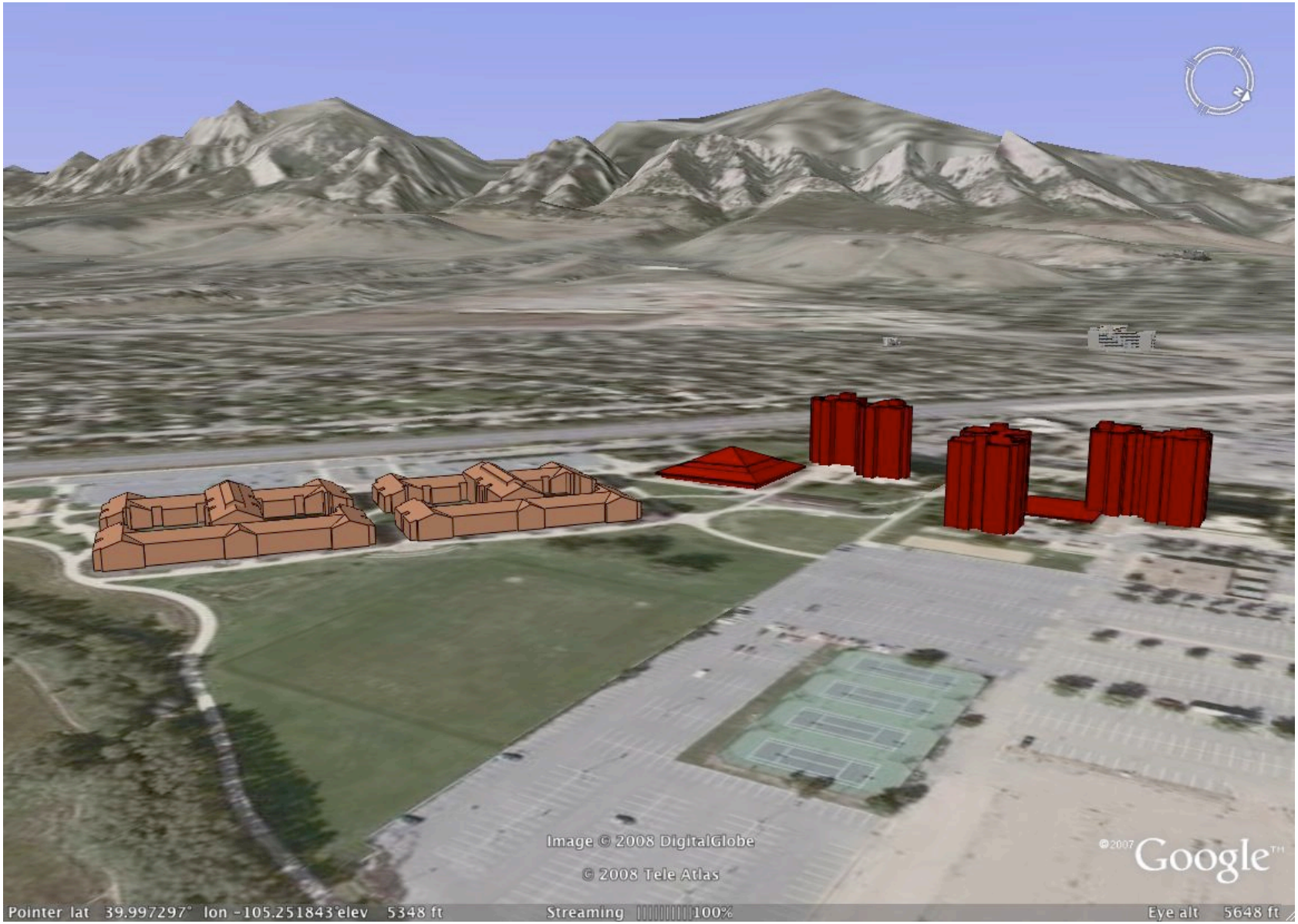
Sketching Support in the EDC



Buildings Sketched into a Google-Earth Client



Fat-Pencil Technologies and Incremental Formalization



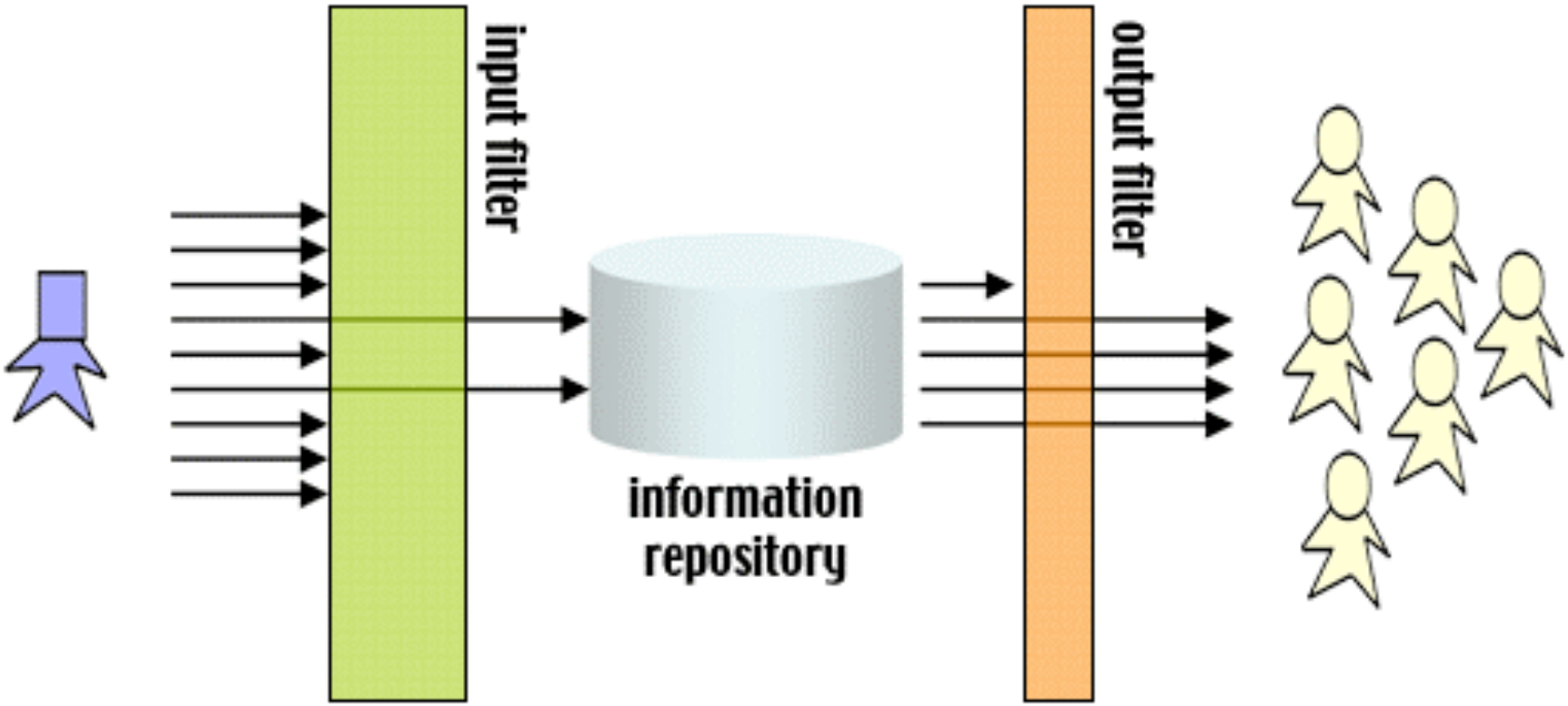
Research Challenges

- **models** for knowledge accumulation and sharing in different cultures

- **"Long Tail"** theory: making all voices heard

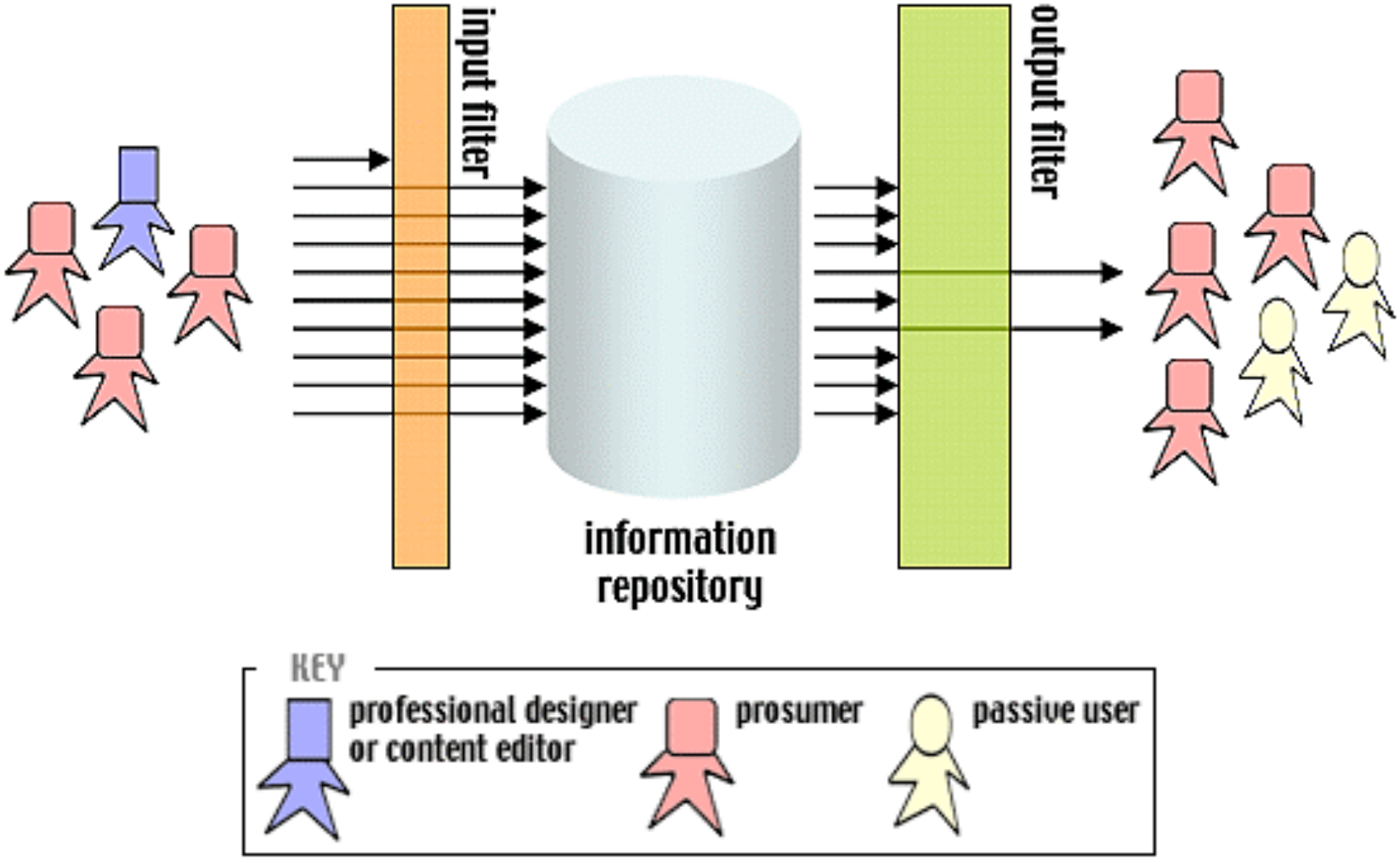
Model Authoritative underlying Consumer Cultures

- 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



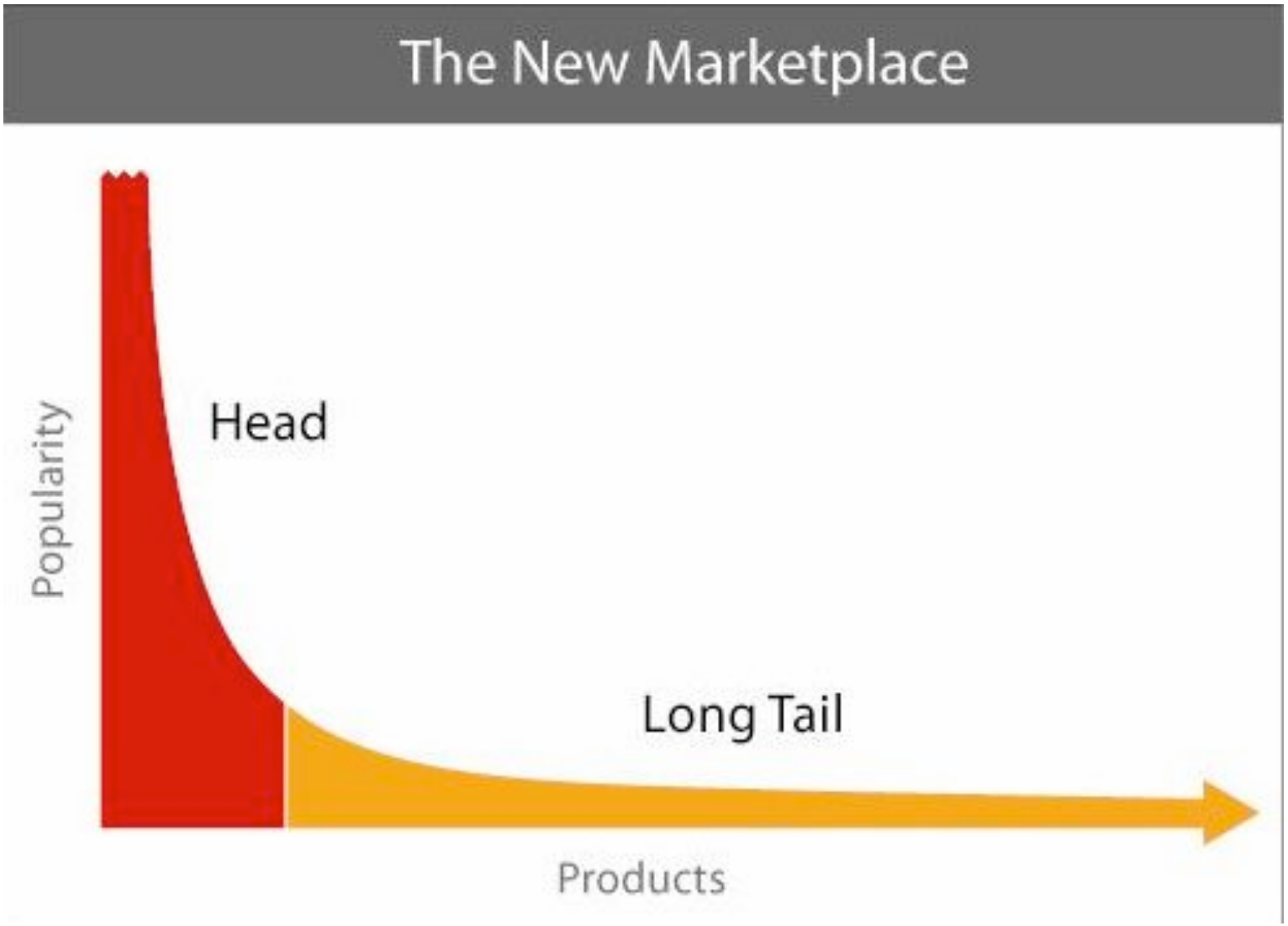
The Long Tail

- **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

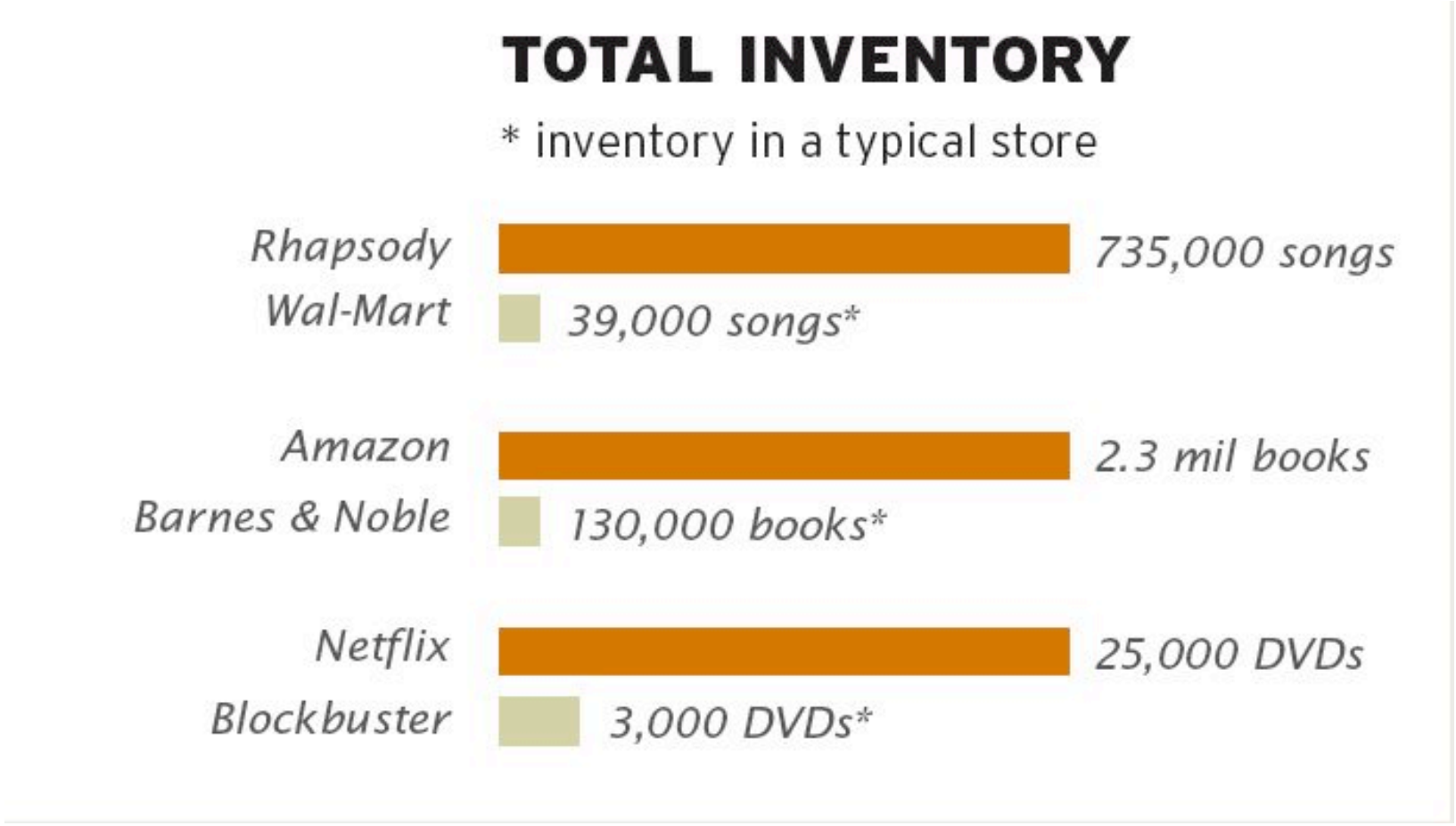
- **main opportunity — digital artifacts:** computer programs, movies, books, 3D models of buildings, …. → as the costs of production and distribution fall, there is less need to lump products and consumers into one-size-fits-all containers

- **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



End-User Development and the "Long-Tail"

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

- 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

- **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, local knowledge in a globalized world

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

Conclusions

- **one of the most exciting innovations and transformations**
  - **past decades**: digital media have provided new powers for the **individual**
  - **future:** the world's networks are providing enormous unexplored opportunities for **groups and communities**
  - **cultures of participation** → opportunities and challenges to provide **all citizens** with the means to become **co-creators** of new ideas, knowledge, and products in personally meaningful activities

- **end-user development and meta-design** are prerequisites to bring cultures of participation alive

EUD'2009 is a timely and important symposium