



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

Human-Centered Computing Themes for the Future

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University of Milan, February 2012

Themes

- Cultures of Participation
- Meta-Design
- Social Creativity
- Distributed Cognition
- Context-Aware Systems
- Learning and Education in the 21st Century

Matches / Mismatches between Teachers and Learners

Teacher	Student	Example
authority (“sage on the stage”)	Dependent, passive	lecture without questions, drill
motivator and facilitator	Interested	lecture with questions, guided discussion
Delegator	Involved	group projects, seminar
coach/critic (“guide on the side”)	self-directed, discovery-oriented	self-directed study group, apprenticeship, dissertation

teacher / learner = f{person} → f{context}



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Cultures of Participation

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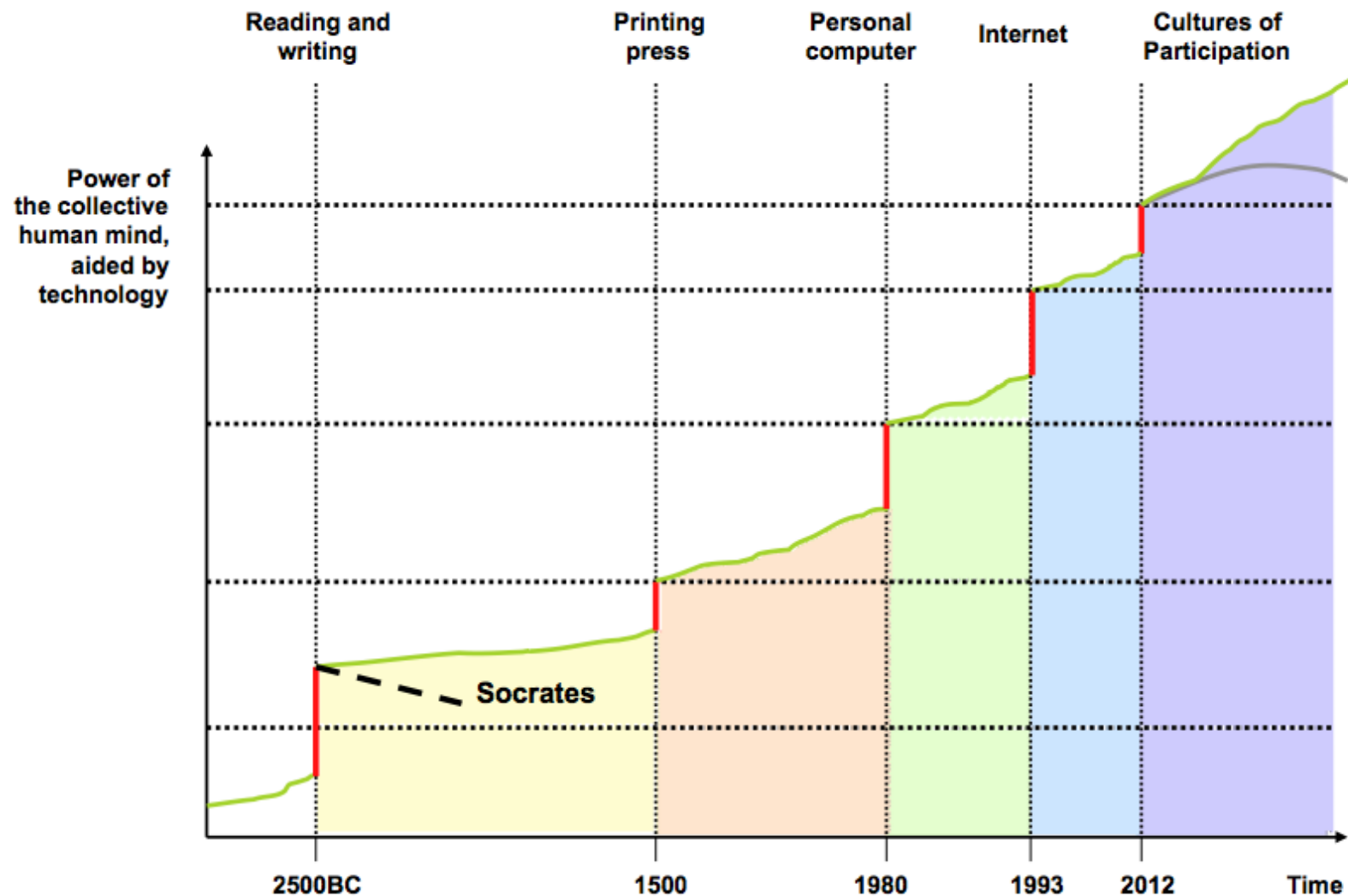
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Outline

- **Basic Message**
- **Cultures of Participation**
- **Examples of Innovative Socio-Technical Environments**
- **Research Challenges**
- **Conclusions**

Basic Message: Beyond the Unaided, Individual Human Mind



Cultures of Participation

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

Consumer Cultures

- **Examples:**

- Television audiences
- Students in an instructionist classroom

- **References:**

- Postman, N. (1985) *Amusing Ourselves to Death—Public Discourse in the Age of Show Business*, Penguin Books, New York.
- Fischer, G. (2002) Beyond 'Couch Potatoes': From Consumers to Designers and Active Contributors, in *Firstmonday* (Peer-Reviewed Journal on the Internet), available at http://firstmonday.org/issues/issue7_12/fischer/.

Comments about Cultures of Participation

- *“The experience of having participated in a problem makes a difference to those who are affected by the solution. People are more likely to like a solution if they have been involved in its generation; even though it might not make sense otherwise” [Rittel, 1984].*
- *“I believe passionately in the idea that people should design buildings for themselves. In other words, not only that they should be involved in the buildings that are for them but that they should actually help design them” [Alexander, 1984].*
- *“The hacker culture and its successes pose by example some fundamental questions about human motivation, the organization of work, the future of professionalism, and the shape of the firm” [Raymond & Young, 2001].*
- *“Users that innovate can develop exactly what they want, rather than relying on manufacturers to act as their (often very imperfect) agents” [von Hippel, 2005].*
- *“The networked environment makes possible a new modality of organizing production: radically decentralized, collaborative, and nonproprietary” [Benkler, 2006].*

Consumer and Designers – Beyond Binary Choices

- **claims:**

- there is nothing wrong about being a consumer (watching a tennis match, listening to a concert, ...)
- the same person wants to be a consumer in some situations and in others a designer → consumer / designer is not an attribute of a person, but of a context
consumer / designer \neq f{person} → f{context}

- **problems:**

- someone wants to be a designer but is forced to be a consumer → ***personally meaningful activities***
- someone wants to be a consumer but is forced to be a designer → ***personally irrelevant activities***

Cultures of Participation — Application Domains

- Web 2.0
- Learning 2.0
- President 2.0
- Science 2.0
- Digital Libraries 2.0
- Electricity 2.0 (Smart Grids)
- Health 2.0
- Crisis 2.0 (CNN versus Bloggers, Twitter,)

Cultures of Participation — Concepts

- prosumers (= producers + consumers)
- pro-ams (= professionals + amateurs)
- user-generated content
- wisdom of crowds
- crowd sourcing
- long tail

→ What is needed:

**a theoretical model to understand and foster
cultures of participation**

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
- to reach **extensive coverage**
- to expose artifacts to **public scrutiny**

Elements of an Analytic Model: 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

Environments Created by Cultures of Participation

Site	Objectives and Unique Aspects
Wikipedia	web-based collaborative multilingual encyclopedia with a single, collaborative, and verifiable article; authority is distributed (http://www.wikipedia.org/)
iTunes U	courses by faculty members from “certified institutions”; control via input filters; material can not be remixed and altered by consumers (http://www.apple.com/education/itunes-u/)
YouTube	video sharing website with weak input filters and extensive support for rating (http://www.youtube.com/)
Encyclopedia of Life (EoL)	documentation of the 1.8 million known living species; development of an extensive curator network; partnership between the scientific community and the general public (http://www.eol.org/)
SketchUp and 3D Warehouse	repository of 3D models created by volunteers organized in collections by curators and used in Google Earth (http://sketchup.google.com/3dwarehouse/)

Environments Created by Cultures of Participation

Scratch	Learning environment for creating, remixing, and sharing programs to build creative communities in education (http://scratch.mit.edu)
Instructables	socio-technical environment focused on user-created and shared do-it-yourself projects involving others users as raters and critics (http://www.instructables.com/)
PatientsLikeMe	collection of real-world experiences enabling patients who suffer from life-changing diseases to connect and converse (http://www.patientslikeme.com/)
Stepgreen	library of energy saving actions, tips, and recommendations by citizen contributors for saving money and being environmentally responsible (http://www.stepgreen.org/)

Encyclopedia of Life

HOME PREFERENCES LANGUAGE : EN FEEDBACK PRESS ROOM



Encyclopedia of Life

"Imagine an electronic page for each species of organism on Earth..." - Edward O. Wilson

[login](#) | [create an account](#)

☒ Names ☐ Tags ☐ Full-

Explore



[*Oenothera humifusa* Nutt.](#)
Seabeach evening-primrose



[*Gnaphosa montana* \(L. Koch, 1866\)](#)

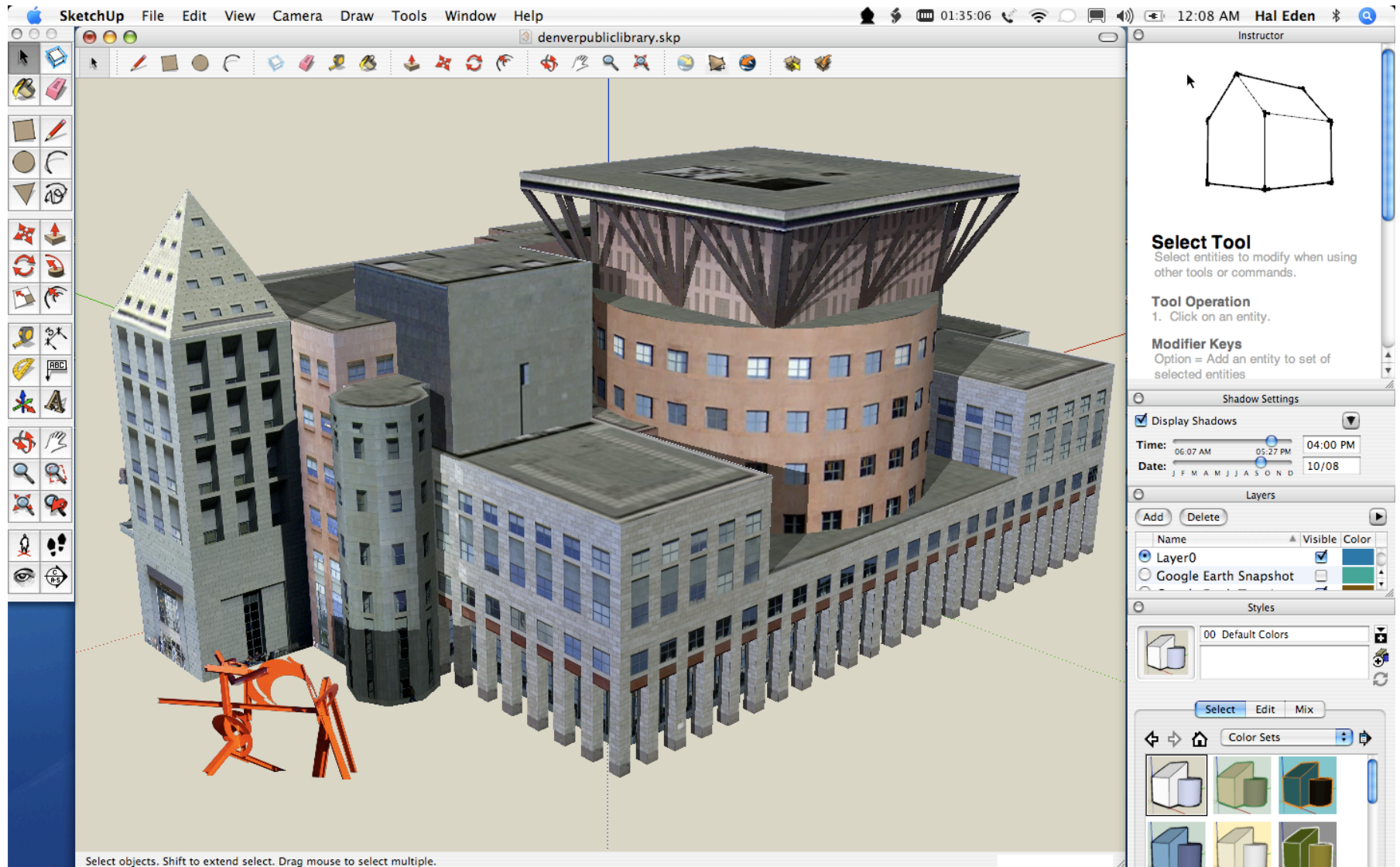


[*Cnephasia incertana* Treitschke 1835](#)
Light grey tortrix



[*Cataulacus tenuis* Emery, 1899](#)

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

3D Building Collections



[Featured Google Earth Modelers](#)

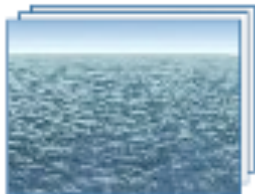


[Help Model a City](#)



[Featured Google Earth Collections](#)

Featured Collections



[Google Earth - Ocean Layer](#)

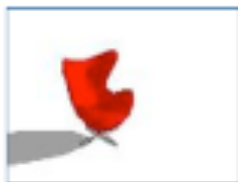


[SketchUp Components](#)



[Interior Furnishings](#)

Popular Models



[Egg Chair](#)
by [Mart](#)



[Chair](#)
by [Yeroc](#)



[People](#)
by [Graphic Sketchbook](#)

CU Boulder in 3D



Downtown Denver in 3D



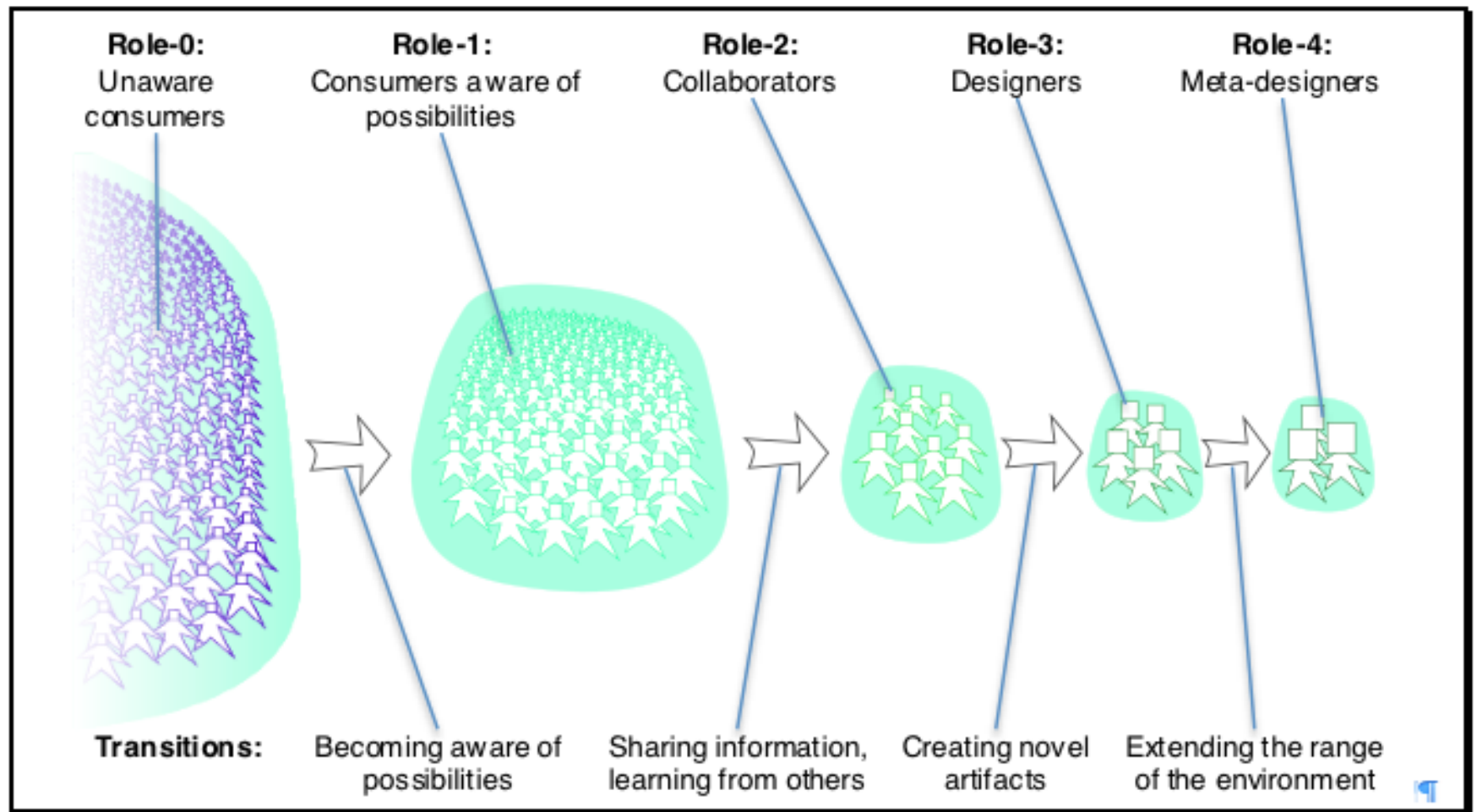
A Tiny Percentage of a Huge Population → Large Number of Participants



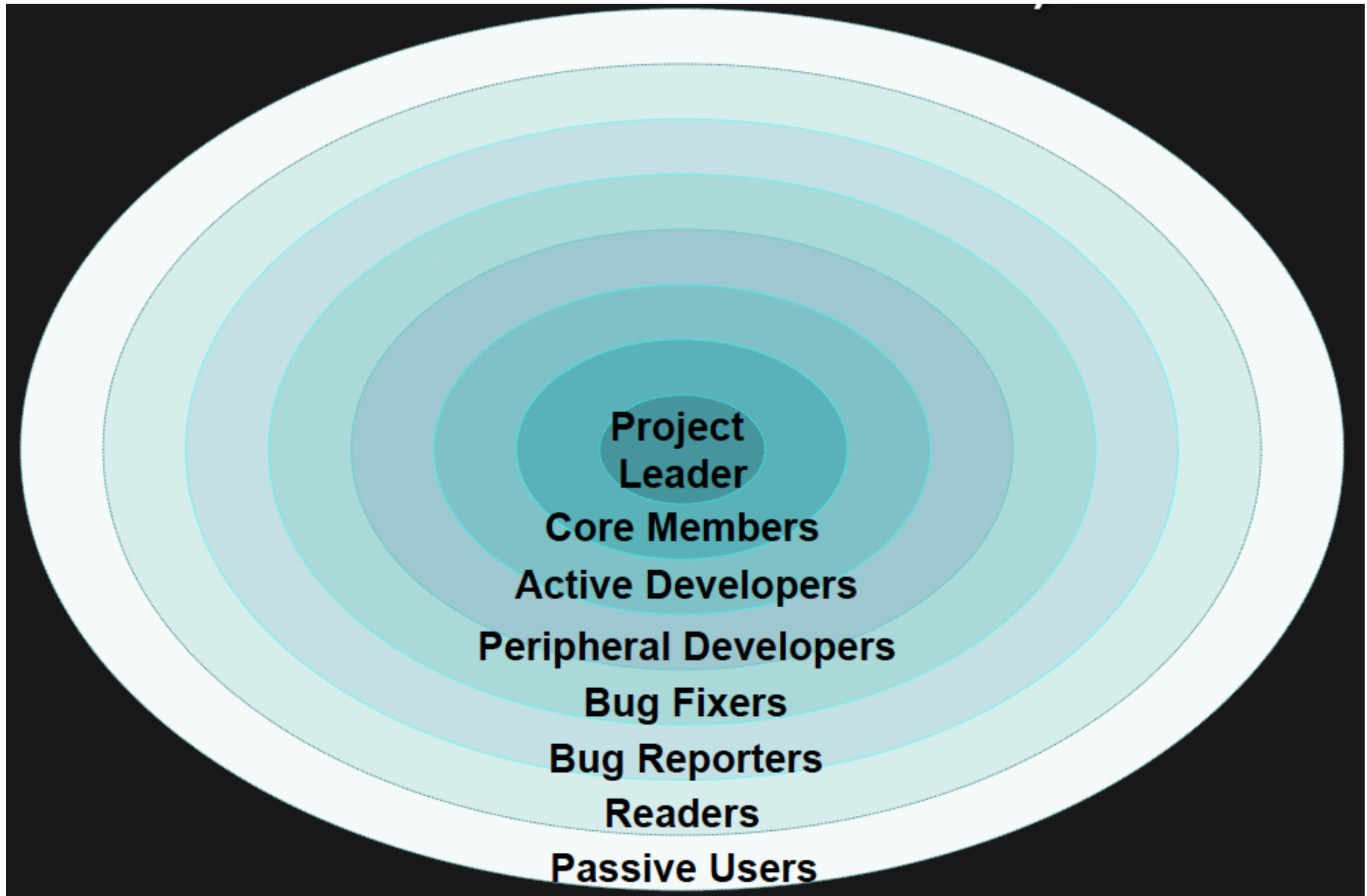
Richer Ecologies of Participation

- ***in the past:***
 - software developers and users
 - producers and consumers
 - professionals and amateurs
- ***in the future: more roles — beyond passive, undifferentiated consumers***
 - producers, raters, taggers, curators, stewards, active users, passive users
- ***roles are distributed in communities:***
 - power users, local developers, gardeners
- ***challenge: support migration paths with “low threshold, high ceiling” architectures***

Richer Ecologies of Participation: Consumer → Contributor → Collaborator → Meta-Designer



Ecologies in Open Source Communities



The CreativeIT Wiki – <http://l3dswiki.cs.colorado.edu:3232/CreativeIT/>



Example: Energy Sustainability

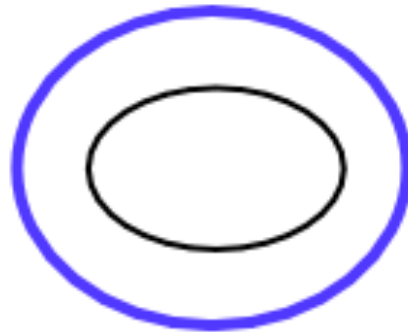
- energy sustainability = a theme of **national and worldwide importance**
- **technical innovations:**
 - Smart Grid + Smart Meters
 - advanced metering infrastructures
- **challenges of harvesting the benefits of technical innovations:**
 - most citizens are unaware of new technological developments (“energy illiteracy”)
 - information presentation is poorly designed
 - feedback alone is not persuasive enough to change human behavior
- **claim:** all of these challenges are grounded in the intersection of **human behavior** (at individual and social levels) and **technology**

Socio-Technical Environments for Energy Sustainability

Electric Grid → Smart Grid

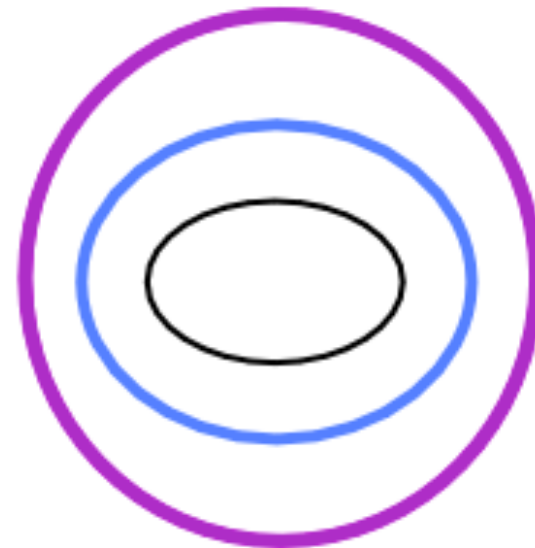
electrical grid

information and communication
technologies:
smart grid + smart meters +
advanced smart infrastructure

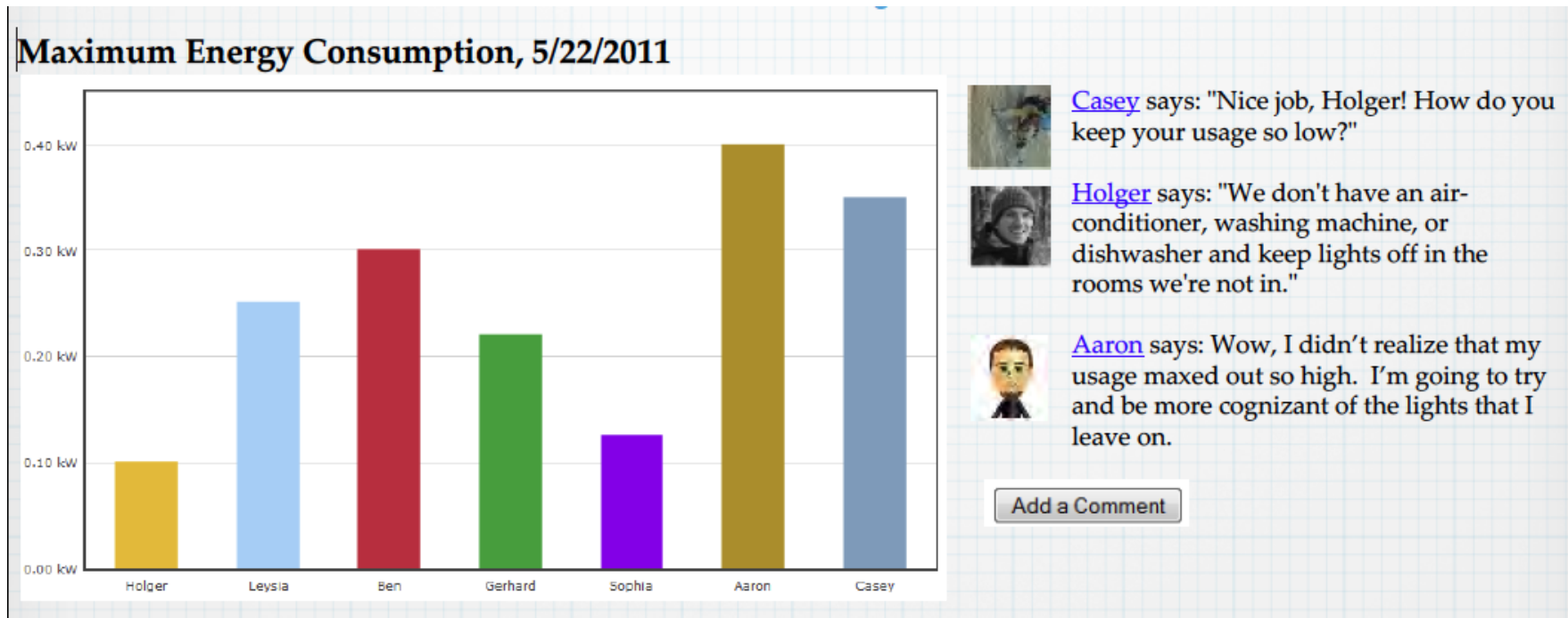


→ Human Grid

social environment:
energy illiteracy + control +
intrinsic motivation + social norms +
changing human behavior + eco-arts



Learning from and Being Motivated by other's Experiences



Roles, Demands, and Activities for a Culture of Participation in the Energy Domain

	The Unaware	Aware Consumers	Collaborators	Designers	Meta-Designers
Specific roles	Unaware consumers	Aware users of energy; active decision makers	Assistants; teachers; learners; observers	End-user developer; visualization designer	Leaders, software architects, social community founders
Demands and activities	Use energy unconsciously as part of daily life	Are aware of energy and energy use; know the space of possibilities; make educated decisions about actions	Share data and knowledge with others; compare with and learn from others	Learn advanced languages and tools; use existing infrastructure to design new artifacts	Define tools and languages; perform seeding; create infrastructure; set policies

Research Challenge

—

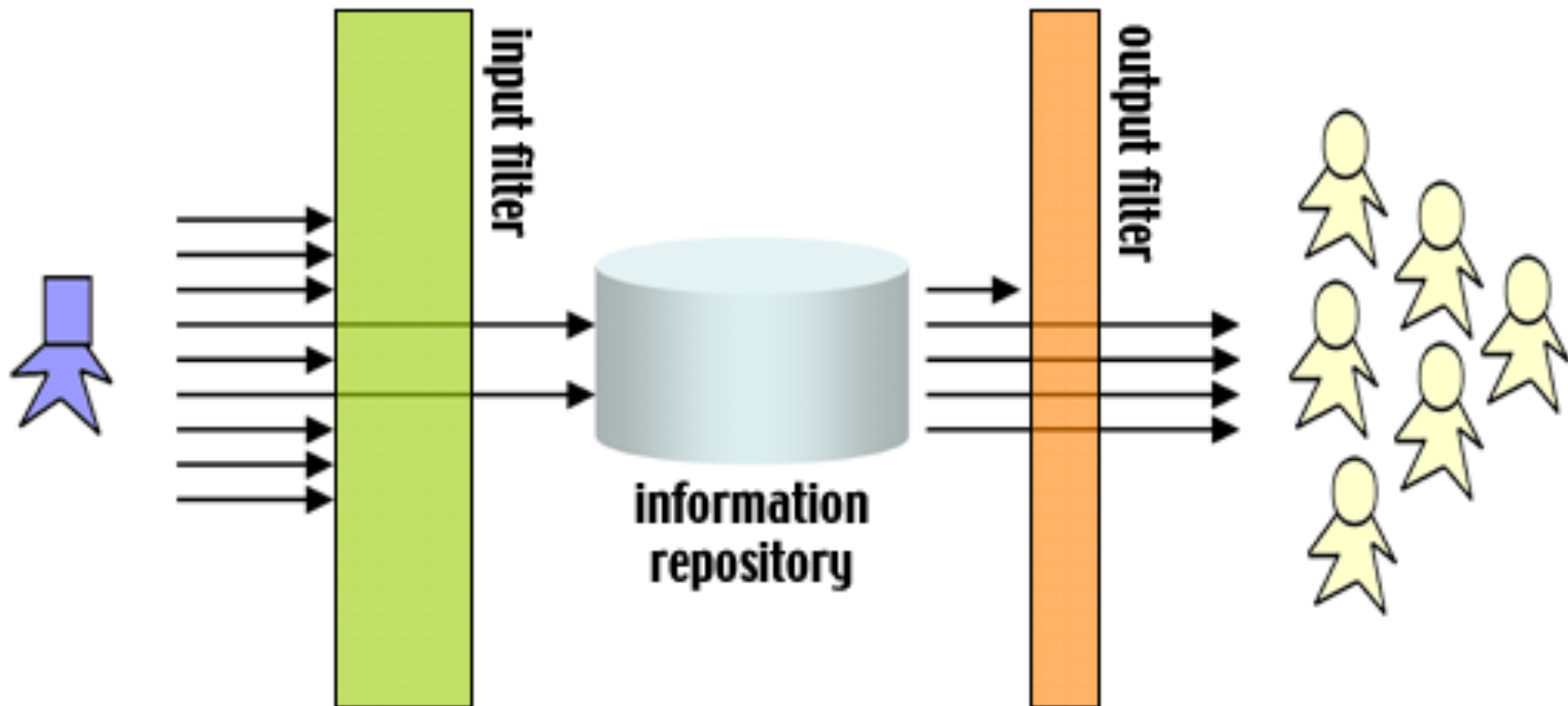
Different Models for Knowledge Accumulation and Sharing

- **Model Authoritative**
- **Model Democratic**

Model Authoritative underlying Consumer Cultures

“filter and publish”

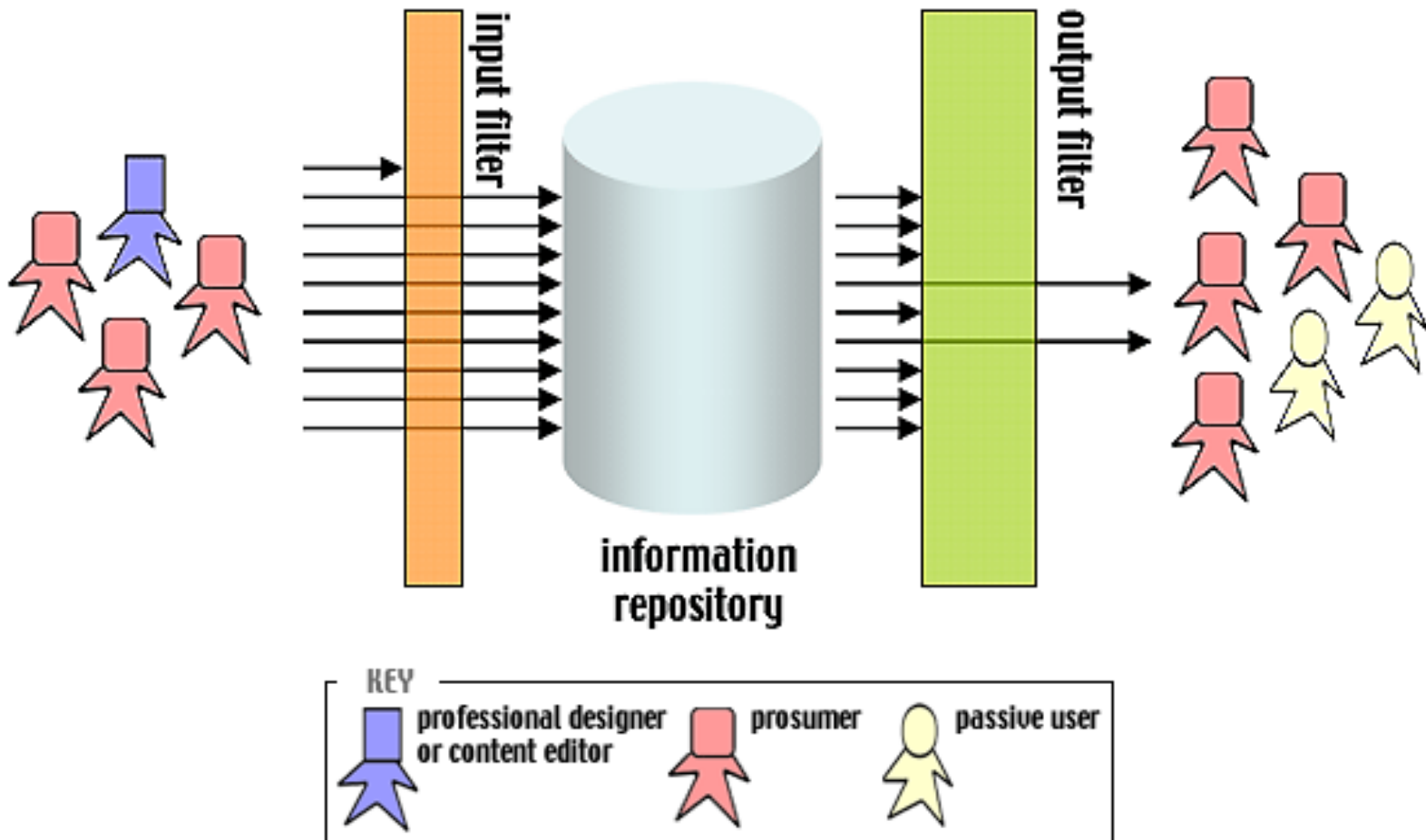
- Strong Input Filters, Small Information Repositories, Weak Output Filters
- **Limitation:** Making All Voices Heard



Model Democratic underlying Participation Cultures

“publish and filter”

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



Passion and Intrinsic Motivation

- **utility = value / effort**

- SketchUp → **Building Maker** = an easy-to-use tool for creating three-dimensional buildings. Position building blocks on top of 2D aerial images to quickly create realistic looking buildings.
- Incremental Formalization

- **movies:**

- Staircases / Escalators
- 3D Modelers

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

Relevant Perspectives for Cultures of Participation

- **social production** → Benkler, Y. (2006) *“The Wealth of Networks: How Social Production Transforms Markets and Freedom”*
- **democratizing innovation** → von Hippel, E. (2005) *“Democratizing Innovation”*
- **richer ecologies of participation** → Preece, J., & Shneiderman, B. (2009) "The Reader-to-Leader Framework: Motivating Technology-Mediated Social Participation"
- **mass collaboration** → Tapscott, D and Williams, A. (2006): *“Wikinomics: How Mass Collaboration Changes Everything”*
- **wisdom of crowds** → Surowiecki, J. (2005): *“The Wisdom of Crowds”*
- **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”*
- **learning / education** → Collins, A. and Halverson, R. (2009): *“The Second Educational Revolution: How Technology is Transforming Education Again”*

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- Fischer, G. (2011) "Understanding, Fostering, and Supporting Cultures of Participation," ACM Interactions XVIII.3 (May + June 2011), pp. 42-53.