

# Social Implications II

---

**from past to future  
from place to placeless?**

**History of Information**

April 26, 2011



# exam

---

**May 9**

**11:30 - 2:30**

**155 Kroeber**

**study sessions**

**Tuesday May 3 - Thursday May 5**

**2-3:30**

aob

distance 3



# storage & search

---

up in the clouds

**History of Information**

April 15, 2010

aob

---





# storage & search

## Goliath Stubs Toe: Amazon Cloud's Morning Malfunction

April 21, 2011

By Matthew Dublin

It looks like Giles Day knew whereof he spoke at last week's Bio IT World Expo when he called for a bit of "cloud sobriety," asking attendees: what if Amazon's cloud fails? What then? While most in the audience probably thought of that as the remotest of possibilities, like the entire national power grid failing, the unthinkable did in fact happen today. Early this morning at 1:48 AM PDT, Amazon's cloud failed, crippling many social networking sites including Foursquare, Quora, Reddit, and Hootsuite, Discovr, Wildfir, Livefyre, CampgroundManager, Totango, ESchedule, ZeHosting, Recorded Future, PercentMobile, the Cydia Store, and whatever other jobs were being run by private users at the time.

The technical failures affect Amazon EC2, Relational Database Service (RDS), Elastic Beastalk, CloudFormation, and Elastic Block Store (EBS).

aA Type size: + -

Login or register to post comments

ds

on

10



# aob



# storage & search

aob

## Goliath Stubs Toe: Amazon Cloud's Morning Malfunction

April 21, 2011

By Matthew Dublin

It looks like Giles Day knew when he called for a bit of "cloud fails? What then? While the remotest of possibilities, unthinkable did in fact happen. Amazon's cloud failed, crippling Foursquare, Quora, Reddit, and CampgroundManager, Totango, PercentMobile, the Cydia Store, and private users at the time.

The technical failures affected CloudFormation, and Elastic

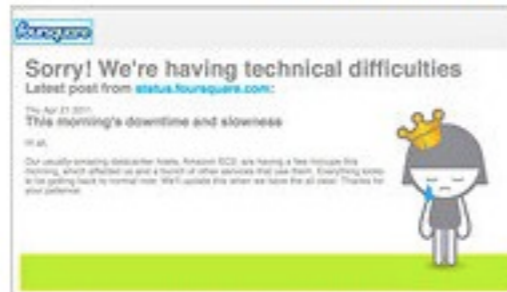
## Amazon's Trouble Raises Cloud Computing Doubts

By STEVE LOHR

Published: April 22, 2011

As technical problems interrupted computer services provided by Amazon for a second day on Friday, industry analysts said the troubles would prompt many companies to reconsider relying on remote computers beyond their control.

 Enlarge This Image



foursquare.com, via Associated Press

The Foursquare Web site, as well as some other sites using Amazon Web Services, have had problems in the last two days.

"This is a wake-up call for cloud computing," said Matthew Eastwood, an analyst for the research firm IDC, using the term for accessing services and information in big data centers remotely over the Internet from anywhere, as if the services were in a cloud. "It will force a conversation in the industry."

That discussion, he said, will most likely center on what data and computer operations to send off to the cloud and what to keep inside the corporate walls.



# storage & search

aob

## Goliath Stubs Toe: Amazon Cloud's Morning Malfunction

April 21, 2011

By Matthew Dublin

It looks like Giles Day knew when he called for a bit of "cloud fails? What then? While the remotest of possibilities, unthinkable did in fact happen. Amazon's cloud failed, crippling Foursquare, Quora, Reddit, and CampgroundManager, Totango, PercentMobile, the Cydia Store, and private users at the time.

The technical failures affected CloudFormation, and Elastic

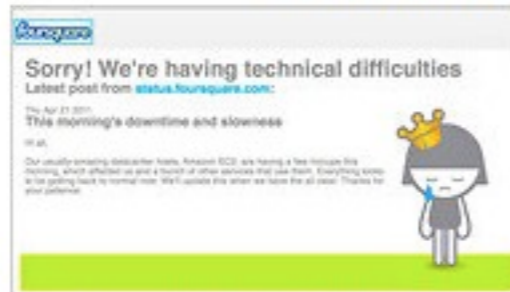
## Amazon's Trouble Raises Cloud Computing Doubts

By STEVE LOHR

Published: April 22, 2011

As technical problems interrupted a second day on Friday, industry analysts say companies to reconsider relying on

 Enlarge This Image



foursquare.com, via Associated Press

The Foursquare Web site, as well as some other sites using Amazon Web Services, have had problems in the last two days.

## Why hackers and spooks want our heads in the cloud

Our unthinking embrace of these giant data centres is throttling the giddy anti-authoritarian computing dream



John Harris

[guardian.co.uk](http://guardian.co.uk), Monday 25 April 2011 20.00 BST

[Article history](#)

Imagine this. A notorious multinational is on the lookout for new business. For the sake of argument, let's imagine it's Lockheed Martin, the defence, security, and "advanced technology" corporation that has lately been seeing to the census. From somewhere in their R&D division comes an idea: "personal lifestyle security services" for millions across the planet. The wheeze is simple enough: sign up and hand them your personal correspondence, financial records, bank details, ID documents, and more. They'll have all your stuff, and you'll have a unique password whenever you want a look. And just think: more clutter shunted out of your life, leaving you to glide through the minimalist bliss of 21st century living.

# overview

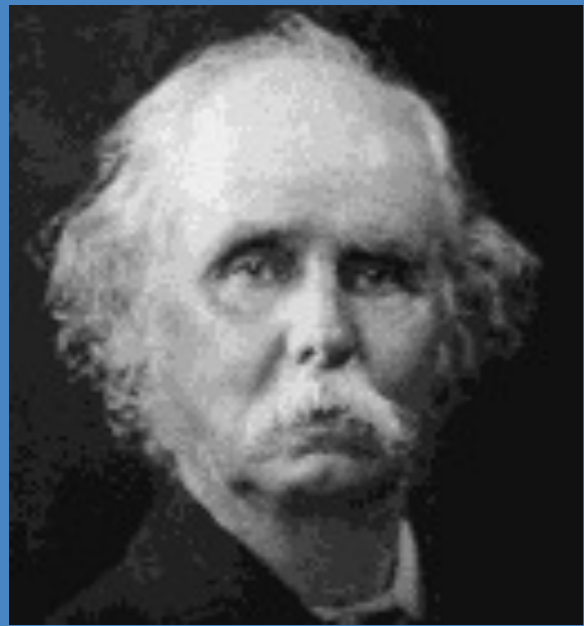
---

**death of distance**  
**some doubts**  
**bear in mind**  
**social implications**  
**a little learning**



# death of distance

---



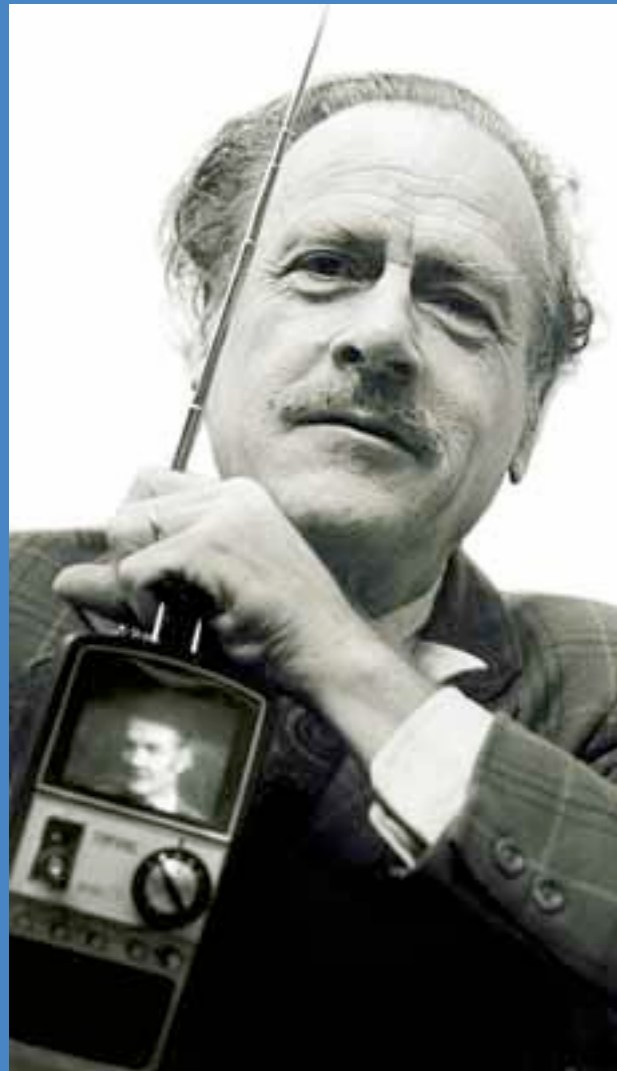
Alfred Marshall  
1842-1924

"Every cheapening of the means of communication, every new facility for the free interchange of ideas ... alters the action of the forces which tend to localize industries."

Alfred Marshall, *Principles of Economics*,  
1920

# every cheapening ...

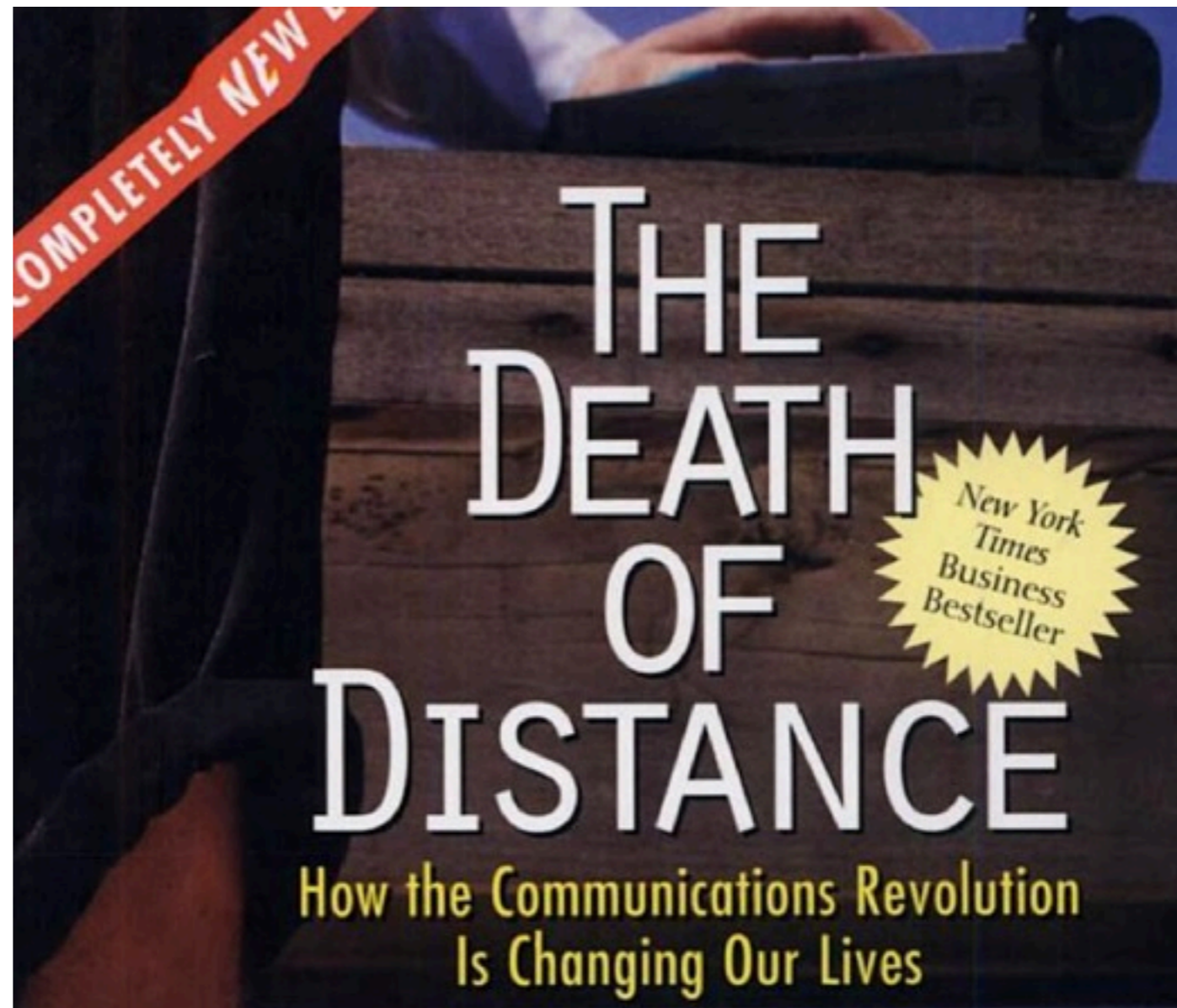
---



"Electric circuitry has overthrown the regime of 'time' and 'space' and pours upon us instantly and continuously concerns of all other men. It has reconstituted dialogue on a global scale. Its message is Total Change, ending psychic, social, economic, and political parochialism... Ours is a brand-new world of allatonceness. 'Time' has ceased, 'space' has vanished. **We now live in a *global village* ... a simultaneous happening.**"

Mcluhan et al., *Medium is the Massage*, 1967

even cheaper



# trendspotting

---

1. **The Death of Distance.** Distance will no longer decide the cost of communicating electronically. Indeed, once investment has been made in a communications network, in buying a computer or telephone, or in setting up a Web site, the additional cost of sending or receiving an extra piece of information will be virtually zero.
2. **The Fate of Location.** Companies will be free to locate many screen-based activities wherever they can find the best bargain of skills and productivity. Developing countries will increasingly perform on-line services – including monitoring security screens, inputting data from forms, running help-lines, and writing software code – and sell them to the rich industrial countries that generally produce such services domestically.
3. **Improved Connections.** Most people on earth will eventually have access to networks that are all interactive and broadband. The Internet will continue to exist in its present form, but will also carry many other services, including telephone and television.
4. **Increased Mobility.** Every form of communication will be available for mobile or remote use.
5. **More Customized Networks.** The huge capacity of networks will enable individuals to order “content for one”: that is, individual consumers will receive (or send) exactly what they want to receive (or send), when and where they want it.
6. **A Deluge of Information.** Because people’s capacity to absorb new information will not increase, they will need filters to sift, process, and edit it.
7. **Increased Value of Brand.** Companies will want ways to push their information ahead of their competitors’. One of the most effective will be branding. What’s hot – whether a product, a personality, a sporting event, or the latest financial data – will attract the greatest rewards.
8. **More Minnows, More Giants.** Many of the costs of starting a new business will fall and companies will more easily buy in services. So small companies will start up more readily, offering services that, in the past, only giants had the scale and scope to provide. If they can back creativity with competence and speed, they will compete effectively with larger firms. At the same time, communication amplifies the strength of brands and the power of networks. In industries where networks matter, concentration will increase.
9. **More Competition.** More companies and customers will have access to accurate price information. In addition, some entry barriers will fall. The result will be greater competition in many markets, resulting in “profitless prosperity”: it will be easier to find buyers, but harder to make fat margins.

# trendspotting

- 1. The Death of Distance.** Distance will no longer decide the cost of communicating electronically. Indeed, once investment has been made in a communications network, in buying a computer or telephone, or in setting up a Web site, the additional cost of sending or receiving an extra piece of information will be virtually zero.
- 2. The Fate of Location.** Companies will be free to locate many screen-based activities wherever they can find the best bargain of skills and productivity. Developing countries will increasingly perform on-line services – including monitoring security screens, inputting data from forms, running help-lines, and writing software code – and sell them to the rich industrial countries that generally produce such services domestically.
- 3. Improved Connections.** Most people on earth will eventually have access to networks that are all interactive and broadband. The Internet will continue to exist in its present form, but will also carry many other services, including telephone and television.
- 4. Increased Mobility.** Every form of communication will be available for mobile or remote use.
- 5. More Customized Networks.** The huge capacity of networks will enable individuals to order “content for one”: that is, individual consumers will receive (or send) exactly what they want to receive (or send), when and where they want it.
- 6. A Deluge of Information.** Because people’s capacity to absorb new information will not increase, they will need filters to sift, process, and edit it.
- 7. Increased Value of Brand.** Companies will want ways to push their information ahead of their competitors’. One of the most effective will be branding. What’s hot – whether a product, a personality, a sporting event, or the latest financial data – will attract the greatest rewards.
- 8. More Minnows, More Giants.** Many of the costs of starting a new business will fall and companies will more easily buy in services. So small companies will start up more readily, offering services that, in the past, only giants had the scale and scope to provide. If they can back creativity with competence and speed, they will compete effectively with larger firms. At the same time, communication amplifies the strength of brands and the power of networks. In industries where networks matter, concentration will increase.
- 9. More Competition.** More companies and customers will have access to accurate price information. In addition, some entry barriers will fall. The result will be greater competition in many markets, resulting in “profitless prosperity”: it will be easier to find buyers, but harder to make fat margins.

# trendspotting

1. **The Death of Distance.** Distance will no longer decide the cost of communicating electronically. Indeed, once investment has been made in a communications network, in buying a computer or telephone, or in setting up a Web site, the additional cost of sending or receiving an extra piece of information will be virtually zero.
2. **The Fate of Location.** Companies will be free to locate many screen-based activities wherever they can find the best bargain of skills and productivity. Developing countries will increasingly perform on-line services – including monitoring security screens, inputting data from forms, running help-lines, and writing software code – and sell them to the rich industrial countries that generally produce such services domestically.
3. **Improved Connections.** Most people on earth will eventually have access to networks that are all interactive and broadband. The Internet will continue to exist in its present form, but will also carry many other services, including telephone and television.
4. **Increased Mobility.** Every form of communication will be available for mobile or remote use.
5. **More Customized Networks.** The huge capacity of networks will enable individuals to order “content for one”: that is, individual consumers will receive (or send) exactly what they want to receive (or send), when and where they want it.
6. **A Deluge of Information.** Because people’s capacity to absorb new information will not increase, they will need filters to sift, process, and edit it.
7. **Increased Value of Brand.** Companies will want ways to push their information ahead of their competitors’. One of the most effective will be branding. What’s hot – whether a product, a personality, a sporting event, or the latest financial data – will attract the greatest rewards.
8. **More Minnows, More Giants.** Many of the costs of starting a new business will fall and companies will more easily buy in services. So small companies will start up more readily, offering services that, in the past, only giants had the scale and scope to provide. If they can back creativity with competence and speed, they will compete effectively with larger firms. At the same time communication amplifies the strength of brands and the power of networks. In industries where networks matter, concentration will increase.
9. **More Competition.** More companies and customers will have access to accurate price information. In addition, some entry barriers will fall. The result will be greater competition in many markets, resulting in “profitless prosperity”: it will be easier to find buyers, but harder to make fat margins.

# distance is dead

---

## **your thoughts**

call centres

ideas and beliefs spread worldwide at no cost

companies no longer dependent on physical  
location or "patronage of court"

eliminated the need for localization

...

I'm a bit confused ...

distance 9

# overview

---

**death of distance**

**some doubts**

**bear in mind**

**social implications**

**a little learning**



10. **Increased Value of Niches.** The power of the computer to search, identify, and classify people according to similar needs and tastes will create sustainable markets for many niche products. One of the most valuable improvements will be in the ability of people to locate things that have hitherto been hard to find: from friends with similar tastes to specialized services.
11. **Communities of Practice.** The horizontal bonds among people performing the same job or speaking the same language in different parts of the world will strengthen. Common interests, experiences, and pursuits, rather than proximity, will bind these communities together.
12. **The Loose-Knit Corporation.** Culture and communications networks, rather than rigid management structures, will hold companies together. Vertically integrated companies that do the costs of dealing with arm's-length suppliers and partners. Alliances will bond companies together at many levels.
13. **Openness as a Strategy.** Loyalty, trust, and open communications will reshape the nature of supplier and customer contacts. Suppliers will draw directly on their customers' databases, working as closely and seamlessly as an in-house supplier does now. Customers will be able to manage and track their orders through the production process.
14. **Manufacturers as Service Providers.** Companies will tailor their products more precisely to a customer's tastes and needs. Some will retain lasting links with their products: car companies, for instance, will continue electronically to track, monitor, and learn about their vehicles throughout the product's life cycle. New opportunities to build links with customers will emerge as a result.
15. **The Inversion of Home and Office.** The line between home and work will blur. People will increasingly work from home and shop from work. The office will become a place for the social aspects of work such as networking, brainstorming, lunching, and gossiping. More people will work on the move: from their cars, from hotel rooms, from airport departure lounges. Home design will change: new homes will routinely have home offices.
16. **The Proliferation of Ideas.** New ideas and information will travel faster to the remotest corners of the world. Developing countries will acquire more rapidly access to the industrial world's knowledge and ideas. That will help many developing countries to grow more quickly and even to narrow the gap with the rich world.
17. **The Decline of National Authority.** Governments will find national legislation and censorship inadequate for regulating the global flow of information. As content sweeps across national borders, it will be harder to enforce laws banning child pornography, libel, and other criminal or subversive material, and those protecting copyright and other intellectual property.
18. **Loss of Privacy.** Protecting privacy will be difficult, as it was in the villages of past centuries. Governments and companies will easily monitor people's movements. Machines will recognize physical attributes such as a voice or fingerprint. Civil libertarians will worry, but others will rationalize the loss as a fair exchange for the reduction of crime, including fraud and illegal immigration. In the electronic village, there will be little true privacy – and little unsolved crime.
19. **A Global Premium for Skills.** Pay differentials will continue to widen, as companies fight for the scarce talents of well educated workers. Managerial and professional jobs will be less vulnerable to competition from automation than jobs requiring relatively little skill. In addition, the Internet enhances the value of creative use of information. On-line recruitment will make the job market more global and efficient. As a result, highly skilled people will earn broadly similar amounts, wherever they live in the world.
20. **Rebirth of Cities.** As individuals spend less time in the office and more time working from home or on the road, cities will change from concentrations of office employment to centers of entertainment and culture. They will become places where people congregate to visit museums and galleries, attend live performances of all kinds, participate in civic events, and dine in good restaurants. Some poor countries will use low-cost communications to stem the flight from the countryside by providing rural areas with better medical services, jobs, education, and entertainment.

10. **Increased Value of Niches.** The power of the computer to search, identify, and classify people according to similar needs and tastes will create sustainable markets for many niche products. One of the most valuable improvements will be in the ability of people to locate things that have hitherto been hard to find: from friends with similar tastes to specialized services.
11. **Communities of Practice.** The horizontal bonds among people performing the same job or speaking the same language in different parts of the world will strengthen. Common interests, experiences, and pursuits, rather than proximity, will bind these communities together.
12. **The Loose-Knit Corporation.** Culture and communications networks, rather than rigid management structures, will hold companies together. Vertically integrated companies that do the costs of dealing with arm's-length suppliers and partners. Alliances will bond companies together at many levels.
13. **Openness as a Strategy.** Loyalty, trust, and open communications will reshape the nature of supplier and customer contacts. Suppliers will draw directly on their customers' databases, working as closely and seamlessly as an in-house supplier does now. Customers will be able to manage and track their orders through the production process.
14. **Manufacturers as Service Providers.** Companies will tailor their products more precisely to a customer's tastes and needs. Some will retain lasting links with their products: car companies, for instance, will continue electronically to track, monitor, and learn about their vehicles throughout the product's life cycle. New opportunities to build links with customers will emerge as a result.
15. **The Inversion of Home and Office.** The line between home and work will blur. People will increasingly work from home and shop from work. The office will become a place for the social aspects of work such as networking, brainstorming, lunching, and gossiping. More people will work on the move: from their cars, from hotel rooms, from airport departure lounges. Home design will change: new homes will routinely have home offices.
16. **The Proliferation of Ideas.** New ideas and information will travel faster to the remotest corners of the world. Developing countries will acquire more rapidly access to the industrial world's knowledge and ideas. That will help many developing countries to grow more quickly and even to narrow the gap with the rich world.
17. **The Decline of National Authority.** Governments will find national legislation and censorship inadequate for regulating the global flow of information. As content sweeps across national borders, it will be harder to enforce laws banning child pornography, libel, and other criminal or subversive material, and those protecting copyright and other intellectual property.
18. **Loss of Privacy.** Protecting privacy will be difficult, as it was in the villages of past centuries. Governments and companies will easily monitor people's movements. Machines will recognize physical attributes such as a voice or fingerprint. Civil libertarians will worry, but others will rationalize the loss as a fair exchange for the reduction of crime, including fraud and illegal immigration. In the electronic village, there will be little true privacy – and little unsolved crime.
19. **A Global Premium for Skills.** Pay differentials will continue to widen, as companies fight for the scarce talents of well educated workers. Managerial and professional jobs will be less vulnerable to competition from automation than jobs requiring relatively little skill. In addition, the Internet enhances the value of creative use of information. On-line recruitment will make the job market more global and efficient. As a result, highly skilled people will earn broadly similar amounts, wherever they live in the world.
20. **Rebirth of Cities.** As individuals spend less time in the office and more time working from home or on the road, cities will change from concentrations of office employment to centers of entertainment and culture. They will become places where people congregate to visit museums and galleries, attend live performances of all kinds, participate in civic events, and dine in good restaurants. Some poor countries will use low-cost communications to stem the flight from the countryside by providing rural areas with better medical services, jobs, education, and entertainment.

if distance is dead ...

---

**... why are they here?**

# if distance is dead ...

---

**... why are they here?**



distance 12

# if distance is dead ...

---

**... why are they here?**



distance 12

# where are we?

**the heart of cheap communication**



# why are we here?

---

Silicon Valley is still held to be the premier software region in the US, though it offers no geographical advantages other than its proximity to Stanford (the importance of which has declined as other schools developed prestigious computer science programs). Silicon Valley is the Mecca of computer science for this reason, put forward by Marshall - " Employers are apt to resort to any place where they are likely to find a good choice of workers with the special skill which they require; while men seeking employment naturally go to places where there are many employers who need such skill as theirs and where therefore it is likely to find a good market". That is, if you do software, you go to Silicon Valley because that's where the jobs are, and if you are starting a software company, you go to Silicon Valley because that's where the talent is.

-Andrew

# why are we here?

---

Even though nowadays with modern technology and means of communication, Marshall's claims of localized industries is still true. For instance, Marshall said "localized industry gains a great advantage from the fact that it offers a constant market for skill. Employers are apt to resort to any place where they are likely to find a good choice of workers with the special skill which they require", this is true for cases like Hollywood for modeling and acting, Silicon Valley for computer related industries and so on. We can still recognize these localized industries in modern society. Also, industries like mining, which Marshall mentioned are still localized industries.

-Monica



# why are we here?

---

However prestige and demand for higher skilled and highly specialized labor tends to ensure a presence by the major corporations in traditional central business districts. In addition these considerations lead to concentrations of certain industries near each other and near research institutions, for example the proliferation of tech firms in the Bay Area. As Marshall points out there is a virtuous circle of firms locating where skilled labor is, which in turn attracts those looking for such work (iv.x.9). Then when such workers peel away and form start-ups they remain in the same area and gain a degree of kudos from their location. Marshall also points out the economic problems this can present for an area during a downturn, as was the case in the Bay Area after the “dot com crash” (iv.x.12).

-Gavin

# will we stay here?

---

This completely agrees Marshall's statement by saying the cost of skills and productivity will overcome distance, thus negating localization. From a real world example, Silicon valley companies are tending to move out of California and spread out through the U.S. This increase in distance from their target customers must overcome the costs that are associated with being located in California, such as taxes and cost of living.

-Steven Tanti

SOCIAL MEDIA

## Viadeo opens S.F. office to compete with LinkedIn

Europe's Viadeo plans to challenge leading business network LinkedIn



March 07, 2011 | By Benny Evangelista, Chronicle Staff Writer

LinkedIn Corp. is the world's leading professional social network with more than 90 million members, but the company's main international competitor has quietly put down Bay Area roots to help close the gap.

Viadeo S.A., which has 35 million members, has opened an office in downtown San Francisco and its chief executive has moved here from Paris along with his family and about 20 engineers.

Viadeo hopes to expand its largely unknown presence in the United States by touting its overseas networks. Its strong presence in countries such as China - where LinkedIn was briefly blocked - could be attractive to people seeking new business opportunities.

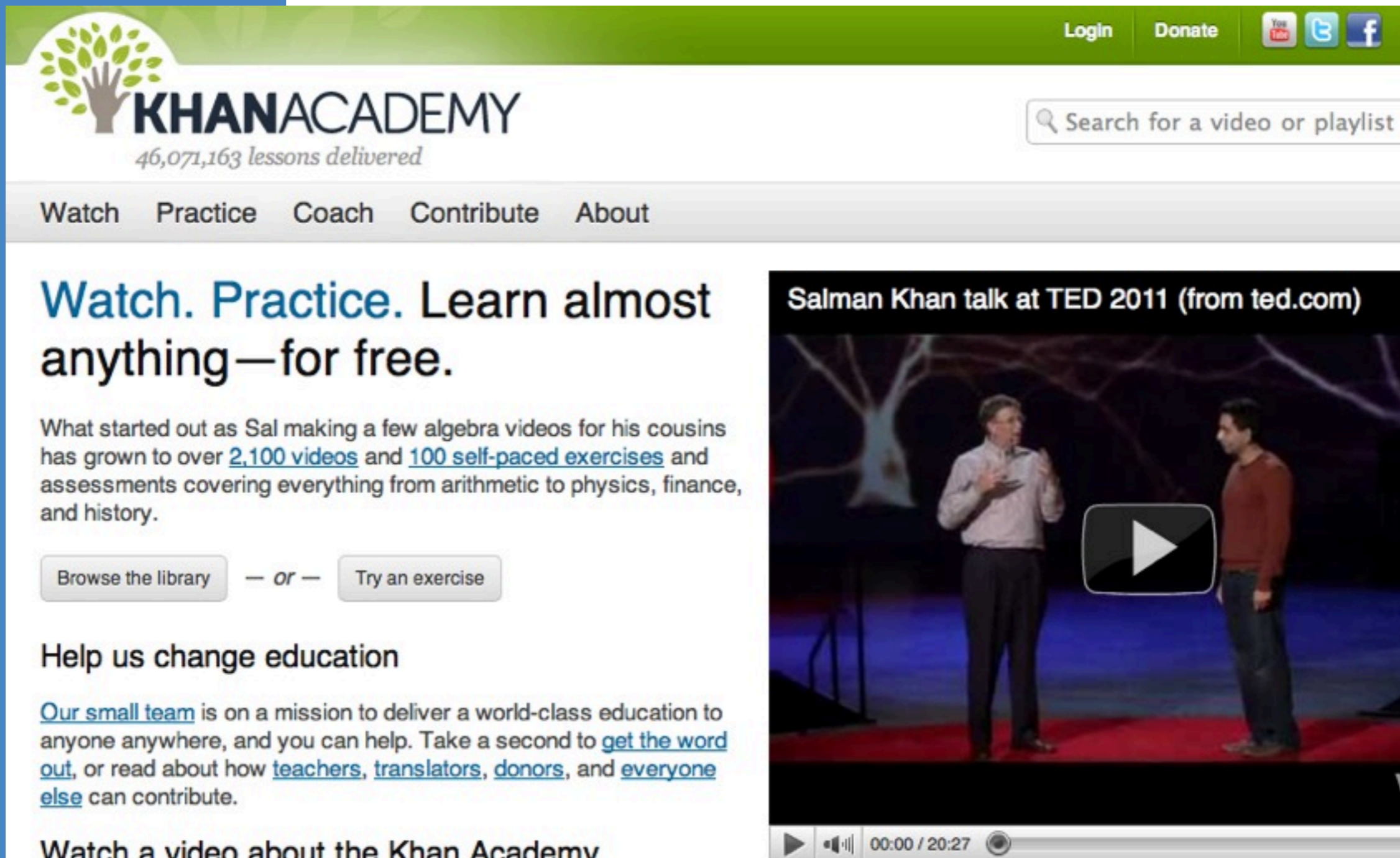
"We still strongly believe that networking is a local thing," said founder and chief executive Dan Serfaty. "You don't network, create content and manage your contacts the same way when you're in France, in Italy, in China, in India or in the U.S."

and why are we here

---



# why indeed?



The image shows a screenshot of the Khan Academy website homepage. At the top, there is a green navigation bar with links for "Login", "Donate", and social media icons for YouTube, Twitter, and Facebook. Below this is the Khan Academy logo, which features a stylized tree with a hand as its trunk, and the text "KHANACADEMY" and "46,071,163 lessons delivered". To the right of the logo is a search bar with the placeholder text "Search for a video or playlist". Below the search bar is a horizontal menu with links for "Watch", "Practice", "Coach", "Contribute", and "About". The main content area is divided into two columns. The left column contains the headline "Watch. Practice. Learn almost anything—for free." followed by a paragraph describing the site's growth and a call to action with two buttons: "Browse the library" and "Try an exercise". Below this is a section titled "Help us change education" with a paragraph about the team's mission and a link to "get the word out". The right column features a video player with the title "Salman Khan talk at TED 2011 (from ted.com)". The video player shows a still image of Salman Khan and another man on a stage, with a large play button in the center. The video player controls at the bottom show a progress bar at 00:00 / 20:27.

**KHANACADEMY**  
46,071,163 lessons delivered

Login Donate YouTube Twitter Facebook

Search for a video or playlist

Watch Practice Coach Contribute About

## Watch. Practice. Learn almost anything—for free.

What started out as Sal making a few algebra videos for his cousins has grown to over [2,100 videos](#) and [100 self-paced exercises](#) and assessments covering everything from arithmetic to physics, finance, and history.

[Browse the library](#) — or — [Try an exercise](#)

### Help us change education

[Our small team](#) is on a mission to deliver a world-class education to anyone anywhere, and you can help. Take a second to [get the word out](#), or read about how [teachers](#), [translators](#), [donors](#), and [everyone else](#) can contribute.

### Watch a video about the Khan Academy

Salman Khan talk at TED 2011 (from ted.com)

00:00 / 20:27

# overview

---

**death of distance**

**some doubts**

**bear in mind**

**social implications**

**a little learning**

# issues to bear in mind

---

There are persons who can write not illegibly in pencil, but are as enigmatical as Rufus Choate or Horace Greeley when they take up the pen. There are persons too lazy to resort to ink and pen who can conquer their besetting sin enough to make a few dabs with a pencil. Living must have been more laborious before the pencil age. Blue pencil, red pencil, what should we do without them? Yet writing with one's own hand seems to be disappearing, and the universal typewriter may swallow all. Librarians of a century or two hence may be searching for the last reference to pencils.

*New York Times* 1938



endism

replacement

liberation

redefinition

constraint vs resource



# endism oddities

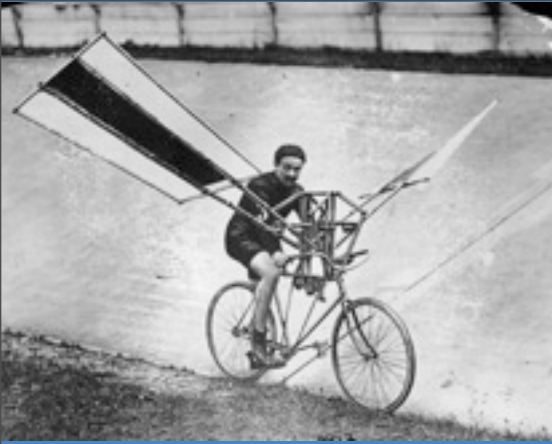
---

"In the utility billing problem, for instance, meter readings would come automatically by wire into the input organs of the central office's electronic accounting and information processing machine which, ... would compare these readings with its customers' accounts in its huge memory storage, make all computations and return the new results to storage while printing out the monthly bills."

--*Fortune*, 1952

"Gas and electric meters will be linked to telephone lines, so that computers read the meters from afar and send out the bills. They could also be connected to banks; customers would then find utility charges on their monthly bank statements."--*National Geographic*, 1970





# endism oddities



"In the utility billing problem, for instance, meter readings would come automatically by wire into the input organs of the central office's electronic accounting and information processing machine which, ... would compare these readings with its customers' accounts in its huge memory storage, make all computations and return the new results to storage while printing out the monthly bills."

--*Fortune*, 1952

"Gas and electric meters will be linked to telephone lines, so that computers read the meters from afar and send out the bills. They could also be connected to banks; customers would then find utility charges on their monthly bank statements."--*National Geographic*, 1970



# endism oddities

## AP Exclusive: 'Smart' meters have security holes

By JORDAN ROBERTSON (AP) – Mar 26, 2010

SAN FRANCISCO — Computer-security researchers say new "smart" meters that are designed to help deliver electricity more efficiently also have flaws that could let hackers tamper with the power grid in previously impossible ways.

At the very least, the vulnerabilities open the door for attackers to jack up strangers' power bills. These flaws also could get hackers a key step closer to exploiting one of the most dangerous capabilities of the new technology, which is the ability to remotely turn someone else's power on and off.

The attacks could be pulled off by stealing meters — which can be situated outside of a home — and reprogramming them. Or an attacker could sit near a home or business and wirelessly hack the meter from a laptop, according to Joshua Wright, a senior security analyst with InGuardians Inc. The firm was hired by three utilities to study their smart meters' resistance to attack.

These utilities, which he would not name, have already done small deployments of smart meters and plan to roll the technology out to hundreds of thousands of power customers, Wright told The Associated Press.

There is no evidence the security flaws have been exploited, although Wright said a utility could have been hacked without knowing it. InGuardians said it is working with the utilities to fix the problems.

# nunberg error



# high and low

---

Donald Davies, 1965

## 7. Some uses for a Message Communication Network

The original intention for its use, the connection of terminals to computer services, remains of primary importance. A selection of such services is listed:

- Numerical computation at various levels of generality
- Editing and typesetting of text
- Design services and problem oriented languages
- Availability of goods for sale
- Ordering of goods
- Invoicing, delivery notes, etc.
- Booking of transport
- Banking, establishing credit
- Remote access to national records, e.g. MPNI, tax, police, medical, on a secure basis
- Betting

# "Electrical Entertainment" | 1981

NYT, 1931

## ELECTRICAL ENTERTAINMENT: A GLIMPSE INTO THE FUTURE

By DR. ALFRED N. GOLDSMITH,  
Vice President and General Engineer,  
Radio Corporation of America.

Dr. Goldsmith of the Radio Corporation Predicts an Instrument Which at a Touch of the Fingers Will Bring to the Home Scenes and Sound, Color Symphonies, or a Keyboard for Self-Created Music

It would not be astonishing if, within the next 100 years, "radio" (in a legitimately expanded use of the term) came to mean the same thing as "entertainment." Some may regard this as an over-bold assertion. Yet an open-minded study of the nature of electrical entertainment—and this is what we really mean by "radio" in the probable broad usage of the future—has capabilities so extensive and agencies so powerful at its disposal that entertainment and radio may come to mean the same thing.

Today, with some branches of electrical entertainment in their infancy and others not yet born, it is difficult for the public and the artists to gauge the significance of the trend in that direction. The ultra-specialist, concentrating on one particular form of electrical entertainment device (such as a radio receiver), is likely to see only his corner of the field. The broad significance of electrical entertainment may well elude him.

Musicians, artists, actors and composers of the present are accustomed to the forms of mechanical, visual and audible entertainment with which the public is now provided. They, too, are specialists and have devoted their lives to the mastery of an instrument or a technique. Not unnaturally they view with some apprehension the mere idea of a revolution in the methods and instrumentalities of entertainment. Electricity is a strange and foreign force, and only those musicians who have won success and fame in the fields of broadcasting and phonograph record production are likely to view with sympathy a tendency toward the superseding of present forms of entertainment by electrical entertainment.

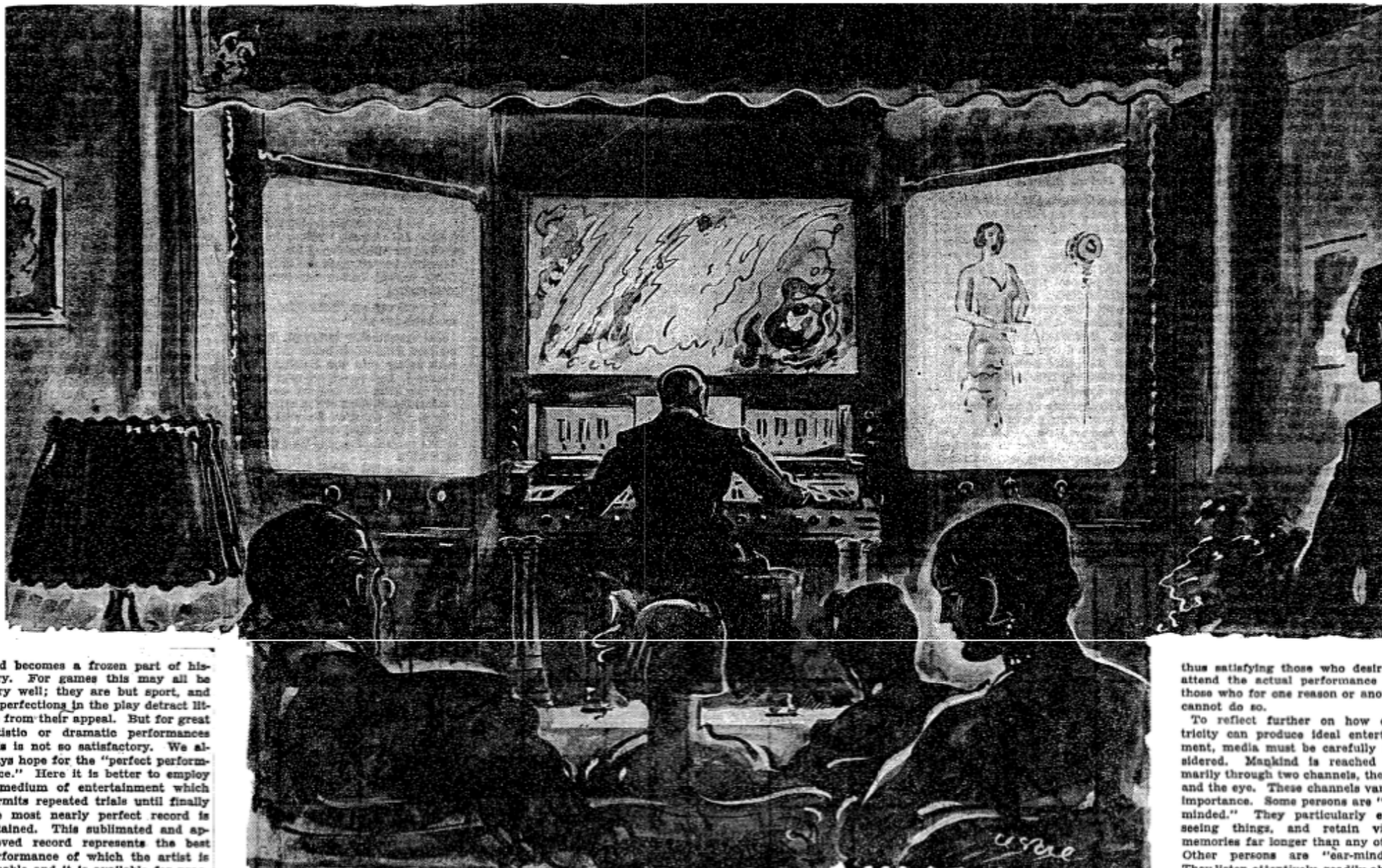
### The Role of Radio.

Yet time brings the answer to most problems and silences the unwarranted objection, and there are extremely powerful reasons for the belief that time is the ally of what is broadly called electrical entertainment, of which radio is the greatest present exponent. Perhaps a brief analysis of the functions of entertainment and the requirements of an ideal plan will show clearly why electrical entertainment necessarily holds the key to the future.

In contriving entertainment material, human psychology must always be kept in mind. Mankind lives not only in the present but also, in a manner of speaking, in the past. We desire to see and to hear not only what is happening but also what has happened and, except through the magic of its reproduction, is gone forever. We need to

and becomes a frozen part of history. For games this may all be very well; they are but sport, and imperfections in the play detract little from their appeal. But for great artistic or dramatic performances this is not so satisfactory. We always hope for the "perfect performance." Here it is better to employ a medium of entertainment which permits repeated trials until finally the most nearly perfect record is obtained. This sublimated and approved record represents the best performance of which the artist is capable and it is available for practically all time, ever ready to live again at a touch of the finger on the controlling switch.

Annihilating Distance.



The Home "Electrical Entertainer" of 1981, as Visualized by Dr. Alfred N. Goldsmith. On the Left is a Panel Upon Which Home Talking Motion Pictures Are Cast From Behind the Screen. In the Centre is an Electrical Music Machine, Combined With a Color-Organ, Which Casts Weird Images on the Centre Screen as the Music Is Produced With a Keyboard Similar to That of a Modern Theatre Organ. Television, Which Will Always Accompany Radio Broadcasting, Plays Over the Right Hand Screen When the Radio Set Is Tuned On.

elate the program. The ideal type of home for the "lookatener" will be both sound-proofed and darkened. Of course, we do not actually need so extreme and peculiar a type of residence for this purpose, because the "lookatener" will demand that the television picture be bright enough to be seen under ordinary home conditions and that the sounds will be loud enough to be appreciated in normally quiet surroundings.

Paralleling the combined television and telephone radio program, we find a form of record for either the home or the theatre which produces similar effects, namely, the sound motion picture. The success of this form of entertainment in the theatre is a clear indication of what may be expected when it becomes available also for the home on a simple and economic basis.

### Electrical Instruments.

A small group of electrical musical instruments have appeared on the market within the last few years, both in the United States and in Europe. Many more forms, some of extreme ingenuity, exist in the laboratories and promise the production of extremely flexible, readily controlled, and exquisitely toned instruments. The forms in which the public has as yet seen them are necessarily only beginnings, yet they indicate only some of the possibilities of such instruments. As the years pass they will be further developed. Great composers will begin to write music specially suited to them and capable of fully utilizing their astounding possibilities of tone quality, volume, flexibility of control, and pitch. And, finally, virtuoso performers on these instruments will then spring up and render masterpieces which have been composed for them. But that is far in the future.

The electric control of mobile color is also foreshadowed in a number of home and auditorium instruments which have already been demonstrated. Examples of these are the Clavilux of Thomas Wilfred and the Colorama of the General Electric Company. The interplay of moving, nebulous forms of color, sometimes softly shaded and sometimes blazing in almost harsh brilliancy, is extraordinarily attractive. Some enjoy viewing such displays without accompanying music; others prefer music and color at the same time. These color symphonies, as they might be termed, can either be produced in a pre-determined fashion from records, or by an individual performance by the artist, or through a combination of these methods.

### A New Art.

Here again electricity brings a new art. It is conceivable that mobile color will be as definite and widely appreciated a form of art in

thus satisfying those who desire to attend the actual performances and those who for one reason or another cannot do so.

To reflect further on how electricity can produce ideal entertainment, media must be carefully considered. Mankind is reached primarily through two channels, the ear and the eye. These channels vary in importance. Some persons are "eye-minded." They particularly enjoy seeing things, and retain visual memories far longer than any other. Other persons are "ear-minded." They listen attentively, readily absorb knowledge through speech or other sounds, and remember others by the sounds of their voices or what they have said. Look back into the important moments of your own life

# in the office

**Fortune**  
Jan 1952

"begin(s) to foreshadow the true office robot"



The door in the UNIVAC, above, opens into the accounting departments of the future. The first UNIVAC, built for the Bureau of Census by Eckert-Mauchly Computer Corp., subsidiary of Remington Rand, marks the transition of big "electronic brains" from scientific to general business and government use.

## Technology

## Office Robots

It won't be very long before U.S. businessmen can employ electronic brains to:

- keep business accounts
- run continuous sales records
- compute and send out bills
- handle entire payrolls
- keep running inventories
- fix production schedules
- serve as vast filing systems
- chart corporate expansion

AA reservisor  
mail order

When the first of the giant "electronic brains" was unveiled after the last war, performing feats of lightning calculation on abstruse scientific and military problems, its creators proclaimed it the beginning of "the second industrial revolution." They foresaw profound applications in industry, business, and government.

Few laymen, if aware of the development at all, could see the connection. Now, however, a few rudimentary production models of electronic digital computers are in growing business use, many more advanced prototypes are in operation or development, and it becomes possible to glimpse and weigh that revolution. It appears that its first and heaviest impact, beyond the fields of science and engineering, will be on the business-executive office.

The office is ripe for revolution. Its costs have doubled and tripled, while clerical staffs become steadily harder to recruit or expand. There is, in fact, a real shortage of good clerical help in most regions. The mountains of paper work grow year by year, and the tasks they entail grow steadily more onerous. Some of the most grinding of all industrial routines are now found in business offices, probably one reason why it becomes harder to attract young people into them. The fact is that the office has been nearly the last area to be touched by industrial rationalization, and it is still not mechanized to anything like the degree of the modern factory.

The proof is in the extraordinary curve of white-collar employment, which is out of line with all other types. While the



Under the operator's hand is the desk-sized computer called MADDIDA (Mad Ida), for MAGnetic Drum Digital Differential Analyzer, developed by Northrop Aircraft and now in production. Mainly for engineering, it pioneers compact features for general use.



The keyboard and electric typewriter, above, are linked to CADAC, latest approach to an automatic general computer—a 195-tube machine with magnetic-drum memory (see page 117) tucked away in a closet. Computer Research Corp. will offer it to business.

distance 27

# Behold the Computer Revolution

## going home

**National Geographic**  
1970

By PETER T. WHITE National Geographic Staff

*Illustrations by National Geographic Photographers  
BRUCE DALE and EMORY KRISTOF*

**M**Y WIFE IS MAD AT COMPUTERS. "Those awful machines," she calls them. "How they mess up our credit card accounts! Imagine sending a bill for \$232.24 every month for four months after you've paid it!"

But I'm not mad. That mixup was settled after five months; and we never did feel as computer-harassed as some Americans, notably the Kansan repeatedly reminded that his department store bill was "overdue in the amount of \$00.00." At last he too managed to pacify the computer—with a check for \$00.00.

In a way, though, my wife is right. After a year of looking closely at computers—at what they are doing all over the country, what they are likely to do before long, and what their effects are expected to be upon us all and upon our descendants—I must say that these machines are indeed awful, in just about every sense the dictionaries assign to that word: inspiring dread, appalling, objectionable; solemnly impres-



At the consoles of such electronic wonders as this IBM 370, man achieves the power to master information on a

# Behold the Computer Revolution

## combining themes: home office

---

"Perhaps someday the desk worker fed up with traffic jams in the city will do his job at a computer input-output station at home: If he wants to see documents from company files, he punches his keyboard and they appear on his display screen. If he needs a copy, he presses a button and there it is, on paper. ... If he wants to confer with colleagues, he presses buttons, and they appear on the screen too. To dictate a letter, he punches up his secretary, at her office desk or at her terminal in her home. She'll type it on her keyboard— and the text will emerge in the downtown office, to go into the files and into the mail. Or she'll send electronic impulses directly to the company addressed—into their computer.... How soon could computer use from home be upon us? Among 85 leading technical experts asked, the majority say within a decade. But it's not only a question of technology. It is also a question of economic practicality, and I trust no predictions on that." --

*National Geographic, 1970*



within a  
decade

**percentage of home workers in population**

<b>1960</b>	<b>1970</b>	<b>1980</b>	<b>1990</b>	<b>1999</b>	<b>2005</b>
0.025	0.013	0.0095	0.014	0.034	0.039

**Inc.**  Payroll, benefit  
What a drag.

▶ START-UP ▶ RUNNING A BUSINESS ▶ FINANCE ▶ LEADERSHIP & MANAGING ▶ SALES & MAF

Archives >

**April 2010**



COVER STORY

The Case, and the Plan, for the Virtual  
Company

30

# overview

---

**death of distance**

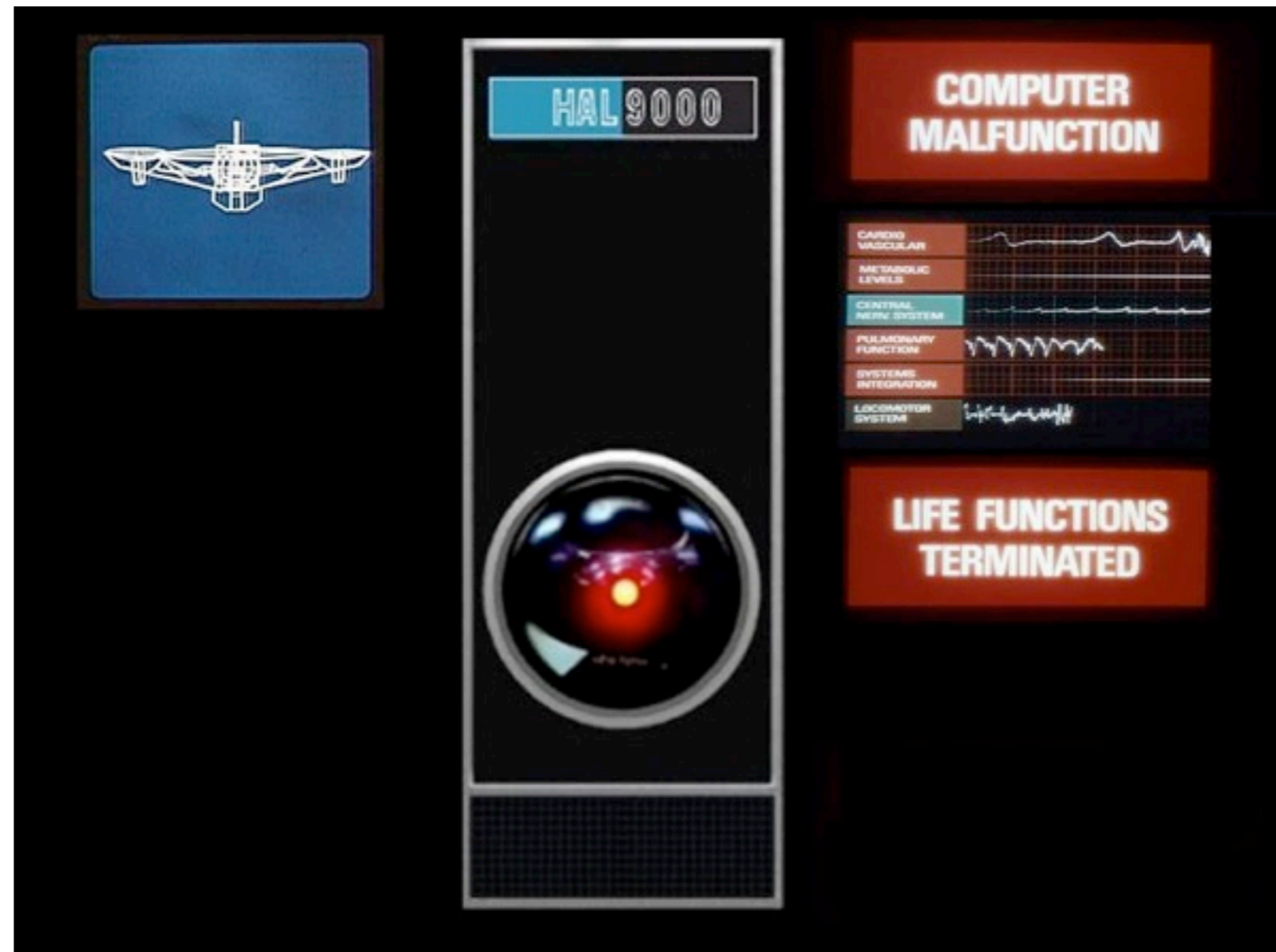
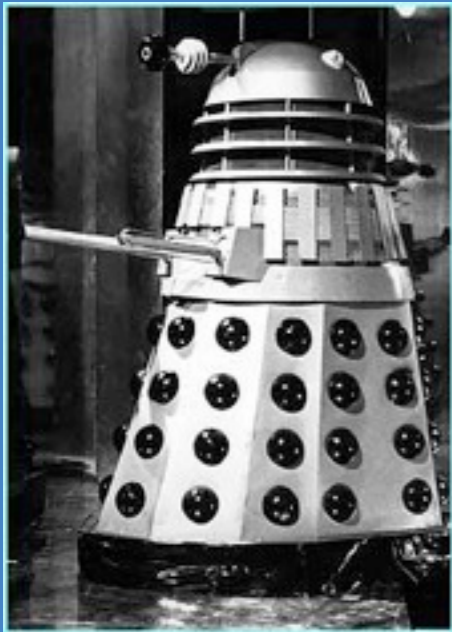
**some doubts**

**bear in mind**

**social implications**

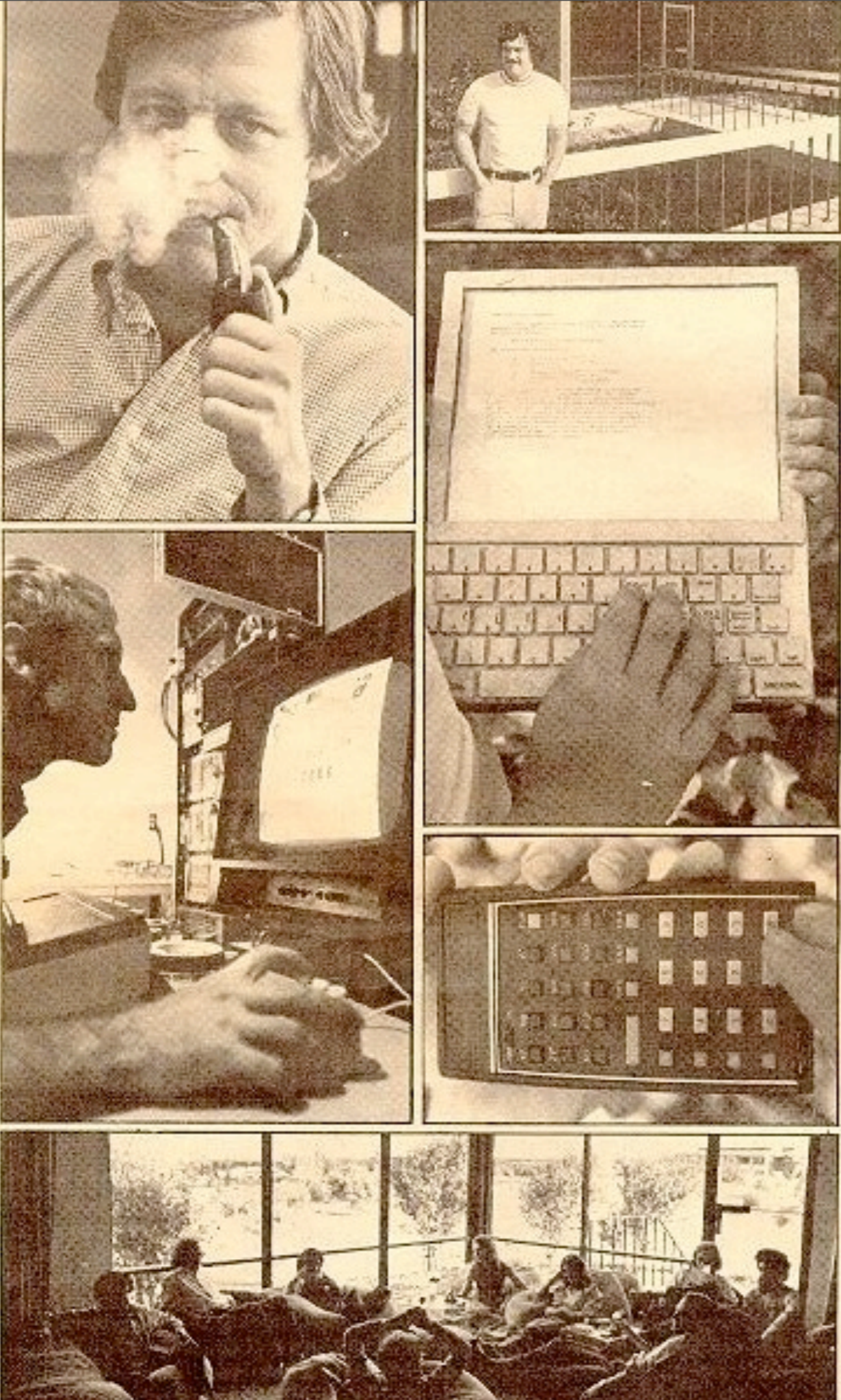
**a little learning**

# social implications



# generational change?

"Fanatic Life and Symbolic  
Death Among the  
Computer Bums"  
--Stewart Brand  
**Rolling Stone**  
7 December, 1972

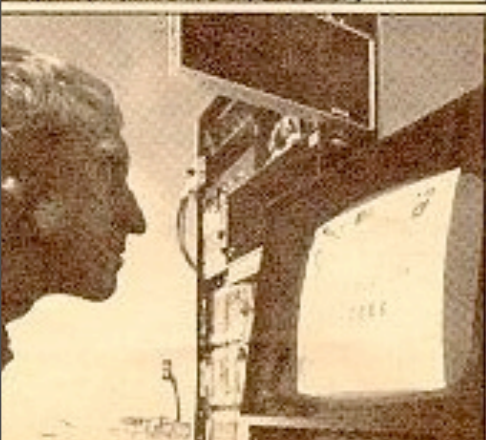
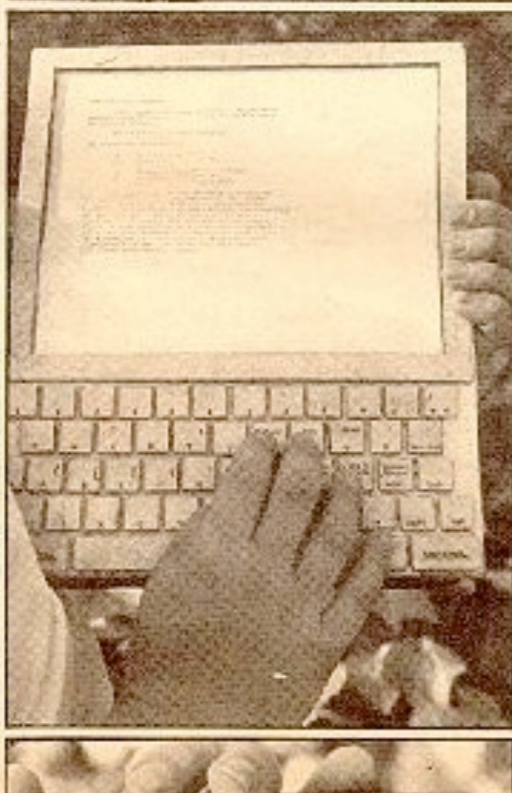
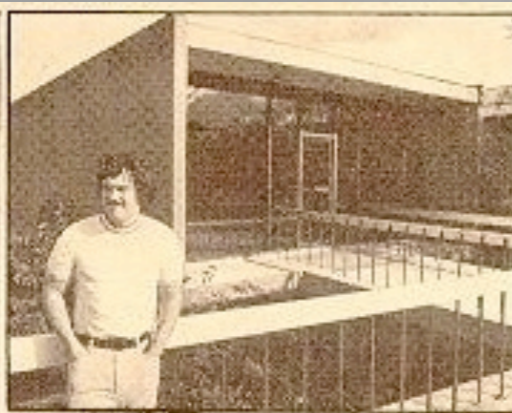




Technology

The door in the UNIVAC, above, opens into the accounting departments of the future. The first UNIVAC, built for the Bureau of Census by Eckert-Mauchly Computer Corp., subsidiary of Remington Rand, marks the transition of big "electronic brains" from scientific to general business and government use.

## Office Robots



November 1970

NATIONAL GEOGRAPHIC

NATIONAL GEOGRAPHIC MAGAZINE VOL. 118, NO. 5 COPYRIGHT © 1970 BY NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON, D.C. INTERNATIONAL COPYRIGHT SECURED

# compare & contrast

## Behold the Computer Revolution

*From Counterculture to Cyberculture*

Fred Turner

By PETER T. WHITE National Geographic Staff

Illustrations by National Geographic Photographers BRUCE DALE and EMORY KRISTOF

**M**Y WIFE IS MAD AT COMPUTERS. "Those awful machines," she calls them. "How they mess up our credit card accounts! Imagine sending a bill for \$232.24 every month for four months after you've paid it!"

But I'm not mad. That mixup was settled after five months; and we never did feel as computer-harassed as some Americans, notably the Kansan repeatedly reminded that his department store bill was "overdue in the amount of \$00.00." At last he too managed to pacify the computer—with a check for \$00.00.

In a way, though, my wife is right. After a year of looking closely at computers—at what they are doing all over the country, what they are likely to do before long, and what their effects are expected to be upon us all and upon our descendants—I must say that these machines are indeed awful, in just about every sense the dictionaries assign to that word: inspiring dread, appalling, objectionable; solemnly impressive; commanding reverential fear or profound respect; sublimely majestic.

In the end I found my own ways of



At the consoles of such electronic wonders as this IBM 370, man achieves the power to master information on a scale that profoundly influences the course of science, business, government—even the arts. © N.G.S.

# Next phase of working at home: Leaving home

coworking

By Thom Patterson

CNN

**ROSWELL, Georgia (CNN)** -- More than a decade after the Internet allowed millions of people to work at home, the next phase of telecommuting involves, well, not working at home.



Organized "coworking" -- the concept of working solo alongside like-minded independents -- has spread to dozens of cities.

The irony of coworking isn't lost on organizers, including Kevin Bachman, who set up a group north of Atlanta as part of an informal Web-based network called Jelly.

"The reason people work alone, is because they're looking for freedom," said Bachman, a 34-year-old Web developer who [telecommutes](#) part time. "It may be ironic that you crave isolation, but you also want to be socially interactive with others like you."

[See how Jelly works together »](#)

Once a month, Bachman's group takes over a room provided by Tony's American Grille & Tap. A handful of home-based Internet workers hunch over laptops writing code, tweaking administration systems or enhancing databases.

Web developer Toby Ho, left, has joined a coworking group called "Jelly" in Roswell, Georgia.

1 of 4



# deep in the heart of the computer

---

"The accumulation of many large manufacturing establishments in the same district has a tendency to bring together purchasers or their agents from great distances, and thus to cause the institution of a public mart or exchange. This contributes to diffuse information relative to the supply of raw materials, and the state of demand for their produce, with which it is necessary manufacturers should be well acquainted. The very circumstance of collecting periodically, at one place, a large number both of those who supply the market and of those who require its produce, tends strongly to check the accidental fluctuations to which a small market is always subject, as well as to render the average of the prices much more uniform." --Charles Babbage

# moving information

---

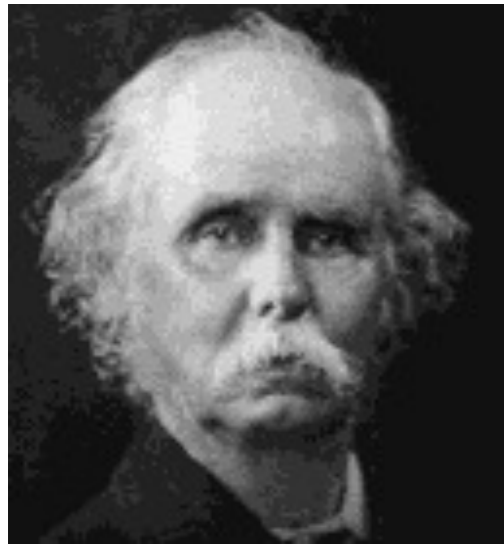
**information/knowledge management**

**the HP conundrum**

**sticky or leaky**

**resolution**





# more than information

---

When an industry has thus chosen a locality for itself, it is likely to stay there long: so great are the advantages which people following the same skilled trade get from near neighbourhood to one another. **The mysteries of the trade become no mysteries;** but are as it were in the air, and children learn many of them unconsciously. Good work is rightly appreciated, inventions and improvements in machinery, in processes and the general organization of the business have their merits promptly discussed: if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes the source of further new ideas. And presently subsidiary trades grow up in the neighbourhood, supplying it with implements and materials, organizing its traffic, and in many ways conducing to the economy of its material.

# what moves?

---

Every cheapening of the means of communication ... alters the action of the forces which tend to localize industries. Speaking generally we must say that a lowering of tariffs, or of freights for the transport of goods, tends to make each locality buy more largely from a distance what it requires; and thus tends to concentrate particular industries in special localities: but on the other hand everything that increases people's readiness to migrate from one place to another tends to bring skilled artisans to ply their crafts near to the consumers who will purchase their wares. **These two opposing tendencies** are well illustrated by the recent history of the English people.

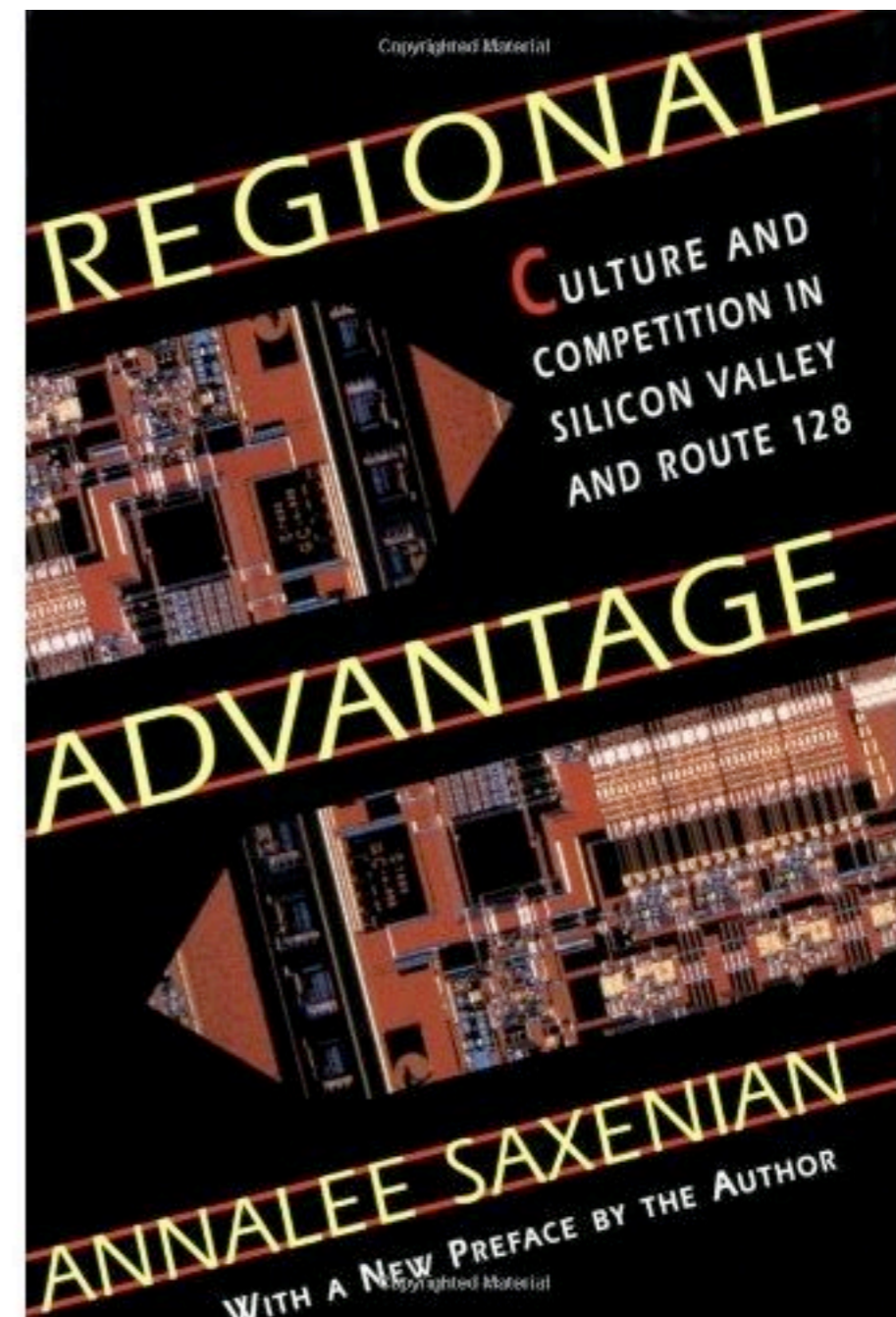
"through the WTO, World Bank, and the IMF information and its needed resources ... can move and migrate freely, but not necessarily the people" --Corbyn

## what moves?

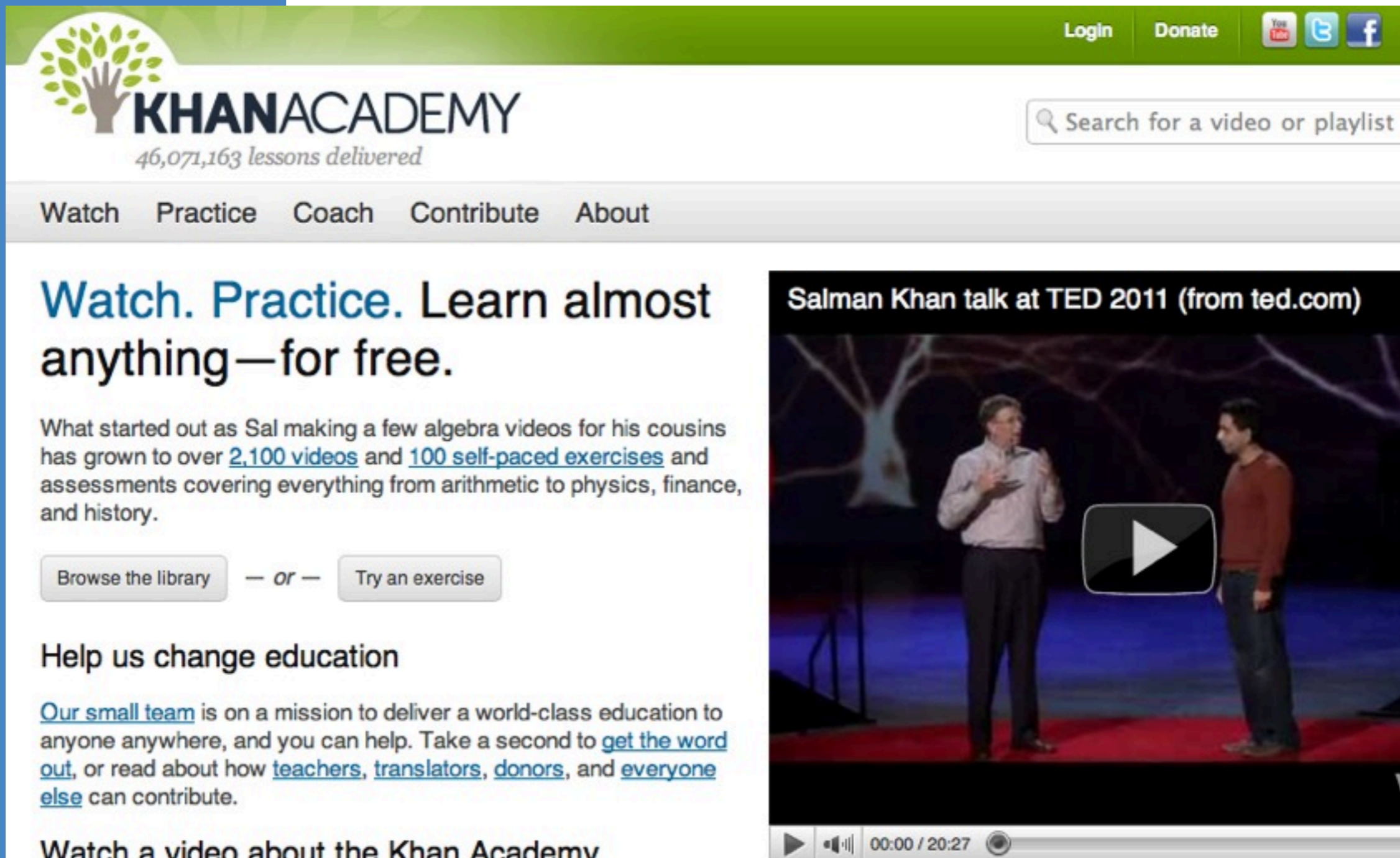
---

Every cheapening of the means of communication ... alters the action of the forces which tend to localize industries. Speaking generally we must say that a lowering of tariffs, or of freights for the transport of goods, tends to make each locality buy more largely from a distance what it requires; and thus tends to concentrate particular industries in special localities: but on the other hand everything that increases people's readiness to migrate from one place to another tends to bring skilled artisans to ply their crafts near to the consumers who will purchase their wares. **These two opposing tendencies** are well illustrated by the recent history of the English people.

east is east and ...



# why indeed?



The image shows a screenshot of the Khan Academy website homepage. At the top, there is a green navigation bar with links for "Login", "Donate", and social media icons for YouTube, Twitter, and Facebook. Below this is the Khan Academy logo, which features a stylized tree with a hand as its trunk, and the text "KHANACADEMY" and "46,071,163 lessons delivered". To the right of the logo is a search bar with the placeholder text "Search for a video or playlist". Below the search bar is a horizontal menu with links for "Watch", "Practice", "Coach", "Contribute", and "About". The main content area is divided into two columns. The left column contains the headline "Watch. Practice. Learn almost anything—for free." followed by a paragraph describing the site's growth from algebra videos to a wide range of subjects. Below this are two buttons: "Browse the library" and "Try an exercise", separated by "— or —". The right column features a video player with the title "Salman Khan talk at TED 2011 (from ted.com)". The video player shows a still image of Salman Khan and another man on a stage, with a large play button in the center. At the bottom of the video player, there is a progress bar showing "00:00 / 20:27".

**KHANACADEMY**  
46,071,163 lessons delivered

Login Donate YouTube Twitter Facebook

Search for a video or playlist

Watch Practice Coach Contribute About

## Watch. Practice. Learn almost anything—for free.

What started out as Sal making a few algebra videos for his cousins has grown to over [2,100 videos](#) and [100 self-paced exercises](#) and assessments covering everything from arithmetic to physics, finance, and history.

[Browse the library](#) — or — [Try an exercise](#)

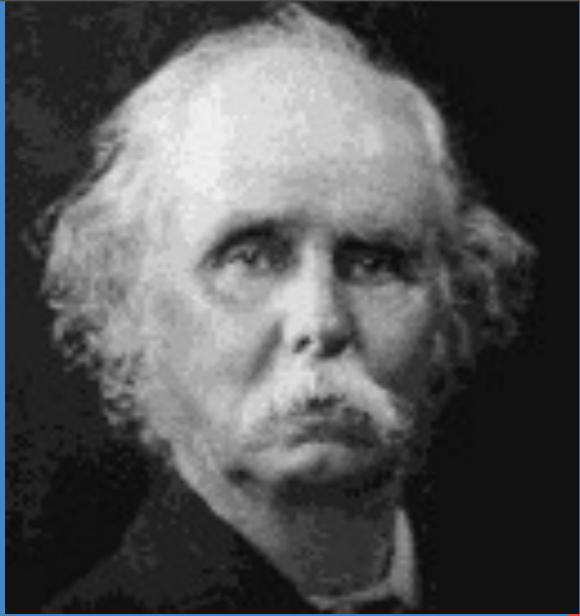
### Help us change education

[Our small team](#) is on a mission to deliver a world-class education to anyone anywhere, and you can help. Take a second to [get the word out](#), or read about how [teachers](#), [translators](#), [donors](#), and [everyone else](#) can contribute.

### Watch a video about the Khan Academy

Salman Khan talk at TED 2011 (from ted.com)

00:00 / 20:27



# location, work, and learning

---

These immigrants taught us how to weave  
woollen and worsted stuffs, though for a  
long time we sent our cloths to the  
Netherlands to be fulled and dyed. They  
taught us how to cure herrings, how to  
manufacture silk, how to make lace,  
glass, and paper, and to provide for many  
other of our wants

# airy visions

---

"Children in the public schools will be taught practically everything by moving pictures. Certainly they will never be obliged to read history again"

D.W. Griffith

"The people's University of the Air will have a greater student body than all of our universities put together."

RCA, 1932

distance 43

# info-education

---

## **PLATO**

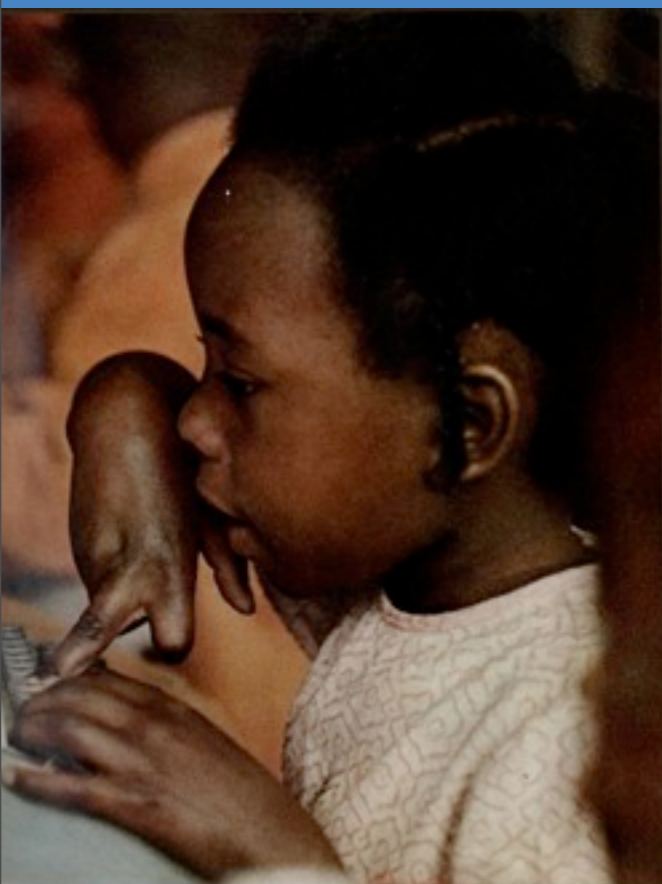
(Programmed Logic for Automated Teaching Operations)

"One can predict that in a few more years, millions of schoolchildren will have the personal services of a tutor as well-informed as Aristotle."

Patrick Suppes, *Scientific American*,  
1966.

**Open University**  
early morning television

distance 44



locates her file, reviews her performance, and picks up with the day's practice problems. Work done, it grades the assignment and bids a printed "GOOD-BYE, MABELLA." Computer practice not only speeds the rate of learning, but also frees the teacher to explain new concepts. Launched as an experiment by the Federal Government three years ago, computer instruction has been enthusiastically adopted by the McComb school system as part of its curriculum.

595



# any time, anywhere



**Grandfather:**  
Well, I finally finished my  
doctoral thesis.

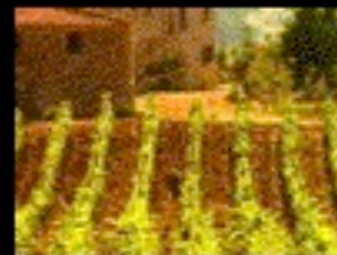


**Woman:**  
Way to go, Gramps.



**Grandfather:**  
Did my research at  
Indiana University.

**Woman:**  
Indiana?



**Grandfather:**  
Yup. IBM took the  
school's library...and  
digitized it. So I could  
access it over the Internet.

*She cocks her ear to take  
this all in.*



**Grandfather:**  
You know... It's a great time  
to be alive.



**Tag:**  
IBM. Solutions for  
a small planet.

# the end of the university?

---

a "stagnant" sector --William Baumol

**against stagnation**

Alvin Toffler

Peter Drucker

John Chambers

**Bill Gates**  
distance 46

# *kinds of distance?*

---

**geographical**

extension courses

**social**

correspondence degrees

the Open University

# going global

---

## **the mega universities**

Indira Gandhi (New Delhi) : 2 million

Allama Iqbal (Islamabad) : 1.8 million

Islamic Azad (Tehran) : 1.3 million

- \* Allama Iqbal Open University
- \* Anadolu University
- \* Athabasca University
- \* Bangladesh Open University
- \* China Central Radio & TV University
- \* City College of San Francisco
- \* Fern University in Hagen
- \* Indira Gandhi National Open University
- \* Indonesian Open Learning University
- \* Instituto Tecnológico Autónomo México
- \* Payame Noor University
- \* Korea National Open University
- \* Sukhothai Thammathirat Open University
- \* The Open University, U.K.
- \* Universidad Nacional de Educación a Distancia
- \* University of Maryland University College
- \* University of South Africa
- \* University of Phoenix
- \* Universidad Nacional Autónoma de México
- \* Shanghai TV University

"Institutions  
working together  
to advance  
education and  
empower people  
worldwide through  
opencourseware"

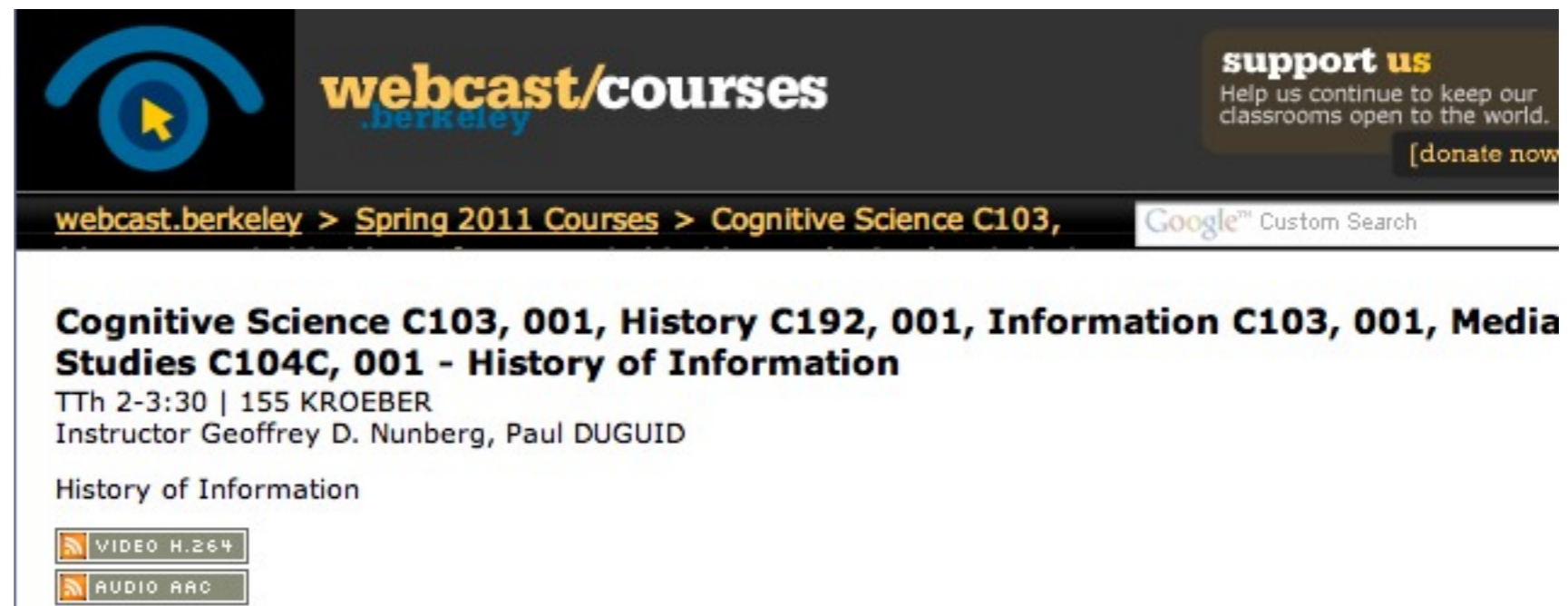
[www.ocwconsortium.org](http://www.ocwconsortium.org)

## "open" again

---

- \* Arizona State University
- \* College of Eastern Utah
- \* Dixie State College of Utah
- \* Johns Hopkins Bloomberg School of Public Health
- \* Kaplan Higher Education
- \* Massachusetts Institute of Technology
- \* Michigan State University
- \* Open Institute of law, Int.
- \* Tufts University
- \* UC Berkeley
- \* University of Alaska Fairbanks
- \* University of California, Irvine
- \* University of Massachusetts Boston
- \* University of Michigan

# other alternatives



The screenshot shows the header of the webcast.berkeley website. On the left is a logo with a blue eye shape and a yellow cursor arrow. In the center, the text "webcast/courses" is displayed in white and yellow, with ".berkeley" in blue below it. On the right, there is a "support us" section with the text "Help us continue to keep our classrooms open to the world." and a "[donate now]" link. Below the header is a navigation bar with the text "webcast.berkeley > Spring 2011 Courses > Cognitive Science C103," and a "Google™ Custom Search" button. The main content area displays the course title "Cognitive Science C103, 001, History C192, 001, Information C103, 001, Media Studies C104C, 001 - History of Information" in bold black text. Below the title, it lists the schedule "TTh 2-3:30 | 155 KROEBER" and the instructors "Instructor Geoffrey D. Nunberg, Paul DUGUID". Underneath, the text "History of Information" is shown. At the bottom of the screenshot, there are two buttons: "VIDEO H.264" and "AUDIO AAC", each with a small icon to its left.

# more alternatives

**ĐẠI HỌC QUỐC GIA HÀ NỘI**  
**TRƯỜNG ĐẠI HỌC NGOẠI NGỮ**  
UNIVERSITY OF LANGUAGES AND INTERNATIONAL STUDIES

Message from the ULIS President | Welcome Speeches | A Video Clip about ULIS | Functions of Three Faculties  
Online Debate | Online Entertainment | Online Talk | Online Learning | Let's Learn English Together | Practise Lis  
English Pronunciation | Graduation Papers | Research Materials | English Alumni | Contact Me | Your General F

**GET MAILS FROM ENGLISH I**

Enter your email address:  
  
Subscribe

1757 Readers

**SATURDAY, JANUARY 2, 2010**

**Online Course 12 - InfoSys C103 History of Information**

**InfoSys C103 History of Information**  
[http://webcast.berkeley.edu/course\\_details.php?seriesid=1906978352](http://webcast.berkeley.edu/course_details.php?seriesid=1906978352)

**History of Information**  
Posted by English I at 6:07 PM

# still local?

---

"New products are associated with old brand names. This ensures the prospective consumer of the quality of the product.

"Doctors, lawyers, and barbers, the high school diploma, the baccalaureate degree, the Ph.D., even the Nobel Prize, ... education and labor markets themselves have their own 'brand names'".

--George Akerlof, "The Market for Lemons: Quality, Uncertainty, and the Market Mechanism," 1970

distance 52



# still local?

"New products are associated with old  
prospects. This ensures the  
prospects of the quality of  
the product.

"For example, lawyers, and barbers with high  
school diplomas, the Nobel  
degree prize, and the Nobel  
prize, ... and for markets  
the 'brand names'".

and the Market Mechanism," 1970

distance 52

# where we've been

---

**death of distance**

**some doubts**

**bear in mind**

**social implications**

**a little learning**

# the final sticker

---

**I survived i103**

# coming up

---

what you've all been waiting for

last class

**virtual pollution**

summing up