

Futuropolis: Plentiful bits, bytes, bandwidth, & pixels that are connected to everything

**Singapore
22 October 2008**

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Futuropolis Talks

How S&T will revolutionize

City Mgmt and long term plan. Fut. Metropolis

1. Cities and sustainability of dev world
2. Climate change in planning future cities
3. Imaging Sustainable cities
4. Trends, issues for Asian urban future

Next Gen nets: wiring global citizen

1. ICT's Benefits on the Development of Cities
2. OpenSocial: Connecting Social Networks through Future Applications
3. The future of money, contactless payment
4. Blurring virtual and cyber

Internationalization of R&D

Future Living spaces: work, live, and play

1. Embedded Sustainability, Accenture
2. Autonomy, Self Sufficiency and Right Living U of Auck., autonomous house

Eng, and construct: Transport & Water

1. Transport plan in rapidly urbanized
2. Reshaping for a sustainable fut. Csiro
3. Sustainable water mgmt for cities
4. Sustainability at cutting edge
5. Sustainable construction

Alt energy: powering our future

1. Harnessing wind
2. Panel: Is S&T > City growth needs

Bits, bandwidth, pixels

I cannot see 2058! *Look now, ... imagine*

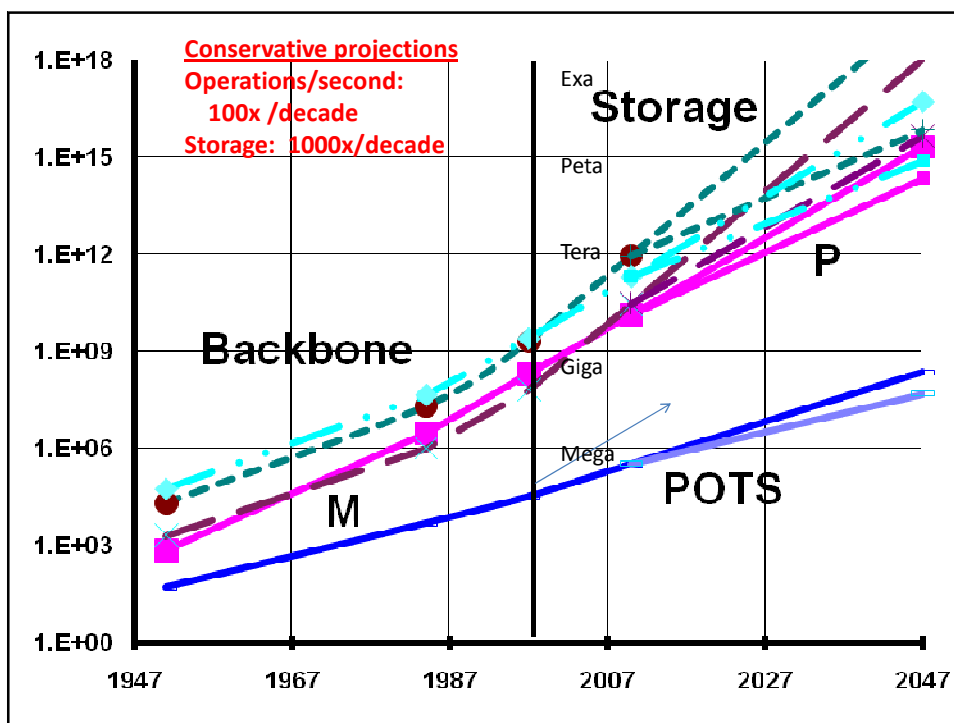
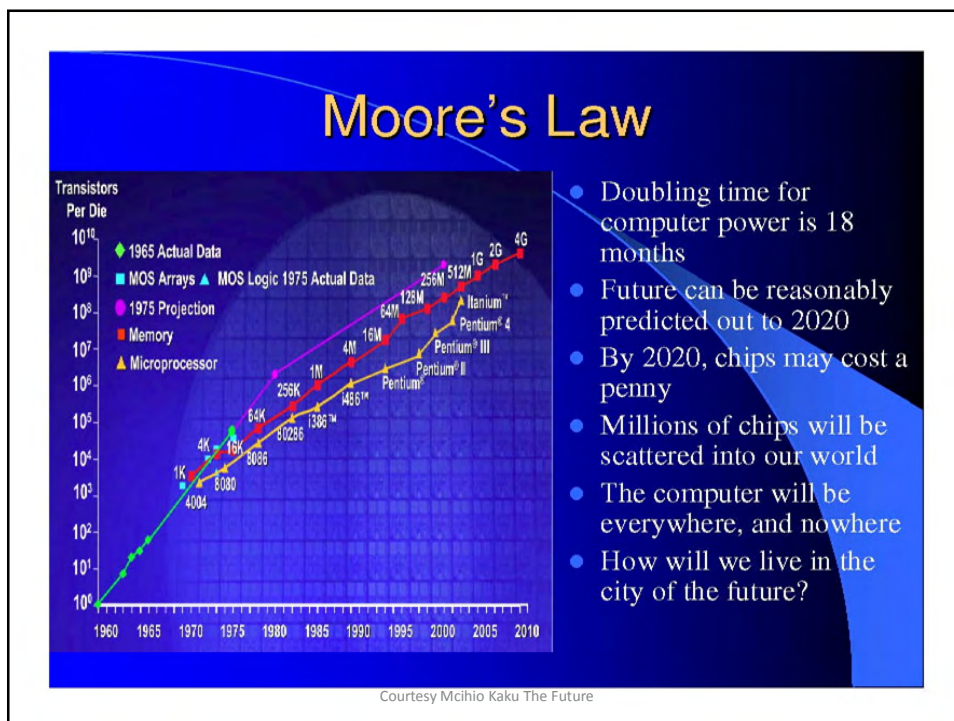
I can hardly think a decade out, the period of a new computer class. Silicon for another two decades.
2058... vs 1958 (Edvac report 1945; Noyce patent 1959; Moore's Law 1965 of learning curves)

- **Bits processed per second ... more than we can use**
 - Simulate everything. W/O the models, global warming , questionable. Simulate cities.
 - The Singularity: when computers >> people. E.g. chatbot more effective than humans.
- **Bytes... or all that data.**
 - Everything will be kept. Cyber landfill ...everything you do is discoverable
 - In science this a big deal! Fourth Paradigm. observation, theory, & simulation. WWT
- **Bits per second communicated through fiber and air**
 - Everything will be connected
- **Pixels telepresence, windowless buildings to be anywhere**
... artificial reality.
 - Substitution of travel
 - Substitution of paper ... I can see the end of the books we know and love
- **Sensors will “connect” everything else...**
 - Means “anything” i.e. thing or process of value will be sensed!
 - People will have on body state, or a Memex
- **PEOPLE Will live in the CyberCities or Metaverses**

Dematerialization aka Cyberization technology:

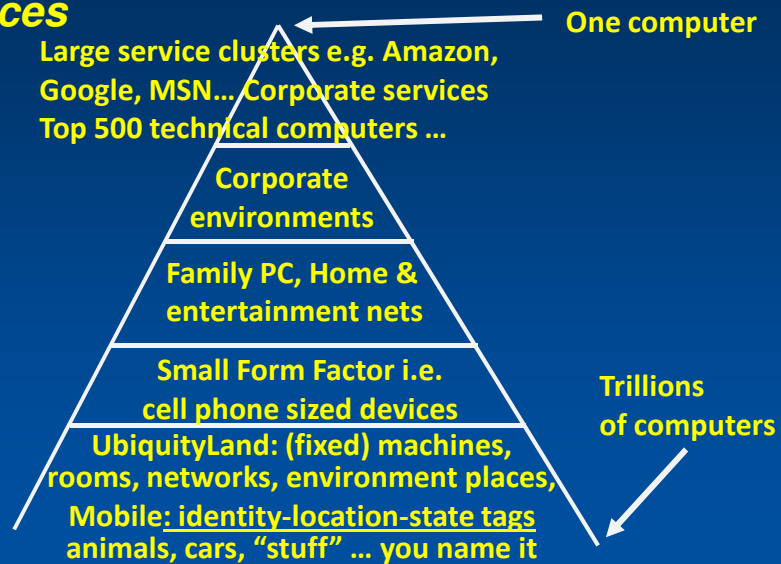
ops, bytes, bits/second, pixels, and sensors/effectors

- Conversion of the world's Atoms into electrons held in semiconductors and magnetics and photons




Computer community and population...

Pyramid of networked – computing, communicating, and storage devices

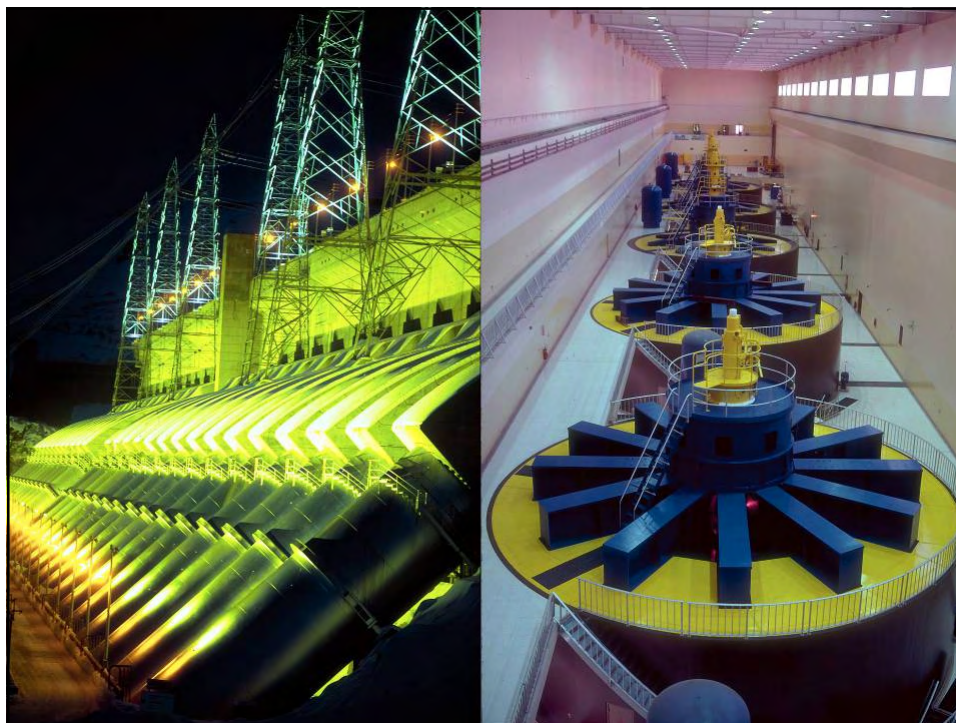


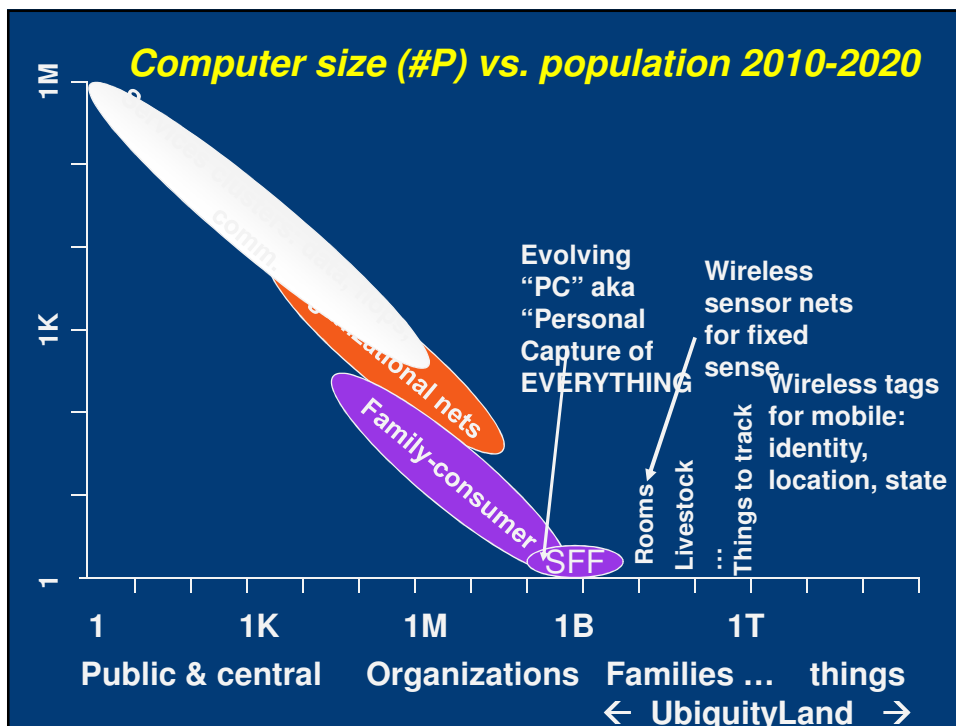
**Large servers... new services
are added "in flight"**



1,000's ?
10,000's ?
100,000s ?
1,000,000s ?

Technology transitions



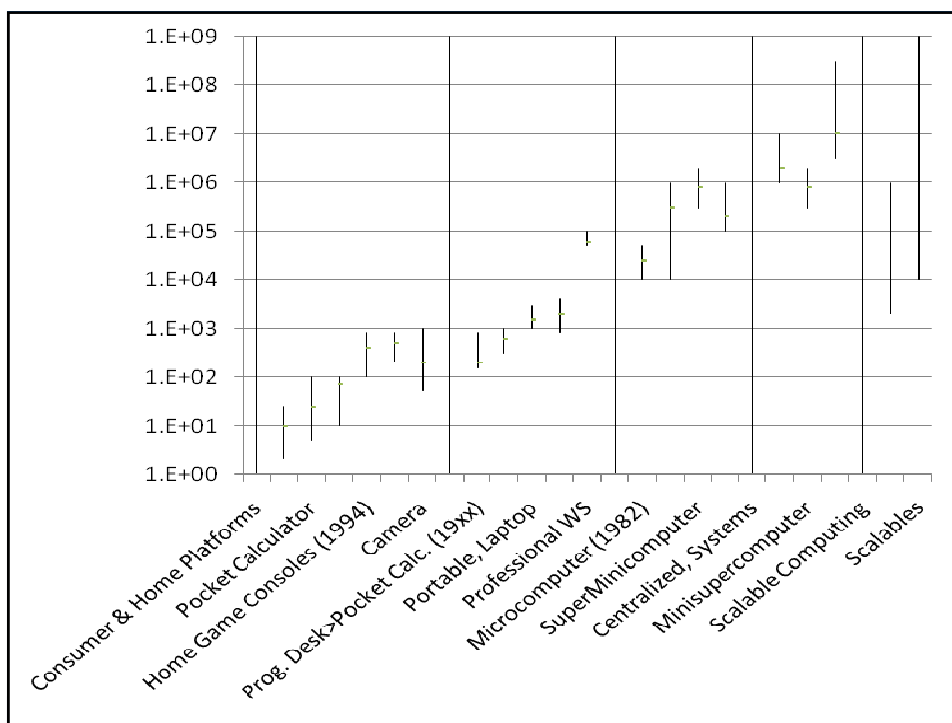


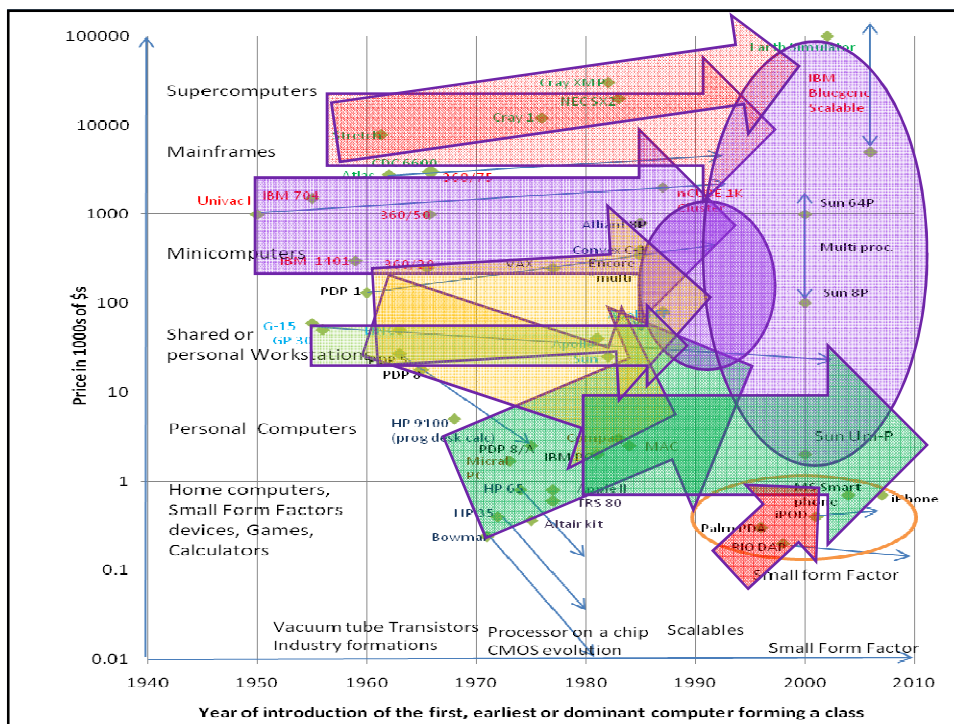
Bell's Law of Computer Classes...

Every Decade a new class emerges and some die

- Every decade a new, lower (1/10)¹ cost class of computers emerge to cover cyberspace with a
 - New computing platform
 - New Interface to humans or something in physical world, “stuff”
 - New networking and/or interconnect structure
- New classes --> new apps --> new industries
- The classes... a decade in price every decade

| | | |
|-------|------------|---|
| – 60s | \$millions | mainframes |
| – 70s | \$10K-100K | minis |
| – 80s | \$10K | workstations and PCs |
| – 90s | \$1K | The Internet PCs |
| – 00s | \$100s | PDA's & cell phones (small form factor) |
| – 10s | \$10 | “the cloud” & small form factor devices |
| | | wireless sensor nets, motes, etc. |
| – ?? | ? | In body, implantable everything. |
| – ??? | ? | “the singularity” computers > human |





**The computer:
just a big calculator, symbol processor and
record keeper**

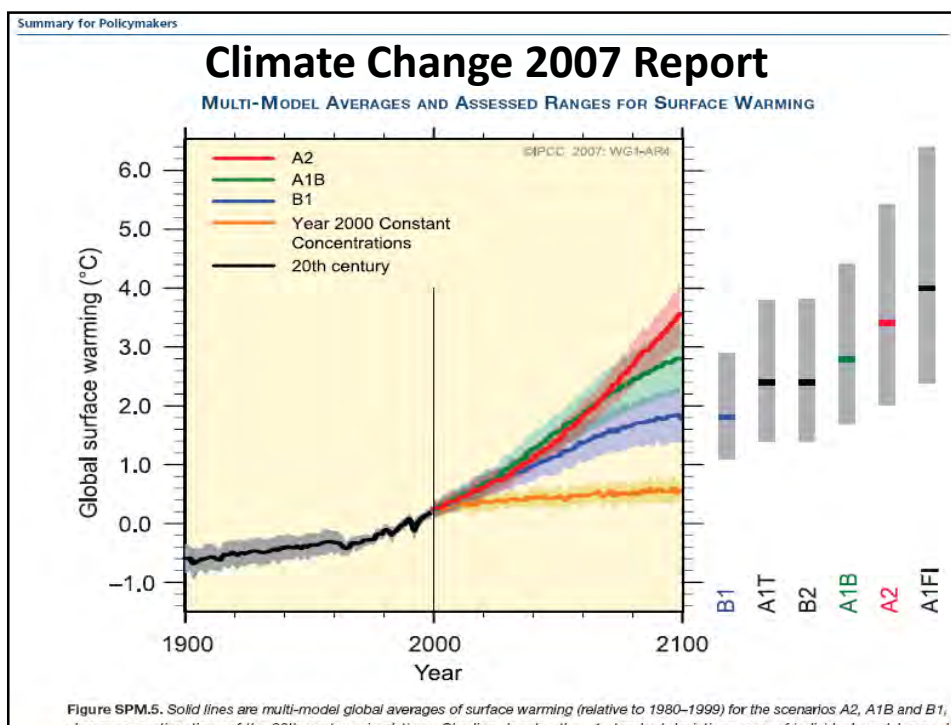
- As a simulator
- As a human surrogate (simulator) to converse with and people both conversationally and physically
- Record keeper for all of us now and the future
 - Will explore this when discussing data

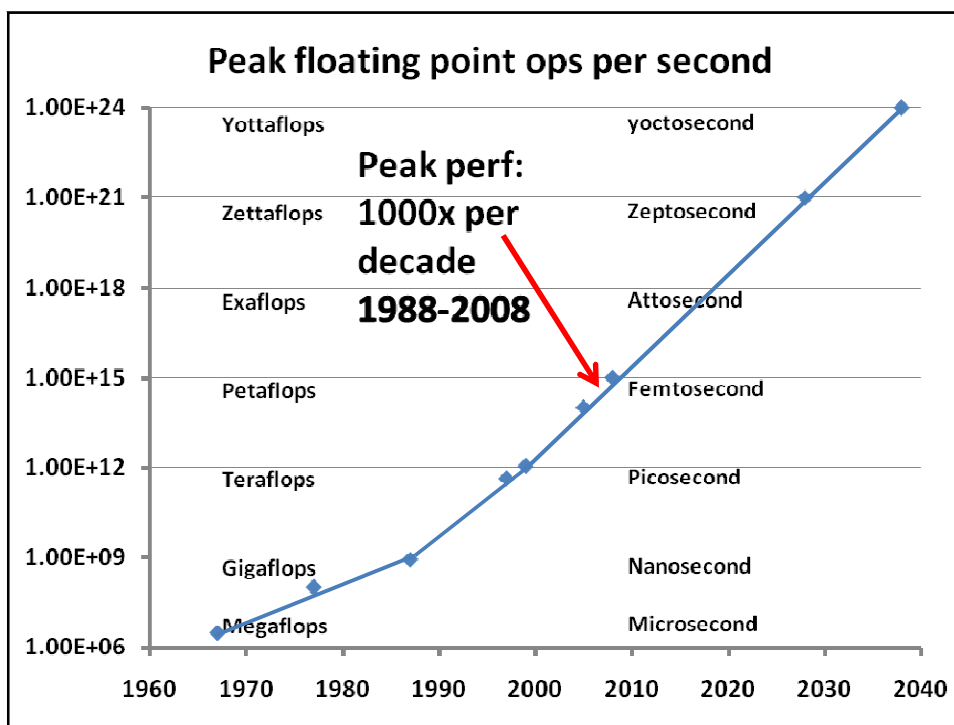
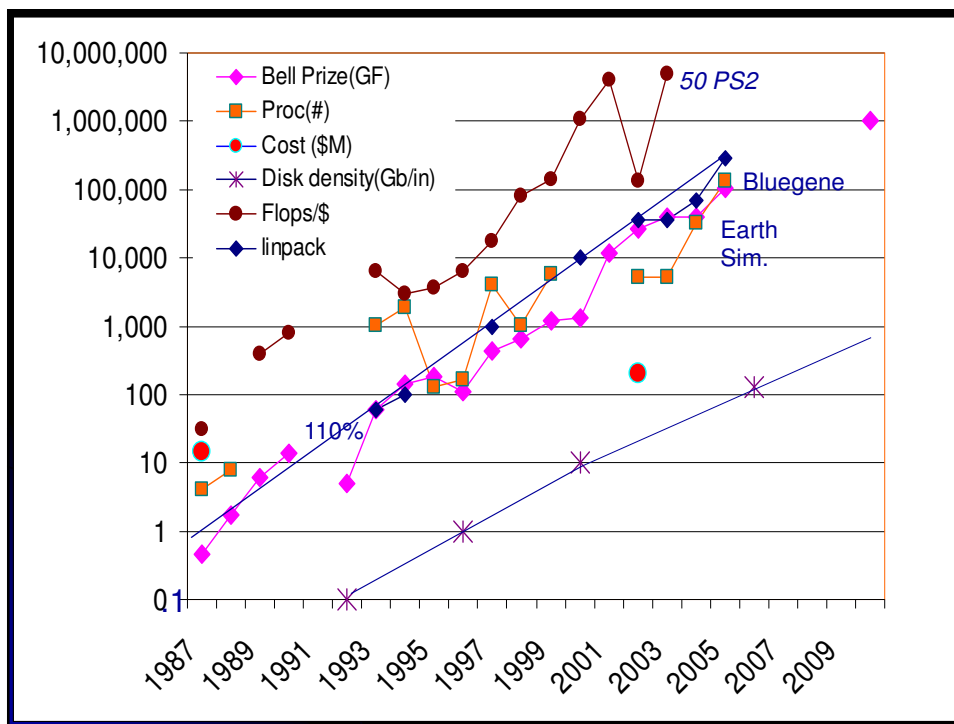
Can our big calculators simulate enough for fundamental understanding?

- Current machines deliver peta-ops 10^{15} peak speed
- 10^{**5} cores x 10^{**9} = 10^{**14} ops or 100 teraops/center
- There are 6+ billion people
- Each machine can contribute $0.16 \times 10^{**6}$ ops
- Six centers give > 1 million ops per sec per person.

- Based on expected power increases of 1000x / decade expect another factor of one million in 20 years.
- Amounts to a trillion operations/sec per person...

- Computers will increasingly compete with people as stated by Ray Kurzweil in the Singularity






What questions would simulation answer?

The Singularity

- **It's a future period during which the pace of technological change will be so rapid, its impact so deep, that human life will be irreversibly transformed.** Although neither utopian or dystopian, this epoch will transform the concepts that we rely on to give meaning to our lives, from our business models to the cycle of human life, including death itself. Understanding the Singularity will alter our perspective on the significance of our past and the ramifications for our future. To truly understand it inherently changes one's view of life in general and one's own particular life.
Ray Kurzweil, award-winning inventor, author of *The Singularity Is Near*
- **To any thoughtful person, the singularity idea, even if it seems wild, raises a gigantic, swirling cloud of profound and vital questions about humanity and the powerful technologies it is producing.** Given this mysterious and rapidly approaching cloud, there can be no doubt that the time has come for the scientific and technological community to seriously try to figure out what is on humanity's collective horizon. Not to do so would be hugely irresponsible.
Douglas R. Hofstadter, celebrated author of *Gödel, Escher, Bach*



- Robo – doctors, robo-lawyers and robo-clerks are possible due to advances in “heuristics” – the ability to answer “yes” and “no” questions using rule-based logic.

Courtesy Mchiro Kaku The Future

Siemens: I am the Siemens support chat robot. How can I help you?


You: *i would like help with tuning my radio*


Siemens: Would you like help with manual tuning, seek tuning, preset channel, or auto? Preset channel is the easiest


You: *preset channel*


Siemens: To find a preset station, simply hit any of the numbered buttons under your radio. If you don't find what you want, come back to me and say tune radio, and I will help you tune another way.


Siemens is waiting for you to send a message







Siemens
0 yrs M Munich DE 

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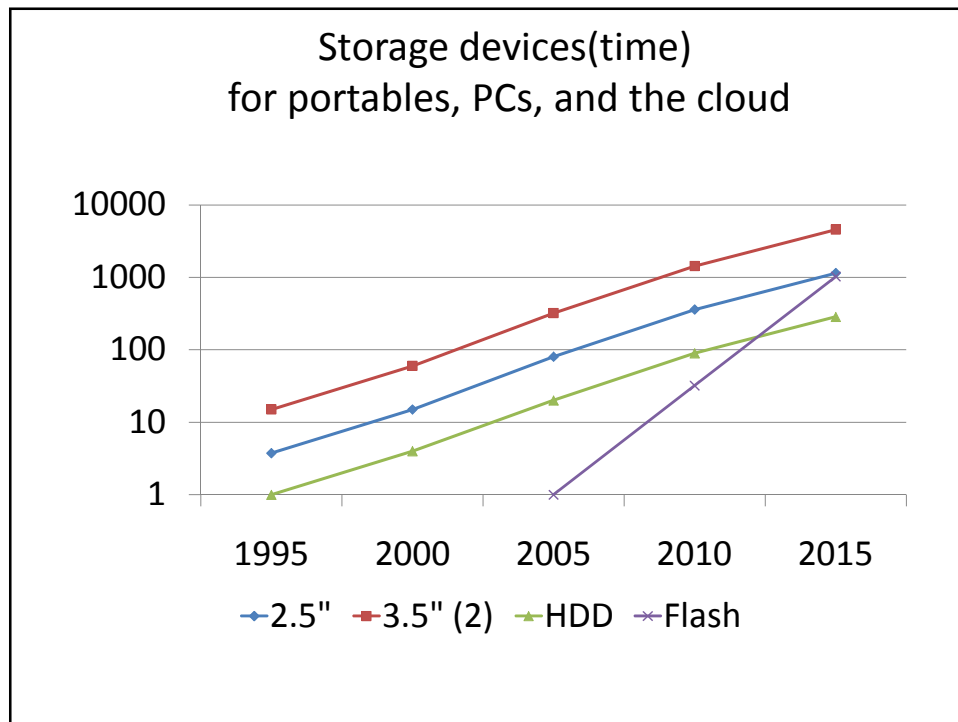
 [Get your own CyberTwin!](#)

| | | |
|--------------------|----------|--|
| Jul 14 at 11:38 AM | Customer | which card has the highest reward points |
| | | You can belong to one of the rewards programs with your B..A credit card. Once a member, you'll be able to earn points towards a great range of rewards when you use your credit card. |
| Jul 14 at 11:38 AM | B..A | Which program would you like to know more about: <ul style="list-style-type: none"> • Gold Rewards • Velocity • FlyBuys |
| Jul 14 at 11:38 AM | B..A | Another question? Just enter it in the box below. |
| Jul 14 at 11:38 AM | Customer | are you a real person |
| Jul 14 at 11:38 AM | B..A | Online Assistant is an automated information service that can help with your questions about B..A Credit Cards. |
| Jul 14 at 11:38 AM | B..A | If you have another question, simply type it in the box below. |
| Jul 14 at 11:38 AM | Customer | what are you paid |
| Jul 14 at 11:38 AM | B..! | B..A is dedicated to helping your with your credit card queries. |

Synthetic Authenticity

By JOHN CLOUD

- Not long ago I found myself in a Hermitage, Tenn., supermarket studying a bottle of something called All-Purpose Bourbon-Chicken Grill-n-Dip. At the bottom of the label were the words AUTHENTIC FOOD COURT FLAVOR.
- It seemed like a joke at first. A sauce surely can't be authentic if it tastes of a food court and not, say, of your mother's stove. But it wasn't a joke. Promoting products as "authentic" is serious business these days. You will notice the word and its variants being used to sell just about everything—Stoli vodka (whose new ad campaign urges you to "Choose Authenticity"), Kool cigarettes ("Be Authentic"), the now expired presidential campaign of Mike Huckabee (who called himself an "authentic conservative"), the website Highbrowfurniture.com ("Authenticity. Period."), the Claddagh Irish Pub chain (which claims to have an "authentic 'public house' environment," whatever that is) and the state of Maryland, where "even the fun is authentic."
- Legendary business consultants James Gilmore and Joseph Pine II have written a book about what all these claims mean. In *Authenticity* (Harvard Business School Press), they argue that the virtualization of life (friends aren't friends unless you "confirm" them on Facebook; reporters are now all bloggers, and vice versa) has led to a deep consumer yearning for the authentic. America has "toxic levels of inauthenticity," Gilmore and Pine argue: most of the e-mail we get is fake. It's so difficult to reach a real person via an 800 number that we had to invent a heretofore unnecessary locution—*real person*—to describe the entity we are trying to reach. People live fake lives in Second Life. Corporate deceit reached epidemic levels after the dotcom bust. Depending on your politics, you might add that there were no WMD.
- Gilmore and Pine run an Aurora, Ohio, consulting firm called Strategic Horizons that has an almost cultlike following in the business world because of their ability to accurately predict consumer sentiments. Nine years ago, in their first book, they argued that businesses had to start selling experiences—not mere products—in order to survive the new economy. *The Experience Economy: Work Is Theatre & Every Business a Stage* made the case that goods and services were being so thoroughly commoditized by Wal-Mart and the Internet that companies would fail unless they could create such diverting shopping experiences that customers would pay more for the same stuff they could buy for less elsewhere. The book helped explain the success of Starbucks, which sold not just coffee but an Italian coffeehouse experience. The Geek Squad was another example: the company thrived by staging computer repair as theater. Its repairmen arrive at your door literally in costume. The Experience Economy became a sensation in business circles.
- Gilmore and Pine write as much about culture as about business, and their new book on authenticity has crystallized the interaction between self and commerce in the current era the way *The Experience Economy* did for the late 1990s. The aura of inauthenticity around some brands is killing them, Gilmore and Pine say. Just look at Sharper Image and all its shiny gawags—or Lillian Vernon, which sells tacky jewelry and fake "Forever-Fresh" daisies. Both companies filed for bankruptcy last month. "What [consumers] buy must reflect who they are and who they aspire to be in relation to how they perceive the world—with lightning-quick judgments of 'real' or 'fake' hanging in the balance," Gilmore and Pine write.



**All that data:
to be acquired, held, and tracked**

- 2008: Large sites have 10 Peta-bytes 10×10^{15}
- 6+ billion; or 1.6 Megabytes per person...
- 2030: at least 10 zetta-bytes or 10×10^{21}
- Data about people grow to 1.6 Terabytes per person

- How much of your memories are "in the cloud"

Study of Data Mining for Terrorists Is Urged

NY Times, October 7, 2008

By [ERIC LICHTBLAU](#)

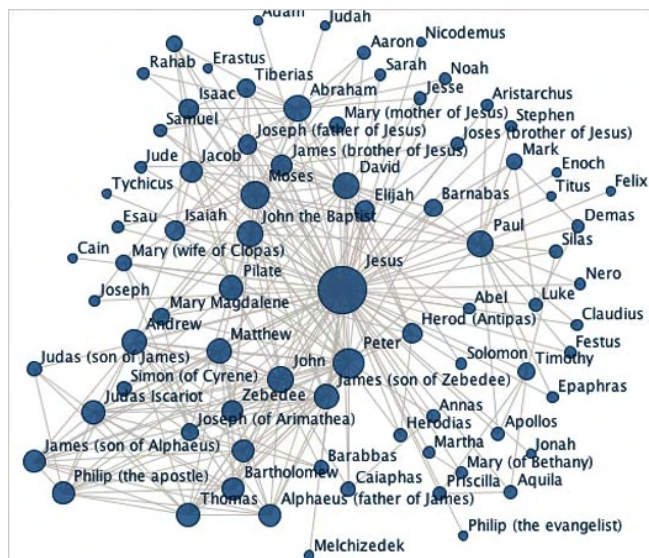
WASHINGTON — A federal panel of policy makers and scientific experts urged a government-wide evaluation Tuesday of programs that sift through databases looking for clues on terrorism, to determine whether the programs are effective and legal.

The federal government has made aggressive use of so-called data-mining tools since the attacks of Sept. 11, 2001, as counterterrorism officials in many intelligence agencies have sought to analyze records on travel habits, calling patterns, e-mail use, financial transactions and other data to pinpoint possible terrorist activity.

Many eyes (Power of visualization)

Shneiderman: "... answers to questions you didn't know you had."

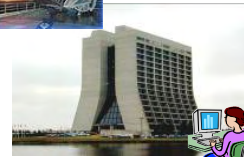
<http://services.alphaworks.ibm.com/manveyes/home>



The 4th Paradigm of Science: Now its Data

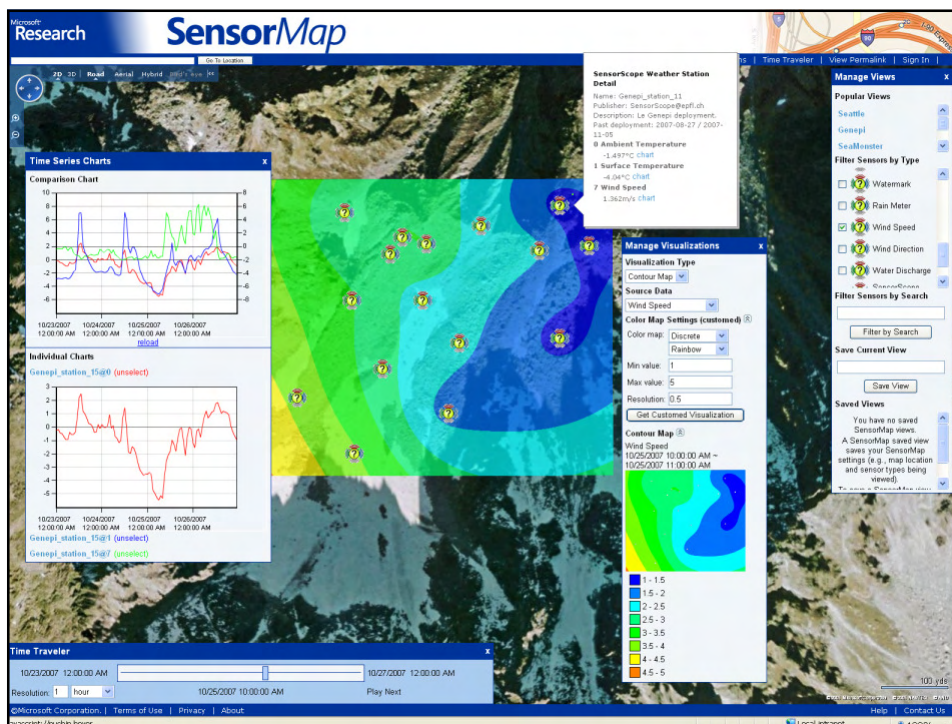
1. Thousand years ago:
science was **empirical**
describing natural phenomena
2. Last few hundred years:
theoretical branch
using models, generalizations
3. Last few decades c1940s:
a **computational** branch
simulating complex phenomena
4. Today c2000:
data exploration (eScience)
unify theory, experiment, and simulation
 - Data captured by instruments
Or generated by simulator
 - Processed by software
 - Information/Knowledge stored in computer
 - Scientist analyzes database / files
using data management and statistics

$$\left(\frac{\dot{a}}{a}\right)^2 = \frac{4\pi G\rho}{3} - K\frac{c^2}{a^2}$$



Jim Gray NRC-CSTB 2007-01

The screenshot shows the WorldWide Telescope application window. At the top, there are menu options: Explore, Guided Tours, Search, Community, Telescope, View, and Settings. Below the menu is a 'Collections > Hubble Images' section with a row of 10 thumbnail images. The main display area shows a large, detailed image of a galaxy. At the bottom, there is a 'View' section with a dropdown menu set to 'Sky', an 'Imagery' dropdown set to 'Digitized Sky Survey (Color)*', and an 'Image Crossslide' control. To the right of the main image is a 'Context Search Filter' dropdown set to 'All' and a 'Tracing' control. At the bottom right, there is a 'Context Search Filter' dropdown set to 'All', a '1 of 4' indicator, a 'N' button, a 'Orion' label, and a '01:52:30' timer. Below these are coordinates: 'RA: 05:23:18' and 'Dec: -05:24:19'.



Healthy Waterways (UQ Eva Abal)

- Queensland is experiencing a water crisis due to drought, expanding population, and estuarine reparation
- Healthy Waterways includes 19 local governments, 6 state agencies, 5 universities and key industrial partners
- Data processing hampered by lack of tools and ontologies (to merge data from heterogeneous sources).
 - Report cards shown currently take 3 months to compile.
 - Planned sensor deployments will only make this worse.

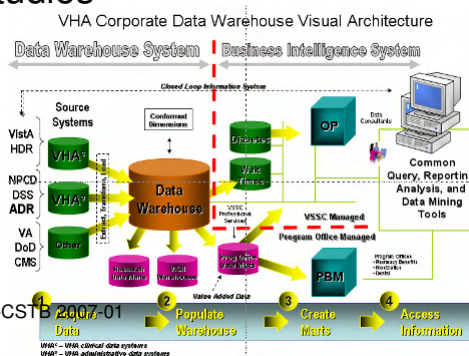
<http://www.healthywaterways.org>



VHA Health Informatics

- VHA: largest standardized electronic medical records system in US.
- Design, populate and tune a ~20 TB Data Warehouse and Analytics environment
- Evaluate population health and treatment outcomes,
- Support epidemiological studies

- 7 million enrollees
- 5 million patients
- Example Milestones:
 - 1 Billionth Vital Sign loaded in April '06
 - 30-minutes to population-wide obesity analysis (next slide)
 - Discovered seasonality in blood pressure -- NEJM fall '06



HDR Vitals Based Body Mass Index Calculation on VHA FY04 Population
 Source: VHA Corporate Data Warehouse

| Vital | 5lt 0n | 5lt 1n | 5lt 2n | 5lt 3n | 5lt 4n | 5lt 5n | 5lt 6n | 5lt 7n | 5lt 8n | 5lt 9n | 5lt 10n | 5lt 11n | 5lt 0n | 5lt 1n | 5lt 2n | 5lt 3n | 5lt 4n | 5lt 5n |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|--------|--------|
| 100 | 230 | 211 | 334 | 276 | 316 | 364 | 346 | 300 | 244 | 172 | 114 | 73 | 58 | 16 | 11 | 3 | 1 | 1 |
| 105 | 339 | 364 | 518 | 532 | 558 | 561 | 584 | 515 | 436 | 284 | 226 | 144 | 102 | 25 | 13 | 4 | 4 | 1 |
| 110 | 488 | 489 | 836 | 815 | 955 | 972 | 1,031 | 899 | 680 | 521 | 395 | 256 | 161 | 70 | 23 | 10 | 6 | 4 |
| 115 | 526 | 614 | 1,018 | 1,098 | 1,326 | 1,325 | 1,607 | 1,426 | 1,175 | 903 | 598 | 451 | 264 | 84 | 59 | 17 | 6 | 4 |
| 120 | 644 | 714 | 1,419 | 1,583 | 1,964 | 2,153 | 2,612 | 2,374 | 1,933 | 1,450 | 1,085 | 690 | 501 | 153 | 95 | 38 | 13 | 9 |
| 125 | 672 | 855 | 1,682 | 1,933 | 2,628 | 3,005 | 3,521 | 3,405 | 2,929 | 2,197 | 1,538 | 1,144 | 756 | 253 | 114 | 46 | 32 | 8 |
| 130 | 753 | 944 | 1,984 | 2,392 | 3,462 | 3,968 | 5,039 | 4,827 | 4,285 | 3,223 | 2,378 | 1,765 | 1,182 | 429 | 214 | 81 | 41 | 12 |
| 135 | 753 | 1,062 | 2,173 | 2,852 | 4,105 | 4,912 | 6,535 | 6,535 | 5,797 | 4,500 | 3,393 | 2,467 | 1,668 | 596 | 309 | 108 | 70 | 15 |
| 140 | 754 | 1,073 | 2,300 | 3,177 | 4,937 | 6,286 | 8,769 | 8,750 | 7,939 | 6,303 | 4,837 | 3,493 | 2,534 | 977 | 513 | 144 | 106 | 22 |
| 145 | 748 | 1,053 | 2,254 | 3,389 | 5,412 | 7,334 | 10,485 | 11,004 | 10,576 | 8,084 | 6,511 | 4,686 | 3,344 | 1,207 | 680 | 221 | 140 | 41 |
| 150 | 730 | 1,077 | 2,361 | 3,596 | 6,152 | 8,665 | 12,772 | 14,335 | 13,866 | 11,255 | 9,250 | 6,545 | 4,796 | 1,792 | 979 | 350 | 162 | 48 |
| 155 | 683 | 923 | 2,178 | 3,391 | 6,031 | 8,891 | 14,181 | 15,899 | 16,594 | 13,517 | 11,489 | 8,056 | 5,741 | 2,155 | 1,203 | 472 | 249 | 70 |
| 160 | 671 | 872 | 2,106 | 3,532 | 6,184 | 9,580 | 15,493 | 18,869 | 19,939 | 17,046 | 14,650 | 10,366 | 7,708 | 2,831 | 1,618 | 615 | 341 | 100 |
| 165 | 627 | 772 | 1,894 | 3,074 | 5,773 | 9,549 | 16,332 | 20,080 | 22,507 | 19,692 | 17,729 | 12,588 | 9,558 | 3,548 | 2,032 | 716 | 399 | 117 |
| 170 | 596 | 750 | 1,716 | 2,900 | 5,428 | 9,080 | 16,633 | 21,550 | 25,051 | 22,568 | 21,198 | 15,552 | 12,093 | 4,548 | 2,626 | 944 | 489 | 124 |
| 175 | 493 | 674 | 1,521 | 2,551 | 4,816 | 8,417 | 15,900 | 21,420 | 26,262 | 24,277 | 23,756 | 18,194 | 13,817 | 5,361 | 3,178 | 1,152 | 586 | 144 |
| 180 | 486 | 599 | 1,411 | 2,323 | 4,584 | 7,855 | 15,482 | 20,873 | 26,922 | 26,067 | 26,313 | 20,358 | 16,459 | 6,451 | 3,848 | 1,441 | 737 | 207 |
| 185 | 420 | 546 | 1,195 | 1,985 | 3,905 | 6,918 | 13,406 | 19,362 | 25,818 | 25,620 | 27,037 | 21,799 | 18,172 | 7,206 | 4,458 | 1,548 | 867 | 247 |
| 190 | 424 | 495 | 1,073 | 1,729 | 3,363 | 5,909 | 11,918 | 17,640 | 24,277 | 25,263 | 27,398 | 22,697 | 19,977 | 8,344 | 4,937 | 1,858 | 993 | 287 |
| 195 | 341 | 463 | 913 | 1,474 | 2,803 | 5,207 | 10,584 | 15,727 | 22,137 | 23,860 | 26,373 | 22,513 | 20,163 | 8,754 | 5,683 | 2,178 | 1,120 | 309 |
| 200 | 315 | 384 | 763 | 1,338 | 2,602 | 4,551 | 9,413 | 14,149 | 20,608 | 22,541 | 25,452 | 23,358 | 21,548 | 9,284 | 6,221 | 2,294 | 1,295 | 372 |
| 205 | 265 | 338 | 633 | 1,026 | 1,993 | 3,736 | 7,765 | 11,940 | 17,501 | 19,944 | 23,065 | 21,094 | 20,354 | 9,270 | 6,350 | 2,597 | 1,322 | 376 |
| 210 | 275 | 284 | 543 | 853 | 1,794 | 3,148 | 6,804 | 10,540 | 15,647 | 18,129 | 21,862 | 20,540 | 20,271 | 9,566 | 6,816 | 2,786 | 1,509 | 418 |
| 215 | 205 | 244 | 501 | 746 | 1,389 | 2,645 | 5,747 | 8,712 | 13,064 | 15,560 | 19,089 | 18,191 | 19,063 | 9,019 | 6,675 | 2,798 | 1,509 | 454 |
| 220 | 168 | 208 | 415 | 652 | 1,231 | 2,326 | 4,850 | 7,751 | 11,645 | 13,900 | 17,577 | 17,239 | 17,583 | 8,896 | 6,818 | 2,948 | 1,635 | 484 |
| 225 | 156 | 180 | 325 | 522 | 988 | 1,873 | 4,015 | 6,340 | 9,794 | 11,890 | 14,868 | 15,097 | 15,741 | 8,332 | 6,441 | 2,915 | 1,647 | 452 |
| 230 | 141 | 160 | 259 | 486 | 880 | 1,653 | 3,334 | 5,410 | 8,657 | 10,500 | 13,532 | 13,488 | 14,815 | 7,901 | 6,258 | 2,859 | 1,701 | 496 |
| 235 | 115 | 119 | 244 | 373 | 738 | 1,251 | 2,795 | 4,570 | 7,192 | 8,784 | 11,489 | 11,857 | 12,796 | 7,113 | 5,544 | 2,744 | 1,617 | 465 |
| 240 | 72 | 116 | 214 | 313 | 562 | 1,099 | 2,422 | 3,861 | 6,044 | 7,652 | 9,982 | 10,692 | 11,825 | 6,496 | 5,392 | 2,606 | 1,581 | 449 |
| 245 | 71 | 76 | 169 | 253 | 509 | 888 | 1,858 | 3,167 | 5,076 | 6,446 | 8,312 | 8,647 | 9,910 | 5,638 | 4,742 | 2,263 | 1,479 | 469 |
| 250 | 70 | 55 | 152 | 226 | 452 | 753 | 1,647 | 2,826 | 4,505 | 5,509 | 7,569 | 8,064 | 8,900 | 5,183 | 4,319 | 2,177 | 1,451 | 469 |
| 255 | 59 | 61 | 128 | 174 | 316 | 599 | 1,289 | 2,130 | 3,468 | 4,540 | 5,957 | 6,451 | 7,438 | 4,320 | 3,741 | 1,903 | 1,271 | 443 |
| 260 | 50 | 64 | 117 | 167 | 281 | 493 | 1,107 | 1,929 | 2,963 | 3,947 | 5,190 | 5,797 | 6,725 | 3,900 | 3,429 | 1,828 | 1,218 | 481 |
| 265 | 37 | 34 | 88 | 122 | 234 | 454 | 894 | 1,449 | 2,457 | 3,152 | 4,374 | 4,818 | 5,729 | 3,350 | 2,984 | 1,539 | 1,028 | 406 |
| 270 | 47 | 42 | 67 | 119 | 203 | 367 | 800 | 1,291 | 2,110 | 2,740 | 3,878 | 4,133 | 5,075 | 2,934 | 2,685 | 1,468 | 918 | 403 |
| 275 | 22 | 34 | 44 | 85 | 184 | 291 | 662 | 1,064 | 1,767 | 2,235 | 3,113 | 3,412 | 4,267 | 2,598 | 2,362 | 1,247 | 837 | 334 |
| 280 | 21 | 20 | 51 | 69 | 139 | 286 | 548 | 903 | 1,513 | 1,955 | 2,770 | 3,126 | 3,804 | 2,273 | 2,020 | 1,152 | 763 | 300 |
| 285 | 12 | 12 | 36 | 68 | 118 | 201 | 451 | 720 | 1,318 | 1,613 | 2,208 | 2,394 | 3,132 | 1,924 | 1,780 | 994 | 677 | 241 |
| 290 | 16 | 14 | 47 | 38 | 92 | 182 | 387 | 667 | 1,050 | 1,301 | 1,904 | 2,150 | 2,655 | 1,749 | 1,529 | 881 | 688 | 252 |
| 295 | 9 | 12 | 22 | 53 | 92 | 127 | 341 | 431 | 611 | 764 | 1,011 | 1,145 | 1,445 | 1,333 | 813 | 533 | 202 | 205 |
| 300 | 12 | 10 | 30 | 43 | 59 | 117 | 309 | 434 | 784 | 988 | 1,428 | 1,588 | 1,989 | 1,255 | 1,212 | 709 | 479 | 205 |

Legend

BMI < 18 Underweight

BMI 18-24.9 Healthy Weight

BMI 25-29.9 Overweight

BMI 30+ Obese

Total Patients
23,876 (0.7%)

701,089 (21.6%)

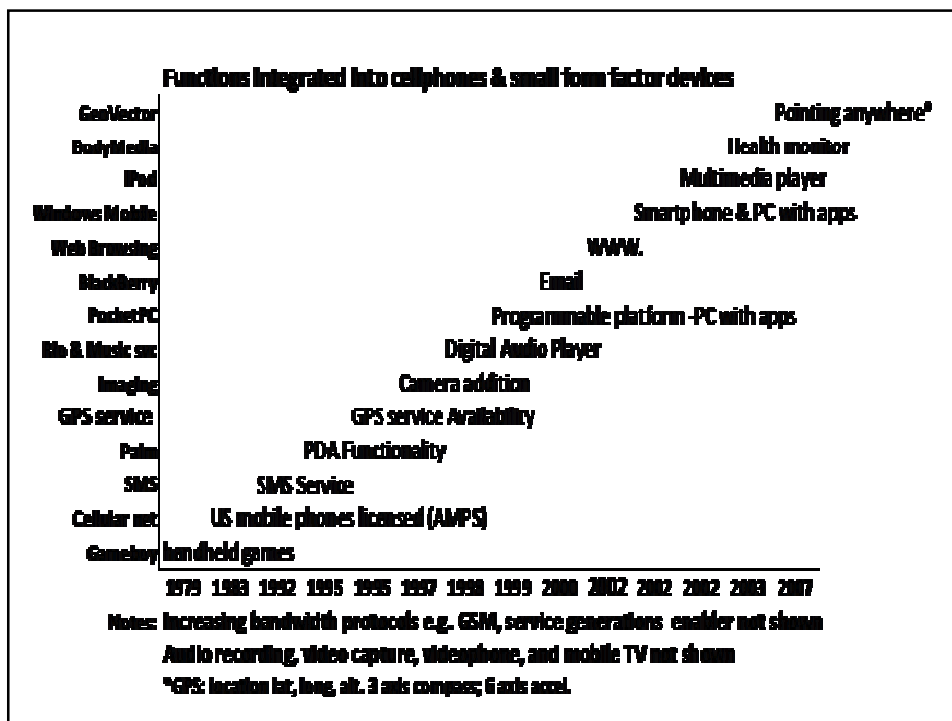
1,177,093 (36.2%)

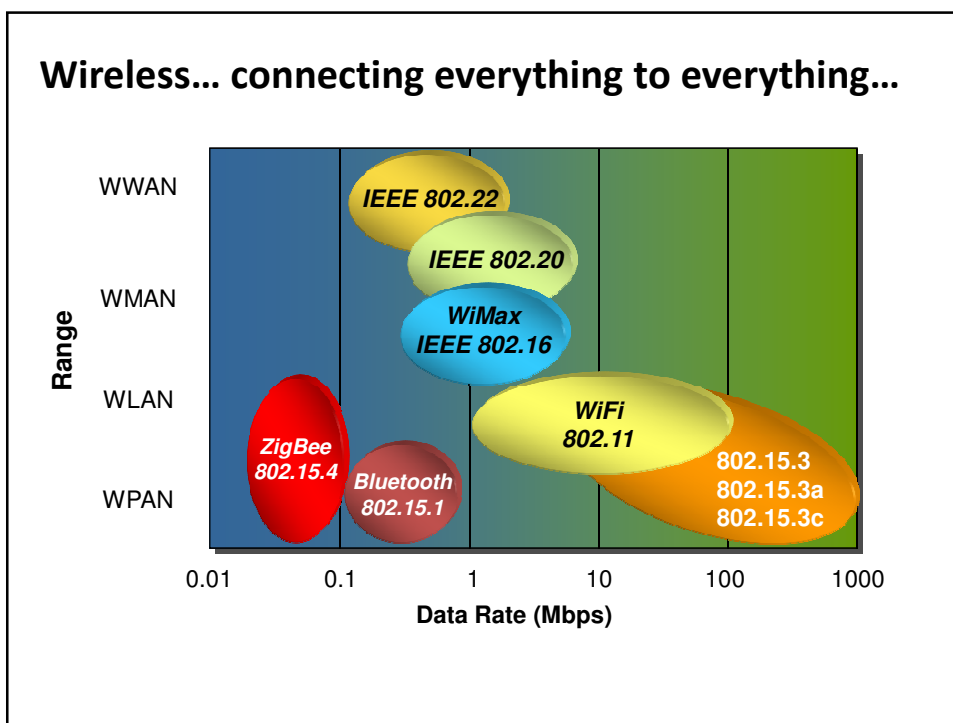
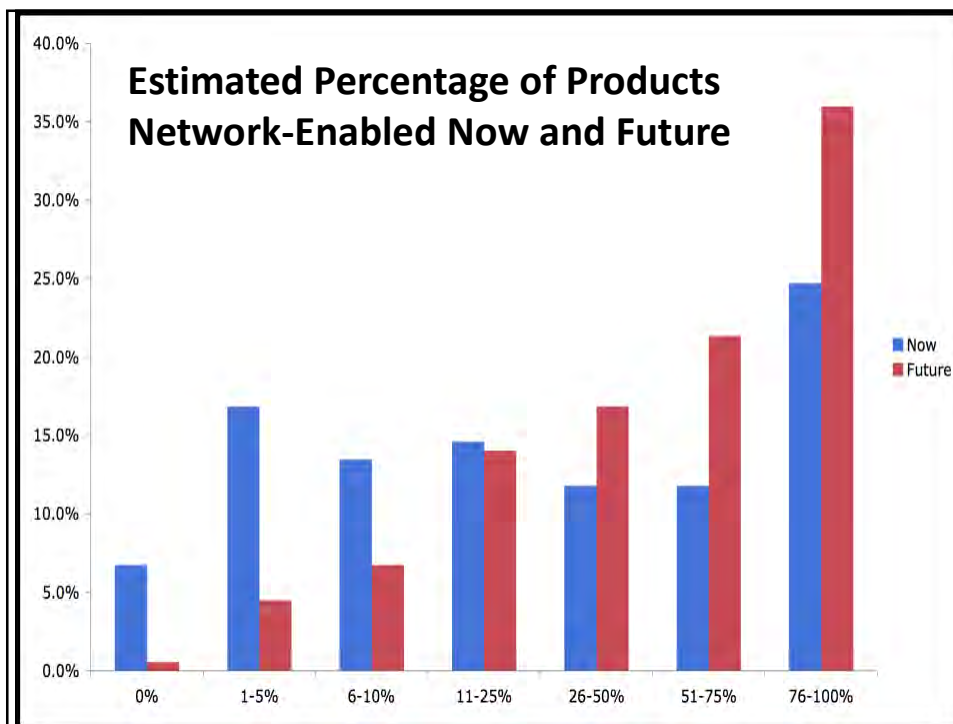
1,347,098 (41.5%)

3,249,156 (100%)

Communication for ubiquity

- Connects us all
- Connects to everything in the future





Now add sensors including place

Livestock Industry: Do you know where your cows are?

www.ict.csiro.au

- **Animal production is big business**

- 1B cattle
- 1B sheep

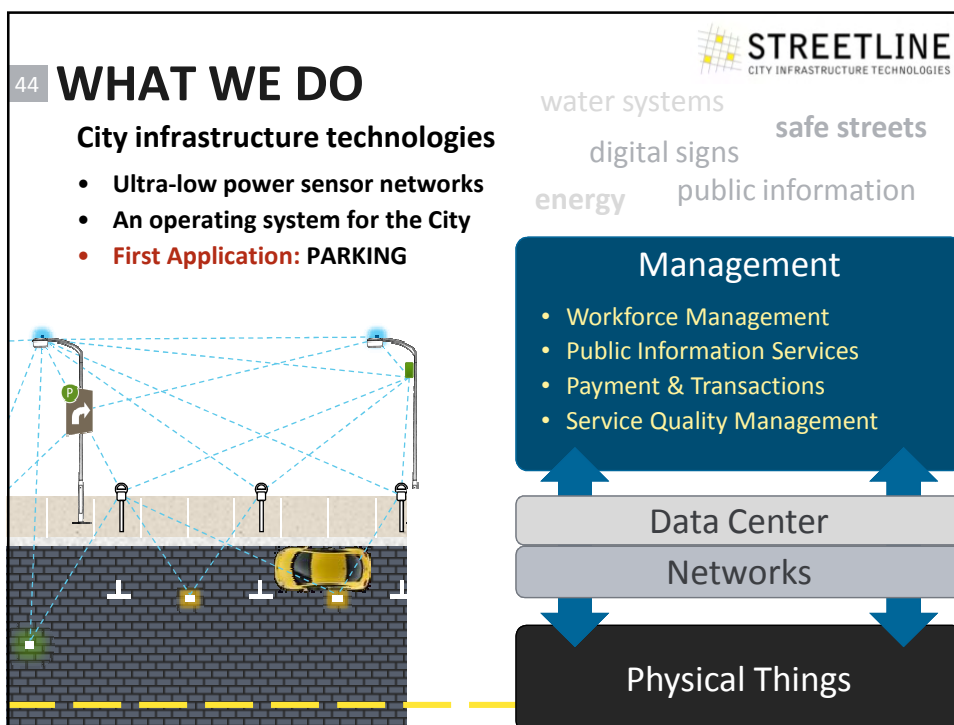
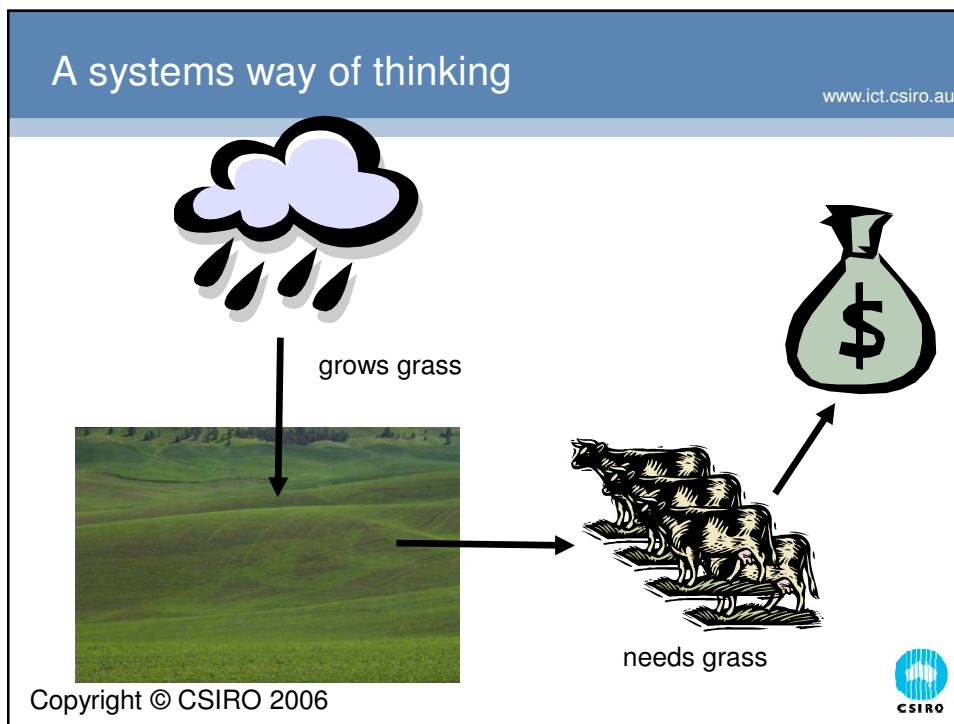
- **Big issues:**

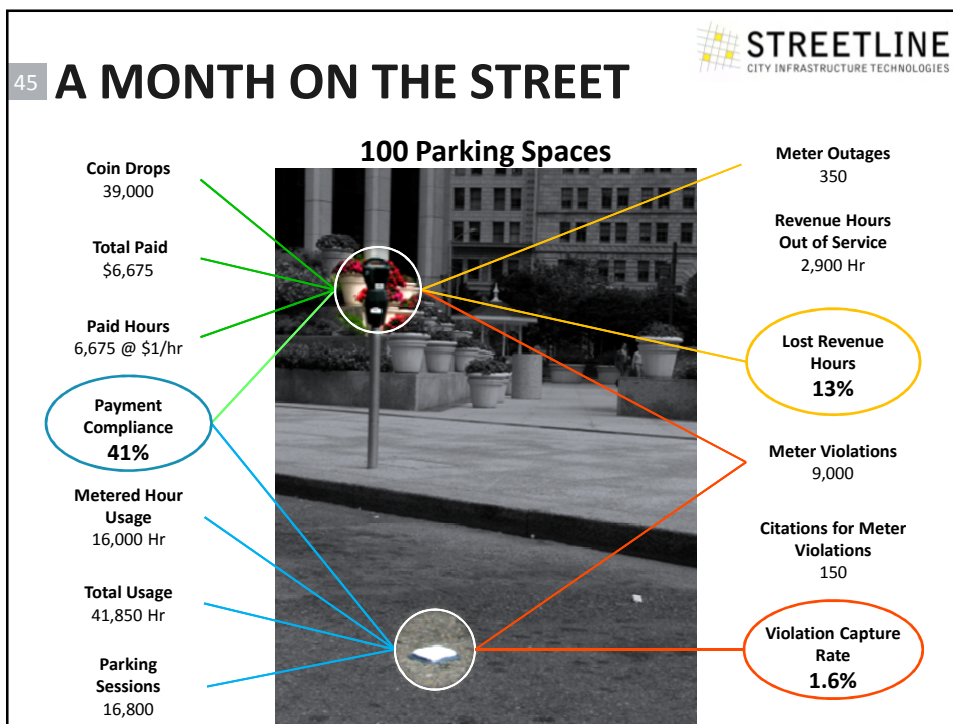
- limited labour
- expansive/remote properties
- environmental sustainability
 - Soil degradation
 - Water shortage
 - Licence to farm legislation
- cost of fencing and mustering
- Disease outbreaks
- Doing more with less



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47 PARKING FINDER

STREETLINE
CITY INFRASTRUCTURE TECHNOLOGIES

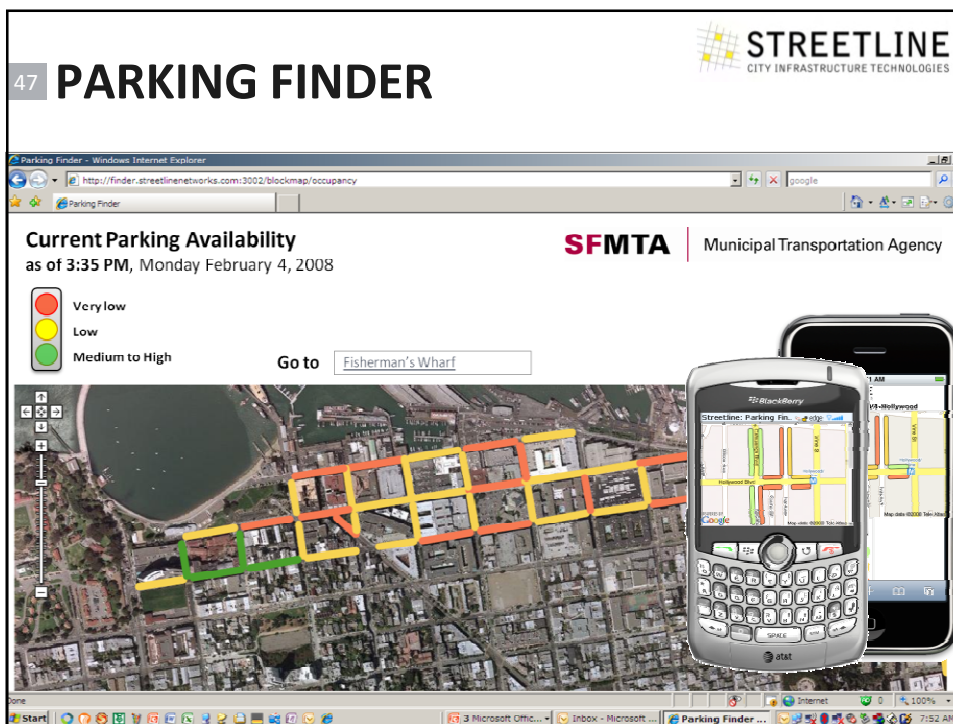
Parking Finder - Windows Internet Explorer
http://finder.streetlinenetworks.com:3002/blockmap/occupancy

Current Parking Availability
as of 3:35 PM, Monday February 4, 2008

SFMTA | Municipal Transportation Agency

Very low
Low
Medium to High

Go to



ZIPCAR

Cars know who, what, where, and how they are!



Telepresence ... “being here, while being there, now or then”

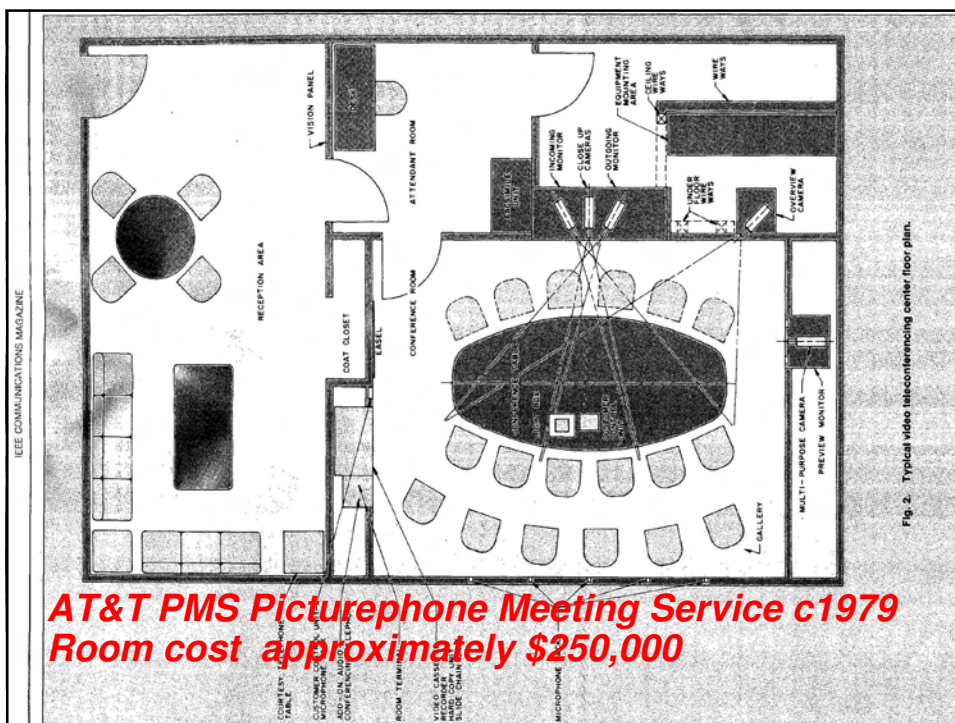
The Promise of Videoconferencing

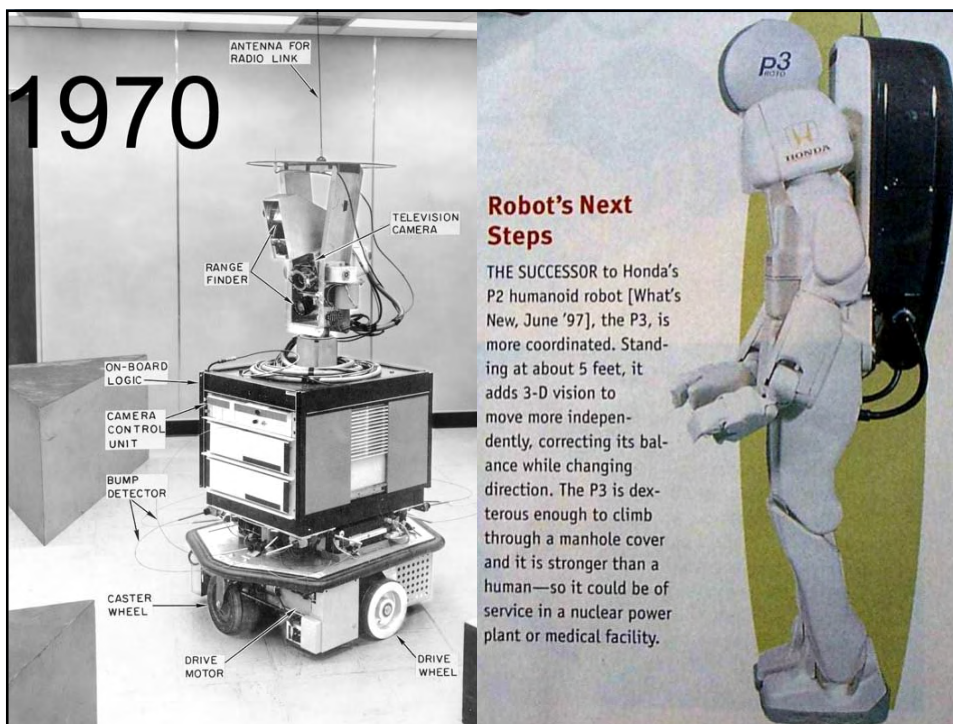
- AT&T introduced Picturephone at the 1964 World’s fair
- 1978: Picturephone Meeting Service (room)
- 2008 Cisco Telepresence system (room)
- 1990’s Desktop/internet systems grandma phone (Cu-SeeMe, MBONE, NetMeeting) – cheap!
- Skype
- Why isn’t videoconferencing much bigger than it is???PEOPLE WANNA JUST BE THERE

How to Fail at Videoconferencing

- Audio latency high + quality poor
- No gaze awareness/screen area/2-D only.
- Lack of ubiquity
- Hard to set up call
- Note: phone is the competitor (ubiquitous, easy calling, low latency).
- **Critical: audio quality, 3-D space, and gaze awareness**
- **PEOPLE WANNA BE THERE AT THAT TIME**

Cisco Telepresence System 3200: \$340,000 '08





2 Mb/s - spread-spectrum LAN (150' indoors)

Face/Eye can pan, tilt, zoom (LCD display).

eye

Face

mouth

ears for stereo

Mobile Robot Form

Small as possible

6'

1.
2.
3.

Tele-site (Mobile Robot house)

Tele-site (Table top)

Operator-site

camera

Need feedback so robot to control/show who one is looking at ... to get pressure

Stages

1. p1
2. p2 in a window
3. Special mounter - Tilt, etc.
4. Mobile

Walking Video K ⇒ WVK

**Gordon's
Telerobot
c1991
updated
5/6/08**






A photograph showing the ASIMO robot, a small white humanoid robot, standing on a stage. A woman in a red jacket and black skirt is walking towards it, gesturing with her hand. The word "ASIMO" is visible on the wall behind the robot.

- Asimo, the world's most advanced robot, walks just like a human; however, it must be programmed and scripted.

Courtesy Michio Kaku The Future



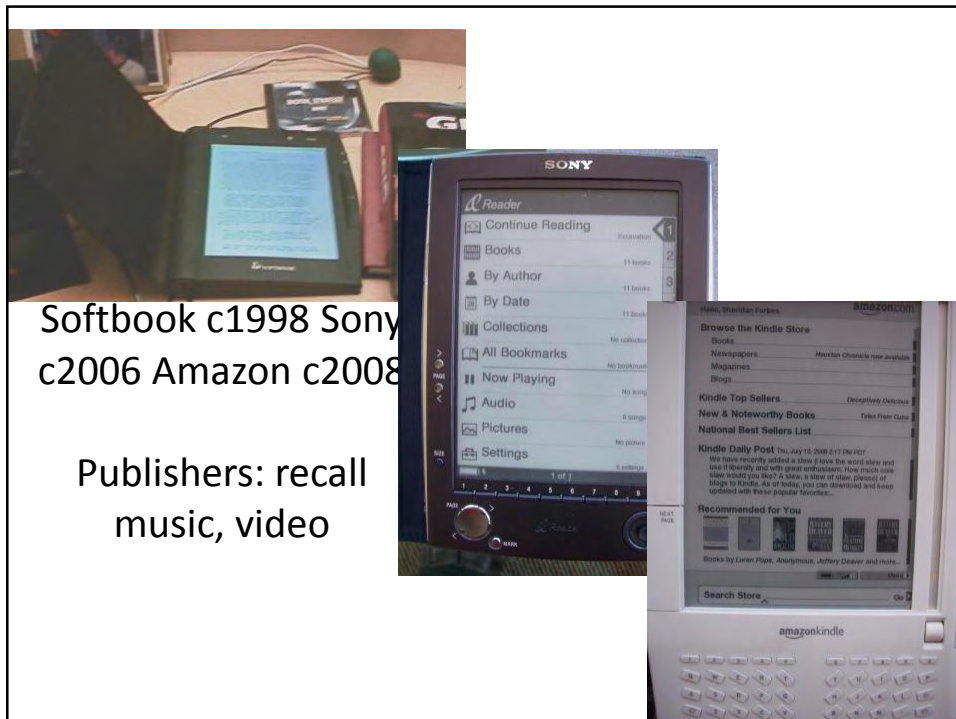
A photograph showing a woman in a dark dress interacting with a white Fujitsu robot. The robot has a screen on its chest and the Fujitsu logo. The woman is touching the screen.

- Why is Japan spending so much on robots?
- Ans. These are robot nurses, because Japan's population is aging so fast.

Courtesy Michio Kaku The Future

Pixels: the technology for windows on the world

- Energy could drive:
 - Elimination of papers
 - Elimination of books
 - Elimination of windows



Photocopy King Pushes Paperless Office

- NY Times, October 7, 2008, 3:05 pm
- By [Ashlee Vance](#) It's a bit rich for Xerox, the company whose name became synonymous with photocopying, to claim that a morass of paper stands as one of the grand challenges still haunting "knowledge workers." After all, Xerox and its ilk have helped push us to the point where a paperless office is more of a joke than a realistic goal.

Your surrogate memory

- Harry Potter's Pensive
- Zoe after Final Cut (Wikipedia: n. "Zoe Implants", developed by EYE Tech company, record every moment of one's lives, so that they may be viewed by loved ones after one's death.)
- MyLifeBits– project to capture, hold, and recall EVERYTHING

Wikipedia: n. Harry Potter's Pensieve

- A **Pensieve** is a stone receptacle used to store and review memories. Covered in mystic runes, it contains memories that take physical form as a type of matter that is described as neither liquid nor gas. A witch or wizard can extract their own or another person's memories, store them in the Pensieve, and review them later. It also relieves the mind when it becomes cluttered with information. Anyone can examine the memories in the Pensieve, which also allows viewers to fully immerse themselves in the memories stored within, much like a magical form of real world [virtual reality](#).
- Users of these devices view the memories from a [third-person-point-of-view](#), providing a near-[omniscient](#) perspective of the events preserved. This, of course, raises questions of how they are able to see things beyond what they have remembered. Rowling answered this question in an interview, confirming that memories in the pensieve allow one to view details of things that happened even if they did not notice or remember them, and stated that "that's the magic of the Pensieve, what brings it alive".^[17] The "memories" contained in the Pensieve have the appearance of silver threads. Memories that have been heavily manipulated or tampered with to alter perspectives, or are simply aged and gone-spoiled (such as Slughorn's), may appear thick and jelly-like and offer obscured viewing. Memories are not limited to just those of humans, since at least one [house-elf](#) (Hokey) provided Dumbledore with a memory as well.

What do you carry with you and in you?

1. Laptop & PS (main computer) ... backed up in the cloud
2. Phone & PS
3. Ipod & PS (in cable carrier)... 8,000 songs!
4. Earbuds: small, no power
5. Kindle & PS (many books)
6. Kodak & PS (camera)...normally carry two
7. GPS tracker (PC or USB charger)
8. Sensecam; Audio recorder & batteries
9. BodyBugg (batteries) for energy, HR, monitor
10. Implanted Pacemaker 5 year battery life
11. Razor & PS
12. Cable carrier (techno stuff to connect anything anywhere)
- ~~13. Bose Case w/ PS very bulky noise cancelling earphones~~
- ~~14. Spare laptop & PS (spare)~~
- ~~15. Back up hard drive... too risky to carry my cyberlife~~

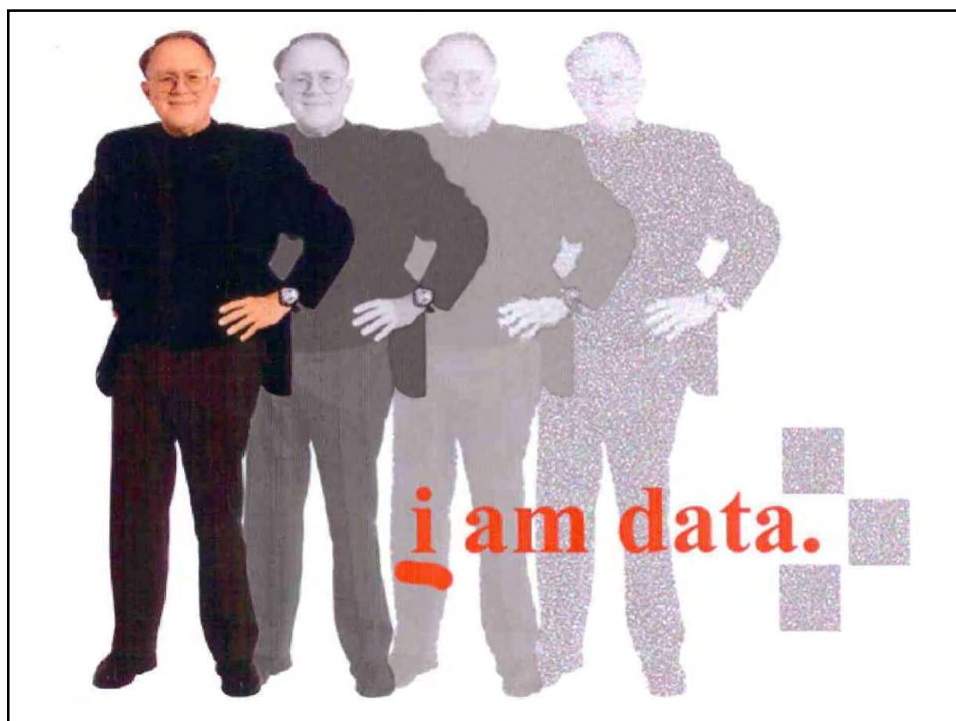


**Realizing Memex... Digital
Capture, Storage, and Utilization
of All Personal Information**

Gordon Bell, Jim Gemmell, Roger Lueder

www.MyLifeBits.com

Microsoft
Research



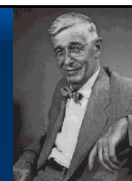
MyLifeBits Manifesto

- Digital information cost to store, transmit, replicate is negligible
- Nothing should be deleted
- The information for an individual: what's heard, said, and saw, will have a super-linear value that *exceeds acquisition & retention cost*
 - to free one's life from clutter
 - to supplement human memory
 - to enable ambience and digital immortality
 - to enable anyone to “be” anywhere, including the metaverse
- Software must provide a unified store for anywhere, anytime access while satisfying privacy, sharing, management, and retention.

Technology transitions

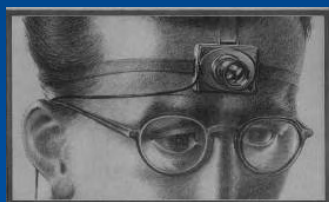
Re-discovery of Memex

As We May Think, Vannevar Bush, 1945

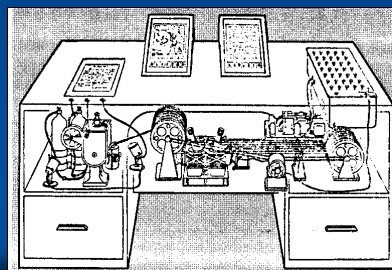


“A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility”

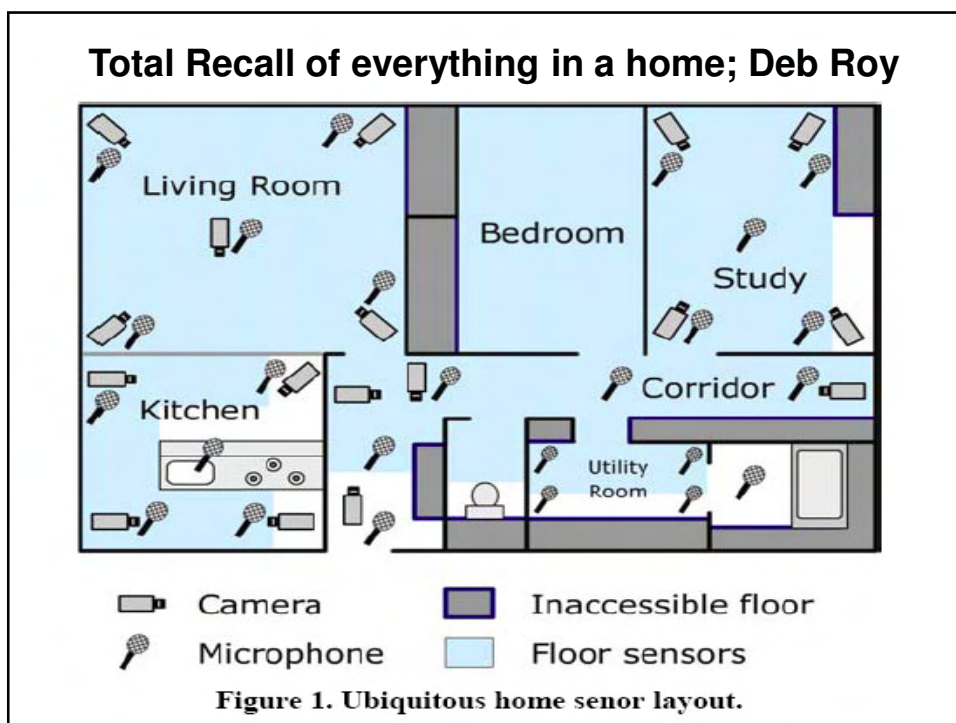
Full-text search, text & audio annotations, and hyperlinks

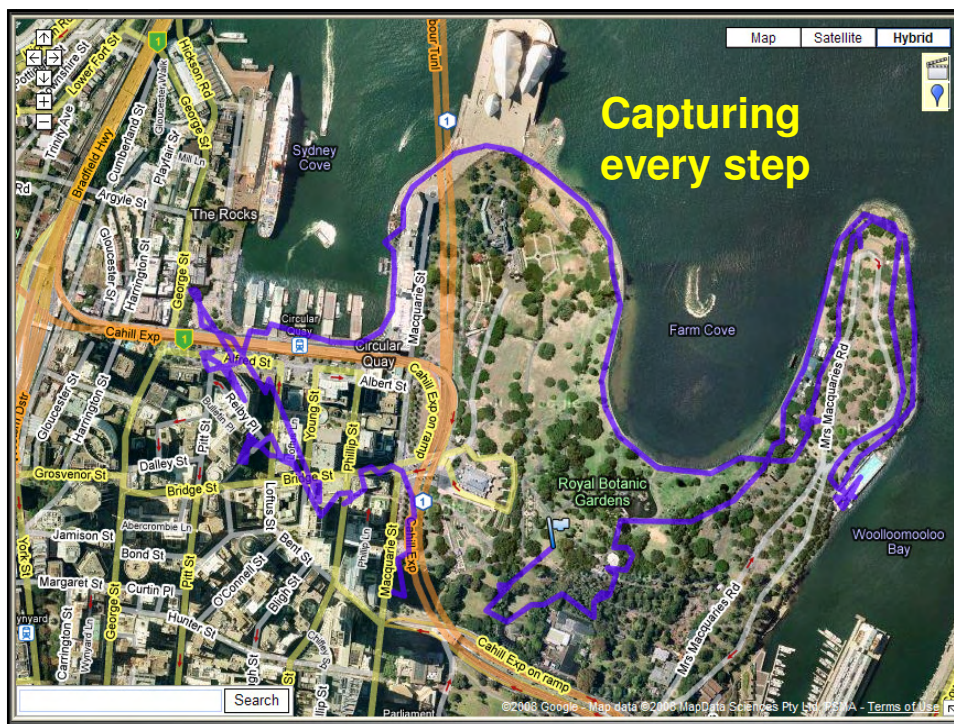


AS WE MAY THINK
A TOP U.S. SCIENTIST FORESEES A POSSIBLE FUTURE WORLD
IN WHICH MAN-MADE MACHINES WILL START TO THINK



ns



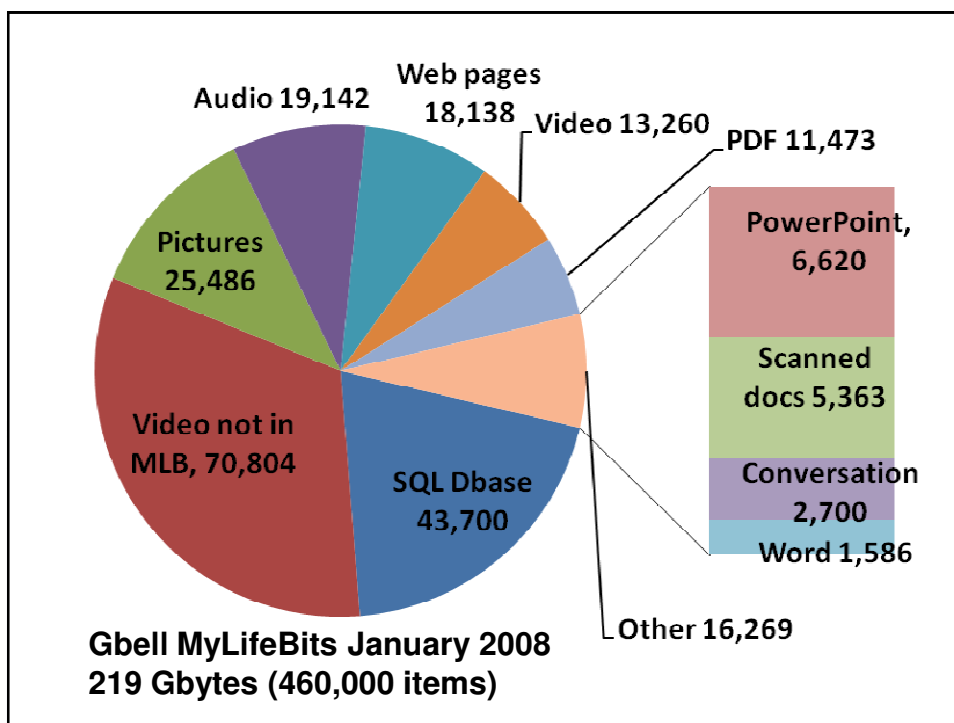
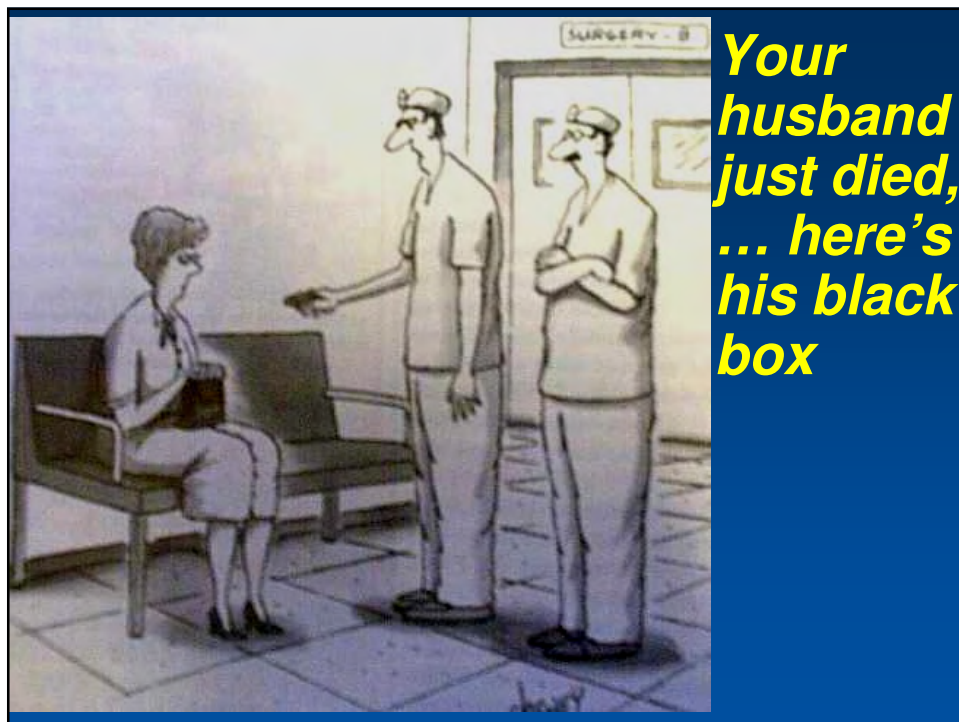




Capturing every heartbeat

- 72.6 beats/min; 38.16 Million beats/year
- 3.13 billion beats per life
- The important number is 4-4.5 years, or ETS
- Battery life: the expected trip to surgery!

| Rate (ppm) | Event Counts | | | | |
|---------------|-------------------|---------------------------|---------------|-------------------|--------------|
| | PV | PR | AV | AR | PVE |
| 30 - 54 | 411,860 | 4 | 28,630 | 1 | 0 |
| 55 - 69 | 6,824,410 | 195 | 4,614 | 3,609 | 12 |
| 70 - 89 | 8,113,024 | 1,359 | 0 | 0 | 274 |
| 90 - 109 | 2,516,074 | 524 | 0 | 0 | 386 |
| 110 - 129 | 451,814 | 212 | 0 | 0 | 180 |
| 130 - 149 | 12,599 | 104 | 0 | 0 | 114 |
| 150 - 179 | 292 | 46 | 0 | 0 | 112 |
| 180 - 224 | 0 | 1 | 0 | 0 | 6 |
| 225 - 249 | 0 | 2 | 0 | 0 | 2 |
| > 250 | 0 | 0 | 0 | 0 | 3 |
| Total: | 18,330,073 | 2,447 | 33,244 | 3,610 | 1,089 |
| | | Total Event Count: | | 18,370,463 | |



How many bits to store you life?

| | amount per day | per day (Mbytes) | 82 year lifetime (TB) |
|--|----------------|---------------------|--------------------------|
| Email @ 33 KB w/ saved attach | 200 | 6.6 | 0.20 |
| Office docs @0.1 | 5 | 0.5 | 0.02 |
| PDF & Tiff @1.8 MB 20 pp | 3 | 5.4 | 0.16 |
| Web pages @0.09 MB | 200 | 18 | 0.55 |
| Songs 4 MB | 1 | 4 | 0.12 |
| Photos @1 MB | 10 | 10 | 0.30 |
| | | | 1.35 |
| SenseCam | | 40 | 1.2 |
| SenseCam event/20 days --40 MB | 0.05 | 2 | 0.06 |
| Personal Video (10 Min event / 20 d) | 0.05 | 16.12 | 0.49 |
| Phone Capture 8KB/sec | 30 min. | 1.8 | 0.05 |
| Stereo Audio 44 KHz | 1 hr | 28.5 | 0.87 |
| Sub-total, practical capture... | | 92.93 | 2.82 |
| <i>Capture Everything</i> | | | |
| Phone quality capture (1KB/sec) | 10 hr | 36 | 1.09 |
| Quality audio record 8 KB/sec | 10 hr | 285 | 8.6 |
| - | | | |
| Video 200KB/sec | 10 hr | 900 | 27 |
| Video .5 GB/hr | 10 hr | 5000 | 152 |

Memex II aka Zoe aka Pensive

- **Embedded i/o or are you sensed?**
 - Retinal implant or "magic" glasses for camera, mixed reality
 - Cochlea (impeded mics for hearing)
 - Mics for voiced output
 - Gesture sensing 6 axis implants
 - Emotional and brain control of stuff e.g. nthe games being introduced this year!
 - Sensors & effectors as needed
- **On body for implant monitoring**
 - Something not unlike we can imagine based on MyLifeBits
 - Wireless for download and backup
- **All smart surfaces... write on anything, anywhere, using whatever software you need and it understands you**
- **Zoe & Pensive: A surrogate memory of everything!**
 - All TV programs are there.
 - Everyday is there just like Jill Price, "The Woman Who Could Not Forget"
- **Networked... communications make it interestn**
- **Challenge: so what besides Total Recall!**
Anticipatory? Off-load thinking. *Technology transitions*



● **Internet glasses will allow:**

- Face recognition
- Virtual reality
- Teleconferencing
- Watch movies
- Monitor stocks
- Edit files
- GPS
- E-mail, etc.
- Scan for the best prices and goods
- This is your home entertainment center
- Your home office of the future.

Courtesy Mchiro Kaku The Future

The end