VIII.

http://data.gov – one small step

The Future of the Web – Search for: New Songdo City
A child born 14 years ago has never known a world without a WWW. A 13 year old came into this world along with the first online banner ad. 12-year-olds were born the year the Federal Networking Council bestowed the official term 'Internet' on a rapidly growing network of networks. See http://www.iftf.org and http://futurity.org

Most Americans go online 'regularly:' 75% (up from half)

The higher the income, the more online: $75K+: 98%

The higher the education, the more online: College: 91%

The younger are more online: 18-29: 94%

BUT, according to a recent ETS survey, only 52% of college students and high school seniors were able to determine whether info on a web site was objective or skewed. Only 4 of 10 knew that using multiple terms in search improved results. Only 44% were able to complete an online assignment and communicate their findings with accuracy - - They do not have the critical thinking skills to use technology effectively.

Their tech. trends will impact the marketplace
- Online gaming: how will this experience change the way employees share info and collaborate?
- Podcasting, Texting, Downloadable Media: phone calls no longer the primary means of communication.
- Blogs: quickly becoming a 'trusted' media source.
- Search: will brands matter in a search world that turns everything into a commodity.

More Women than Men Online: 66%

Bill Joy, formerly Sun Microsystem's Chief Scientist, has an interesting future model of the web:

1 - The Near (Traditional) Web will improve with better computers, keyboards, screens, modems and LANs. Devices to track eye movement, sensitive touch interfaces to gesture-based systems used in "Minority Report' Eventually, the operating system itself may die a slow death: new software will not be necessary for new content. Computers will never need to reboot – they'll have built-in automatic diagnostics. By 2020, we'll have moved from a computer with brain of a lizard to one running as fast as 1 million gigahertz or a million times faster than today's PCs – able to perform 10 to the 15^{th} power calculations per second. Software will be increasingly compartmentalized – applications will talk to one another over the internet through industry standard interfaces. Devices will be still recognizable as computers, but as get faster and smarter, they will understand our speech, body language – replacing mice and keyboards, using biometrics instead of passwords. Search for "One Laptop per Child" – MIT has designed a

laptop costing $200 for underdeveloped nations - energy efficient, with Wi-Fi, a cheap display and minimal software.

The computer of the future – think of a souped-up smartphone with a monitor that unrolls into a larger screen, biometric security that lets you access all your professional and personal info from anywhere – where that data lives in the Internet 'cloud' – it unlocks your car, orders and pays for your coffee, projects a presentation. It'll move from 'engine' to enabler – no longer computing as first function but identification. It won't look like a laptop; mouse replaced by touch-screen technology; projected keyboard and screen, all wireless connectivity, drawing power in unique ways… Most everything is already invented.

Search for Siftable for an interesting look at the future.

Search for: Lifestreamer, Lifecaster, "My Life Bits" and "LifeLog", "LifeBrowser" "SenseCam" Search for NHK OLED display, SensiTile, SmartWrap, E-Paper, OLEDs can be printed onto wallpaper. Video murals on the ceiling. A flexible video screen for your shirt cuff, a monitor so thin and flexible, you can roll it up like a piece of paper. Nanowires – no more than a single nanometer in width. Memristors – transistor-like devices of titanium dioxide that remember voltage state info. Potential to revolutionize storage and processing – processors that can do both, storage that requires no power.

2- The Here (Wireless) Web – coming to you through your always-on mobile phone, page or PDA or combined device. Replacing credit cards for transactions. Webtops: virtual desktops for mobile users to access office applications and files via a web browser. Presence is a new buzz word – for applications that allow you to indicate the accessibility of people you want to stay in touch with

The end of forgetfulness – where everything is recorded forever - is changing our concept of privacy. Cell phones remember every call , search querys are saved forever, we no longer remember just the big stuff. Will it make us more guarded?

3 - The Far (Entertainment) Web will link devices with ambient intell – eliminating the need for distinct media. Consumers will purchase a license key for the content they purchase – content will be available via watch, PDA or cell phone or in a virtual world.

Video rules – see http://hulu.com

You may use synthetic characters to help. These are software agents capable of learning how to serve us better or how to provide us with exactly what we need to know based on their experience of dealing with humans. Examples: See Eliza at http://www.manifestation.com/neurotoys/eliza.php3 or at http://www-ai.ijs.si/eliza/eliza.html

Think automated customer service with an electronic good attitude. Or cyberdoctors with impeccable bedside manners. Or actors who don't merely play Hamlet or Ophelia but "are" those characters. And what character would you like for your synthetic butler, maid, or gardener?

3 – The Device Web will link machines to machines. Wired or not, devices will recognize and communicate with one another. T shirts measuring pulse rates and glucose values and transmitting to physicians; cell phone uses car speakers while activated in your car. At this level, we'll be experiencing pervasive computing. Science Applications International Corp (a big govt. contractor better known as SAIC) is working on the creation of large networks of tiny, cheap, battery-powered, wireless sensors known as motes that would be able to track anything, anytime, anywhere (warehouse flow, security, equip. monitoring, anything that requires detection of changes in an environment and data fed down to a central computer) – though there is severe hype about these – issues include security, interference, reliability, cost. Search Memory Spot.

See The Internet of Things: http://techcrunch.com/2014/12/02/the-internet-of-things-is-reaching-escape-velocity/

M2M or machine-to-machine software is developing rather rapidly. This enables machines equipped with computer chips and access to wireless phone networks to interact with each other. For example, a system that monitors the acidity and other attributes of water in swimming pools can send a message reporting this to a central database that can provide a checkable record, and also automatically page a maintenance worker with a detailed adjustment request. Saves chemical costs, maintenance visits, and disruptions from algae. Networked timers record how long it takes a customer to be served at the drive-through at Checkers restaurants, monitor temps. in refrigerators and cookers, track electricity use and store security systems. More than 24 firms reported having 23 million devices linked via wireless networks at the end of the last year. Business is expected to grow 40% by the end of next year. In the future, you'll see high-end household devices linked to maintenance firms.

In Europe, the *Living Tomorrow* building is a test-bed for many futuristic products. Search also for IBM Gadget Lab. Which of these products is real?

- A talking closet that suggests outfit combinations to wear after checking the weather and what's popular via the web.
- A window that when energized, turns into a projection screen for TV or DVD with casements becoming speakers.
- A talking mirror that dispenses recorded beauty and medical advice – it plays cartoons urging brushing when an electric toothbrush is on.
- A toilet that analyzes what's in it and sends suspicious results to your doctor.
- A bed sheet that monitors a sleeper's breathing, heart rates and body movements to adjust room heat and lighting.
- Floor tiles that recognize footprints.
- A refrigerator with a camera that you can access via a cell phone to see what's inside it.
- Washing machines that recognize cloth materials and colors.
- Ambient lighting that adjusts to weather, time of day and a person's mood.
- Name badges with engagement sensors – motion, speech patterns, etc.
- Shoelace GPS

4 - E- Commerce Web will handle B-to-B and B-to-C transactions – heavy traffic. Billboards talking to you a la 'Minority Report' movie. Stores identifying you and offering you recommendations based on past activity.

RFID (Radio Frequency ID) tags and smart cards are becoming as prevalent as the low-tech UPC sticker. Self-checking grocery stores, completely automated inventory control, and cashless transactions virtually anywhere are just a few of the possibilities we might see some day. Obstacles include: price per unit – currently 20 cents; limited system range; poor quality; incomplete standards and privacy issues. RFIDs current hold about 18 bytes of data.

In Saudi Arabia, RFID are added to visas to help with the logistics, crowd control and security related to the hajj pilgrims to Mecca. Kiosks scan passing crowds and communicate in the language of the pilgrim.

Gillette Company is deploying half-a-billion RFID tags at ten cents each to tag every pallet and every carton coming out of its distribution centers. Gillette will be able to reduce losses from out-of-stock, stolen or lost products and leverage inventory info into smarter marketing to retailers. At the retailer, their products will sit on smart shelves that will relay to the store how many are in stock, thank customers through electronic signage and somehow know the difference between purchasing and shoplifting. Essentially, the product being shipped will be able to sense the real world on its own. Gillette is having problems though – as their tags aren't European-compliant. There are immense technical problems with deploying these worldwide: there aren't international standards.

Other rollouts include for prisoner ID and officer access (in Ariz.), cashless payments for concessions via wristbands; casino chips (Las Vegas), cattle registration (in Spain), tracking runners' progress and times (Boston), baggage tracking, casino chips (Las Vegas), concession stand purchases (Seattle), tracking library books, videos, and CDs (England), soccer balls (Europe).

Walmart requires suppliers to put passive RFID tags on pallets and cases of their products. Passive tags are unpowered – have a range of just a few feet. A 'reader' must wake them up, at which point they transmit the little bit of data they hold. The tag orientation must be just right too and doesn't work well through liquids or metals. Interestingly, after five years, many suppliers aren't using RFID citing costs and technology immaturity. Walmart will soon start charging a fee for each pallet without a tag.

The National Science Foundation's Future Internet Architecture projects are looking to redesign the infrastructure to support mobility, context and location awareness, self-certifying public key addresses, routing traffic based on actual named content rather than just IP

5 - Pocket Web uses more sophisticated pocket communicators to located restaurants, cultural activities, keep tabs on important info. Known as 'wear-wear. This will incorporate Mp3 players, cell phones, video devices into clothing or other accessories. How about a solar-rechargeable, wirelessly loaded iPod-like device the size of 2 stacked credit cards with 40 G storage or an implanted, wireless 500 G iPod with links directly into your audio-processing nerve center. Search: Visualization and Interaction for Business and Entertainment, Search: Kevin Wheeler of NASA (search for him) is working on this integration - using systems that monitor brain activity

in order to manipulate objects – say steering a Mars lander – by merely focusing on them. NASA seeks to eventually develop 'silent communication' between people by enabling them to read each others' minds by using non-invasive way sensors like hats or gloves. The next step gets scary. EEG (electroencephalogram) measures brain activity. So far in early experiments, NASA has been able to get volunteers to move a cursor on a screen merely by thinking left or right, up or down. This goes beyond biofeedback. It works through 128 sensors attached externally to the brain. When a person begins an activity, the electrodes monitor and records the brain waves provided that the associated activities, such as moving a cursor, are very focused. Finally, combining EMG with EEG and a limited vocabulary consisting of just commands and responses, two people could talk to each other just by thinking. See http://ti.arc.nasa.gov/

Want an embedded chip that streams info directly into the cerebral cortex or devices that enhance intell or memory?

6 - Voice Web accessible through device on lapel. This Internet will have truly arrived when you no longer notice it. Cars reading email to you. Anything with a chip could respond to your voice. Cars read email to you. Use your voice as a password. Speech recog, is a processing-intensive app and the hardware can't yet deliver. Superintelligent personal agents will anticipate your needs, whisper in your earbud – it would learn your preferences, environment, have plug-ins for finance, medical needs

Robots

One thing we won't see anytime soon are true bi-pedal robots like Star War's C3PO. First, robotics for most jobs are simply too expensive to develop in comparison to the billions of humans that can do the same thing cheaper We are easy to replace, re-programmable, self-maintaining and a known commodity management-wise. Second, human methods of judging spatial coordinates are immensely complex – why do you think you do not run into others when crossing a city street? They may be our pals though.

Quantum Computing

As the features in transistors shrink to where they are only a few atoms wide, it becomes harder to prevent electrons from wandering out of the channels in which they are supposed to be confined. Leakage drains batteries prematurely at best, if transistors are packed too close together, it can raise temperatures in chips high enough to destroy them even when they are not in use. Just as it becomes harder to push water through pipes as they get smaller, electrical current encounters increasing resistance as chip features shrink, requiring designers to apply higher voltages and thus use more power. Recent innovations have made it possible to mass-produce microchips with a billion transistors – 25 times as many as in today's Pentium 4 chips.

A group of physics researchers from the University of Wisconsin recently created a device that can store one bit of data in one atom. It uses a scanning tunneling microscope to detect the presence or absence of a single silicon atom which can be used to represent a binary zero or one. The data atom must be separated from its neighbors by a five by four cell of atoms, therefore requiring 20 atoms to securely store one bit. This translates to a storage density of 250 terabits per square inch – 2,500 times denser than the current 100 gigabits per square inch that can be stored in the most advanced hard disk drives. Reading data is slower than in hard disk drives, but writing data is currently too slow.

Quantum computing exploits the properties of atoms and their nuclei to create a different type of architecture through quantum physics -- that subatomic netherworld where reality can be and cease to be in nearly the same instant.

Similar to a traditional computer's use of transistors for creating the digital ones and zeros that compose program instruction, quantum computers rely on a particle's traits, such as the direction of its spin, for creating a state. For example, when the spin is up, a particle could be read as "one," and when its spin is down, the particle would be read as "zero."
These quantum bits, or qubits as they're known, demonstrate additional properties that differentiate them from traditional computer bits.

Soon, though, the flat silicon chip which is the computer's brain will become three-dimensional like the human brain with millions of layers networked to each other. Researchers at Rice and Yale Universities already have built molecules to function like on-off switches, as found in traditional gates in electronic circuitry. Recently HP patented the chemical process to connect molecular-scale electronics with the current larger circuitry.

Atoms and nuclei can exist in a state of superposition, where the values of one, zero, and the range in between can be represented concurrently. Furthermore, by entangling the spins of atoms, qubits can become wired together, enabling them to function as a collective whole.

This hybridization shatters the limitations of binary logic, bringing about a nonlinear computational power that far surpasses the capabilities of the fastest supercomputers available today. This level of parallel processing and its potential speed enhancements are nearly mind-boggling.

Imagine huge arrays of data being processed, searched, and manipulated instantaneously, or every conceivable input being amassed in one fell swoop. Imagine, also, a computer capable of factoring a 400-digit number within months, rather than taking billions of years as conventional technology currently requires. Many of today's security codes would be vulnerable to such a computer.