

Virtual Age: Next Wave of Change in Society

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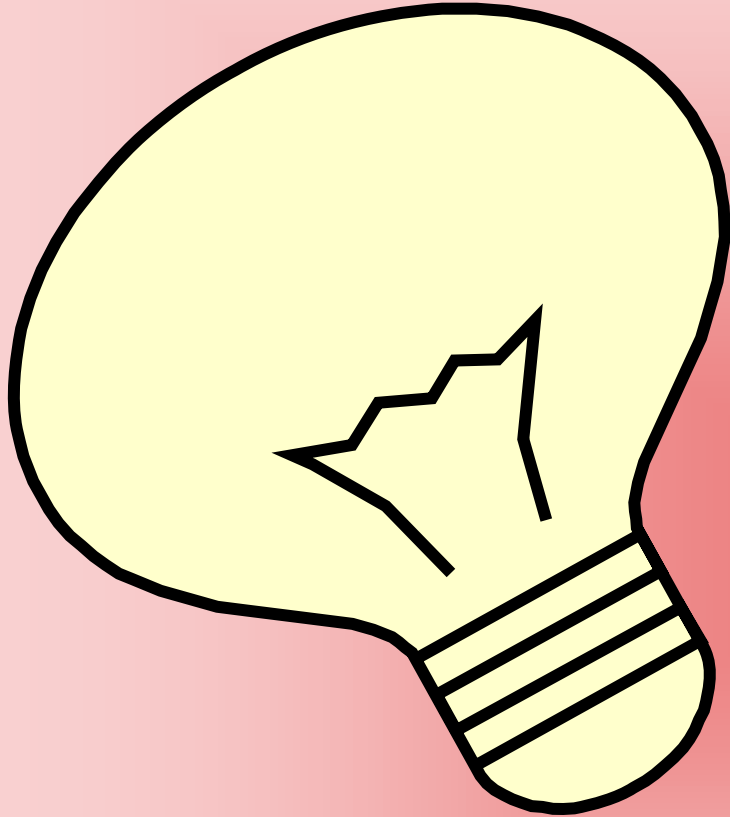


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Outline

- **Introduction: waves of change in human society**
- **Virtual age: fourth wave of change**
- **Enabling technologies**
- **Conclusions**

SCIENCE FICTION



**“IMAGINATION,
” said Albert
Einstein, “is more
important than
knowledge.”**

Imagination and fantasy often point the way to real-world developments. Many inventions, such as airplanes, radio, robots, the laser, and television, were first described in science fiction.

Waves of Change in Human Society

1st Wave: Agricultural Age
(29,500 Years) Goal: Produce Food



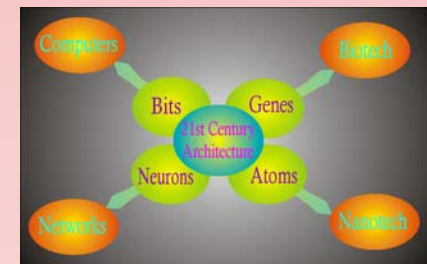
2nd wave: Industrial Age
(500 Years) Goal: Produce Goods



3rd wave: Information Age
(25 Years) Goal: Produce Information



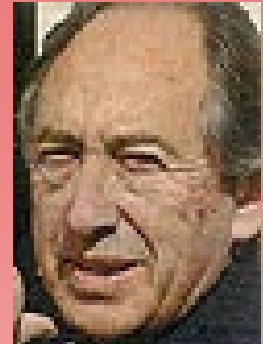
4th wave: ? Age
(20 Years ahead!) Goal: ?



What is the 4th wave of change?

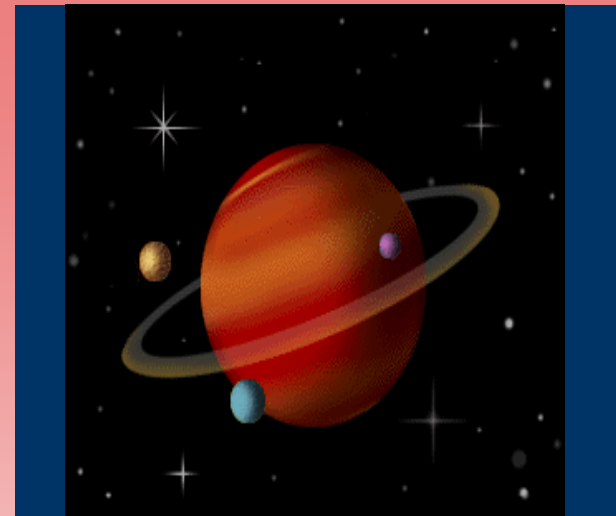
Alvin Toffler and the Third Wave

- He has written about society, culture, the media, organizations, science, computers, politics, and economics.
- Third wave, based not on muscle but on mind. It is what we variously call the information or the knowledge age.



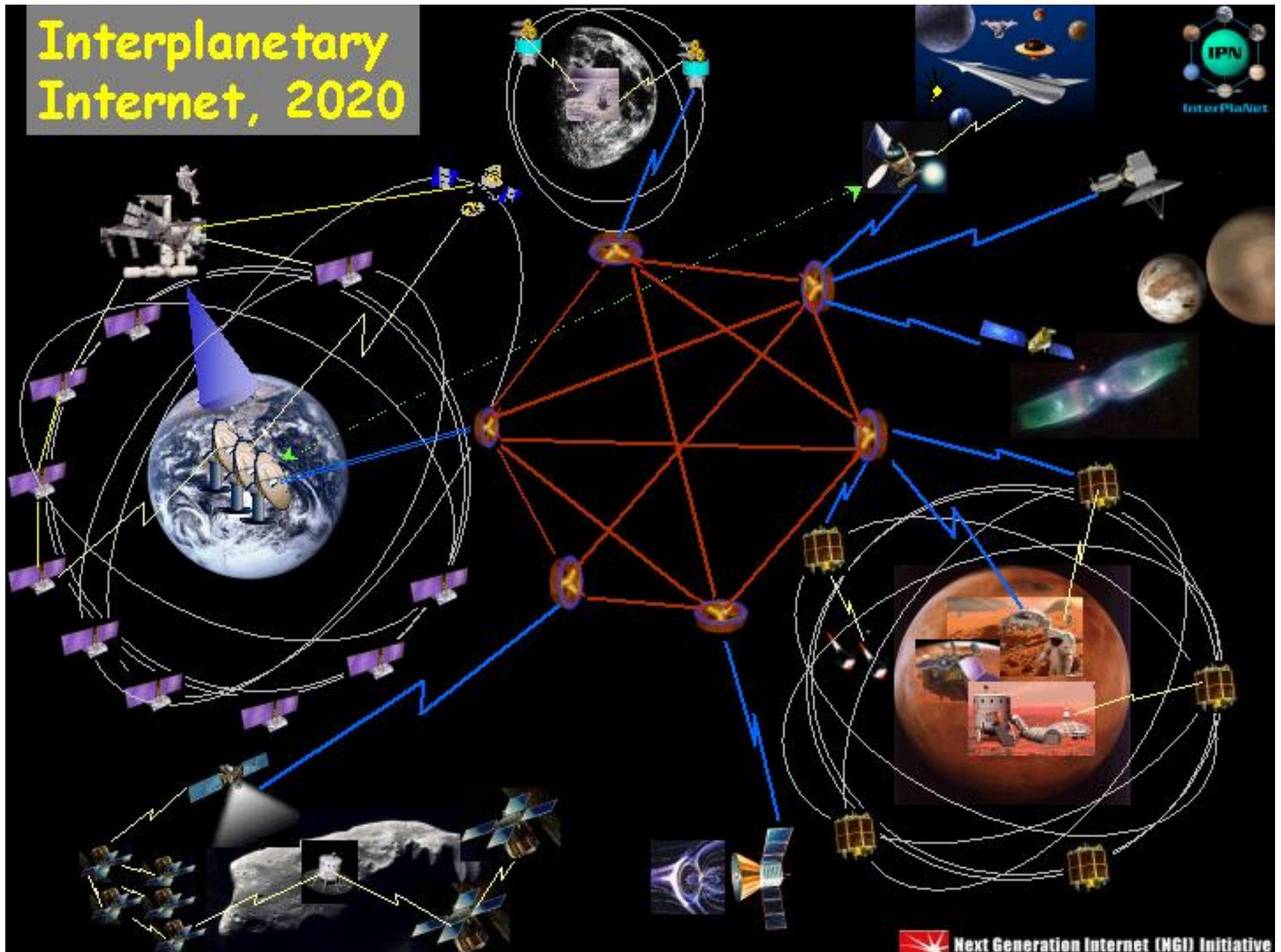
ARE THESE CATEGORIES STILL RELEVANT?

What is the Fourth Wave?



Space Age

Interplanetary Internet, 2020

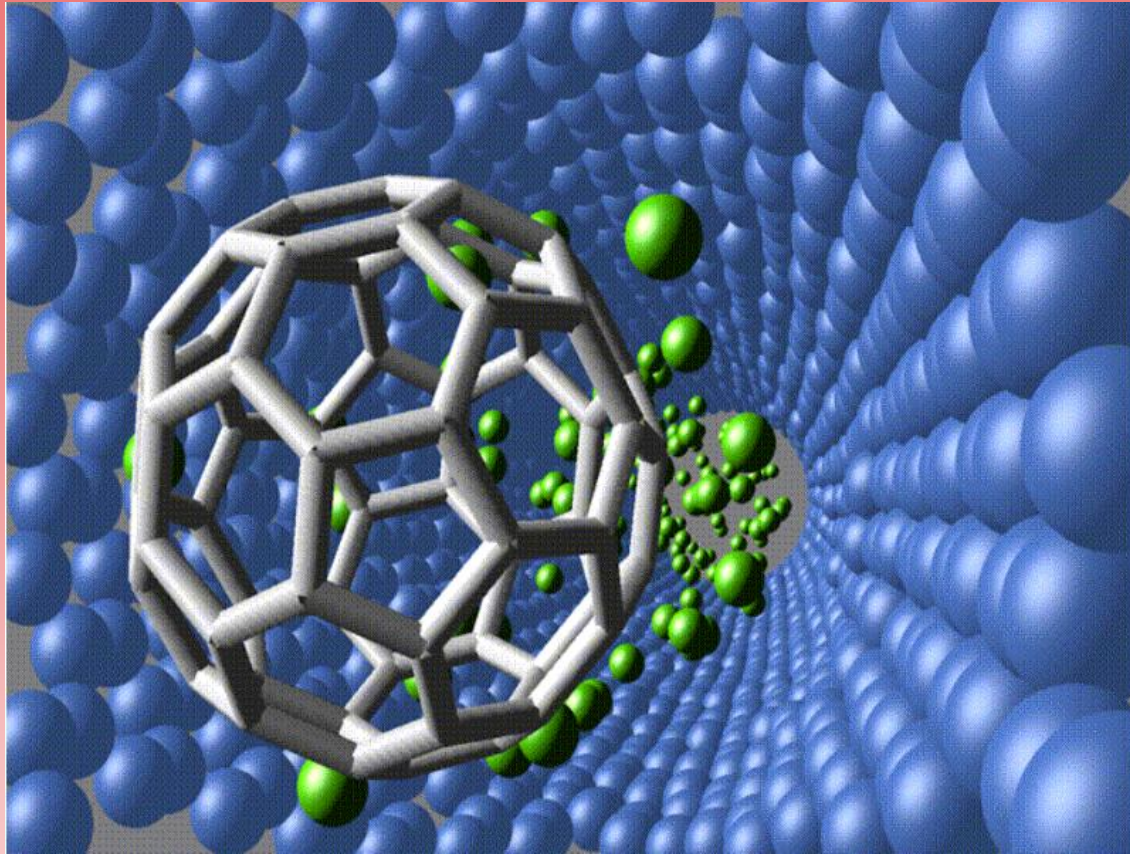


What is the Fourth Wave?



Genetic Engineering Age

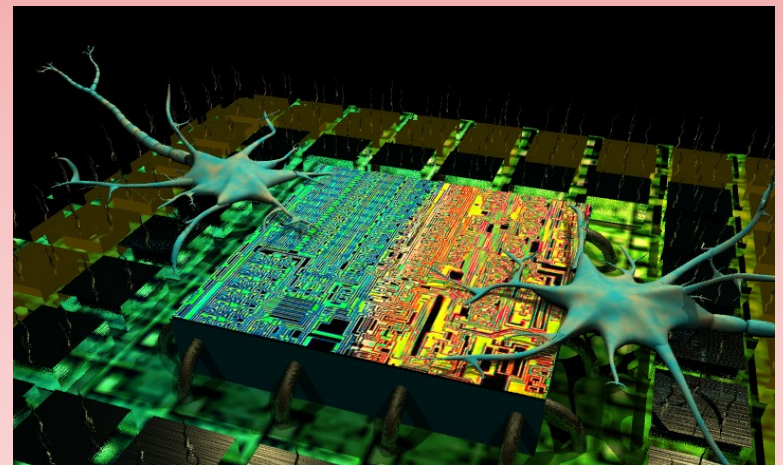
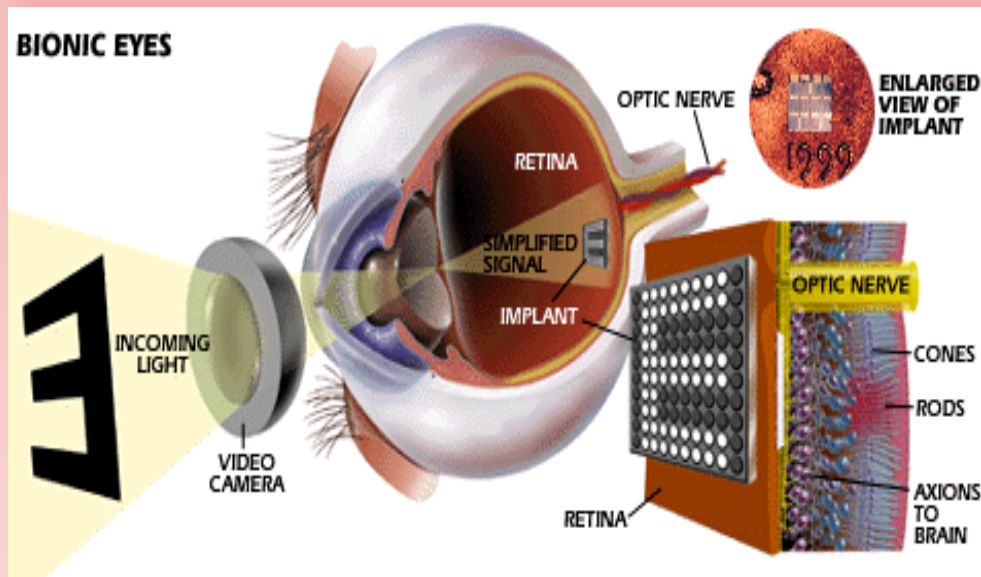
What is the Fourth Wave?



Nanotechnology Age

Life Sciences - Re-Engineering of Life Itself

- Tele-diagnostics Technologies
- Implantable Integrated Biodevices
- Recombinant DNA – Genopharmacology
- Bio-engineered Organisms, Tissue Systems, Organs



What is Fourth Wave?



Virtual Age

A Vision of Life in the 21st Century

- **Every person has easy access to all the accumulated knowledge of the human race.**
 - Any time, any place, any format, any language
- **Every person can interact with any other or every other human being any place, any time.**
 - Virtual commerce through cashless, paperless transactions
 - Virtual transportation and intelligent highways
 - Limitless individual and public entertainment options

A Vision of Life in the 21st Century

- **Every person has access to comfort, dignity and health**
 - Design/manufacturing for a sustainable planet
 - Abundant, clean, safe, affordable energy
 - Reliable, cost effective medical diagnostics and prostheses
- ***IEEE: <http://www.ieee.org/tab/grandchal.html>**

Virtual Technology is one of the key factors driving progress in the 21st century

Virtual Technology is transforming the way we:

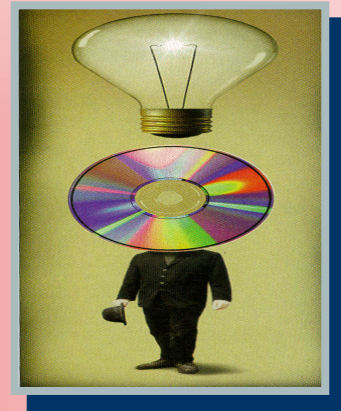
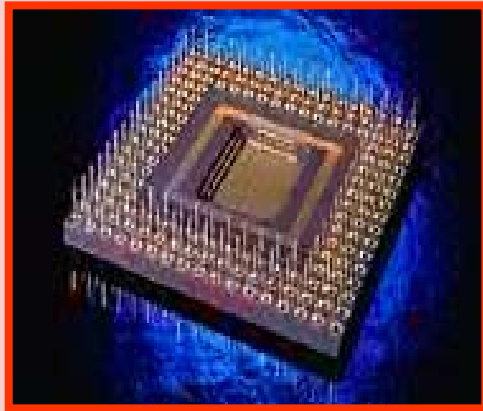
- Conduct commerce
- Conduct government
- Practice health care
- Design and build things
- Deal with the environment
- Communicate
- Deal with information
- Work
- Learn
- Conduct research

Virtual technology is creating a new infrastructure for business, scientific research, and social interaction

A 21st Century Virtual Community

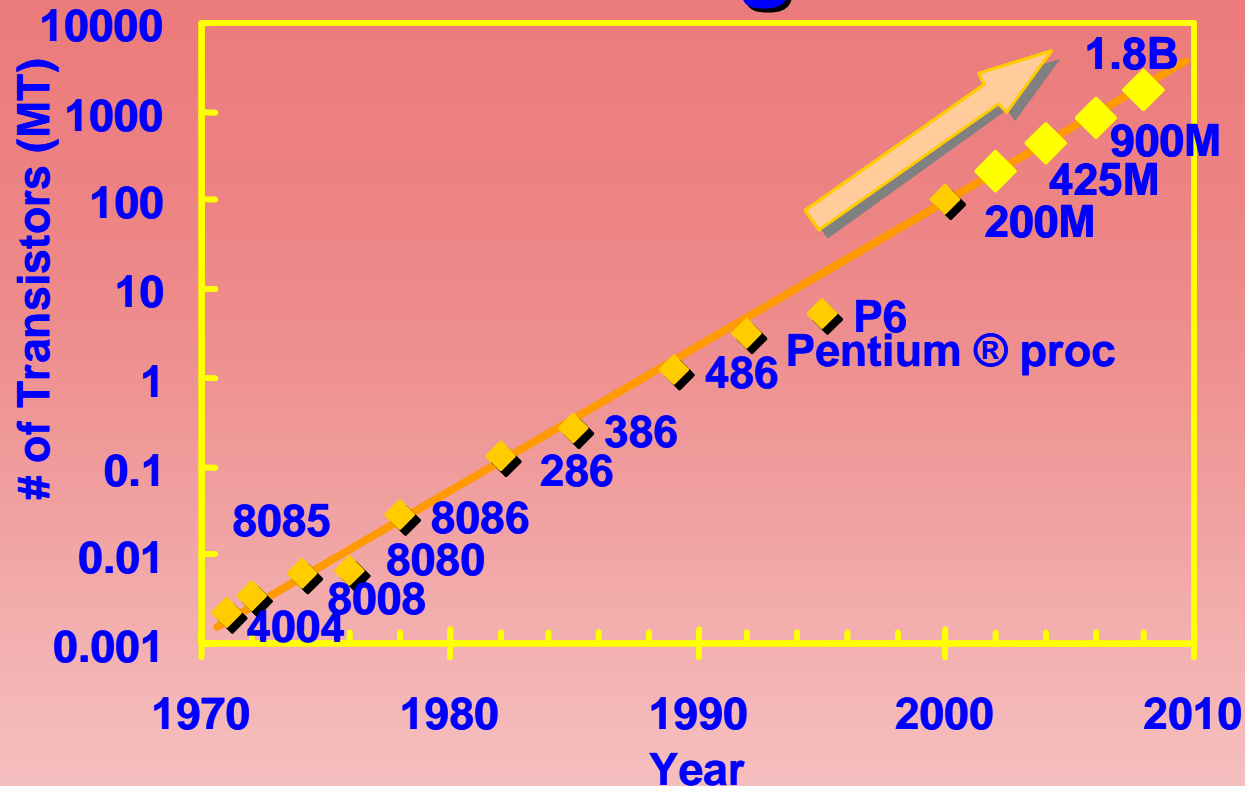
- is a community that has the necessary planning processes,
- Physical and virtual infrastructure,
- community services to meet these goals:
 - Prepare for unprecedented resident population and visitor growth
 - Compete in a global economy to create new jobs,
 - reduce unemployment,
 - increase incomes.

Enabling Technologies of Virtual Age



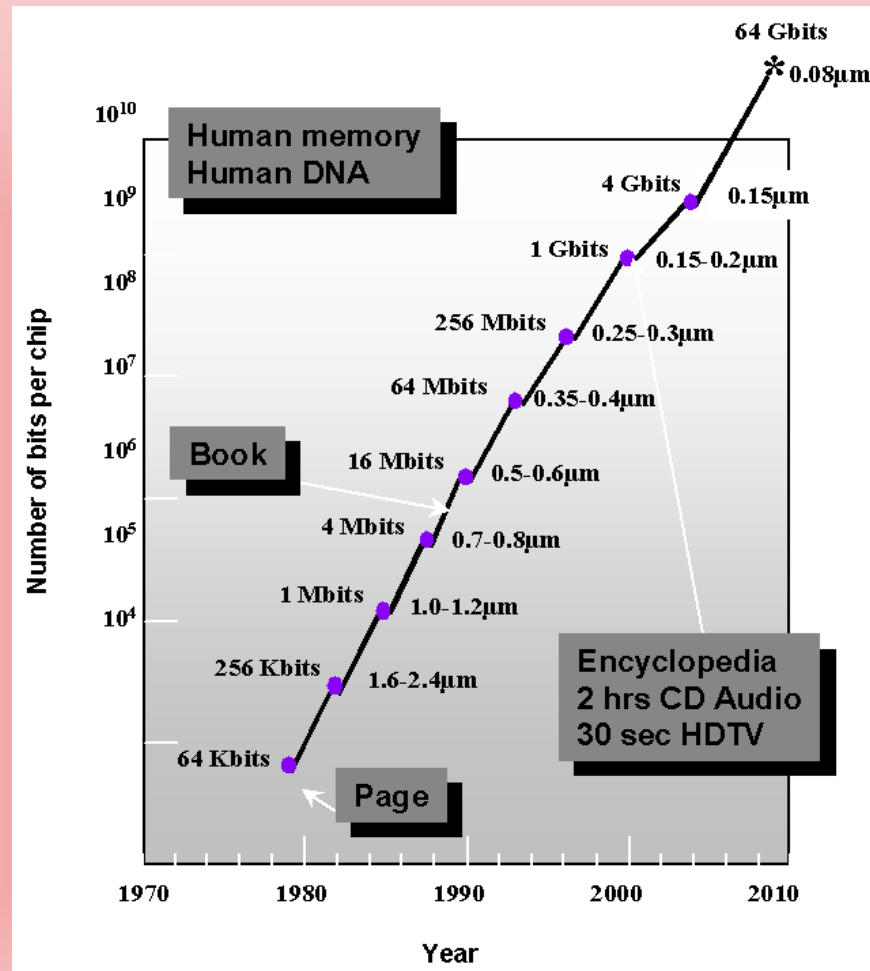
- ➡ **High Speed CPU's**
- ➡ **Large Capacity Memories**
- ➡ **High Speed Media**
- ➡ **Virtual Reality Software**

Microprocessor Complexity Growth: Following Moore's Law



- Transistors on lead microprocessors double every 2 years
- Several billion transistors on the lead microprocessors today!
- More functionality and faster operation

Large Capacity Memories



- Solid-State memory capacity following exponential growth
- Multi giga-bit memory chips available today

Mass Storage Memories

Available:

CD-ROM	650 MB	325,000	Pages
DVD-ROM	4.5-17 GB	8,500,000	Pages
NANO-CD	400 GB	200,500,000	Pages
Magnetic Diskette	1000 GB	500,000,000	Pages

Under Research:

3 D LASER MEMORY

1 Tera B 500,000,000 Pages

Size: a cubic sugar



FINAL

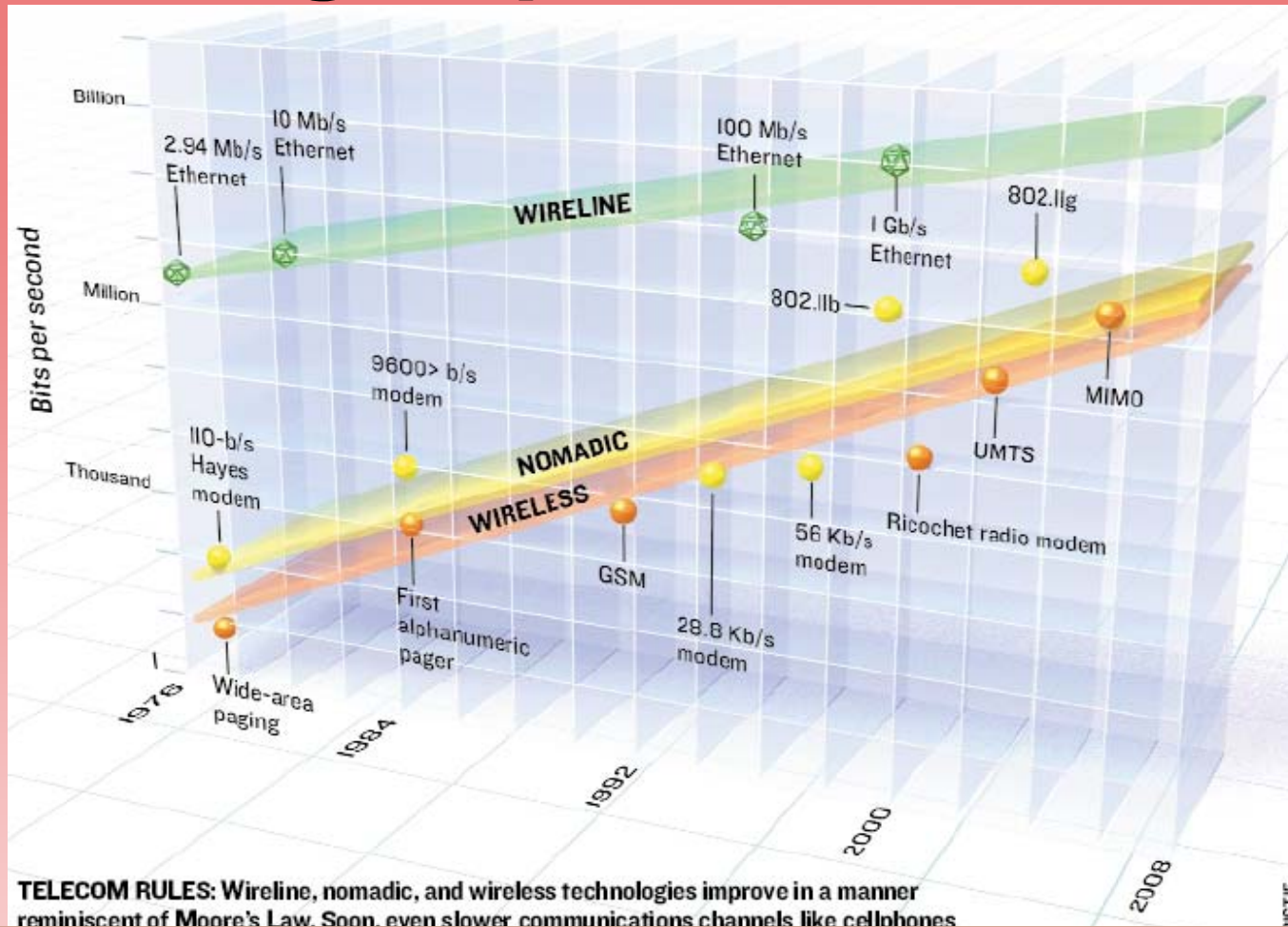
MOLECULAR MEMORY

1000 Tera B

More than human knowledge

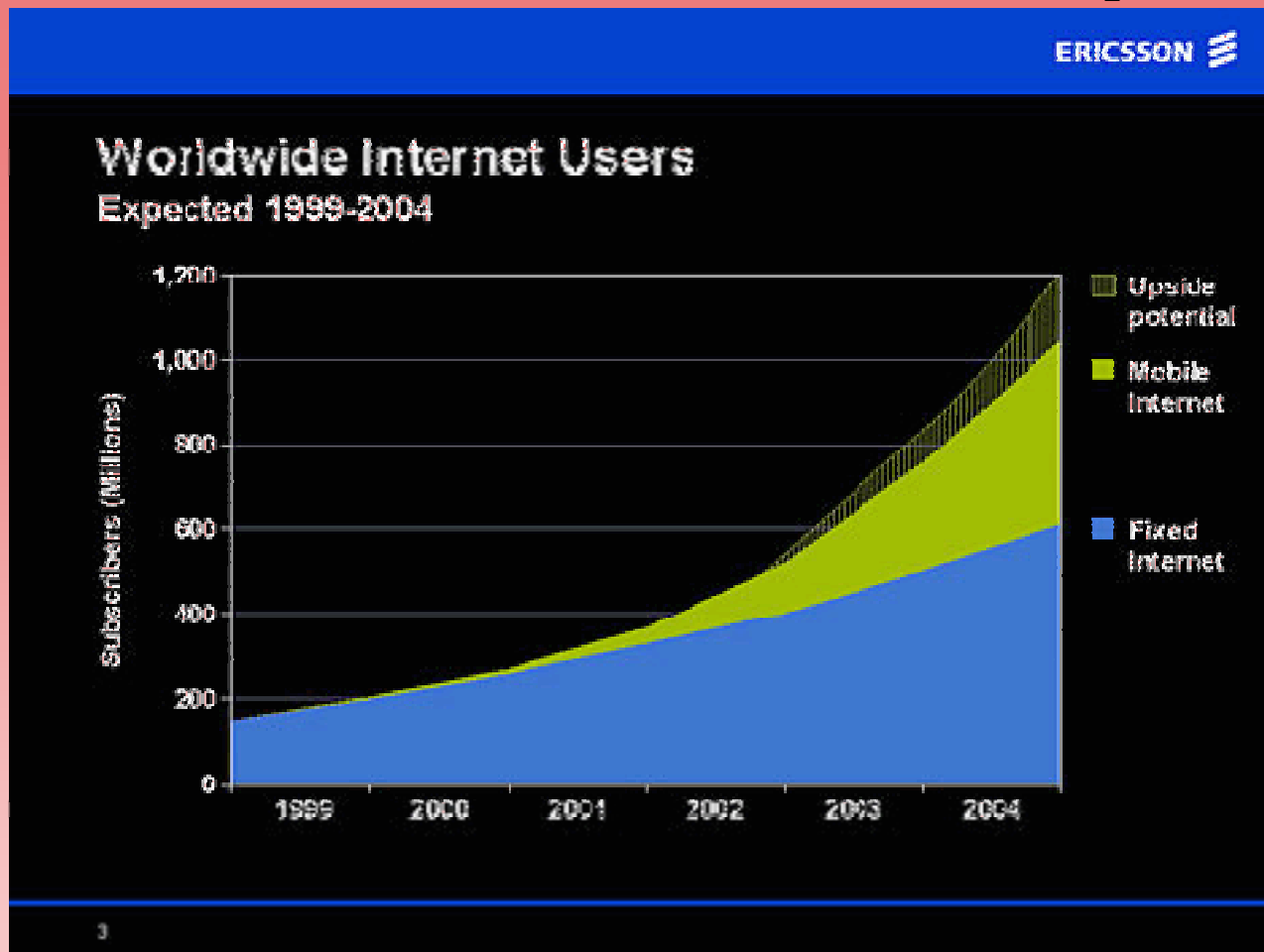
Size: A molecule

High Speed Media



- Exponential growth in bandwidth of all types of communication media

Mobile Internet Development



- *Mobile internet will facilitate ‘anything, everywhere, anytime’ communications*

Conclusions

- **The Fourth Wave of change is Virtual Age.**
- **The Virtual Age is creating virtual world.**
- **Enabling technologies of virtual age include: high speed CPUs, high capacity memories, high speed media, and virtual reality software**
- **Enabling technologies all show exponential growth over time and hold great promises**

... our needs for food (1st wave), goods (2nd wave) and information (3rd wave) have been met.

Finally, by entering the Virtual Age (perhaps, two decade from now), we need something more that is probably ‘spirituality’ ...

