


*An Exponentially Expanding Future
from Exponentially Shrinking
Technology*

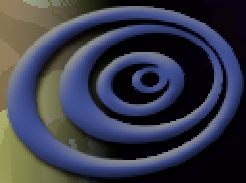
Foresight Institute
New Conference on Advanced Nanotechnology
October 22, 2004

Ray Kurzweil

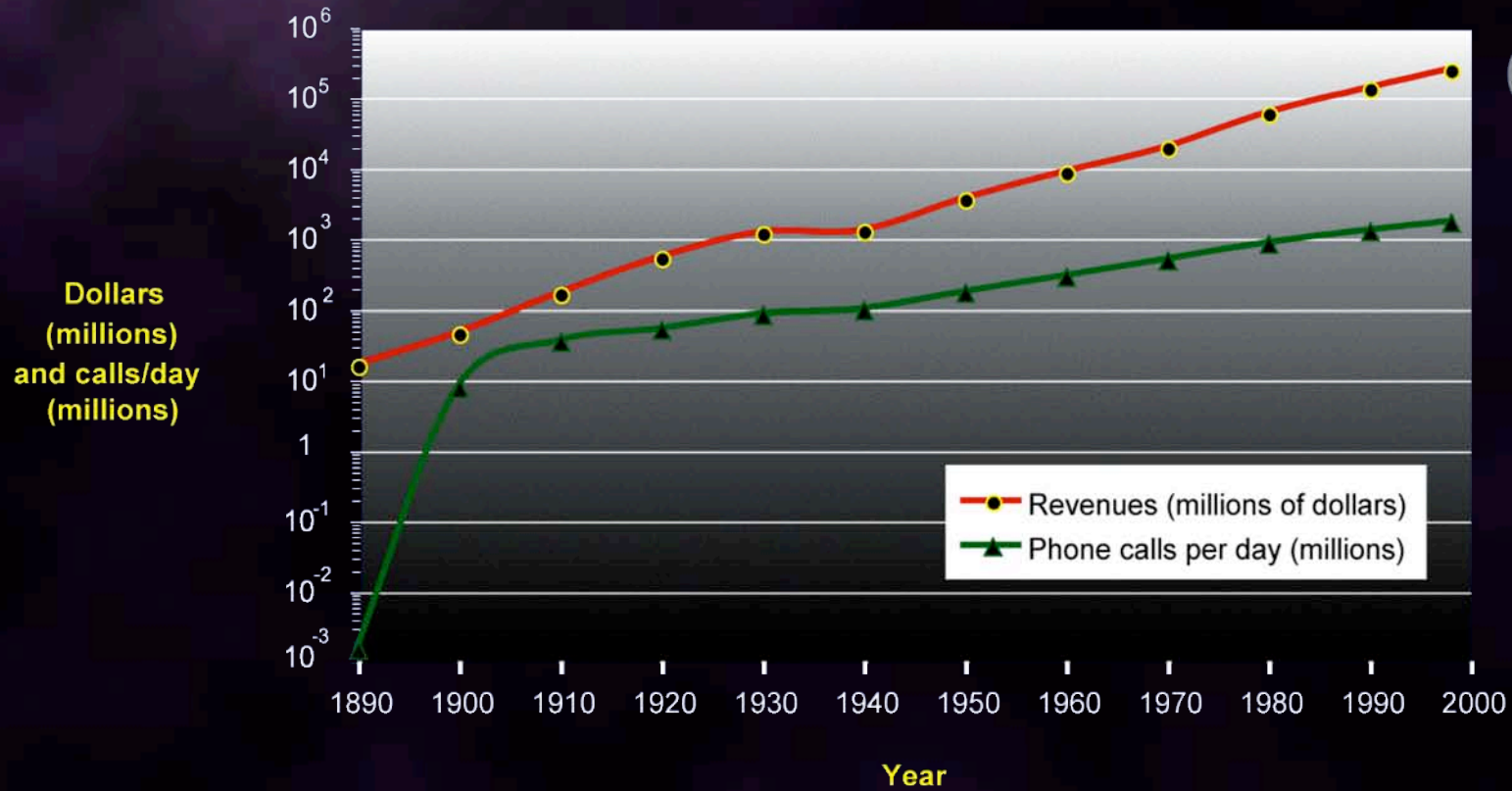




The Paradigm Shift Rate
is now doubling every decade

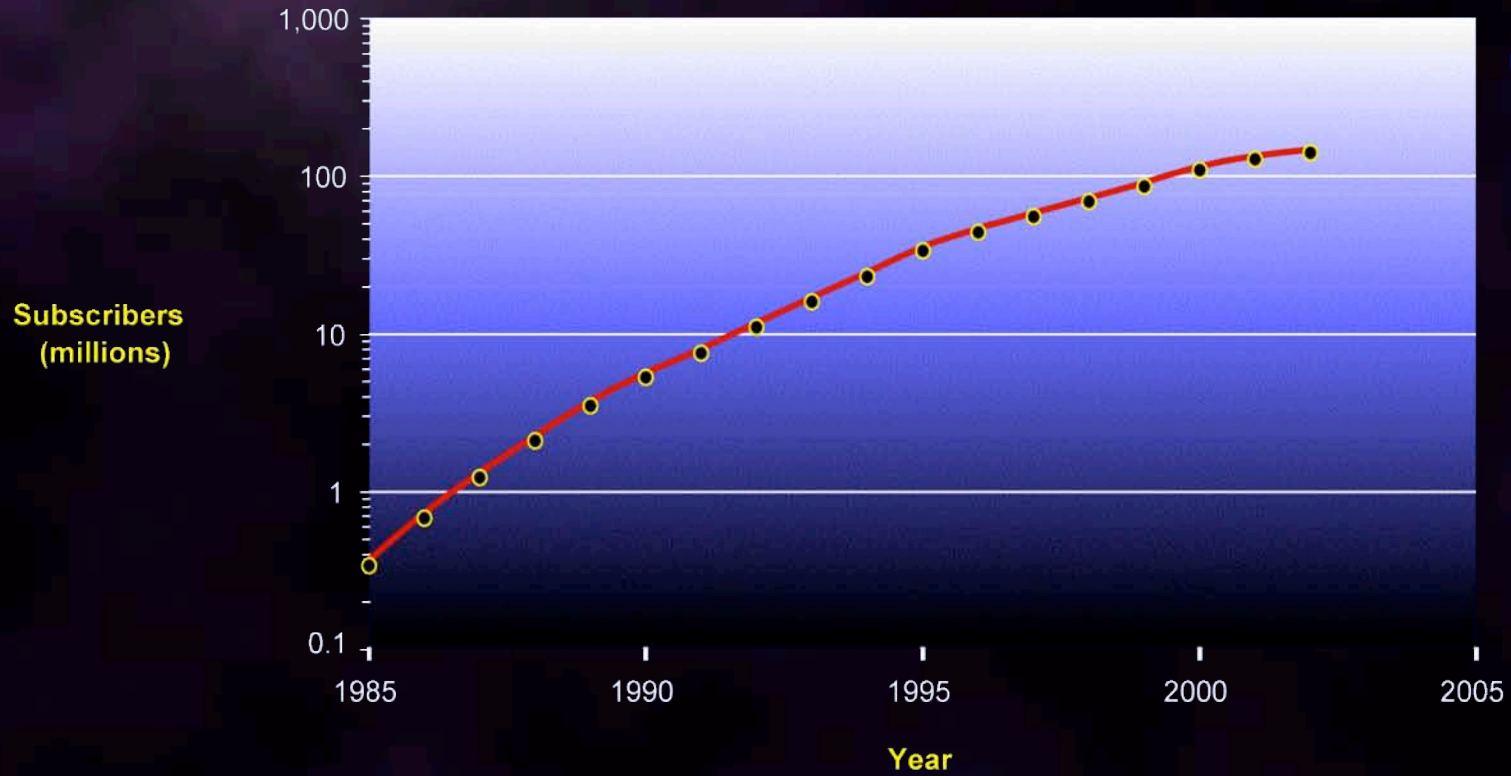


Growth of U.S. Phone Industry



Data from: AT&T Labs

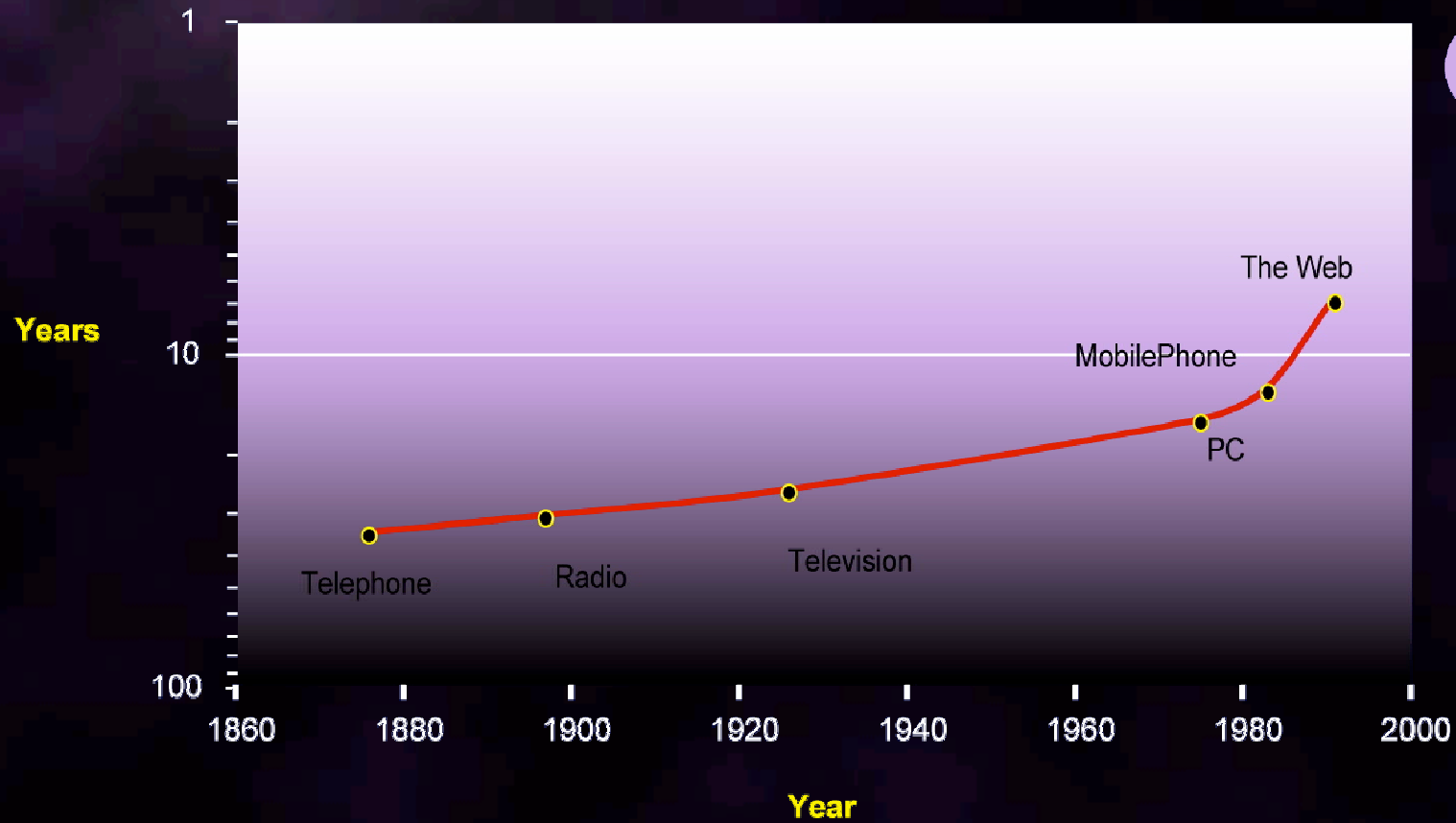
Estimated U.S. Cell Phone Subscribers



Data from: Cellular Telecommunications & Internet Association

Mass Use of Inventions

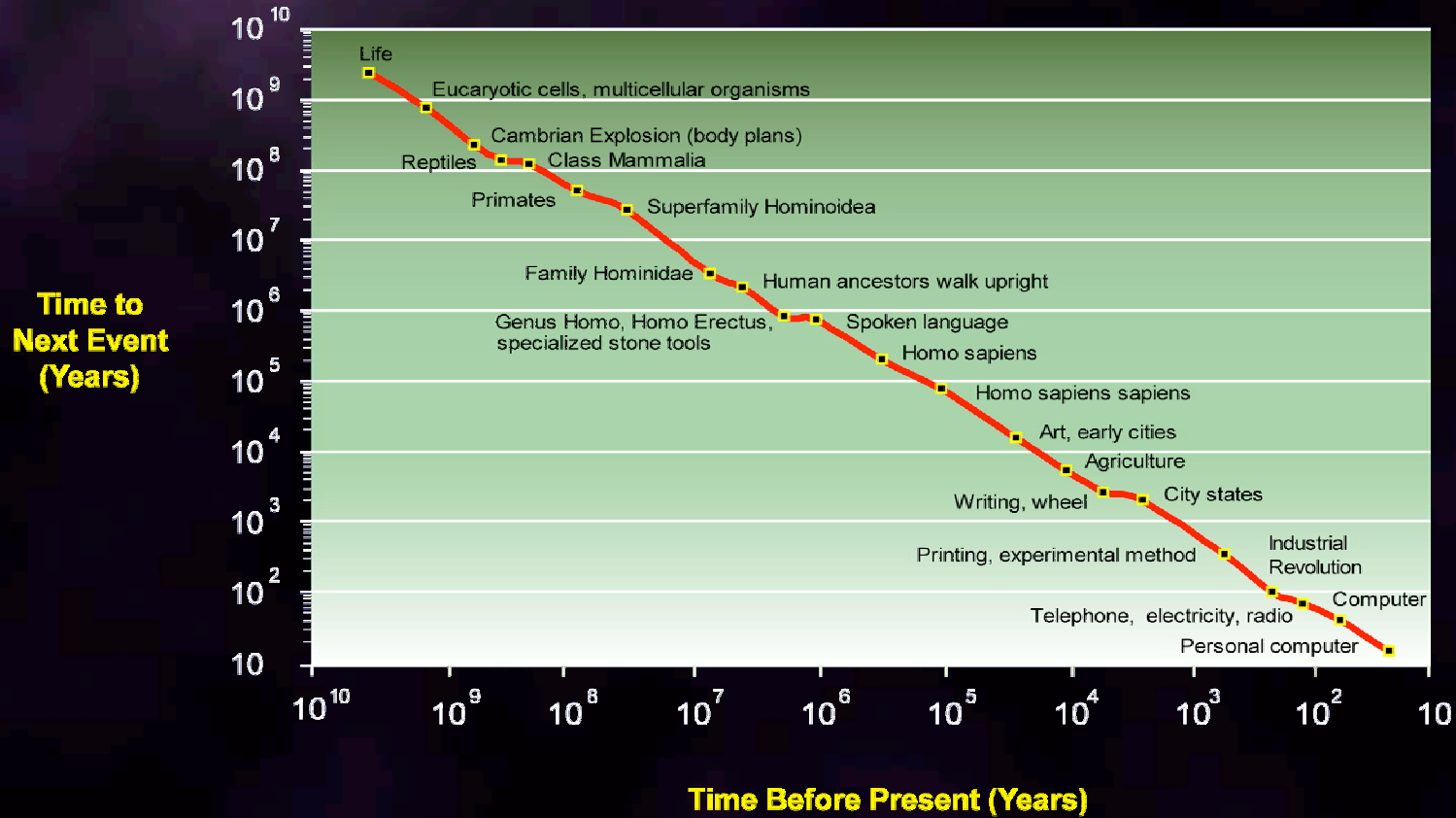
Years Until Use by 1/4 U.S. Population



Data from: The Millennium Notebook, Newsweek

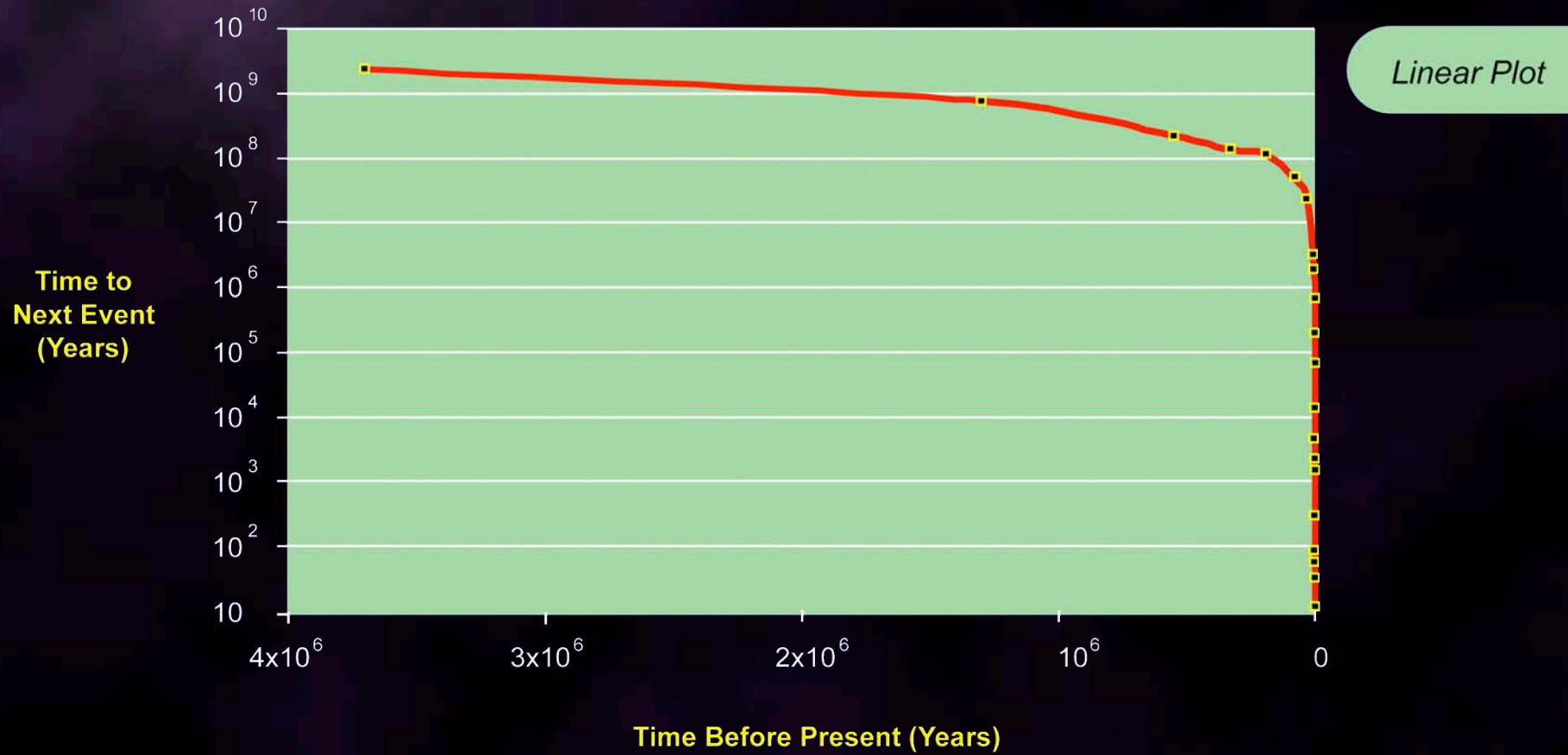
Countdown to Singularity

Logarithmic Plot



Source: Ray Kurzweil, KurzweilAI.net

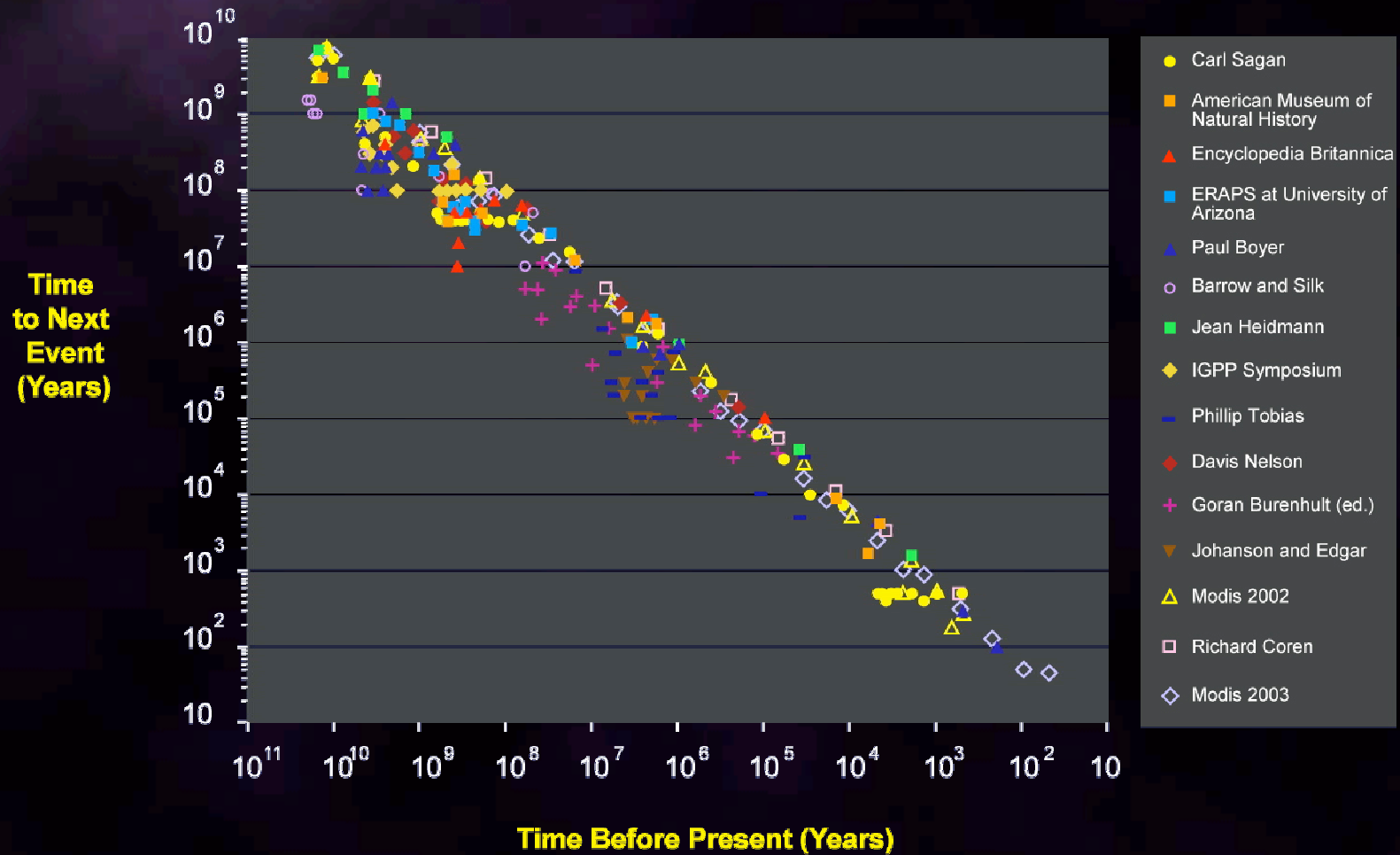
Countdown to Singularity



Source: Ray Kurzweil, KurzweilAI.net

Paradigm Shifts for 15 Lists of Key Events

Logarithmic Plot

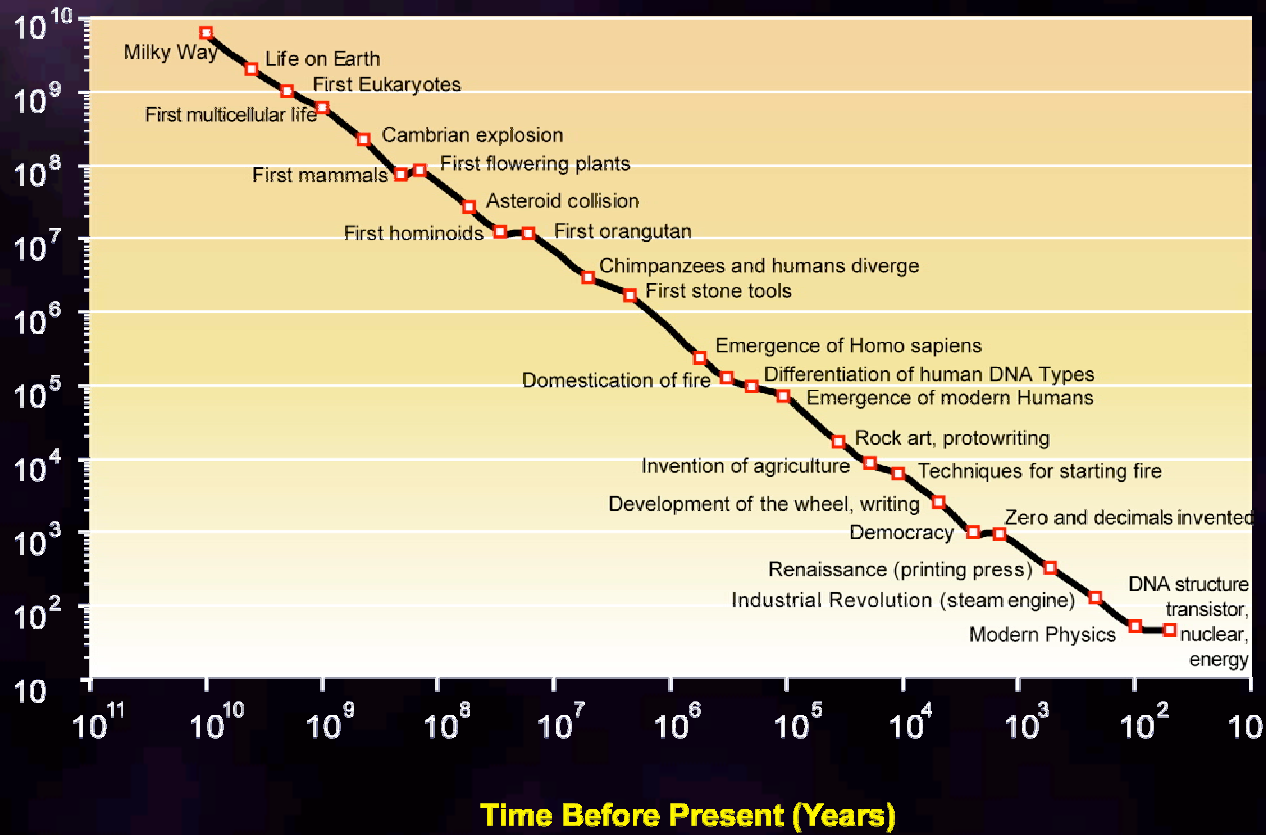


Source: T. Modis

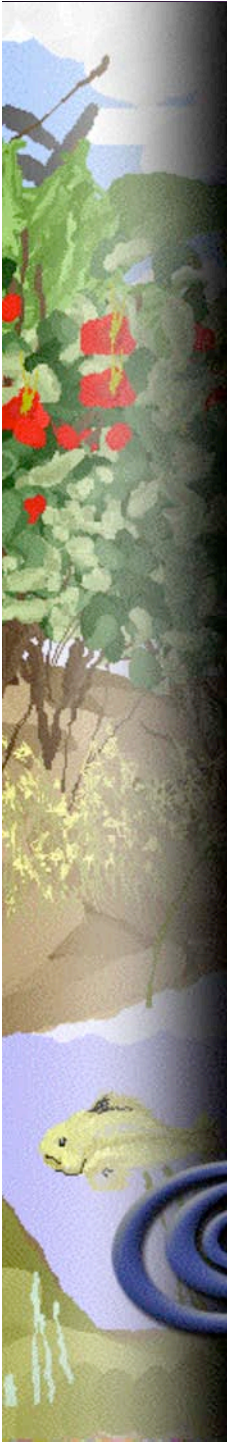
28 Canonical Milestones

Logarithmic Plot

Time to Next Event (Years)



Source: T. Modis



Information Technologies *(of all kinds)*
double their power *(price performance,
capacity, bandwidth)* every year

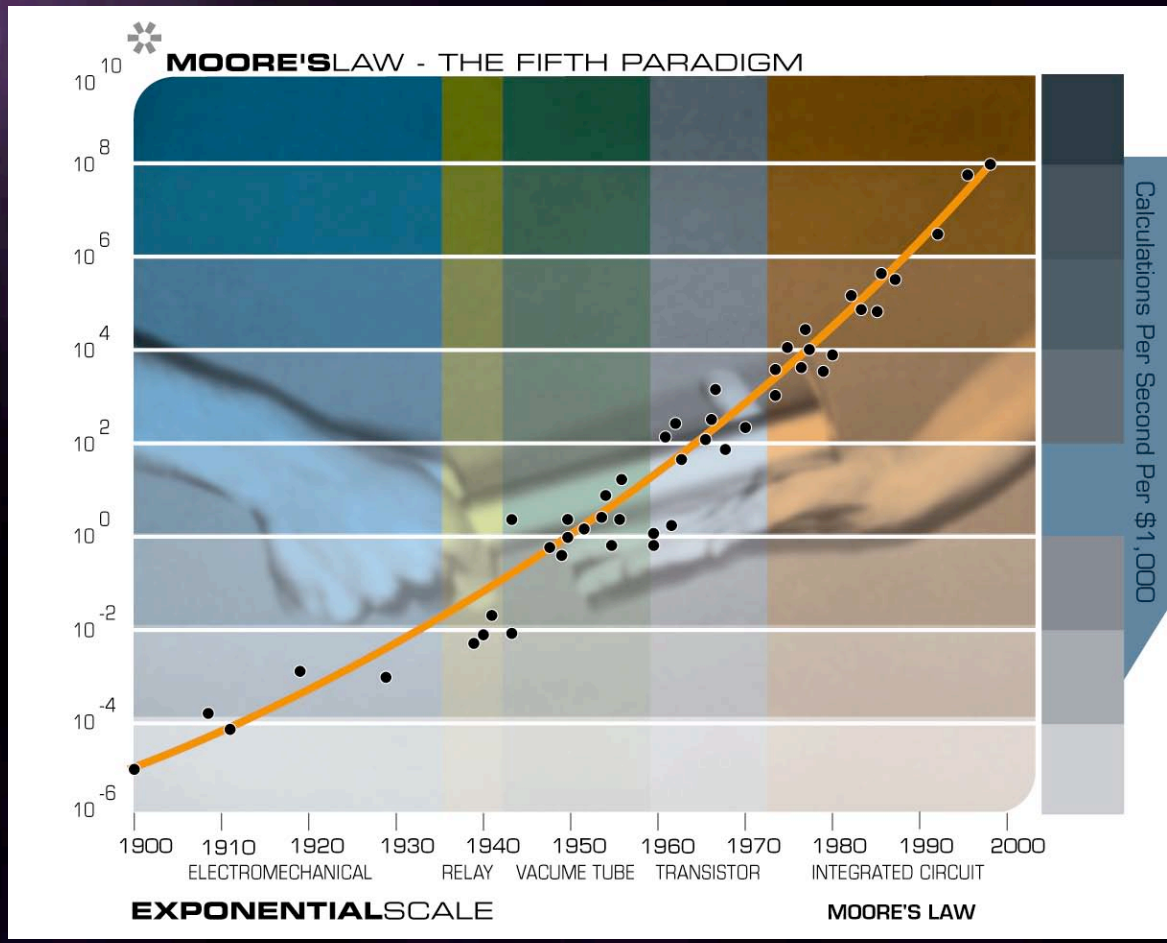
A Personal Experience

Measure	MIT's IBM 7094	Notebook Circa
2003 Year	1967	2003
Processor Speed (MIPS)	0.25	1,000
Main Memory (K Bytes)	144	256,000
Approximate Cost (2003 \$)	\$2,000,000	\$2,000

22 Doublings of Price-Performance in 36 years,
doubling time: 19 months not including vastly
greater RAM memory, disk storage, instruction
set, etc.

Moore's Law is one example
of many....





Evolution of Computer Power/Cost

MIPS per \$1000 (1998 Dollars)

Million

1000

1

1
1000

1
Million

1
Billion

Brain Power Equivalent per \$1000 of Computer

Human

Monkey

Mouse

Lizard

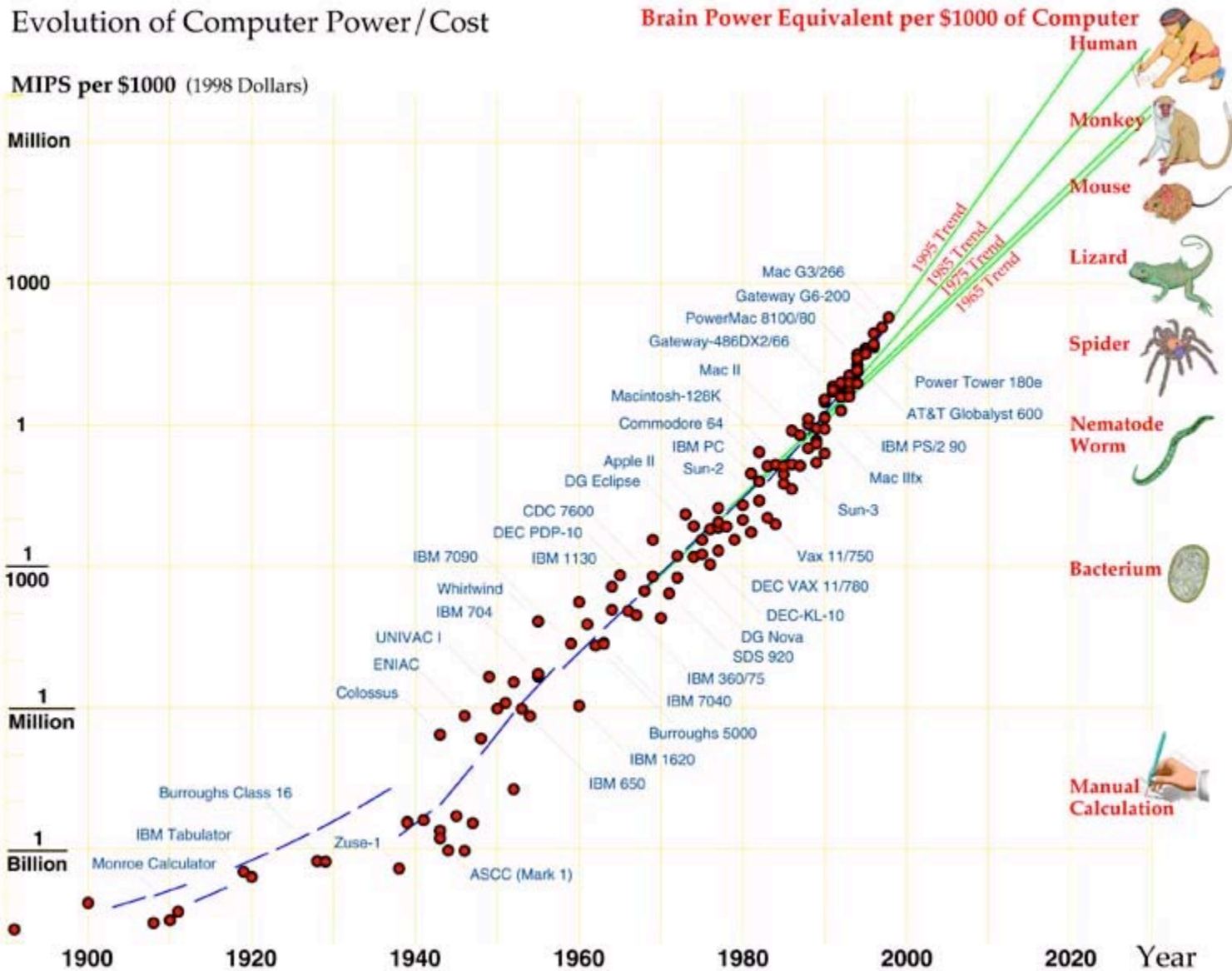
Spider

Nematode
Worm

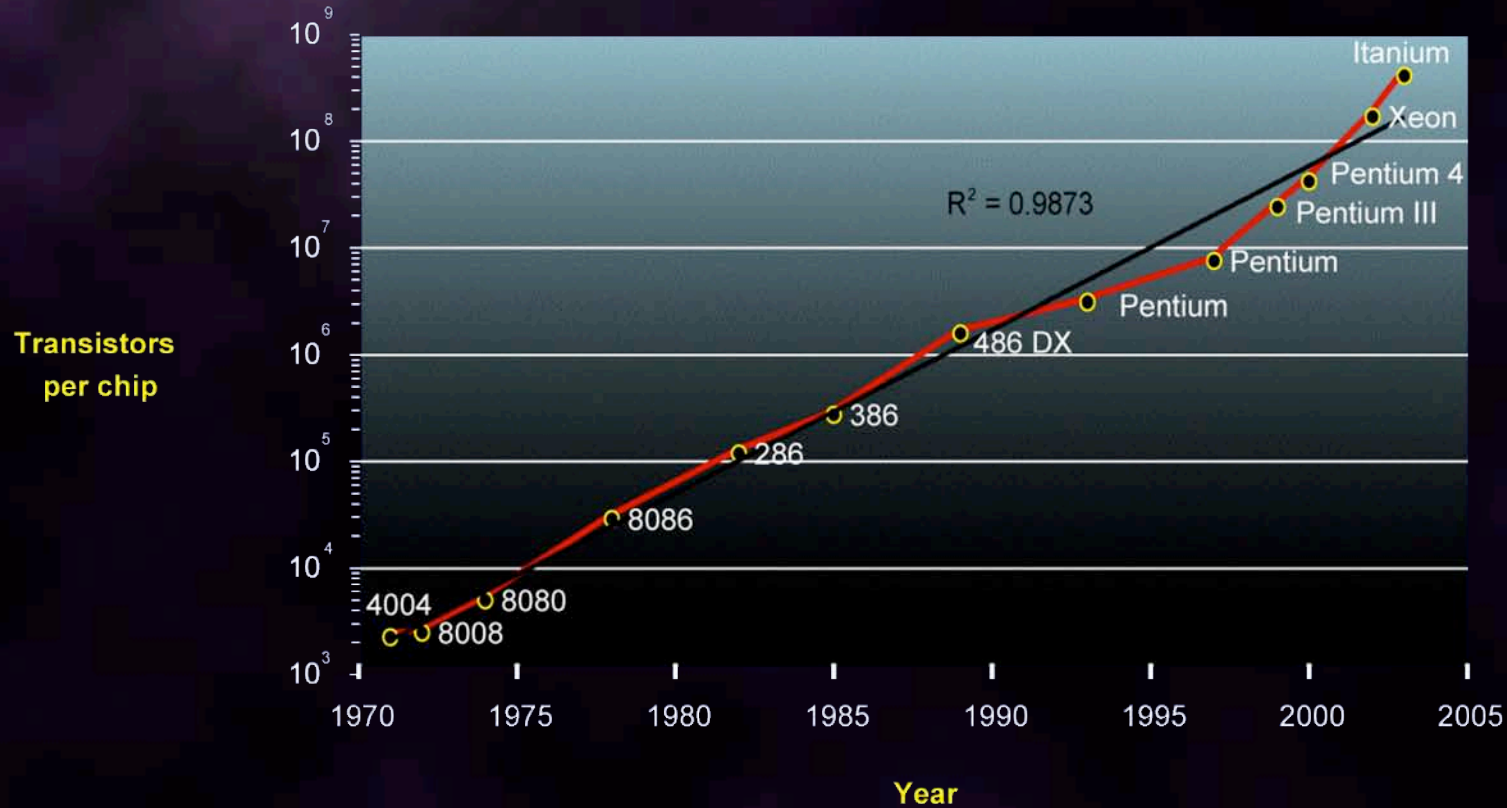
Bacterium

Manual
Calculation

1900 1920 1940 1960 1980 2000 2020 Year



Transistors (Intel processors)



Data from: Intel Research

Doubling time: 2 years