

# “Digital Technology Impact on Civilization”

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Shang-Sheng Jeng

March 26 2008

# Content

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- Prologue
- The Past Civilization
- Human Civilization Development-  
Paradigm Shift (Energy and Tools)
- “What kind of World it is?”
- The Birth of Information Civilization
- My Observations

# Content

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- Impact of IT, Network and the Web
- Case to watch: Why Gopher was Dead?
- Case to watch: IBM and Google?
- Explore Future with New Tools and New Concepts
- Epilogue

# *Prologue*

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# Why this topics?

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- Civilization transition as a grand splendid game
- What we lost in last civilization transition?

# Civilization Transition

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- Homo sapiens (智人種)
- Agriculture Civilization
- Industry Civilization
  - Mechanical based industry civilization
  - Electronic based industry civilization
- Information (Cyber) Civilization
- Planetary Civilization



DAN RICHTER

MOONWATCHER'S  
MEMOIR

— A Diary of —  
2001: A Space Odyssey



FOREWORD BY ARTHUR C. CLARKE

What we lost in last  
civilization  
transition?

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# “The Decline and Fall of China Empire”

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- China Empire: The pre-Capitalism in Song Dynasty
- 元朝成吉思汗的武力帝國
- 明朝 鄭和（1371～1435）在公元一四〇五至一四三三年這段短暫的時間，總兵太監 鄭和 所指揮的寶船船隊，七次英雄式的遠航，遍及了中國海與印度洋，從台灣到波斯灣，並遠及中國人心目中的黃金國-- 非洲。

# “The Decline and Fall of China Empire”

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- 黃宗羲, 顧炎武, 王夫之, 朱舜水-- The Response to the Clash of China Empire
- 王夫之 (1619~1692) 《黃書》
- 黃宗羲 (1610~1695) 《明夷待訪錄》

## 顧炎武 (1613-1682)

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- 《日知錄》卷十三《正始》：
- “有亡國，有亡天下，亡國與亡天下奚辨？  
曰：易姓改號，謂之亡國；  
仁義充塞，而至於率獸食人，人將相食，謂之亡天下。”
- “是故知保天下，然后知保其國。  
保國者，其君其臣，肉食者謀之；  
保天下者，匹夫之賤，與有責焉耳矣。”

# Response to Industrialization

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- The Response of Russia: Peter the Great (1672~1725)
- The Response of Japan: "Meiji Reform" (1868~1912)
- The Response of China: "戊戌變法" in Ching Dynasty (1898~1911)

# “The Emptiness of Chinese Civilization”

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- 從三位中國的文化精英, 看二十世紀的“中國文明的無望掙扎”
- 王國維 ( 1877年12月3日 清光緒三年 ~ 1927年6月2日 )
- 陳寅恪 ( 1890年 ~ 1969年10月7日 )
- 余英時 ( 1930年1月22日 ~ )

# “The Emptiness of Chinese Civilization”

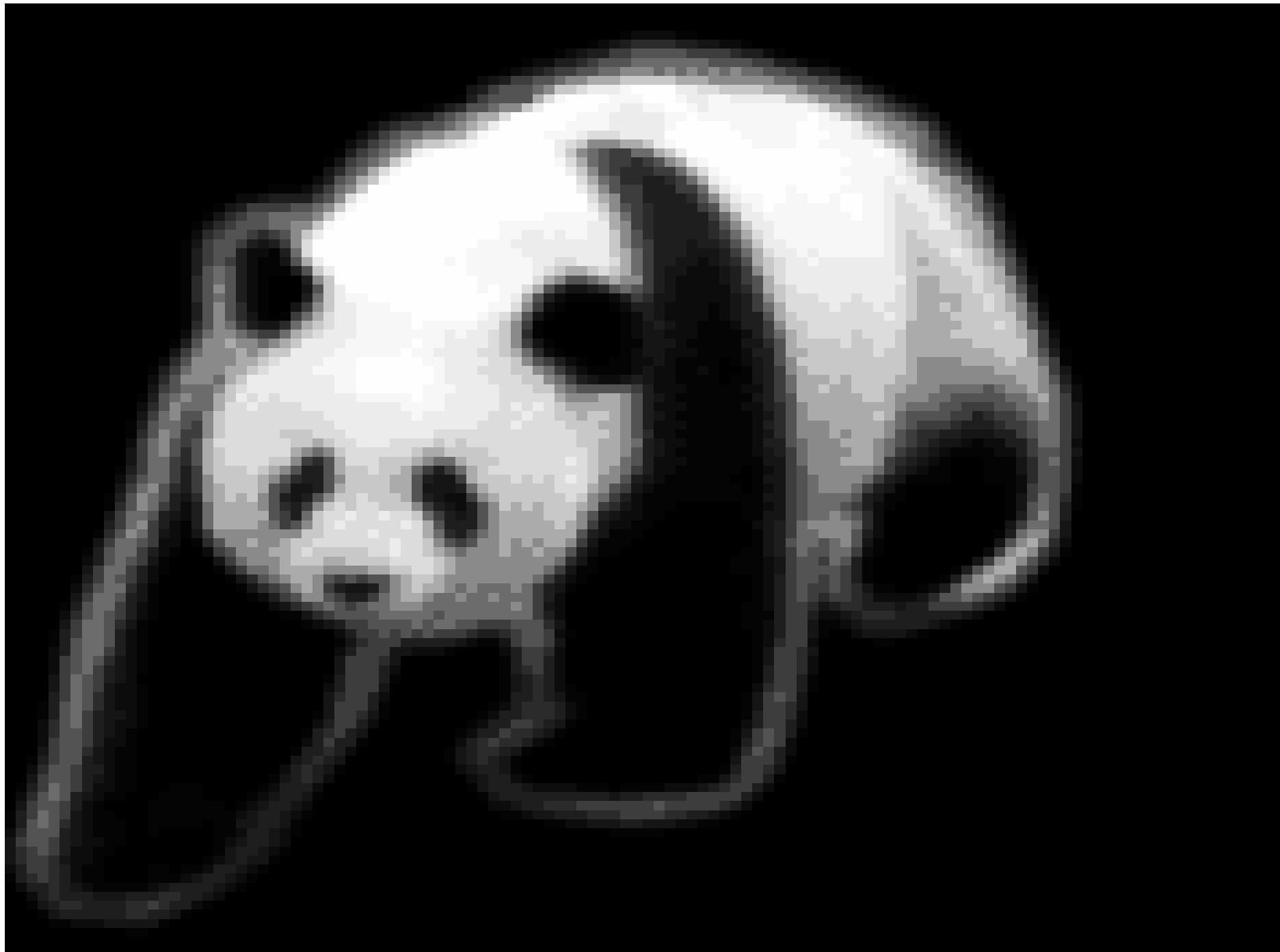
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- 全盤西化: 陳獨秀, 李大釗, 胡适, 魯迅, 錢玄同, 陳序經, 吳虞, 李敖
- 新儒家: 熊十力, 馬一浮, 錢穆, 陳寅恪, 湯用彤, 馮友蘭, 賀麟, 方東美, 張君勱, 徐復觀, 唐君毅, 牟宗三, 胡秋原
- 自由主義: 雷震, 殷海光
- 共產主義: 毛澤東, 鄧小平, 江澤民, 胡錦濤

## 《紅樓夢》第二十七回

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- 黛玉葬花詞
- 爾今死去儂收葬，未卜儂身何日喪？儂今葬花人笑痴，他年葬儂知是誰？
- 試看春殘花漸落，便是紅顏老死時。一朝春盡紅顏老，花落人亡兩不知！



# Industry Civilization- Impact to Female in Taiwan

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- **3 Machines liberate female from housekeeping**
- Gas, Electric, Microwave Oven
- Refrigerator
- Washing Machine

# What's the objectives for you?

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- Awareness of future for your generation
- Challenge and response
- Wandering, wealth, and wellness

善戰者，  
求之于勢，  
不責于人。

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孫子兵法：兵勢第五

“先處戰地而 待敵者佚，  
後處戰地而 趨戰者勞。”

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孫子兵法 虛實篇

**The Power to define  
The Battlefield: MS Vs. Java**

"ye shall know the  
truth, and the truth  
shall make you free."

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John 8:32

# Attitude for Future

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- 1<sup>st</sup> Attitude: Manipulate Future Vision
- 2<sup>nd</sup> Attitude: Participate Future Creation
- 3<sup>rd</sup> Attitude: Expired by Future Surprise

# *The Past Civilization*

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# Understand the Past

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- Civilization transition: the rise and fall of civilization
- From “the rise agriculture civilization” to “the rise of industry civilization”
- From “the decline and fall of China empire” to “the emptiness of Chinese civilization”

# The Rise and Fall of Civilization

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- “*A Study of History*” by Arnold J. Toynbee
- “Challenge and Response,” paradigm
- In it he traces the birth, growth and decay of some 21 to 23 major civilizations in the world.

# Civilizations in the World

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- These are: Egyptian, Andean, Sinic, Minoan, Sumeric, Mayan , Indic, Hittite, Hellenic, Western, Orthodox Christian (Russia), Far Eastern (Korea/Japan), Orthodox Christian (main body), Far Eastern (main body), Iranic, Arabic, Hindu, Mexic, Yucatec, and Babylonian.

# Civilizations in the World

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- There are four “abortive civilisations” (Abortive Far Western Christian, Abortive Far Eastern Christian, Abortive Scandinavian , Abortive Syriac) and five “arrested civilisations” (Polynesian, Eskimo, Nomadic, Ottoman, Spartan); thirty in all.

# The Rise and Fall of Civilization

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- “*The Decline of the West*” by Oswald Spengler (1918~1922)
- “*The History of the Decline and Fall of the Roman Empire*” by Edward Gibbon (1776~1788)
- “*The Rise and Fall of the Great Powers*” by Paul Kennedy (1989)

# The Rise and Fall of Civilization

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- “*Guns, Germs, and Steel: The Fates of Human Societies*” by Jared Diamond (1997)
- The basis of Diamond's theory through the Story of Crops, Animals, Germs, Technology and Geography.

# Guns, Germs, and Steel

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- How did different crops spread and where were they most effective? Wheat, Rice, Corn, Sorghum.
- Areas with domesticable animals thrived while those with less useful animals lagged behind. Cattle, Goats, Horses, Sheep, Pigs, Llamas, or Zebra.

# Guns, Germs, and Steel

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- Why did some people survive outbreaks of germs and not others? Smallpox or Malaria.
- Why did some civilizations evolve faster than others? Steel or Writing.
- For some civilizations their location was the key to their success or downfall. Latitude and Climate, Shape of the Continents, or Cities and Civilizations.

# The Rise and Fall of Civilization

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- “The Paradox of American Power” by Joseph S. Nye Jr. (2002)

# The Paradox of American Power: Leading States

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- |                            |               |
|----------------------------|---------------|
| ■ 16 <sup>th</sup> Century | Spain         |
| ■ 17 <sup>th</sup> Century | Netherlands   |
| ■ 18 <sup>th</sup> Century | France        |
| ■ 19 <sup>th</sup> Century | Britain       |
| ■ 20 <sup>th</sup> Century | United States |
| ■ 21 <sup>th</sup> Century | United States |

# Leading States' Power Resources: Spain (16<sup>th</sup> Century)

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- Gold Bullion
- Colonial Trade
- Mercenary Armies
- Dynastic Ties

# Leading States' Power Resources: Netherlands (17<sup>th</sup> Century)

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- Trade
- Capital Markets
- Navy

# Leading States' Power Resources: France (18<sup>th</sup> Century)

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- Population
- Rural Industry
- Public Administration
- Army
- Culture (Soft Power)

# Leading States' Power Resources: Britain (19<sup>th</sup> Century)

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- Industry
- Political Cohesion
- Finance and Credit
- Navy
- Liberal Norms (Soft Power)
- Island Location (easy to defend)

# Leading States' Power Resources: United States (20<sup>th</sup> Century)

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- Economic Scale
- Scientific and Technical Leadership
- Location
- Military Forces and Alliances
- Universalistic Culture and Liberal International Regimes (Soft Power)

# Leading States' Power Resources: United States (21<sup>th</sup> Century)

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- Technological Leadership
- Military and Economic Scale
- Soft Power
- Hub of Transnational Communications

# Leading States' Power Resources: 21<sup>th</sup> Century

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- Is the status continued?
- If not, what's the problems and what kinds help needed?
- Is the power source category changed?  
And to what direction?

# The U.S. Infrastructure Advantage (by Shang-Sheng Jeng)

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- Opened Competition
- Controlled Freedom
- Creative Destruction
- Ideology Leadership
- Dynamic Adaptable Legal System for an Unstable Evolutionary World

*Human Civilization  
Development- Paradigm  
Shift (Energy and Tools)*

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A Grand Historical View

# Civilization Paradigm Shift Sequence

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- The Economic Foundation of Civilization
- Social Infrastructure of Civilization
- Culture and Value System of Civilization

# Civilization Transition Example

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- Agriculture Civilization
- Industry Civilization
  - Mechanical based industry civilization
  - Electronic based industry civilization
- Information (Cyber) Civilization
- Planetary Civilization

# Agriculture Civilization

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- Driving force:
  - Surplus Value (Livestock and Grain) to support Creative Activity
  - Management from Irrigation System (soft power)
- Impact:
  - The Origins of Civilization Development (Egypt on the river Nile, Mesopotamia on the Euphrates and Tigris, the Indus River Civilization and the Chinese Civilization on the middle Yellow River.)

# Industry Civilization- I Mechanical

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## ■ Driving Force:

- Energy: (Steam) Industry
- Tools: Mechanical Industry (not programmable tools)

## ■ Impact:

- The Power of Rationalism, Scientific Methods and Natural Law to extend human capability (to communicate and manipulate with Nature)
- The Decline and Fall of China Empire and Islam Civilization (imperialism)

# Industry Civilization- II Electronic

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## ■ Driving Force:

- Energy (electricity and gas) Industry (more powerful and ubiquitous)
- Electric and Electronic Industry (computer: **the tool of tools**)

## ■ Impact:

- New Technology and New Industry change all the Economic Activity
- Science, Technology, Industry, Economy, Social and Culture Evolution (Globalization)

*What kind of World it  
is?*

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# The God's World

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- Shamanism
- Multitheism
- Monotheism (exclusive religion)
- Atheism
- Agnosticism
- Platonic Realism

# The Science World

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- Galileo Galilei: Natural Astronomy
- Charles Darwin: The Origin of Species
- Sigmund Freud: Unconsciousness
- Werner Heisenberg: Uncertainty Principle
- Kurt Gödel: Incompleteness Theorem
- Alan Turing: Computer and Human Intelligence

# Cyber World

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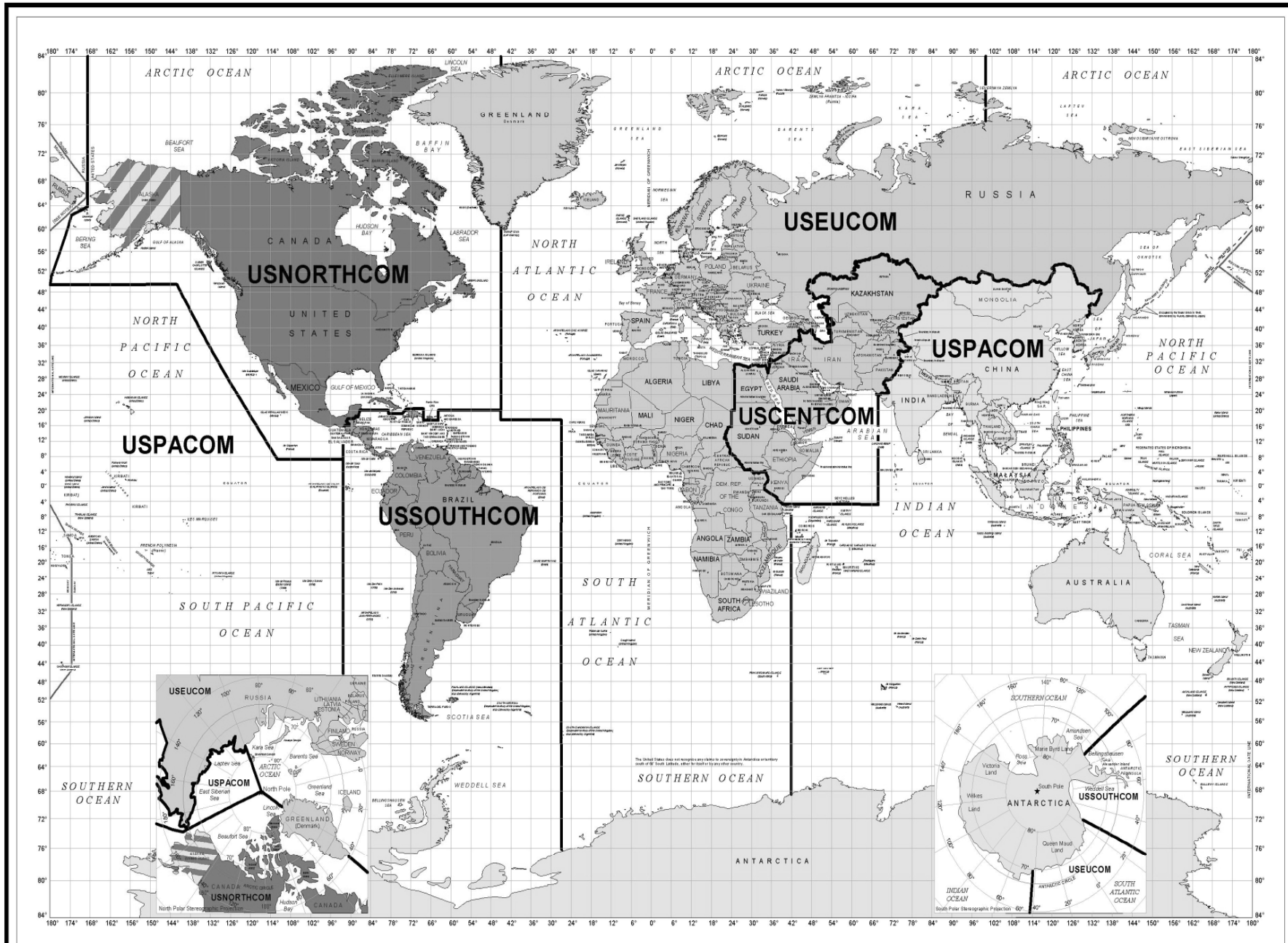
- Mainframe Computer
- Minicomputer
- Personal Computer
- Local Area Network
- Internet
- Client-Server and Web based Applications
- Web 2.0

*Powershift*

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# THE WORLD WITH COMMANDERS' AREAS OF RESPONSIBILITY

Based on  
Unified Command Plan  
February 2002



# The Gramm-Leach-Bliley Act

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- "I believe today we are changing financial services in America to reflect that we do have a new century coming and we have an opportunity **to dominate that century** the way America **dominated the last century.**"

*Texas Senator  
Phil Gramm*

# Knowledge Industry

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- Knowledge origins
- Knowledge storage
- Knowledge processing
- Knowledge distribution
- Knowledge applications
- Knowledge workers
- Mass manipulation

Soft Power,  
Knowledge,  
Imagination

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*The Birth of Information  
Civilization*

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# The Path to Information Civilization

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- Globalization (from imperialism to capitalism)
- Mass Communication Industry (civil right and Individualism)
- Communication Industry (personalized)
- Computer Industry
- PC and the Productivity Software

# The Path to Information Civilization

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- The Internet and the WEB
- Computer based Service Industry
- E-Business
- e-Government and e-Society (Trusted Issue Essential if not Dominance)
- Strategy and the Internet
- IT doesn't Matter

# The Path to Information Civilization

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- Open Source Movement
- Global Outsourcing
- Web 2.0 and Big Switch

*My Observation:  
5M, 5C and 4P  
Development Path*

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by Shang-Sheng Jeng,  
It originated around 1994 at MIC III

# 5M free flow for Globalization

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- Material
- Merchandize
- Manpower
- Money
- Message (information and instruction)

# 5 C Theory

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- Computer (Calculation, Processing, Services)
- Communication (Network)
- Content (Information Representation Retrieval and Search)
- Consumer (We are here now, 1995~2015)
- Control (Automation, Sensor, Intelligence)

# Computer

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- Devices
- Calculation
- Processing
- Application
- Services
- Agent

# Communication

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- Local Area Network
- Wide Area Network
- Metropolitan Area Network
- Wireless Network
- Satellite Network
- Broadcasting network
- P2P Network

# Communication

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- Home Network
- Body Network
- Wireless Sensor Network
- Extraterrestrial Network

# Content

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- Information Production
- Information Representation
- Information Search
- Information Retrieval
- Information Distribution
- Information Storage
- Information Exchange

# Consumerization

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- Mass Momentum Power
- Networked Effect
- Prosumer (Producer & Consumer) Phenomena
- Longtail Effect
- M form Society, Web 2.0, Google style,...
- We are here now, 1995 ~ 2020

# Control

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- Automation
- Intelligence
- Sensors
- Environmental Surveillance
- Robotics, Digital Warriors, Unmanned Aerial Vehicle, DARPA the Grand Challenge, DARPA the Urban Challenge

# Control

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- September 14, 2006 The Air Force has announced "Reaper" has been chosen as the name for the MQ-9 unmanned aerial vehicle, the Air Force's first hunter-killer UAV.
- US will choose a Cyber Command HQ in December 2008

# Control

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- Killer robots may pose a threat to humans sometime in the all-too-near future. Noel Sharkey, a professor at the University of Sheffield, presented this information to Britain's Royal United Services Institute on Wednesday. (Wednesday, 27 February 2008, 00:25 CST)

# Control: C4KISR (pronounced C4-Kisser)

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- C4ISR + Kill (擊殺) = C4KISR
- C4ISR: 指揮, 管制, 通訊, 資訊, 情報, 監視, 偵蒐
- Find, track and precisely identify targets
- Dynamically command and control weapons and sensors
- Share information

## 4 Place-- Digitization and Networking

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- Working Place
- Movable Place (now)
  - Walking
  - On a Moving Machine
- Home Place (will in)
- Ubiquitous (Infrastructure)

*Impact of IT, Network  
and the Web*

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# Mass Communication Industry

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- Publications
- Newspaper, Magazine, and Journal
- Radio Broadcasting
- Television, Cable, and Satellite Broadcasting
- Movie and Video Store
- Networked Information Services

# Communication Industry

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- Telegram
- Local Telephone
- Long Distance and International Telephone
- Network– Intranet and Internet
- Wireless Communication (Wi-Fi, Wi-Max, Blue-Tooth, NFC,...)
- Satellite Communication

# Computer Industry

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- Computer Industry– Mainframe Computer Era, Mini and Workstation, Personal Computer Era, and Internet Era
- The Impact of Mainframe Computer: MIS and Production Automation
- Do you remember: CDC, Amdahl, Trilogy, Cray, Japan Company, Wang Lab., Apollo, DEC,...

# PC and the Productivity Software

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- Wintel Model of Business
  - Replacement based Competition
- Packaged Software
  - Creativity and Speeding
- Personalized Environment
- White Collar Class Automation

# The Internet and the WEB

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- The Network Centric Computing Paradigm
- Pull and Push Technology
- Information Publication
- Information Search (find ~ google)
- Internet Community

# E-Business

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- E-Commerce: B2C(e-tailer), C2C(eBay), C2B(Priceline)
- E-Commerce: B2B, P2P
- E-Commerce: G2B, B2G, G2C, C2G
- Next Generation E-Commerce: Business on demand, Services Oriented Architecture, Service Science

# e-Government

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- The President (Bush) Urges Agencies to Work Together
  - "Our success depends on agencies working as a team across traditional boundaries to better serve the American people, focusing on citizens rather than individual agency needs . . . I thank agencies who have actively engaged in cross-agency teamwork, using E-Government to create more cost-effective and efficient ways to serve citizens, and I urge others to follow their lead."

# e-Society

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- Anti-terrorism Issues
- Not-good attitude for Immigrations: US, UK, France (Paris riot)
- Aging Issues
- 2<sup>nd</sup> Wave of e-Connected Society: p2p, broadcasting, real-time, online, coordinated-cooperated-collaborated working,...

# Web 2.0 Applications

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- Open office
- Wikipedia
- Social Networks
- Blogging
- YouTube
- Tagging
- Google map applications

# More advanced issues

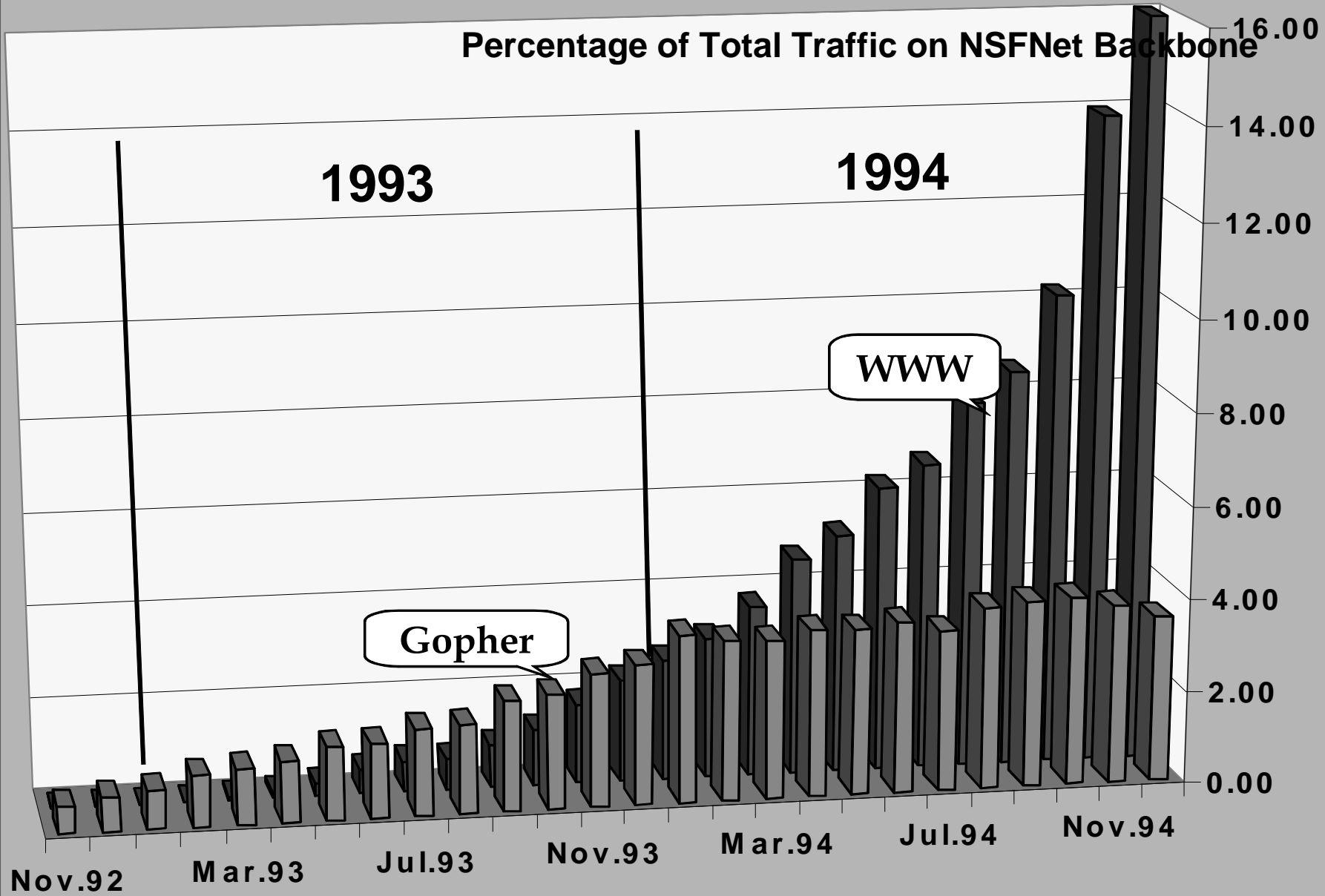
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- Semantic web
- Grand security industry
  - Assurance industry
  - Dependable and Secure Industry
  - Insurance industry
- Intelligent Robotics and the rise of machine
- Nano-technology and its risk management
- Quantum technology and applications

*First Cyber Civilization  
case-- Why Gopher was  
Dead*

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# Percentage of Total Traffic on NSFNet Backbone



Source: <ftp://nic.merit.net/statistics/nsfnet/1992-1994>

# Competition on Internet:

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- A subset Functionality of Web.
- Lesson 1: Superset Competitor
- Ownership Claim of the University of Minnesota.
- Lesson 2: Zero-Price Competitor

*Second Cyber Civilization  
case— The War between  
IBM, Microsoft, and  
Google*

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# Current War to watch

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- IBM: GIE (Global Integrated Enterprise) by Samuel J. Palmisano, Foreign Affairs, May/June 2006
- Microsoft: accumulated users base with financial power (Craig Mundie, the chief research and strategy officer, and Ray Ozzie, chief software architect.)
- Google: innovative applications and services



# Let You to Think!

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From Sneakers

*Explore Future with  
New Tools and New  
Concepts*

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# Scenario Impact

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- Quantity Change: The Cost Efficiency of Computing Power, Storage Devices, and Transmission Speed
- Quantity Change: The users and developers of ITC systems
- Quality Change: The penetration of ITC Applications into daily Life

# Scenario Impact

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- Quality Change: The Methods of Mankind for dealing with searching, expressing, learning, problem solving, and decision.
- Quality Change: The quest for semantic processing. (Traditional Hilbert, Gödel, Turing, von Neumann, Chomsky computing model based on syntactic processing)

# Gödel & Turing

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- Kurt Gödel (1931):
  - mathematical logic is incomplete
  - consistency of such a system can't be proved within itself
- Alan Turing (1936):
  - mathematical logic is undecidable
  - there is no procedure for determining whether a proposition is provable

# Scenario Impact

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- Quality Change: Roles of Computers with Human. (conformed, cooperated, coordinated, collaborated, controlled)
- Quality Change: Sensor technology developed and implemented. (extension the depth of applications)

# Scenario Impact

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- Quality Change: Move intelligence to machines.
- Quality Change: The rise of cyborg.
- Quality Change: The genetic engineering effect to human beings.
- Quality Change: The rise of swarm intelligence.

# Scenario Impact

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- Quality Change: Quantum theory and mind.
- Quality Change: Computational mind?

*Grand Picture of  
Civilization Quality  
Change*

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# Grand Trend in Civilization Transition

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- Use human power
- Use animal's power
- Use nature power
- Use machine power
- Use mind's power

# Technology for Grand Trend

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- New AI
- Bionics
- Robotics
- Genetic Engineering
- Quantum Mechanics
- Mind Research
- Grand Security Industry

# Grand Security Industry

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- Assurance Industry
  - Information Asset Identification
  - Information Asset Evaluation
- Dependable And Secure Industry
- Insurance Industry
  - Information Asset Recovery
  - Information Asset Compensation

# 生技產業 (New news for ITers)

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- 爲了全力輔導生技產業成爲我國另一個「兆元產業」，行政院與立法院充分合作，特別針對生技產業的高風險特性，於**2007年6月**中旬通過「生技新藥產業發展條例」，未來生技產業的租稅獎勵將可延長至**2021年**，並享有較寬鬆的研發、股東投資抵減與技術入股所得緩徵等獎勵優惠，對我國生技新藥產業發展是一大利多。

# *Epilogue*

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**"The empires of the  
future will be  
the empires of the  
mind."**

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Winston Churchill

**"Any sufficiently  
advanced technology is  
indistinguishable from  
magic."**

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-Clarke's Third Law.

-Arthur C. Clarke

# "The Best Way to Predict the Future Is to Invent It"

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*Alan Kay, Apple Fellow, Apple Computer*

Thursday, September 23, 1993  
4:00 P.M. Pacific Daylight Time (2300 GMT) PARC Auditorium

“I’d Rather Burn out  
Than Rust out.”  
“寧願燒盡，不願銹壞”



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馬偕博士  
George Leslie Mackay  
(1844-1901)