

IT Platforms and the Ecology of Innovation

How the next generation of information technology will drive our economies, transform our societies and challenge the way we govern

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Objectives

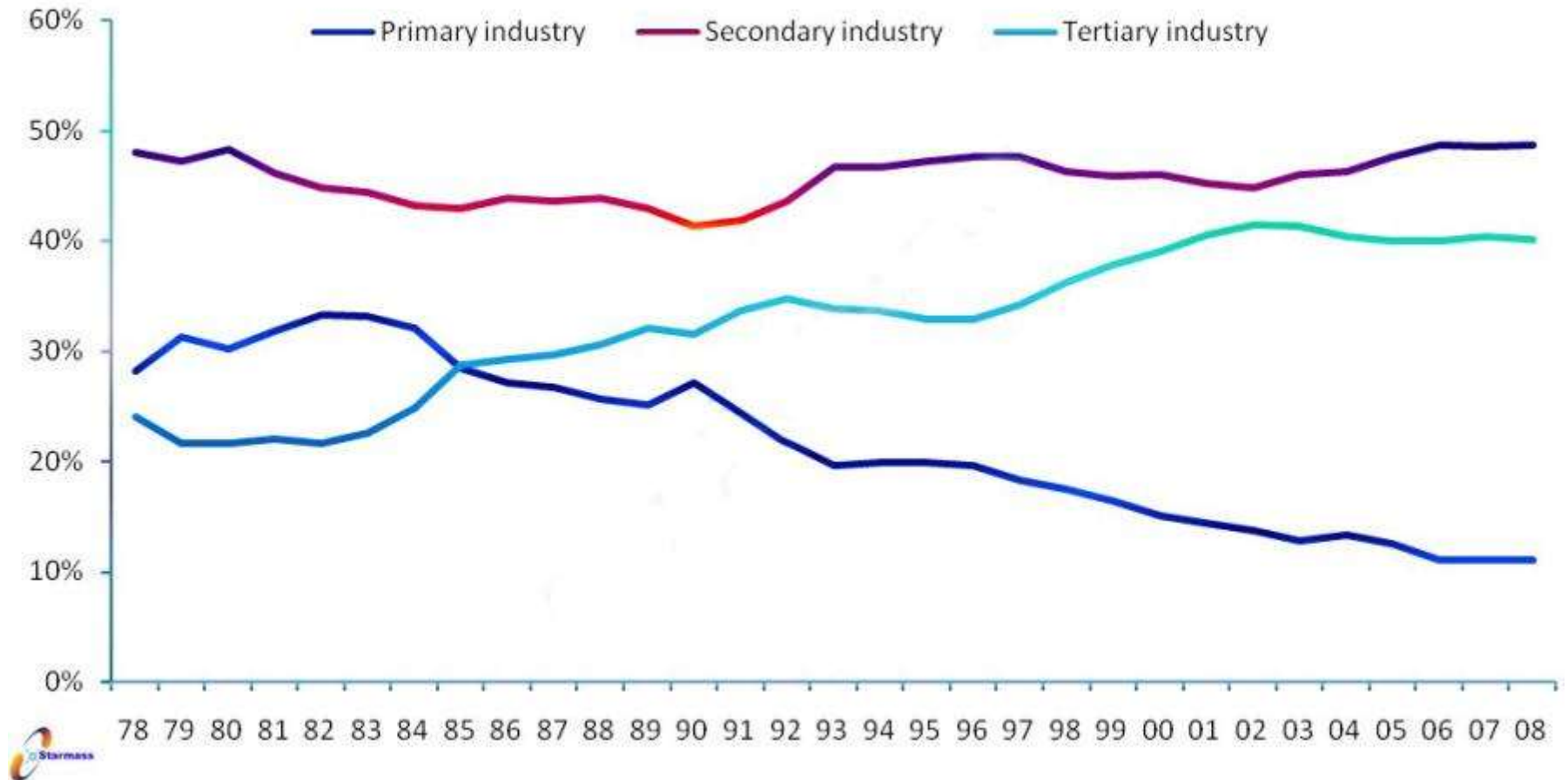
- ❖ Provide a view of the future impact of IT platforms on economic growth and society
- ❖ Discuss challenges in the context of China
- ❖ Answer your questions
- ❖ Learn from you!

Solving Baumol's Paradox

❖ Baumol, W. J. 1967.

“Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crises.” American Economic Review 57, no. 3 (June 1967)

Services Sector in China



Solving Baumol's Paradox

❖ Baumol, W. J. 1967.

“Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crises.” American Economic Review 57, no. 3 (June 1967)

❖ Moore, G. E. 1965.

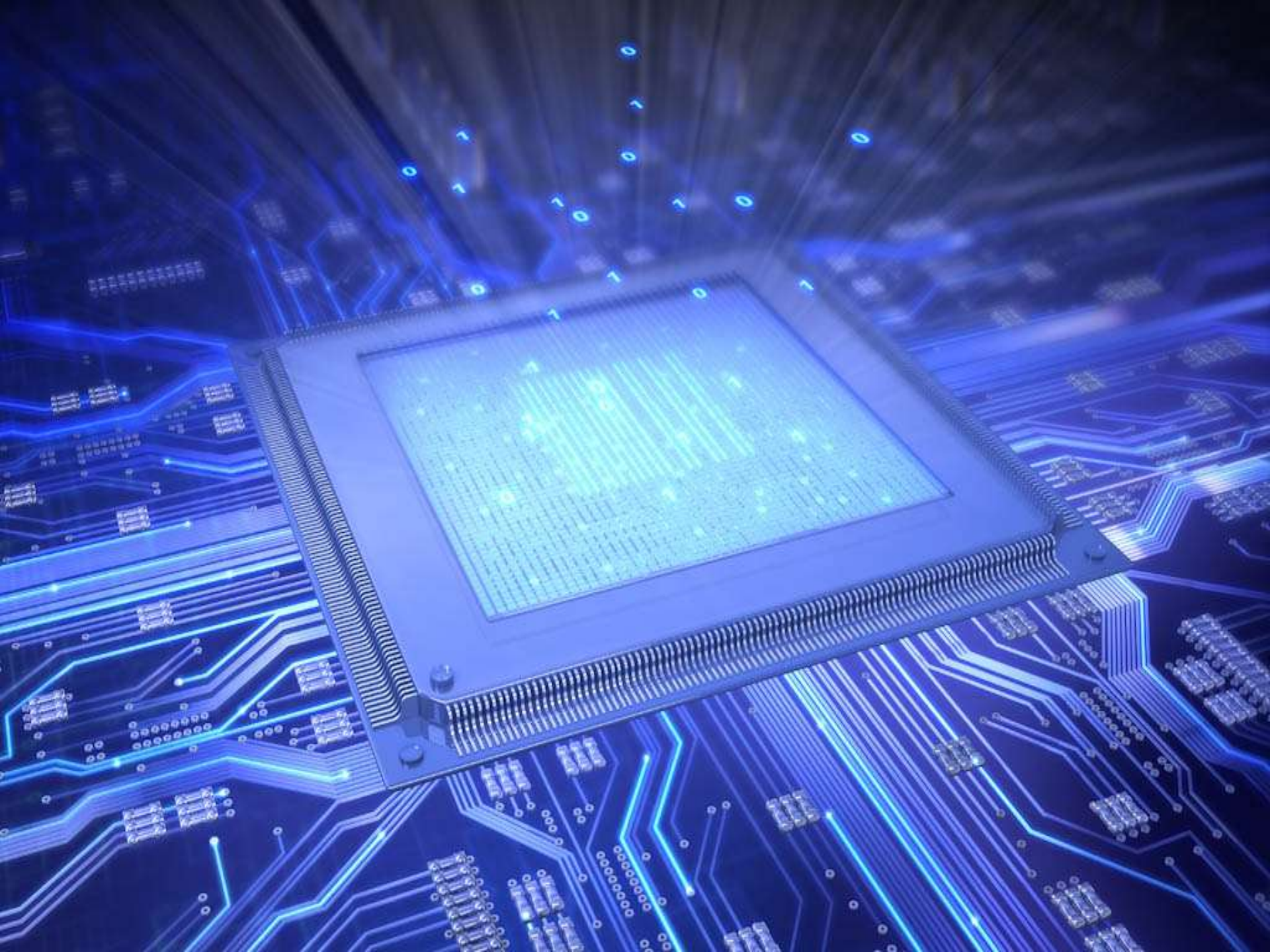
“Cramming more components onto integrated circuits.”
Electronics, Volume 38, Number 8, April 19, 1965

Information Technology:

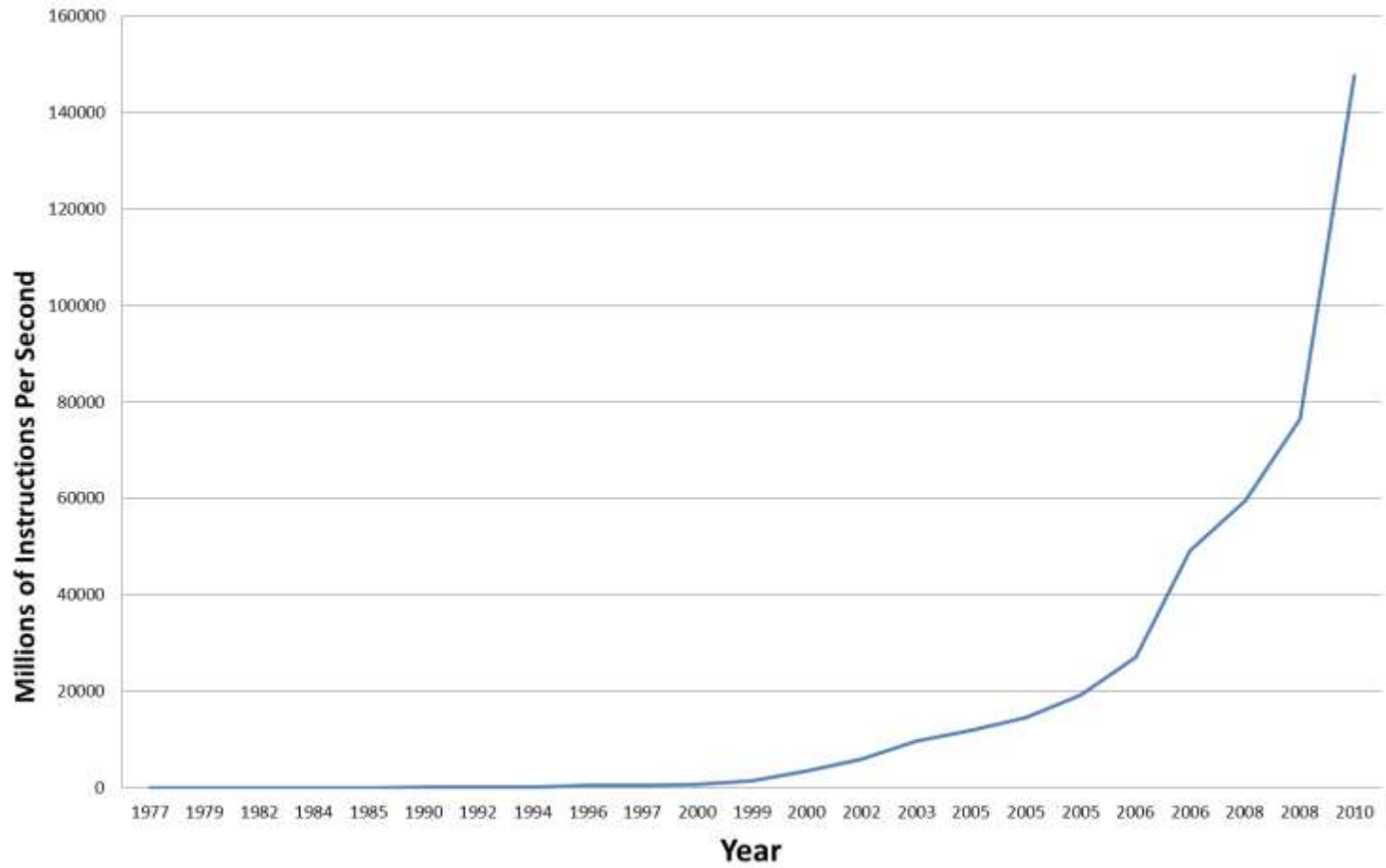
Transforming our Economies

- ❖ Services has become the driver of economic growth and value creation
- ❖ IT has become the key driver of services productivity improvements
 - ❖ As computational power grows, new services become possible
- ❖ The economy of *things* has become the economy of *ideas*

Information Technology's 'Raw Materials'

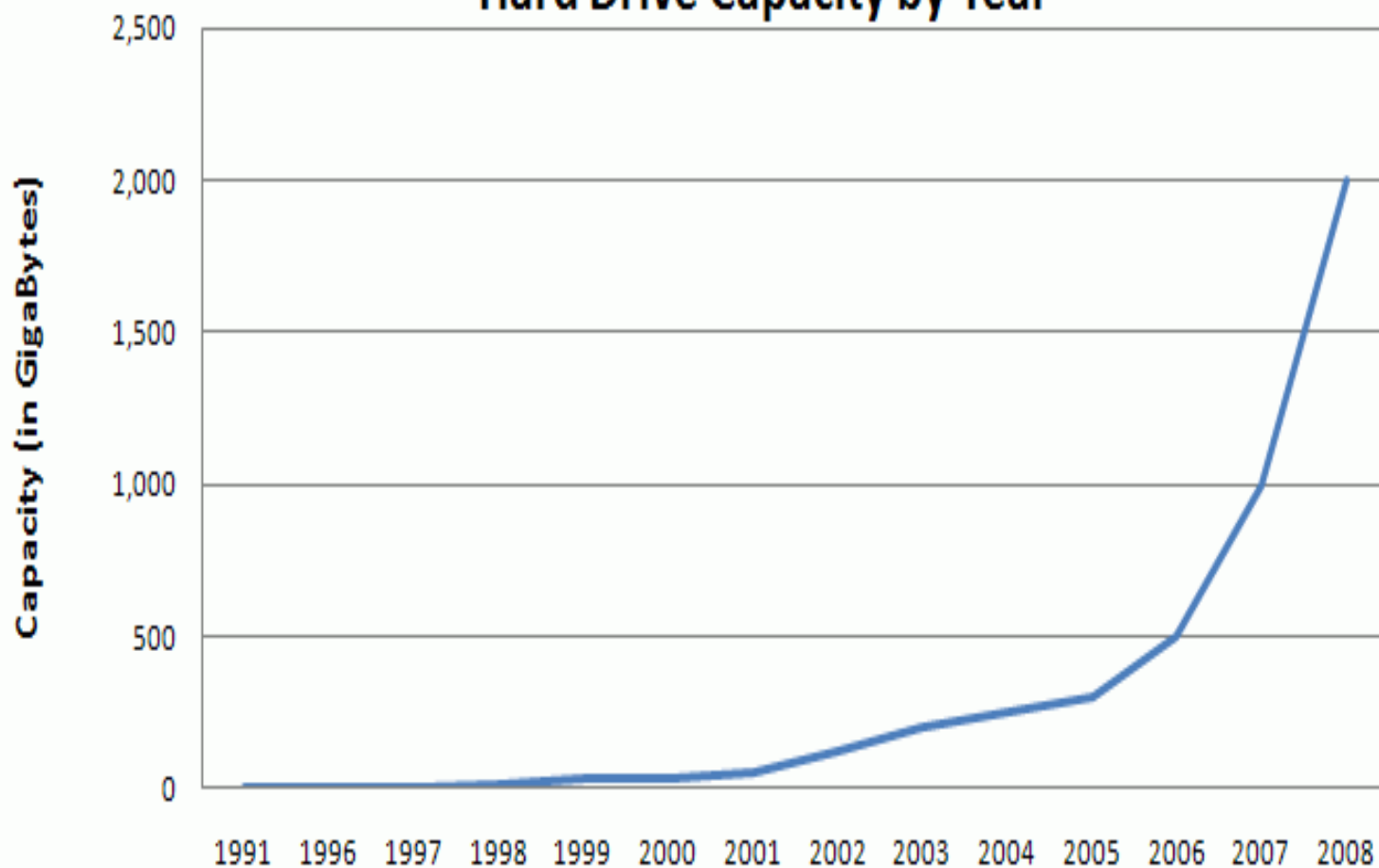


Computational Power Over Time





Hard Drive Capacity by Year





The Expansion of Networks:

Numbers of Connected Devices

❖ '60s	10s
❖ '70s	100s
❖ '80s	1,000s
❖ '90s	1,000,000s
❖ '00s	1,000,000,000s
❖ '10s	1,000,000,000,000s
❖ '20s	1,000,000,000,000,000s

IT Platforms: Past and Future

What is an IT 'Platform'

“A consistent development environment supported by new software and hardware architectures, based on standards and available at scale, that enables service and business model innovation”

New Business Models

Services

Network Connectivity



The Beginning: Devices as Drivers

Platform	Dates	Key Technologies	Knowledge Focus	Organizational Impact	Skills Impact	Machines/ Worker
Mainframe	'60s - Present	Transistor, Magnetic Storage, FORTRAN	Organization specific/ Quantitative	Supported Command and Control Management	Made rote human calculator/tabulator roles redundant	1:1,000s
Departmental	'70s – '90s	Integrated silicon, COBOL, VMS	Function Specific/ Process	Enabled departmental autonomy. The "Loosely Coupled" corporation	The "Specialist": Functional expertise and tool use	1:100s
Personal	'80s - Present	Microprocessor, Pascal, DOS	Individual analytical synthesis	Enabled individual autonomy	The "Knowledge Worker": Self motivation and independent thinking	1:1

Connecting the Devices: The Network as Driver

Platform	Dates	Key Technologies	Knowledge Focus	Organizational Impact	Skills Impact	Machines/ Worker
LAN	'90s - Present	Token Ring/Ethernet, Netware	Formal and informal organizational workflow processes	BPR and flattening of organizational structures	The "Networker": Single organization, functional adaptability and interpersonal skills	10:1
Web	Mid '90s - Present	TCP/IP, HTTP, Java/.Net	Business process and social interactions	Fragmentation of the firm and the rise of service business model	The "Contractor": Multi-organization functional adaptability, customer focus	100's:1

The Platform Becomes Utility: 'Cloud' Computing

Platform	Dates	Key Technologies	Knowledge Focus	Organizational Impact	Skills Impact	Machines/ Worker
Cloud	'10s	Atom Pub, REST, Global scale compute infrastructure	Service system formalization and behavioral modeling	Dynamic service re-configuration and delivery	The "Service Innovator": Abstract, conceptual service innovation, design and configuration	1,000's:1

What is The 'Cloud'?

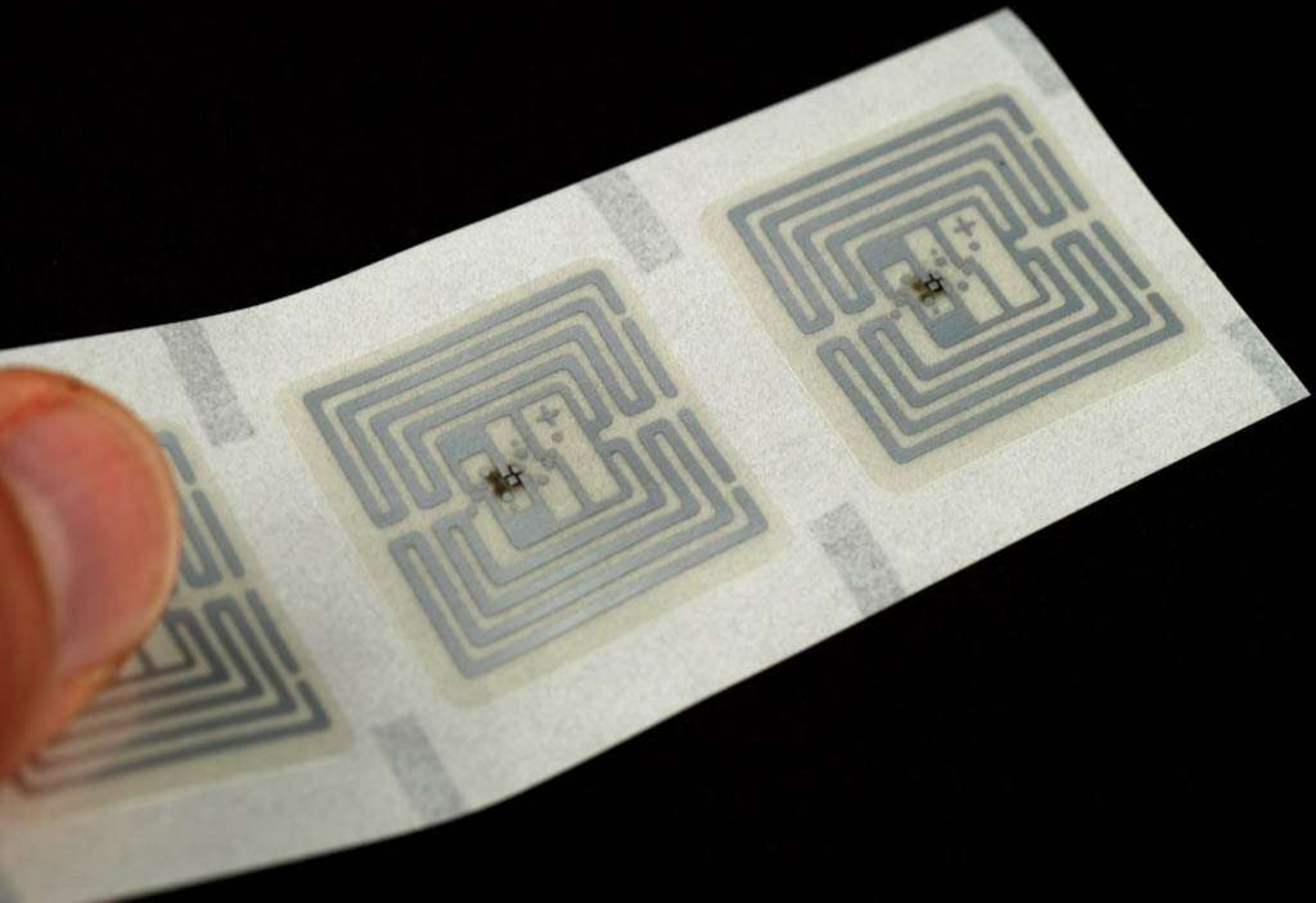
- ❖ IT Services as a 'Utility'
- ❖ Characteristics
 - ❖ Always available, Elastic, 'Pay for Use', Private or Public, Local or Global, Composable
- ❖ The Web becomes a 'Platform' for service creation and delivery

Why *Cloud* changes the rules

- ❖ Dramatically reduced barriers to entry
 - ❖ Much lower capital investment requirements
- ❖ Significantly improved time to market
 - ❖ Move from *writing* software to *constructing* services
- ❖ Devices independent
 - ❖ Available to any device with internet connectivity
- ❖ Enables local and global scale service creation
- ❖ Catalyzing new 'Social Networking' services

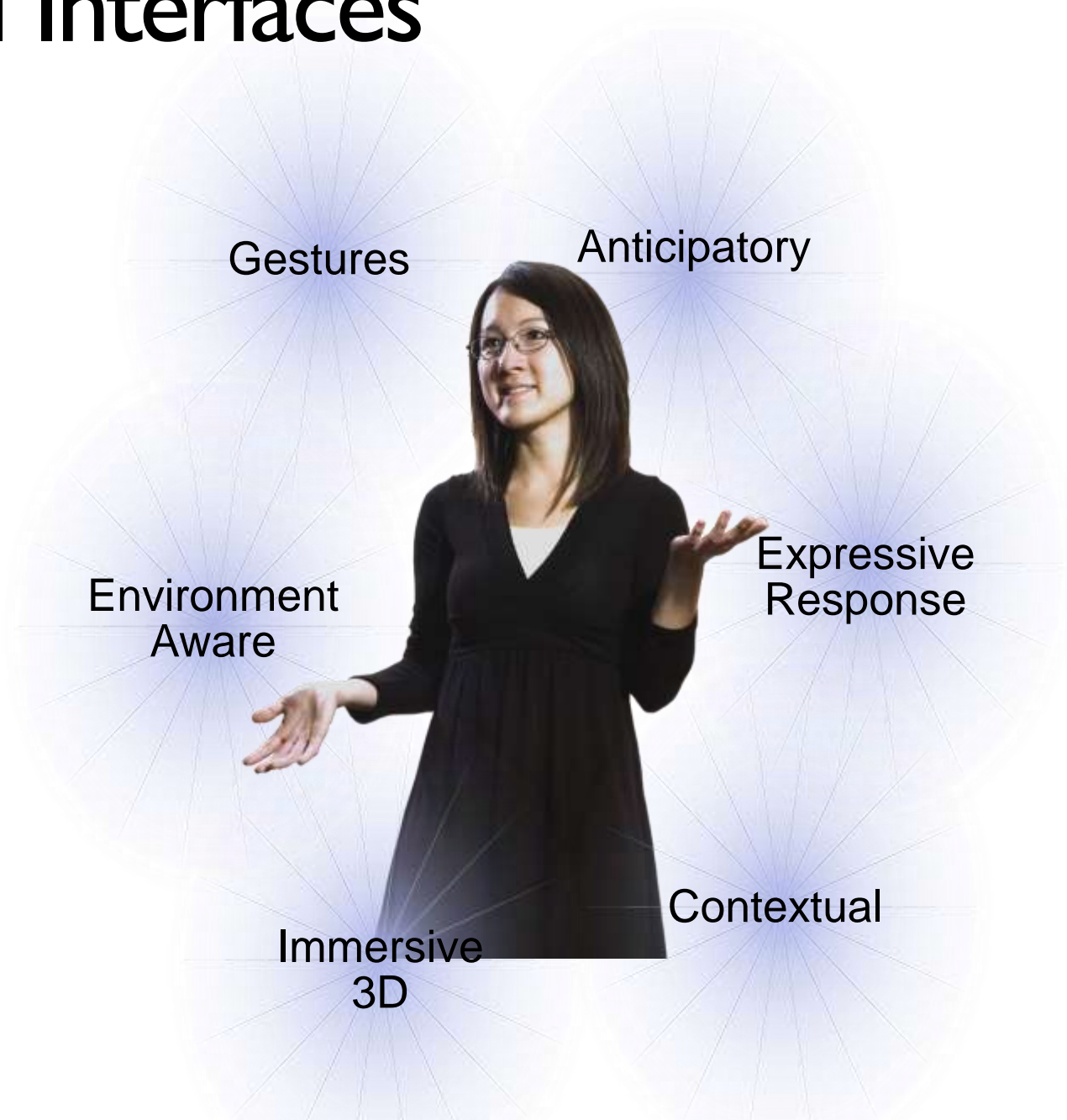
The Next 10 Years







Social Interfaces



Integrating the Real World: Ambient Computing

Platform	Dates	Key Technologies	Knowledge Focus	Organizational Impact	Skills Impact	Machines/ Worker
Ambient Computing	Mid '10s	Sensors, Scale free compute fabrics, evolutionary algorithms, adaptive social interfaces	Social relationship dynamics and adaptive behaviors	Autonomous service configuration, delivery and evolutionary adaptation	The "Experience Innovator": Anthropological understanding. "Empathic" adaptability	10,000's:1

Towards an ‘Algorithmic Transformation*’

Sensors
+
Cloud
+
*Ubiquitous
Networking*
+
*Social
Interfaces*



- ❖ Connecting the *physical* with the *digital*
- ❖ *Automation* of the *routine*
- ❖ *Ad-hoc* and *automated* service provisioning
- ❖ *Embedding* of specialized *knowledge* and *processes*
- ❖ Value creation moves from *specialized* to *generalized* skills



The Talent 'Problem'

- ❖ Access to IT tools and capital is now ubiquitous
- ❖ Global competitiveness depends on innovation
- ❖ Innovation depends on depth of talent
 - ❖ You must develop talent locally
 - ❖ If you develop talent you must retain it
 - ❖ If you can't develop or retain talent you must attract it
- ❖ The best talent can go anywhere in the world!

“The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn”

Alvin Toffler

Implications: Skills

- ❖ Workers will need to *add value* to increasingly *automated* processes and *knowledge networks*
- ❖ *Creative, abstract, strategic* thinking and *empathetic* skills will command a *premium*
- ❖ Education systems will need to transform in order to produce *economically viable* talent

Implications: Education

- ❖ Can the education system deliver these skills?
 - ❖ Conceptual & abstract thinking
 - ❖ Information discrimination
 - ❖ Teamwork
 - ❖ Communications
 - ❖ Learning as a life long personal responsibility
- ❖ From teaching facts to teaching learning
- ❖ Early and consistent familiarity with digital 'Tools' is critical





B.C. Home

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First Nations

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Residents

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Visitors

RESOURCES

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WESTERN PREMIERS MEET IN VANCOUVER

The Western Premiers met in Vancouver to develop a comprehensive [economic agenda](#) for Western Canada, take steps toward a new strategy on [fresh water conservation](#) and support the next phase of the [Own the Podium](#) program. [[Learn more](#)]

FACTS ABOUT THE HST

► DID YOU KNOW?



- It's not enough to be competitive domestically. We need to be able to match efficiencies and policies from competing provinces and nations.

That's why harmonizing B.C.'s sales tax is the single biggest step we can take to build our economy.

[GO TO FACTS ABOUT THE HST TO LEARN MORE](#)

gov.bc.ca/HST

Profound Policy Challenges?

- ❖ Can *policy making* keep pace with the *rate of change* in technology?
- ❖ Will *social* and *governance* issues limit the ability to tap technology's *full potential*?
- ❖ How should concepts of *liability* and *social responsibility* evolve?
- ❖ Will issues of *privacy* and *trust* limit adoption of services?
- ❖ What will it take for China to become a *Global* leader in 7th Wave services?

Summary

- ❖ ‘Cloud’ and ‘Ambient’ platforms will have *major implications* for society, business and governance
- ❖ Access to creative, conceptual, abstract thinking talent will drive *economic advantage*
- ❖ Creating an environment which maximizes *innovation* is critical to global *competitiveness*
- ❖ Policy makers need to act *now* to take advantage of these opportunities

Thank You!

Appendix

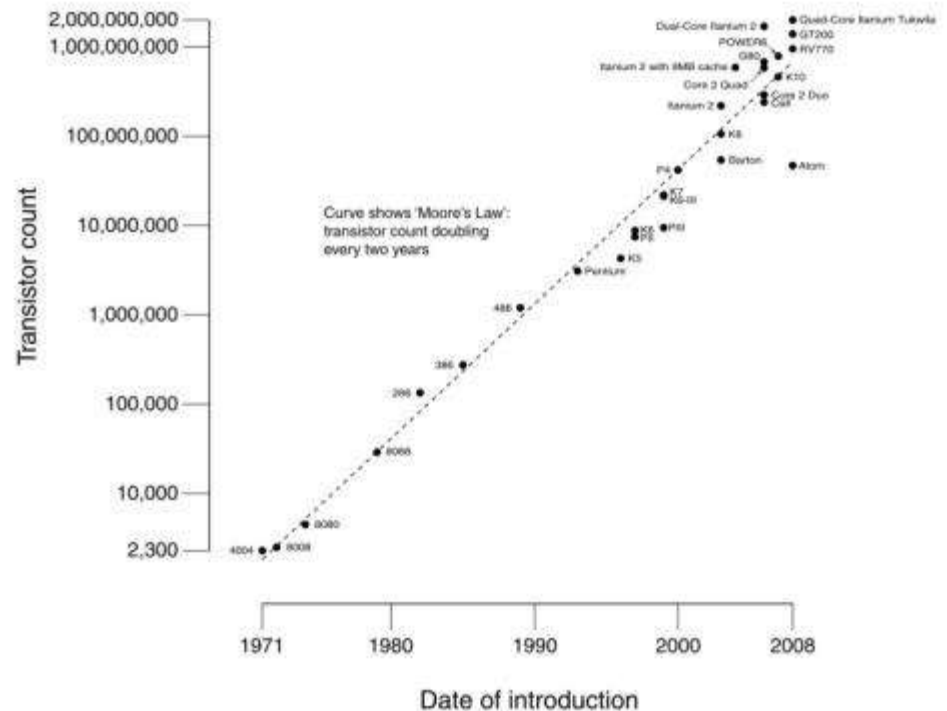
Moore's Law

- ❖ Density doubles every 18-24 Months
- ❖ Computational power doubles at same rate

For *constant* capacity

- ❖ Chip size halves
- ❖ Power use halves
- ❖ Prices halve

CPU Transistor Counts 1971-2008 & Moore's Law



10 Years = 7 Doublings = 2^7 = 128 Times today's capacity

Implications: Business Strategy

- ❖ What is your *Services* strategy?
- ❖ If it can be *automated*, it will be *automated*!
- ❖ *Labor cost* may no longer determine manufacturing *location*
- ❖ The best talent has expectations and will challenge traditional management styles

Why Government Must Lead in Effective use of IT

- ❖ Largest and most sophisticated user of IT in many countries
- ❖ IT is an important enabler of improved service efficiency and effectiveness
- ❖ Government use of IT can drive private sector adoption and capacity building
- ❖ Effective use of IT procurement drives local market for IT skills and service provision