The Global View of Infocomm in 2015

IDEASPARKERS

JSB

Ubiquitous Computing and beyond --
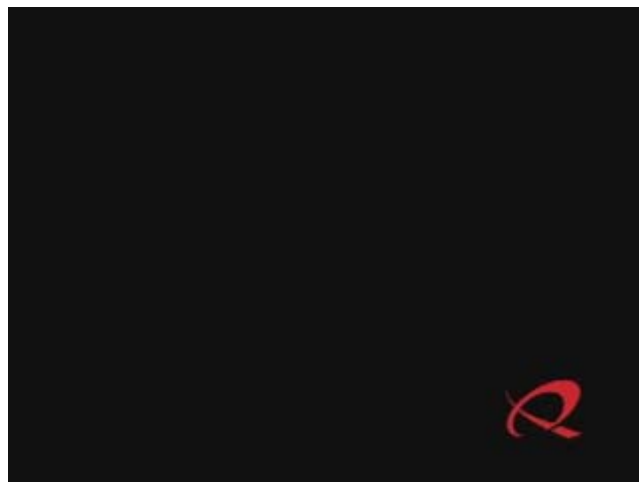### an emerging new common sense model

Things that think
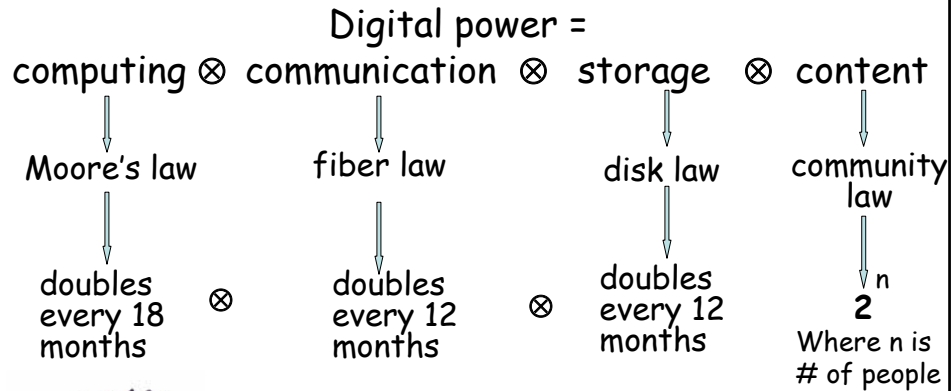want to link.
It is that simple.

Yeah but how is the
world really different
because of that?

One view of infocomm 2015

Fundamental dynamics--
(Pace of change of digital infrastructures)

Digital power =

computing ⊗ communication ⊗ storage ⊗ content

| Moore's law | fiber law | disk law | community law |

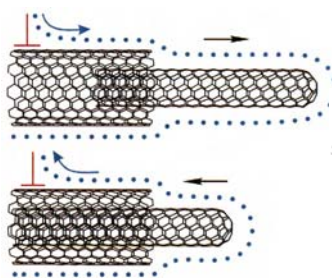| doubles every 18 months | ⊗ | doubles every 12 months | ⊗ | doubles every 12 months | 2^n |

Where n is # of people

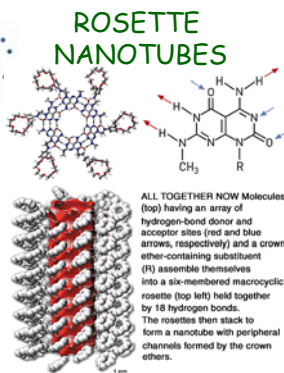But for how long? Hasn't Moore's law already slowed down? And what about Moore's second law – isn't that the killer??

(and algorithms matter, big time)

Building blocks
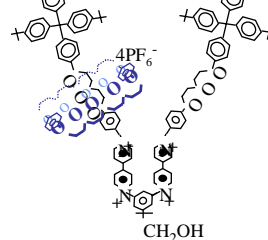## for tomorrow's computers?

Fullerene Nanotubes

ROSETTE NANOTUBES

Rotaxane Molecular Switch

$4PF_6^-$

CH_2OH

C.P. Collier, E.W. Wong et al
Fraser Stoddart

ALL TOGETHER NOW Molecules (top) having an array of hydrogen-bond donor and acceptor sites (red and blue arrows, respectively) and a crown ether-containing substituent (R) assemble themselves into a six-membered macrocyclic rosette (top left) held together by 18 hydrogen bonds. The rosettes then stack to form a nanotube with peripheral channels formed by the crown ethers.

PNAS © 2002 NATIONAL ACADEMY OF SCIENCES U.S.A.

Cummings & Zettl
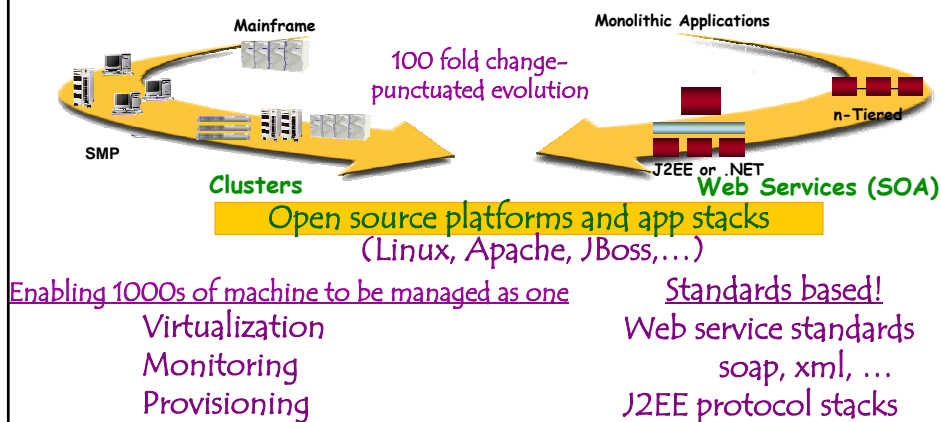
Hicham Fenniri

A new world is unfolding

Architectures are Changing
and changing fast

Multithreaded, multicore chips with intelligent bus structures
Consider the media excitement around the CELL

Key observation here is that architectures for standard
Computing aren't all that well designed for handling
high definition TV
real time rendering of video games
fast, intelligent network switches
security – eg a computational immune system

what happens when the cost
of computing approaches zero?

An Accelerating Confluence:
# thee levels of commoditization
all at once.

Mainframe

Monolithic Applications

100 fold change-
punctuated evolution

n-Tiered

SMP

J2EE or .NET

Clusters

Web Services (SOA)

Open source platforms and app stacks
(Linux, Apache, JBoss,…)

Enabling 1000s of machine to be managed as one
Virtualization
Monitoring
Provisioning

Standards based!
Web service standards
soap, xml, …
J2EE protocol stacks

Changing the Nano Game:
From Combinatorial Design to Rational Design
(ab initio quantum simulations)

continuum

10 nm (150,000)

Molecular

1 nm (31)   Quantum

multi scaling modeling
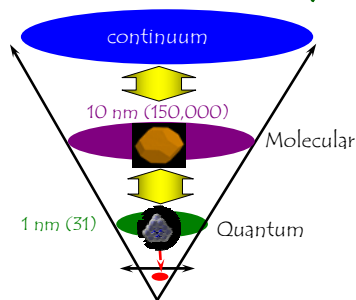
(can now do 100,000 atom nano particle)

cluster computing now permits
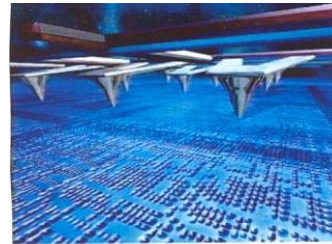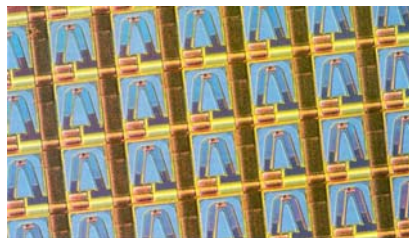Startups to do things that
national labs did.
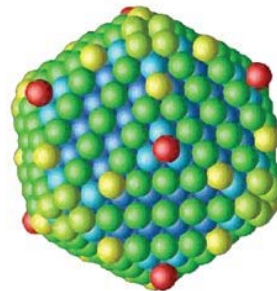
Platinum nano particle catalyst
(603 atoms)

Nanostellar

Steps toward 1000 gigabytes
The tiny millipede disk array
(atomic force 'microscopes')

1,024 array of cantilevers 3mm by 3mm
each with a 50 nanometers wide tip.

MEMS – bridging the nano and the macro worlds

IBM

My World in My Hand
An always on, always connected pda with a
Gigantic, intelligent cache –
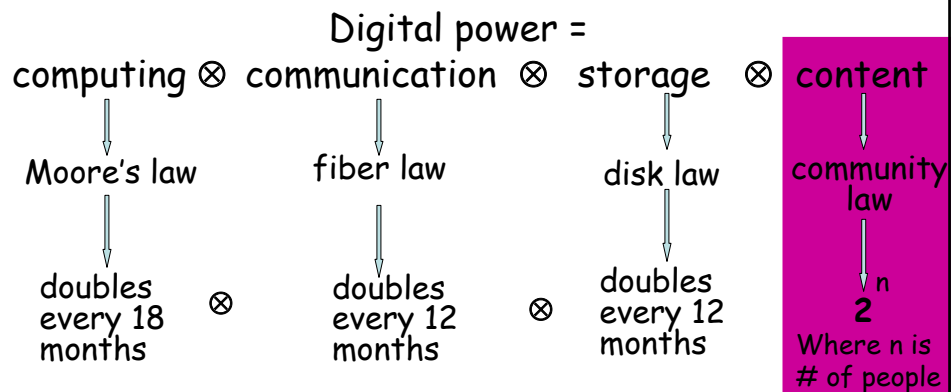7- 24 trickle charge of new knowledge

How does this change what I need to know?
(and maybe my pda has something my buddy needs to know)

Fundamental dynamics--
(Pace of change of digital infrastructures)

Digital power =

computing $\otimes$ communication $\otimes$ storage $\otimes$ content

Moore's law   fiber law   disk law   community law

doubles every 18 months $\otimes$ doubles every 12 months $\otimes$ doubles every 12 months 2^n

Where n is # of people

Ah, 2^n virtual communities makes 2^n niche markets- explaining eBay, Amazon, Napster, IM buddy groups, etc.

The beginning of the P2P world, open source and social software – blogs, wikis, IM.
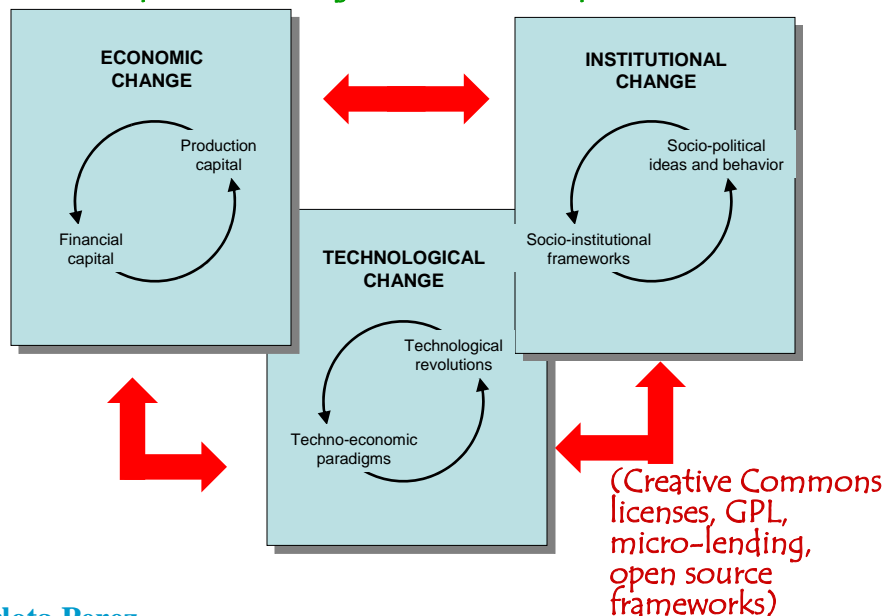
I think therefore I am (Cartesians)

we participate therefore we are

And this is what we always wanted – us over just me.

Morphing to the new Techno-Economic Paradigm
(three spheres of change in constant reciprocal action)

ECONOMIC CHANGE

INSTITUTIONAL CHANGE

Production capital

Socio-political ideas and behavior

Financial capital

TECHNOLOGICAL CHANGE

Socio-institutional frameworks

Technological revolutions

Techno-economic paradigms

(Creative Commons licenses, GPL, micro-lending, open source frameworks)

Carlota Perez

The digital infrastructure starts to accelerate creative destruction
to nearly all extant infrastructures and their business models

Telecommunication: packet communication wins
　　　　voice over IP (VOIP)
　　　　p2p phone calls – SKYPE

Cell Phones (mobile internet): spectrum scarce
　　　　ultra wide band
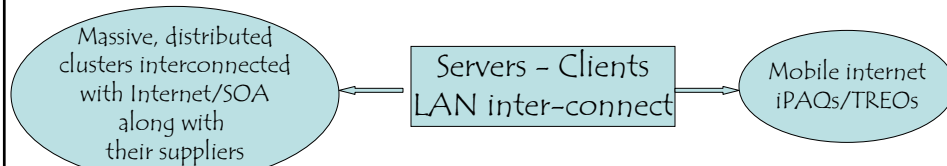　　　　peer to peer, mesh networks and wireless + voip

Music: internet distribution (no choke points for distributor to 'control'
　　　　iTunes – buy by the song, share within network
　　　　Rhapsody – subscription model
　　　　remix songs, tracks and loops

Electric power: mini distributed power generators – at the home level
　　　　fuel cells, mini-turbines, solar cells (nano substrates)

Nice examples but is there a theme here??

The Internet as Platform
(setting the stage for a structural inversion)
with killer apps:
Google
eBay
Yahoo
Amazon
Salesforce.com

Massive, distributed clusters interconnected with Internet/SOA along with their suppliers ← Servers – Clients LAN inter-connect → Mobile internet iPAQs/TREOs

Ah, the client server architecture is being pulled deeply a part setting the stage for universal services and deep inter – enterprise transformations. Could this change the Architecture of Business and the purpose of the firm.

"the new techno-economic paradigm becomes the new generalized 'common sense' which gradually finds itself embedded in social practices, legislation and other components of institutional frameworks"

Oh like in the age of automobile and mass production – changed completely what we thought was normal and obvious!!

And remember – institutional innovation is the hardest kind of innovation – by far!!!!
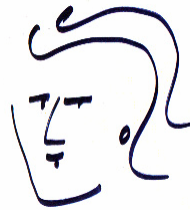
The New Common Sense Model

1) supply push -----> demand pull

retail
physical stores---> online shopping
ex: Amazon

media
mass media (TV, newspapers, magazines) ----> online news, blogging
ex: Google news, CNN.com. Ohmynews.com

advertising
mass media (tv, newspapers, magazines) ----> search driven ads
ex: Goole and Yahoo ads

manufacturing
OEMs --> process networks, ODMs

education
building stocks of knowledge (schools) -> learning on demand
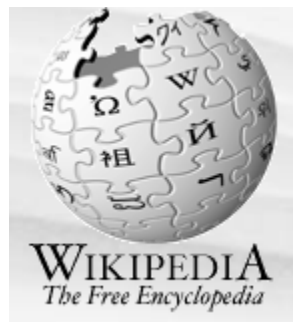
The New Common Sense Model

2) New forms of social capital & knowledge sharing
open source movements

> programming: Linux, Appache, Jboss, Sourceforge
> knowledge creation & sharing: Wikipedia
> open content for learning: OCW-MIT

Note that it is the feedback loops that
help to create a virtuous circle

Social Capital Formation

Intellectual Capital Formation
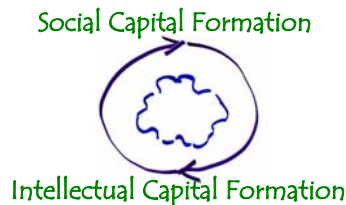
An open source knowledge repository
over 1,000,000 articles built and maintained
by a community of 1000s

WIKIPEDIA
The Free Encyclopedia

But why should I trust it??

The New Common Sense Model

3) Entertainment – from passive to active
(and beyond TV-on-demand &interactive TV) enter the
massively multiplayer, online, role playing games
MMORPGS

I'm of a different generation.
Can you show me an example
and are there any side benefits
(like in sports I get healthier)

Massively Multiplayer Online Role Playing Games:

Entraining and Emotive
Meaning creating thru multi authored, narrative.
Porous membrane between physical and virtual.
To understand their value – pay attention to the social life around the edge.

Lineage: 3 million players in korea, 26k networked game parlors
remix, sharing, persistent & accretive unlike interactive TV

World of Warcraft

The New Common Sense Model
4) extended forms of literacy

text —literacy→ text + image —literacy→ information navigation

. . . I began to realize the potential for multimedia to enhance the learning process was just astronomical . . . To tell a story now means grasping a new kind of language, which includes understanding how graphics, color, lines, music and words combine to convey meaning.

The New Common Sense Model

5) The Rise of the Creative Class
thru participation in
niche communities-of-interest/practice

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amateur ———————————————— professional

⌐ from Latin – amator : lover

Pro-Am(ateur) Production

Mimi Ito (USC)

⋄ Appropriates, reshapes, repackages, "global" knowledge for local social networks

⋄ Relies on mid-scale network of informed peers

⋄ Peer-to-peer learning, assessment, and valuation–

Hmmm, where creating and learning becomes your hobby & your work.

consumer ←——— identity ———→ producer

connoisseur   amateur

Life in the Digital Age –
creating, tinkering, learning and sharing
(the ultimate form of interaction and meaning producing)

consuming

producing
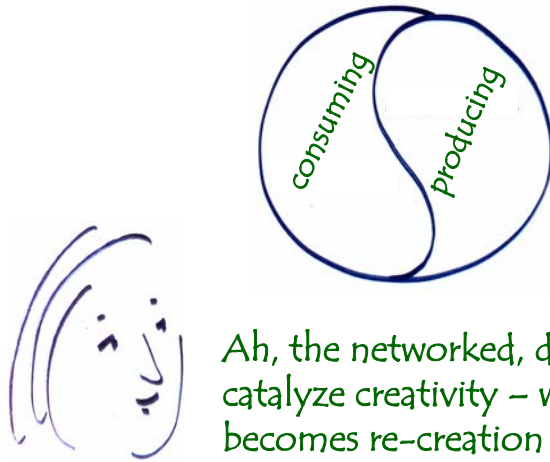
Ah, the networked, digital age helps to catalyze creativity – where recreation becomes re-creation and appropriation.

Digital life, Remix & Voice/Identity

New concepts of authorship
story telling to world-building 'games'
Shifts of power:
author/artist to networks of co-creators

j.c. herz

Creating personal meaning
acknowledgement – via constructivism & OS accretion (persistent worlds)

Sounds like a power way to catalyze creativity and identity/meaning construction.

Thank You
And special thanks to
Mark Weiser –
(the father of ubiquitous computing)
&
The Idea Factory