Ubiquitous Crisis and Renormalization Approach for e-commerce:

Critical Phenomena and Emergence of Phase Transition;
Logarithmic convergence

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Outline

1. Introduction; Fundamental Difference between conventional old commerce and e-commerce ?
2. "Quantity changes into Quality";
   Phase transition and Critical phenomena
   Logarithmic Convergence and Emergence of Quality
3. *Networked Small World; Indications fromGenomics* ;
   Power-Law Ordered Plain Structure of
   Super-Complex System ⇔ The Structure of e-Biz.
4. Uniquitous Crisis to Ubiquitous Critical Points for the Emergence of Qualified Business with e-structure

1. Fundamental Difference between old conventional business and e-commerce?

→ Th.1 Easy "Business Structure Reformation"
With "minimum physical Inertia"

L.1 "Business Structure Reformation"?
→ with changes of "Quality"

L. 2 "minimum physical Inertia"?
→ Only with "Information processing and innovation"; pure MOT industry

Then, 2 working questions

q1 What is the "Qualitative Reformation"?

q2 What Structure should be achieved with Information processing and Innovation?

For q1 Not Quantitative minor Changes
But with emergence of Quantitative Transition

For q2
With concretely different Networked Structure
as 1. Information System and 2. Socio-Economical System

Cf. Ch. S. Pierce, F. de Saussure, C. Levi Strauss and H. Yoshikawa: MOT and Type-2 Basic Research

In this paper we would like to give

1 Clear Definition with logical and simple mathematical form for the Determination of Qualified Business Model Innovation

2 With the basis of Informatics, Neuro-infromatics, Genomics and physical complex system studies; Phase transition theory in adequate application

3 In a Simple, Throughout Total View, up to business applications;

Type-2 Basic Studies (Cf. Fukuta, Ito et al.)

2. "Quantity changes into Quality" From Metaphor To Meta-formula

Early 19C : **Haegelian Dialectics (verbal metaphor)**
1877: **Marx/Engels (metaphor in natural science)**

CH_2O_2 — formic acid: boiling point 100° melting point 1°
$C_2H_4O_2$ — acetic acid: 118° melting point 17°
$C_3H_6O_2$ — propionic acid: 140° " "
$C_8H_8O_2$ — butyric acid: 162°
$C_5H_{10}O_2$ — valerianic acid: 175°

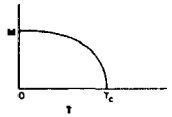
(F. Engels *"Herr Eugen Dühring's Revolution in Science"* Part 1 Philosophy XII Dialectics "Quality and Quantity)

Physical Reality of the metaphor:

'Critical Phenomena'
Boiling, melting.....Emergence of Phase Transition

Present prescription from physical science Y2K: after Renormalization Group theory (Ken Wilson, 1970's)

Quasi-Continuous changes in Quantity And Emergence of Dynamical Non-linear Critical Phenomena



Sample of critical phenomena:Curie point of a ferromagnet
After Ken Wilson's Nobel Lecture " The Renormalization Group and Critical Phenomena" 1982

Quality and Quantity For human recognition

MATERIALISM vs IDEALISM?

→Materialistic Understanding for MIND phenomena

From Neuro-Cognitive Brain Science :wetware approach and Network Informatics :dryware approach

Emergence of Qualitative Perception in Human Sense:

Limit of recognizing continuous qualitative change: ~300 units

Cf. Magicnumber 7 $\times 7 \times 7$

More than **'Order 3'**

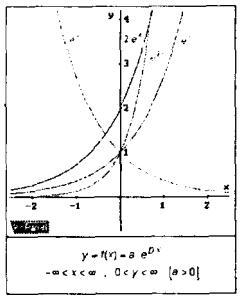
→**Exponential Changes**

is regarded as Quality Shift

The Exponential Function

Cf.
Exponential (=Non-Linear) Increase of Needs
vs
Linear Increase of its Solution
(production, maintenance…)

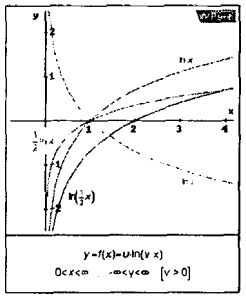
→**"The Software Crisis"**



Inverse Function; Convergence Logalithmic Function

Increasing Industrial Needs,Network nodes etc...and Limit of Human ability
→Importance of Logarithmic characteristic

Cf.**Outsourcing** Business(to China, India,Taiwan…)
→ Cutting of **Labor Costs** truly converge the critical situation?

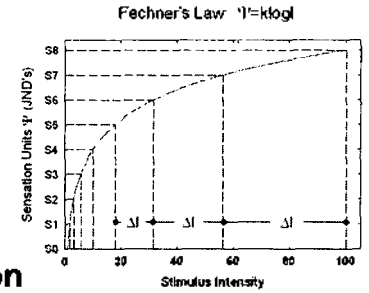


Weber-Fechner's Law of Perception

I = k log(S/S0)

I : sensory intensity
S :stimuli
S0:stimulousThreshold
K: constant

Human perception Converges !



Note:Functional Sameness

I = k log(S/S0) :
Weber-Fechner's Low of Sense

I = k log W : Chanon'sdefinition of information quantity

S = k log W : Boltsmann's definition of Entropy in Statistic Dynamics

Order-disorder, measurment of human cognition and emergence of quality has some very simple Background...

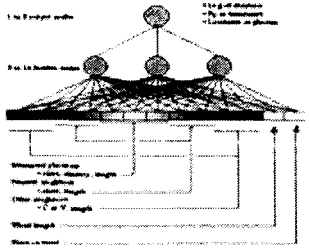
Cf. E. Schroedinger, J. von Neumann

Neural-networked divergence and convergence for cognition

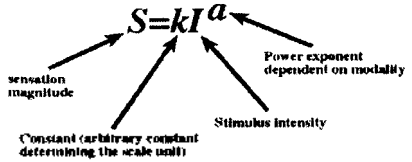
Neural network in human brain

would function for

Informational Degeneration
= Emergence of Qualified Cognition



From Log. to arithmetic daily world: Fechner=Stevens Power law



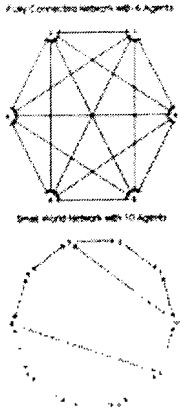
$$\log(S) = a\log(I) + \log(k) = a\log(I) + K$$

Order of Power Law: similarity to
'Small world Network model'

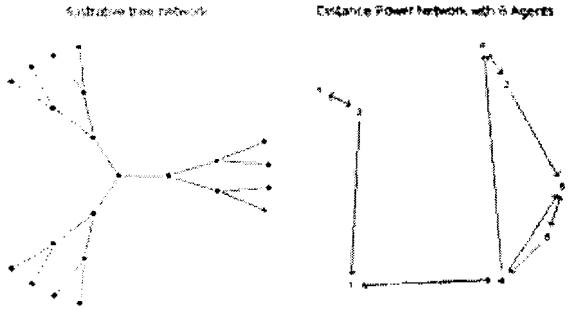
3. Networked Small World

Small World Network:
Contact to EVERYBODY on the earth with 6 step.

- Not exponential **Info-explosion**
- but **weighted efficient network**
- **Orderd by Power-Law**



Directly Tree structure of WWW and efficient small world human network

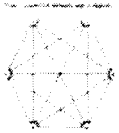


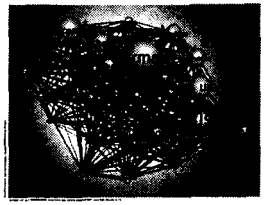
WWW

human small world

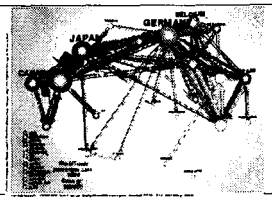
Designing proper network structure and immediate realization: e-networking

Complete Graph

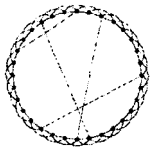


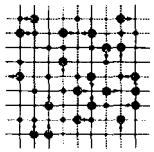


Efficient network:



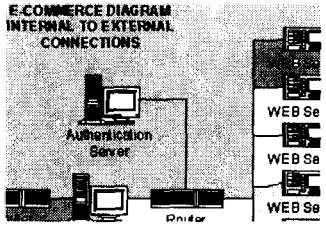
Hints from GENOMICS
Emergence of life function
Folding of acid chain to protain





Formation of (small-world like) info-structure GIVE BIRTH to Living Creature : Non linear dynamics for Life science.

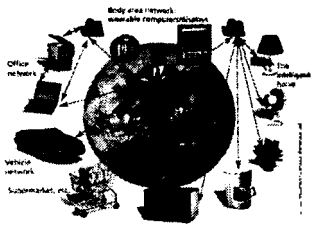
Then, how about e-commerce strategies in Ubiquitous Computing age?



Sufficient, Adequate, and Qualified?

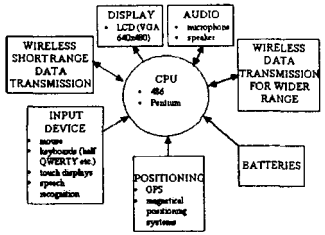
Strategically WISE ENOUGH as a tiny bacterium...?

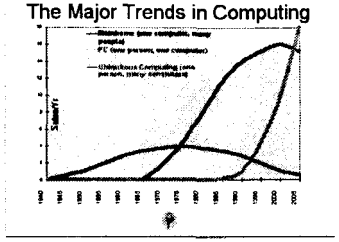
4. Ubiquitous Crisis to Ubiquitous Critical Points for the Emergence of Qualified Business with e-structure



Uniquitous computing dream of tomorrow:
from pomepage of Siemens;

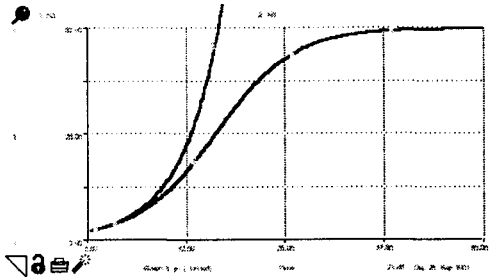
Sunset of "Personal Computer"





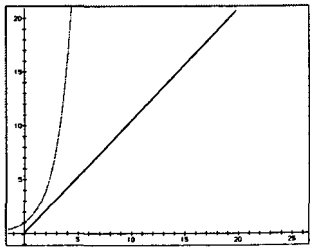
From "one person one computer" to "each person versatile computers

Exponential increase of Potential Needs



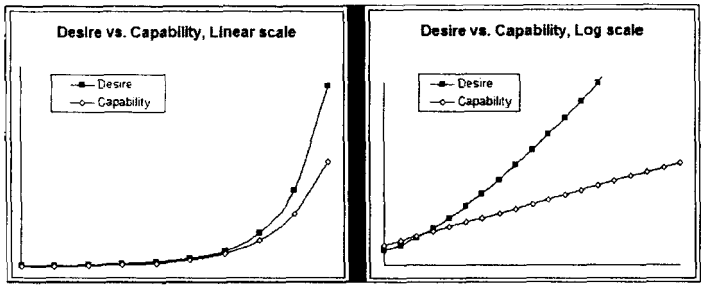
Also potential exponential increase of risk in Ubiquitous computing society: how to manage and hedge them ???

To avoid lose of potential Biz chance: "Beyond the Death valley of needs"



Exponential (=Non-Linear) Increase of Needs & as much as Linear Increase of its Solution (production, maintenance…)

The Software Crisis



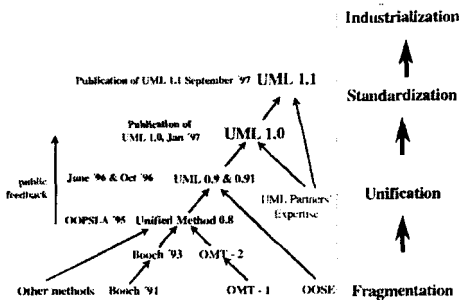
Exponential increase of Demand and
Linear growth of Industrial Capability: Possible Crisis

Object-Oriented Language and advanced IT solutions

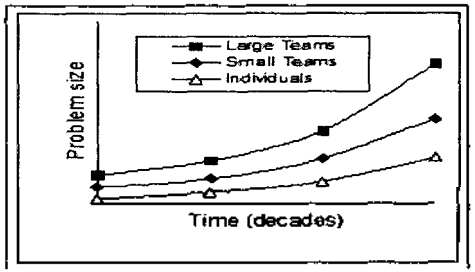
Object-Oriented language:
MORE-THAN=ORDER-3
degenerating of
programming
process.

Qualified Reformation
of Working-Step Saving

The language designing
of UML→



Ubiquitous Increasing of Needs=Risks



A Biz model can make progress in the process at Qualified level?

Masao ITO's Criteria

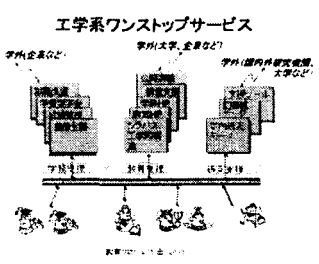
- A Determinant for EFFECTIVE Reformation in Innovation / Biz model structure

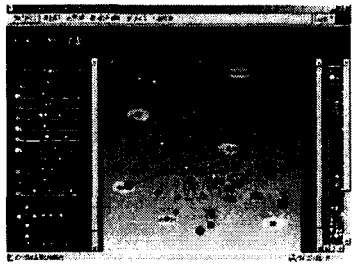
IS THAT

whether it contains logarithmically or similar ordered saving of elementary steps for the whole business process and can emerge qualitatively different business structure in networking configuration

OR NOT.

Early Application: e-learning in Tokyo University





Give emergence for the potential needs of students, and form proper information system with adequate Networked structure for the demand.

Concluding remark

2004

* In IT competitiveness KOREA goes before JAPAN: Japan is following Korea.

- "Global decay" of American Globalization based on PC has been already on going.
- Ubiquitous computing / risk increasing situation is also proceeding in borderless form

→ THEN

Co-Creation of Win-Win Structure

Beyond non-networked national border: as *nature of e-Biz.*

With the application of Fundamental Innovation for Qualified Structural Reformation of e-Biz.

Only e-Biz can achieve it without any physical Inertia through information processing and pure technological management. MOT Biz.

Fundamental Ubiquitous Solution

For your Korean, our Japanese
and every other People's
Win-Win Structure
IS
Principally possible only with e-BIZ.

SYMBIOSIS
without

On the basis of Centre of Excellence in our day.