

Workshop on

Autonomous and Cooperative Intelligent Vehicles: new safety and security challenges, or yet another critical infrastructure?

“What is Autonomous Decentralization Concept and its escalation?”

To Epigenesis and world view of the Kegon-kyo (Avatamsaka Sutra)

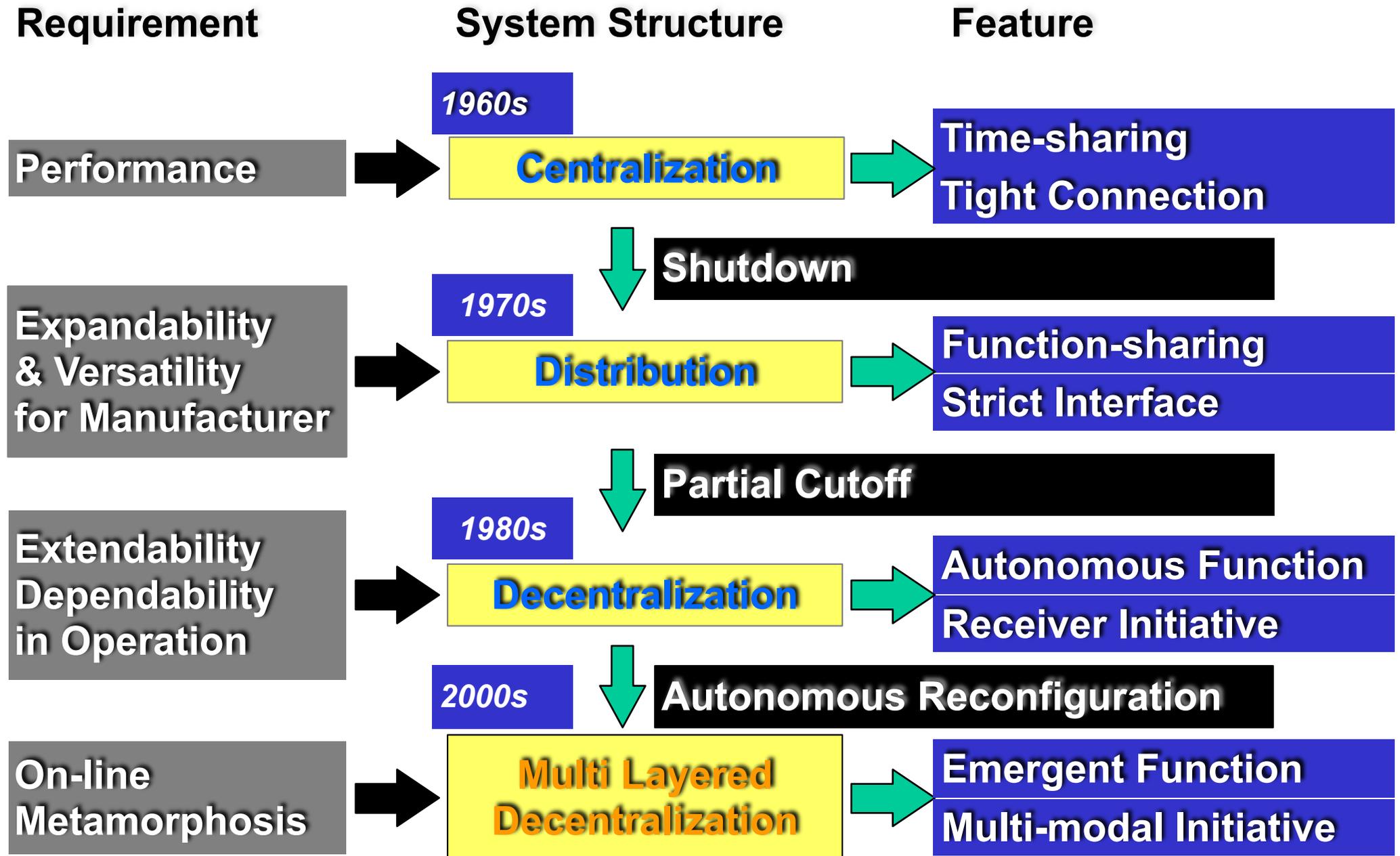
68th IFIP WG10.4 meeting

25 June, 2015 Buzio, Brazil

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IFIP WG 10.4 member Emeritus IEEE Life Fellow

Evolution of Computing Systems



Epoch making events on Autonomous Decentralization Concept and systems(ADC/S) 1/2

- 1972 Centralized Dual-computer system for Toukai Shin-kansen commercialized
- 75 Centralized Dual-triplex computer system for Sanyu Shin-kansen commercialized
- 75 Computer controlled Vehicle System as national project demonstrated
- 76 R/D of Distributed Microcomputer system launched
- 77 Comprehensive automobile traffic control pilot system as national project completed
- 77 Autonomous decentralization Concept proposed
- 78 Paper on Dual –Duplex computer system appeared in IEEE Proceeding
- 79 Autonomous decentralization concept and experimental result presented at IFIP working conference, in London
- 81 IFIPWG10.4 started at Portland,ME,USA
- 82 Train dispatching ADS for Kobe subway commercialized
- 82 Fuzzy control for train operation for Sendai subway Commercialized
- 84 Paper on ADS appeared in IEEE-Computer Magazine
- 85 COMTRAC by ADC(named COSMOS) introduced

Epoch making events of Autonomous Decentralization Concept and systems(ADC/S) 2/2

1985 Cross-sectional SIG started in Japanese academic societies

87 Intelligent space system by ADC/S proposed

88 Reliable Computing & Fault tolerance to Dependable Computing & Fault tolerance (Gotemba,Japan)

89 Technical Community established in Society of Instrument and Control Engineers

90 Four year governmental grant on ADS started

93 First IEEE-ISDAS in Yokohama Japan held

97 Autonomous decentralization Transportation Operation System(ATOS) introduced

2000 Extended ADC for home healthcare proposed and feasibility study started

04 EADC/S at WCC2004 presented

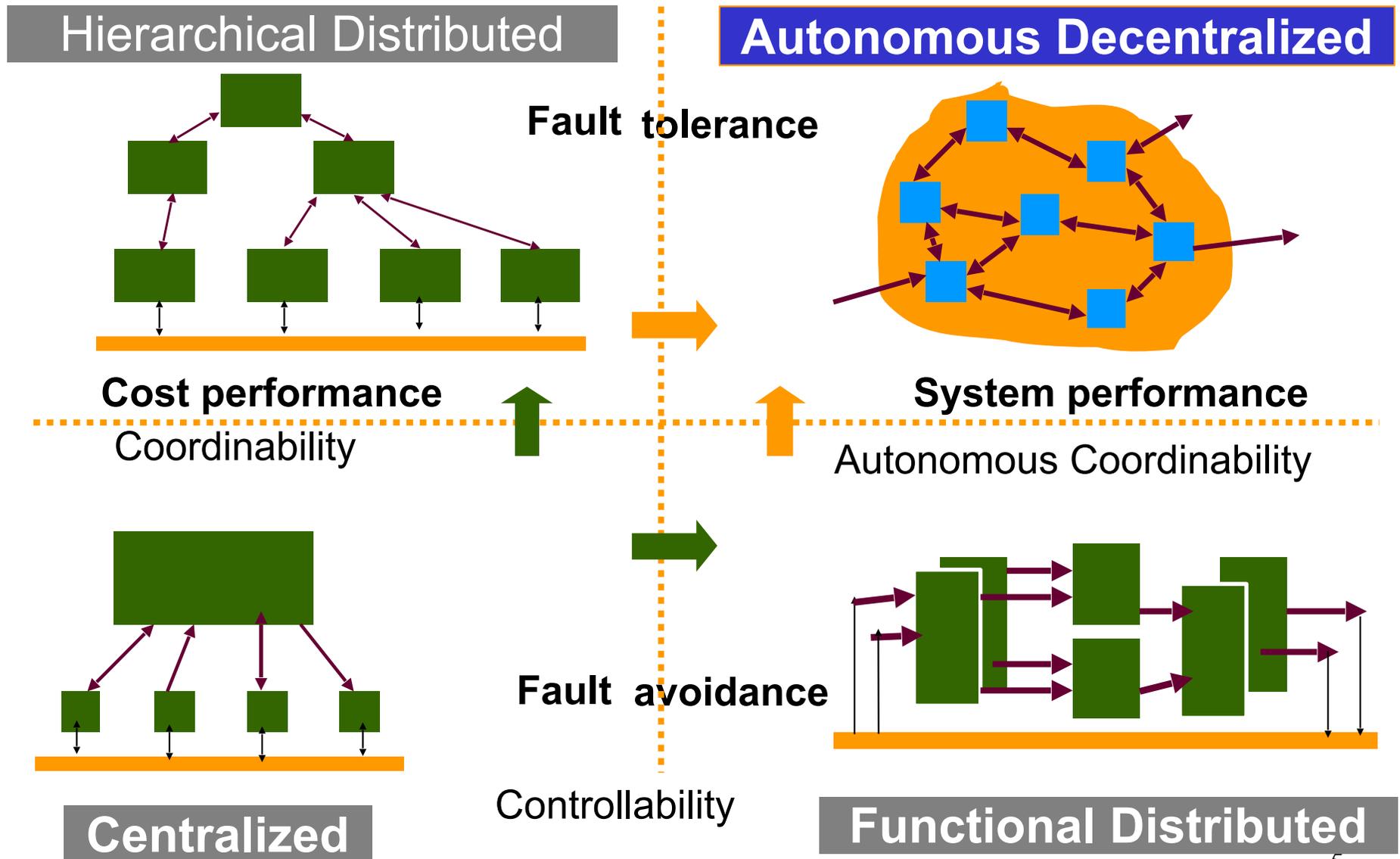
07 Taiwan high speed railway commercialized

08 Intelligent Society R/D Institute (NPO) established for ADC/ADS

15 IEEE-ISI Award given

Our Target of System Concept

Autonomous controllability



Central Dogma of ADC/ADS proposed

1979 Biology(DNA) and LSI(Microcomputer)

Autonomous Decentralization Concept

**Autonomous controllability Autonomous coordinability
including Fault tolerance and Dependability**

Autonomous network(A D L) Data Field(D F)

2000 Consciousness-only cosmology and AI, Fuzzy logics

Extended ADC/ADS (EADC/EADS) Concept

ADC+Autonomous observability(3 dimension)

2015 Keron (Avatamska)world and Epigenetics

Epi-ADC/Epi-ADS Concept

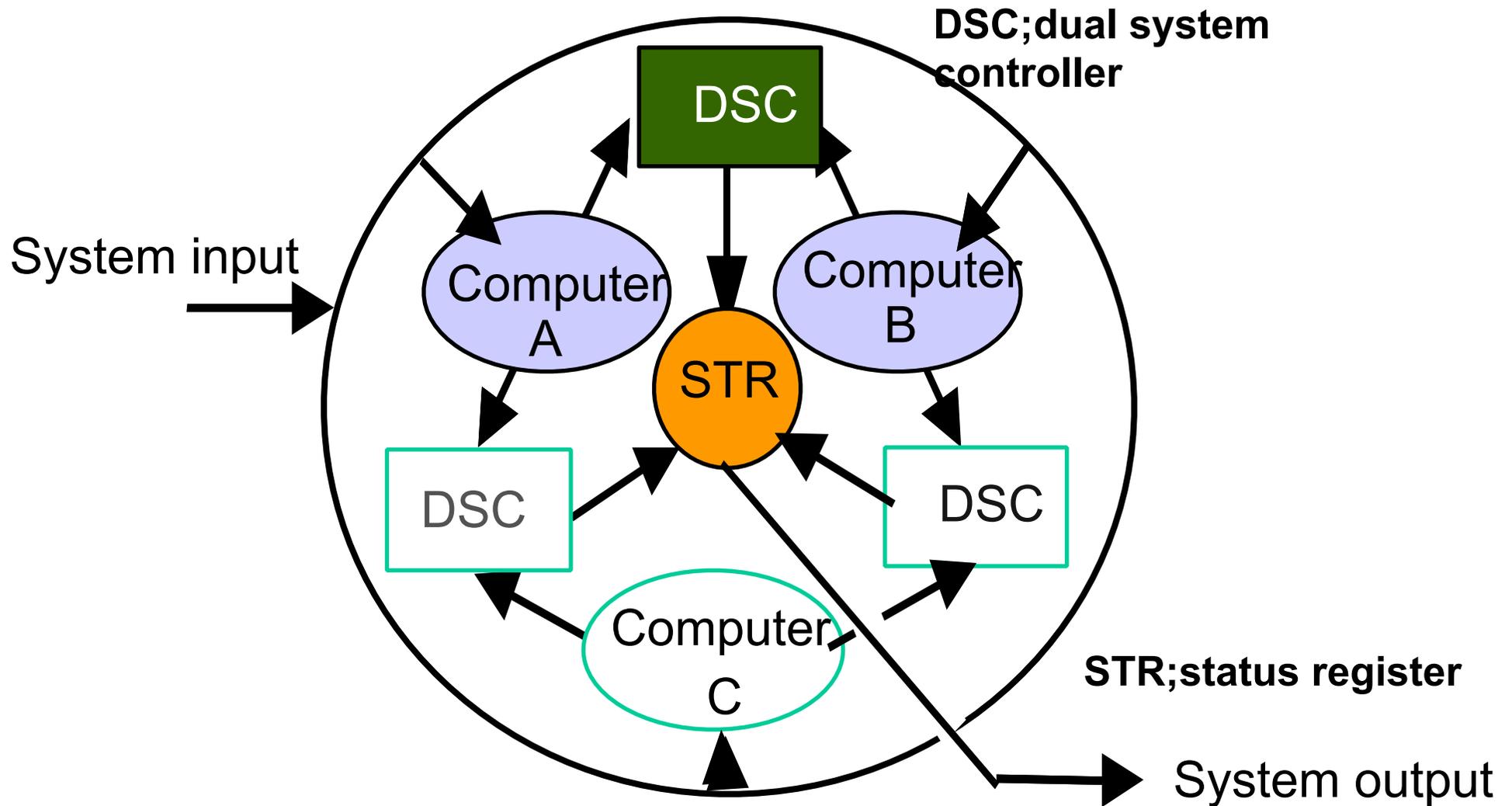
Indra'net (fractal structure)

The realm of non-obstruction between phenomena

Epigenetics (modification of gene), Resilience

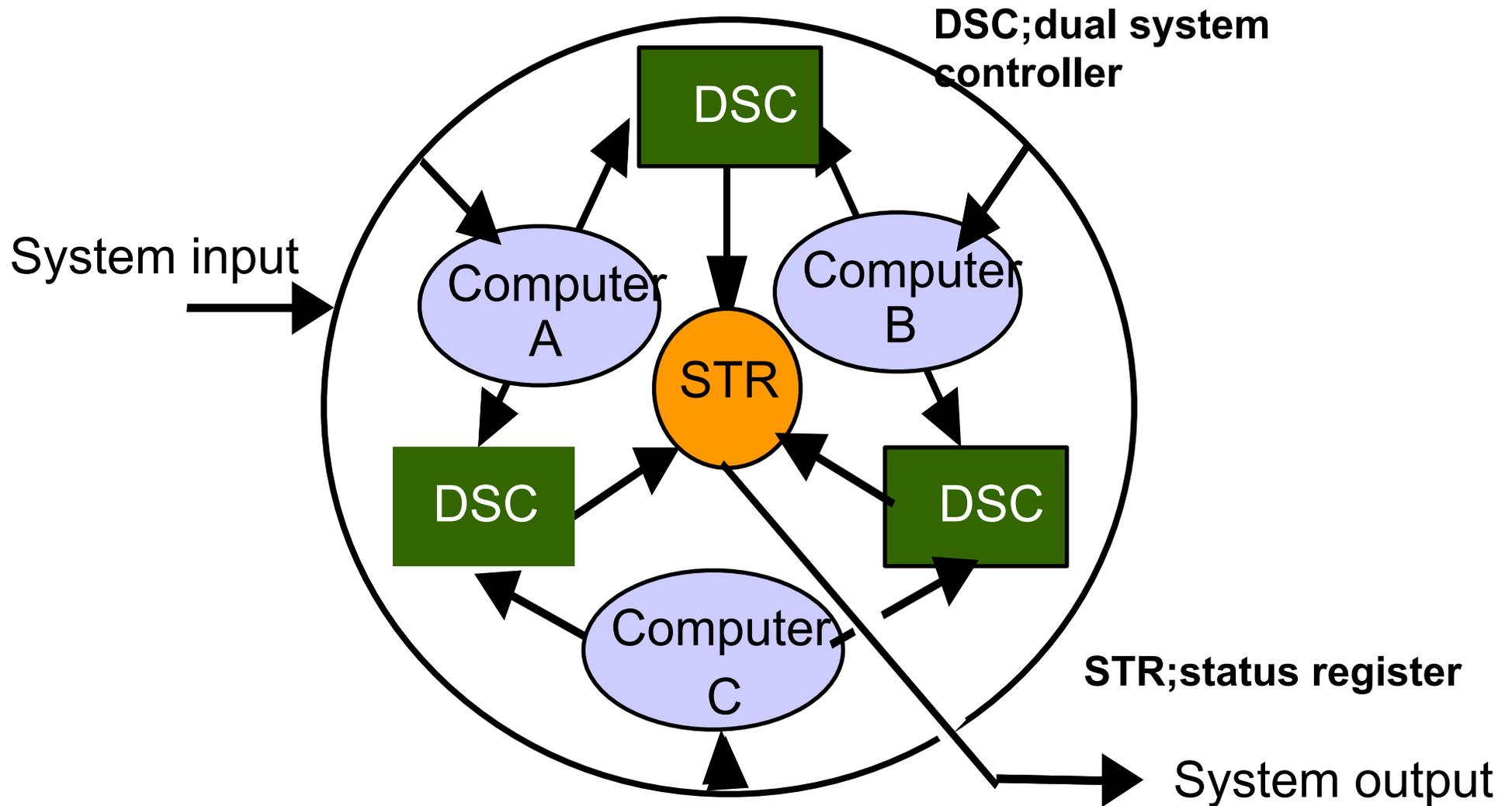
Symmetrical Structure of Early COMTRAC

Dual Centralized System Structure



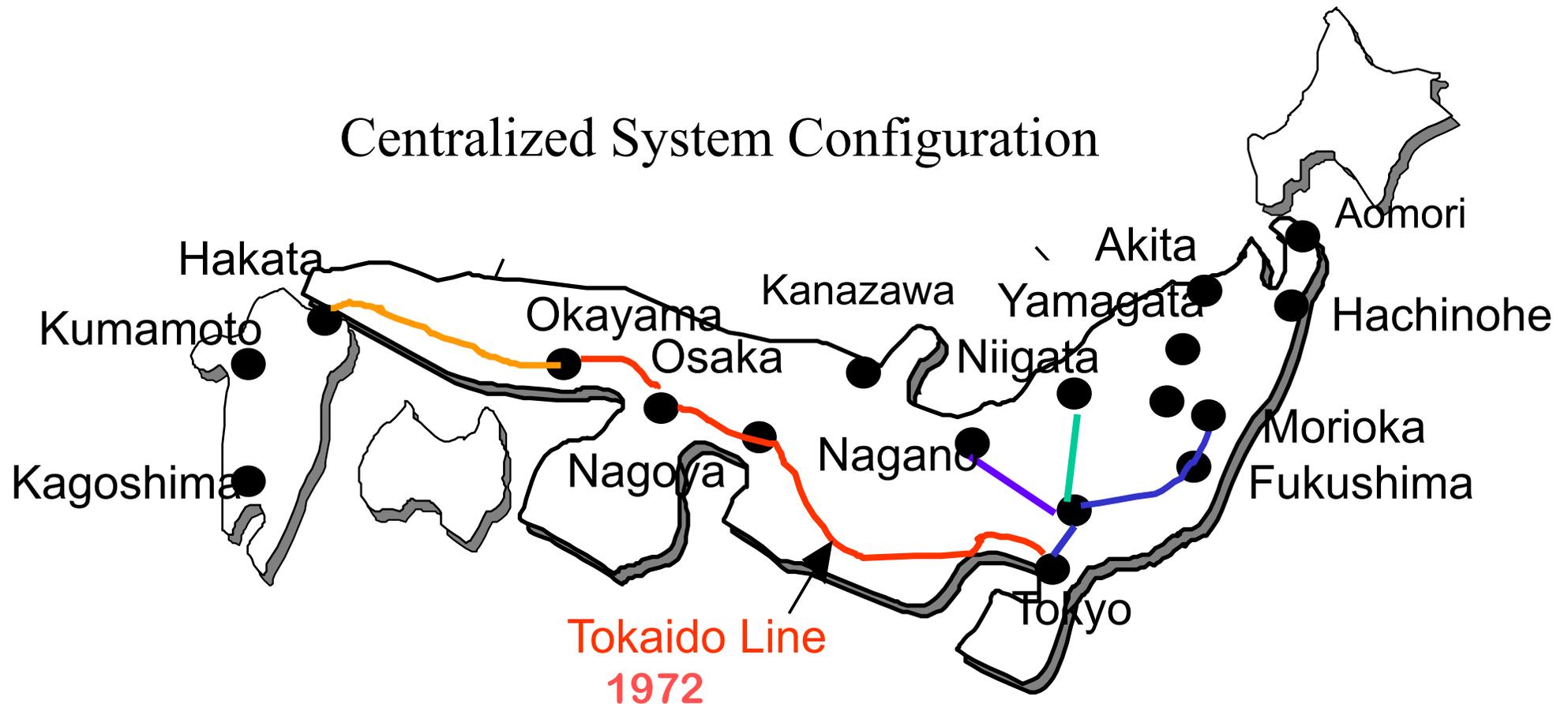
Symmetrical Structure of Early COMTRAC

Dual-Duplex Centralized System Structure



Dependable COMTRAC by Centralization

Network of Shinkansen has been developed line by line since 1964 and operated by COMTRAC since 1972 without any system failure.



Principle Recognition of Autonomous Decentralization Concept (ADC)

- (a) Always includes inactive (temporary faulty, complementary or spare) parts
- (b) Always changes its conditions and states among operation, metabolism, generation and growth (plus or minus)
- (c) Always changes its objectives to the goal by alternatives selection, optimization and daptation
- (d) Always keeps accomplishing its objectives almost completely

This observations are opposite recognition that system should be complete and stable.

Properties of ADC

Uniformity
of
structure

Equality
among
subsystems

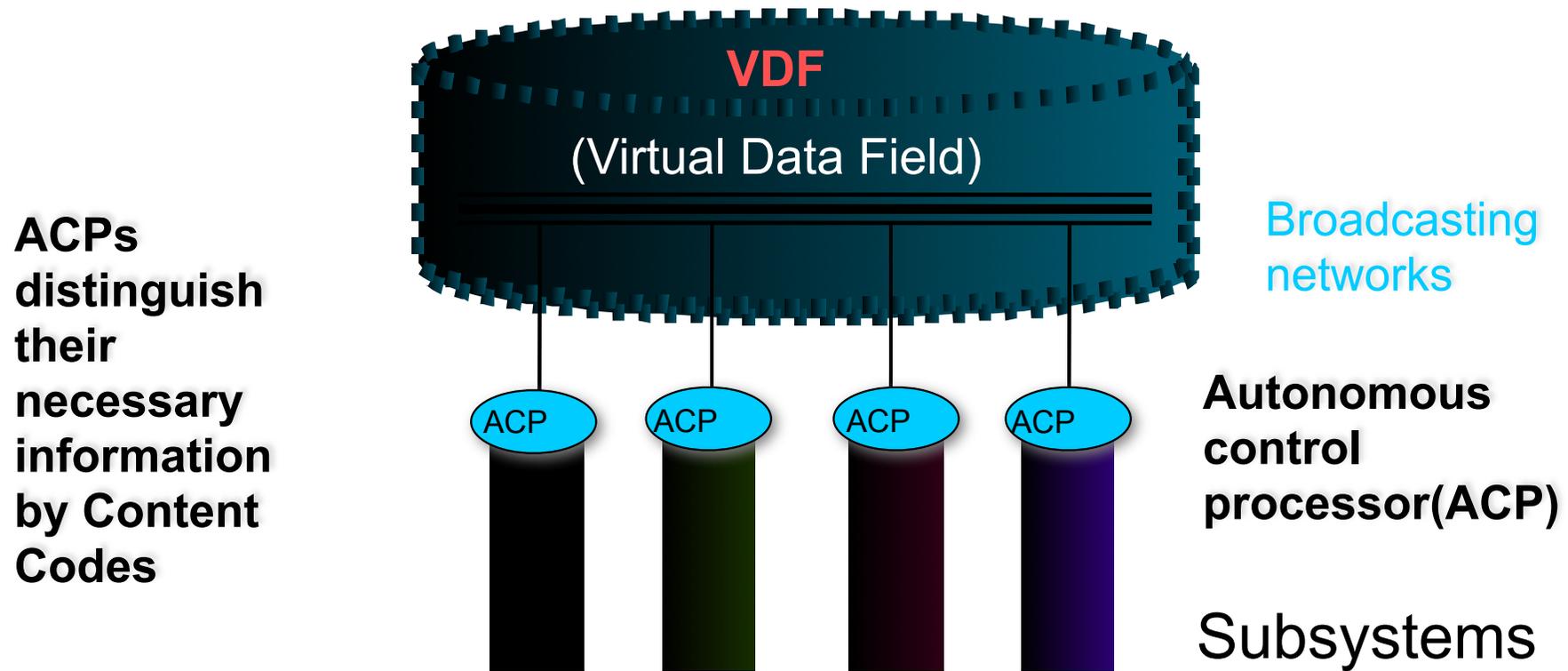
Locality
of
information

Definition of ADS

- (a) **Autonomous controllability:**
if any subsystem fails,
the other survivors can manage themselves

- (b) **Autonomous coordinability:**
if any subsystem fails,
the other survivors can coordinate
their individual objectives
among themselves.

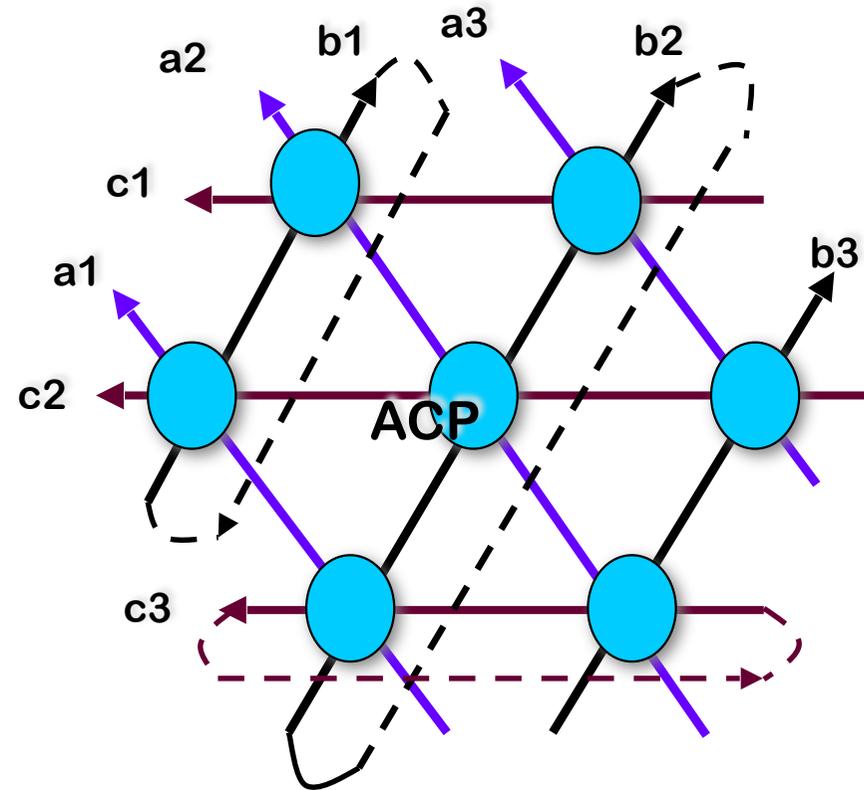
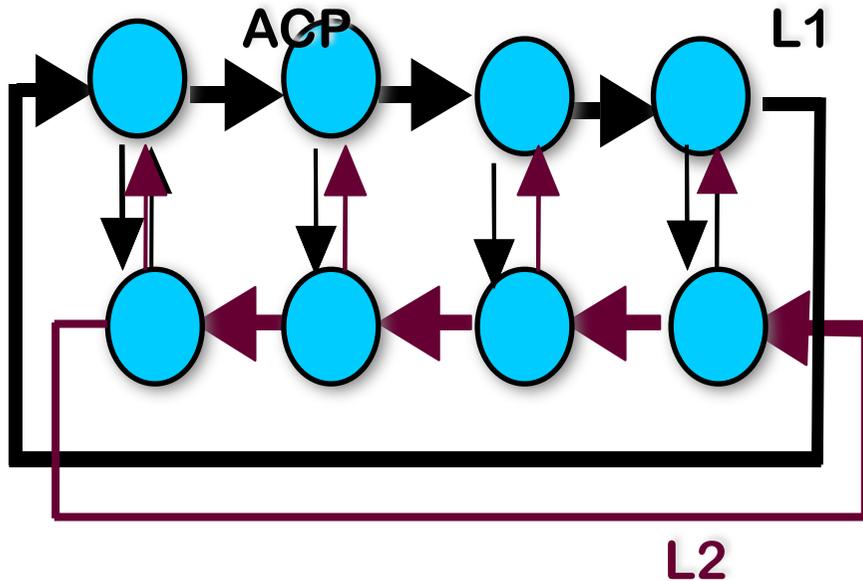
Virtual Data Field by Broadcast



Elements of Typical Information Format

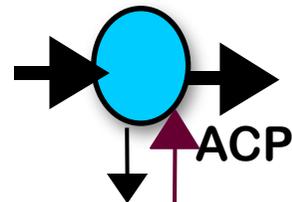
Flag	Content Code	Sender ID	Control Code	Data/ Command	RC	Flag
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Connection of Autonomous Decentralized Systems



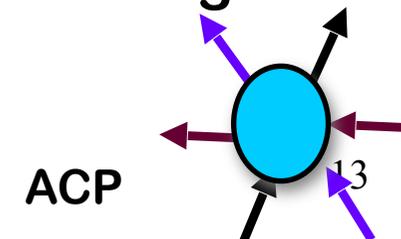
Analogy of Nerve

Loosely coupled Double loop network



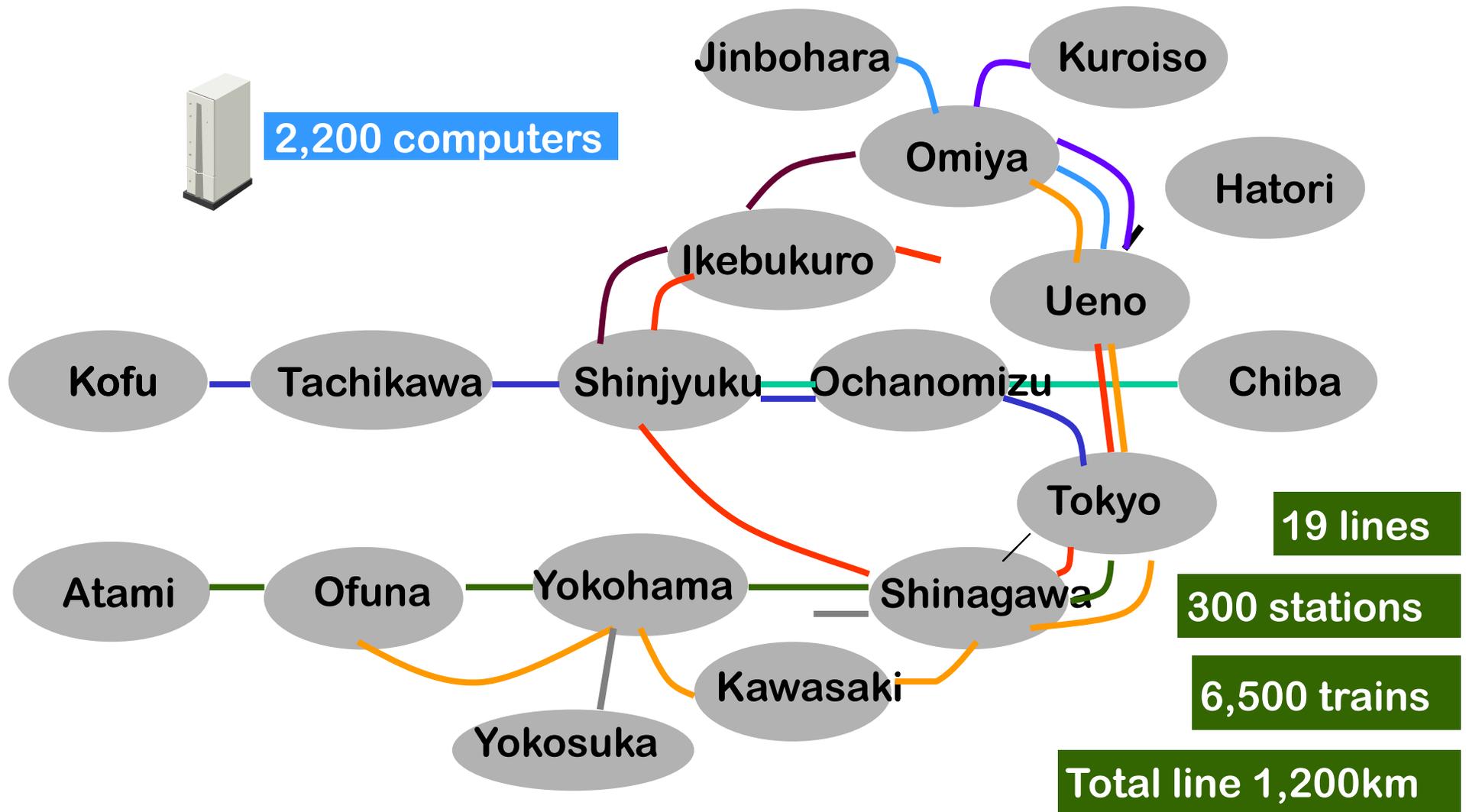
Analogy of Brain

Tightly coupled Hexagonal connection



Autonomous decentralized Transport Operation control and information System (ATOS)

introduced since 1996 in Tokyo Metropolitan Wide Area



Present Dependable COMTRAC & COSMOS

Network of Shinkansen has been developed line by line since 1964 and operated by COSMOS since 1985 without any system failure.



Definition of Autonomous Observability for EADC

Autonomous Observability:

if any change occurs

in the surrounding of the subsystem,
subsystems can observe it immediately

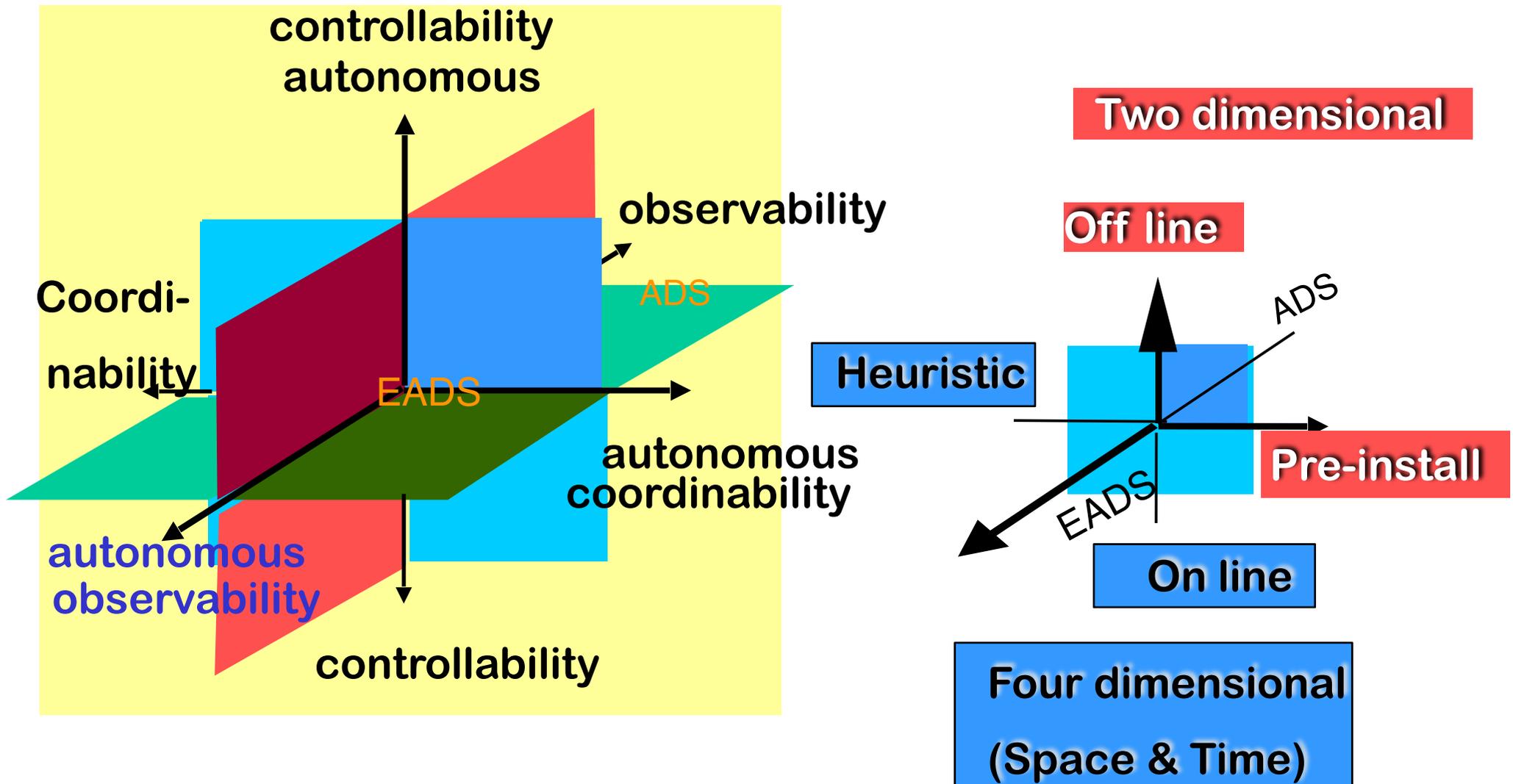
EADC is characterized by

Autonomous controllability

Autonomous coordinability

Autonomous observability

Extended ADS Attached Autonomous Observability to ADS



Extended ADC/S

Properties of Autonomous Observability

(1) Resilient network system structure

- a) Autonomous reconfiguration
- b) Security network among members
- c) Fault tolerant energy sources

(2) Intelligent understanding of Sensor Signal

- a) Perception from sensor signal (lowest layer)---vijJaana
- b) Cognition and Identification (upper layer)----manas-vijnaana
- c) Wisdom(common layer) -----aalaya-vijnaana

(3) Intelligent Autonomous Controlability & Coordinability

- a) backup manage and coordination for vicinity in space and time
- b) Complementarity among layers

What do we consider as future system concept?

Introduction of

(1) Parallel Cosmology by Buddhism

One in all, All in one ——Kegon World

Consciousness Only ——-Zen Doctrine

be expressed in B.C.5

Butterfly's Effect & Schredinger's Cat

(2) Epigenesis from Molecular Biology

Modification on Gene

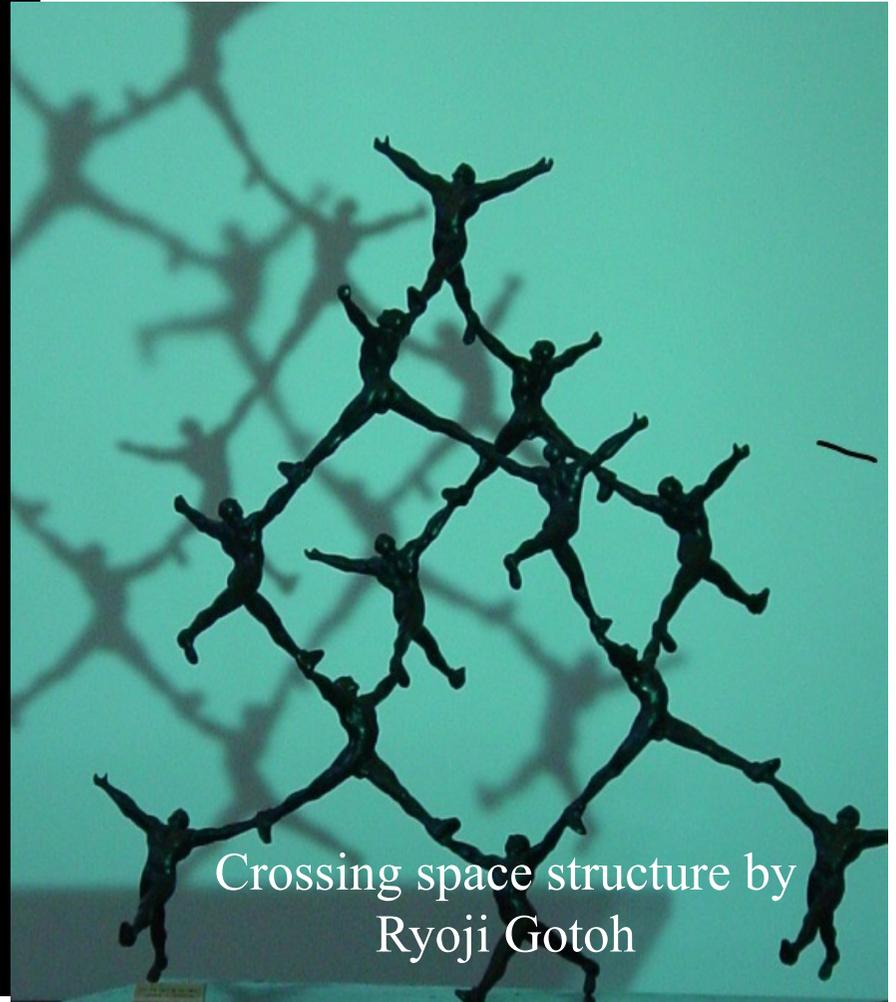
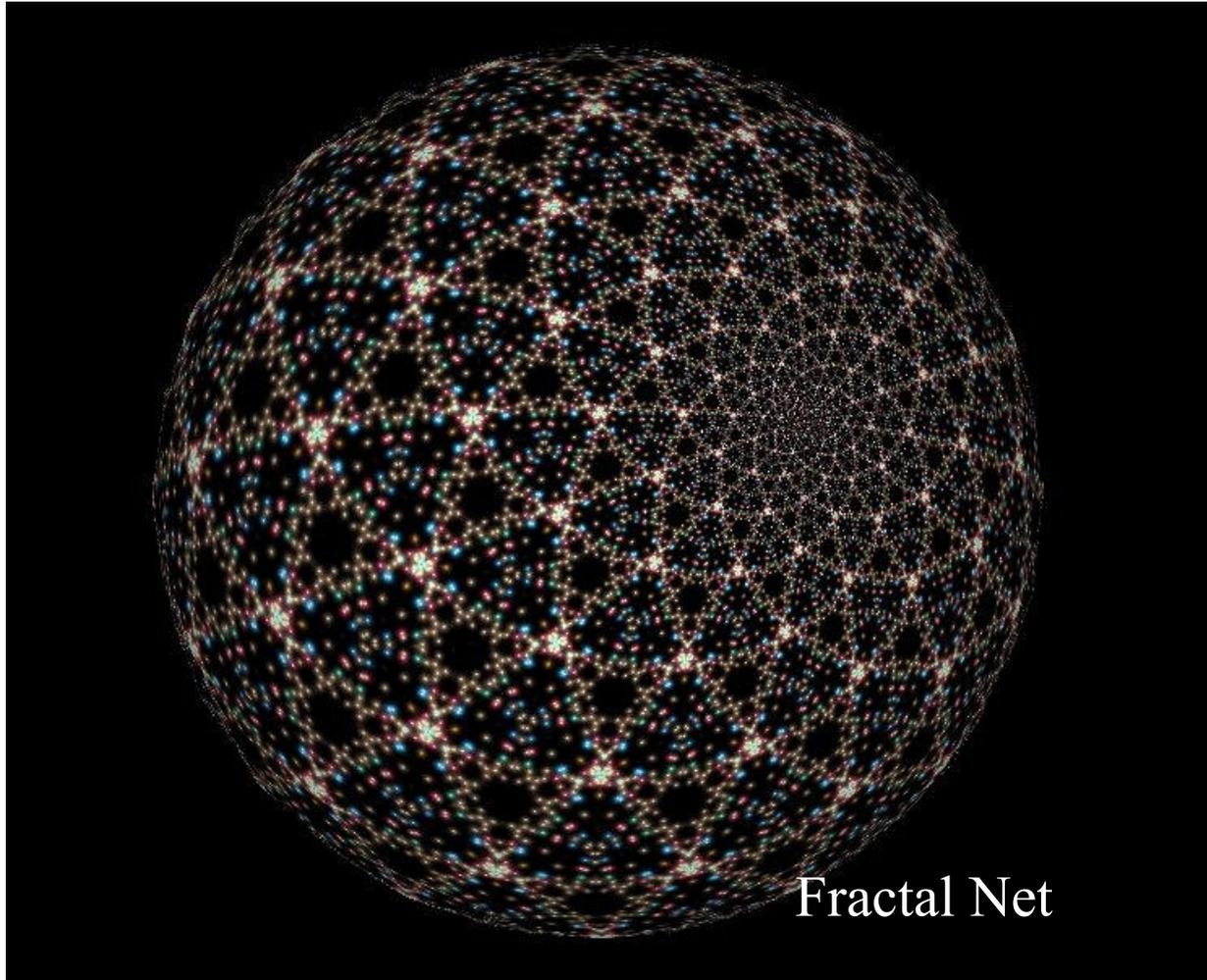
for Individual Properties &

Transferring to Next Generation

on-going investigation since 2000

Indra's Net

因陀羅帝網



Every existence in this universe is mutually related with
boundless connection (重々無尽)

Presentation of world view of Avatamsaka

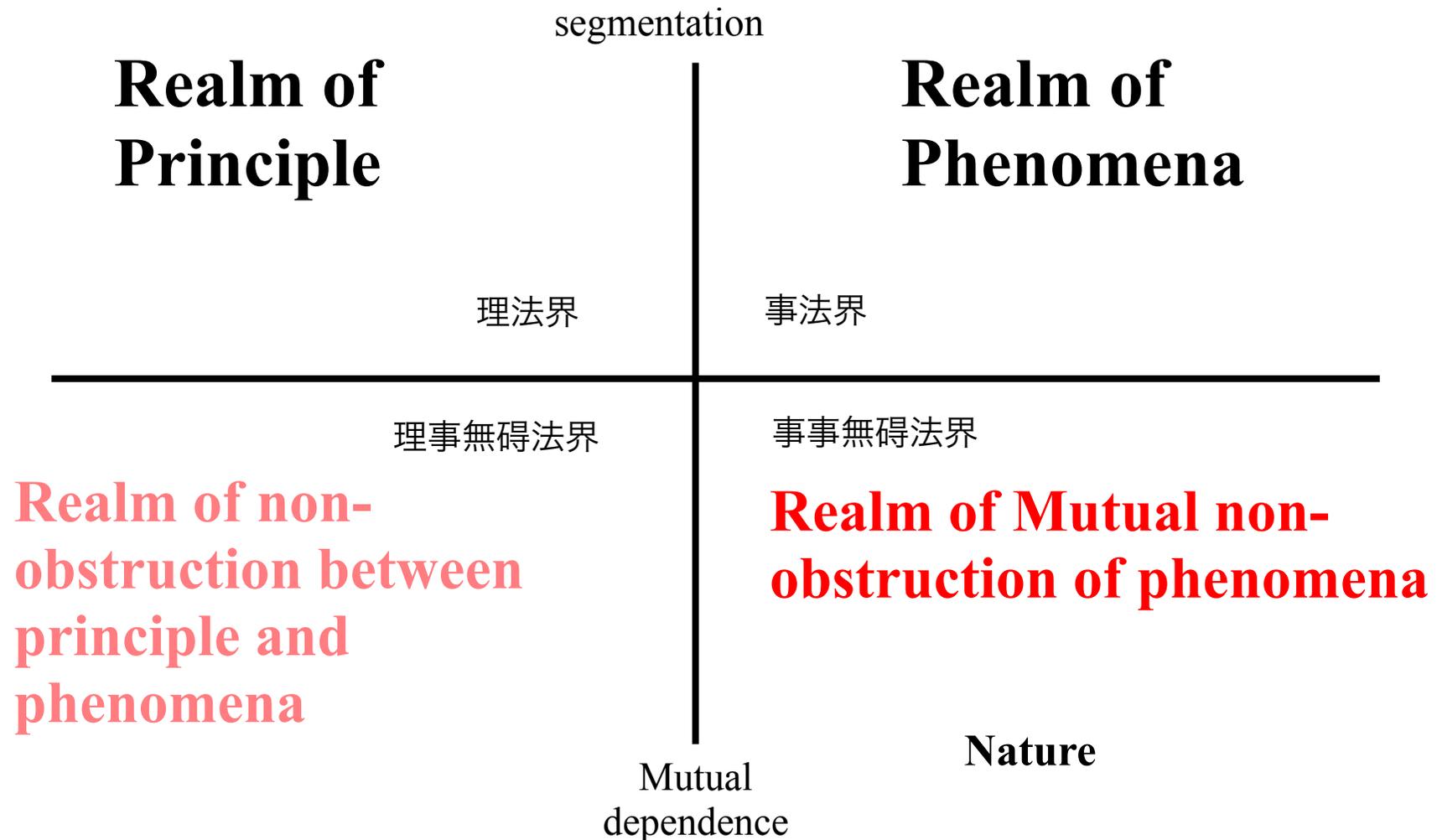
Traditional glass work in Tokyo
Edo Kiriko



The one is all, the all is one

Basic principal of ZEN

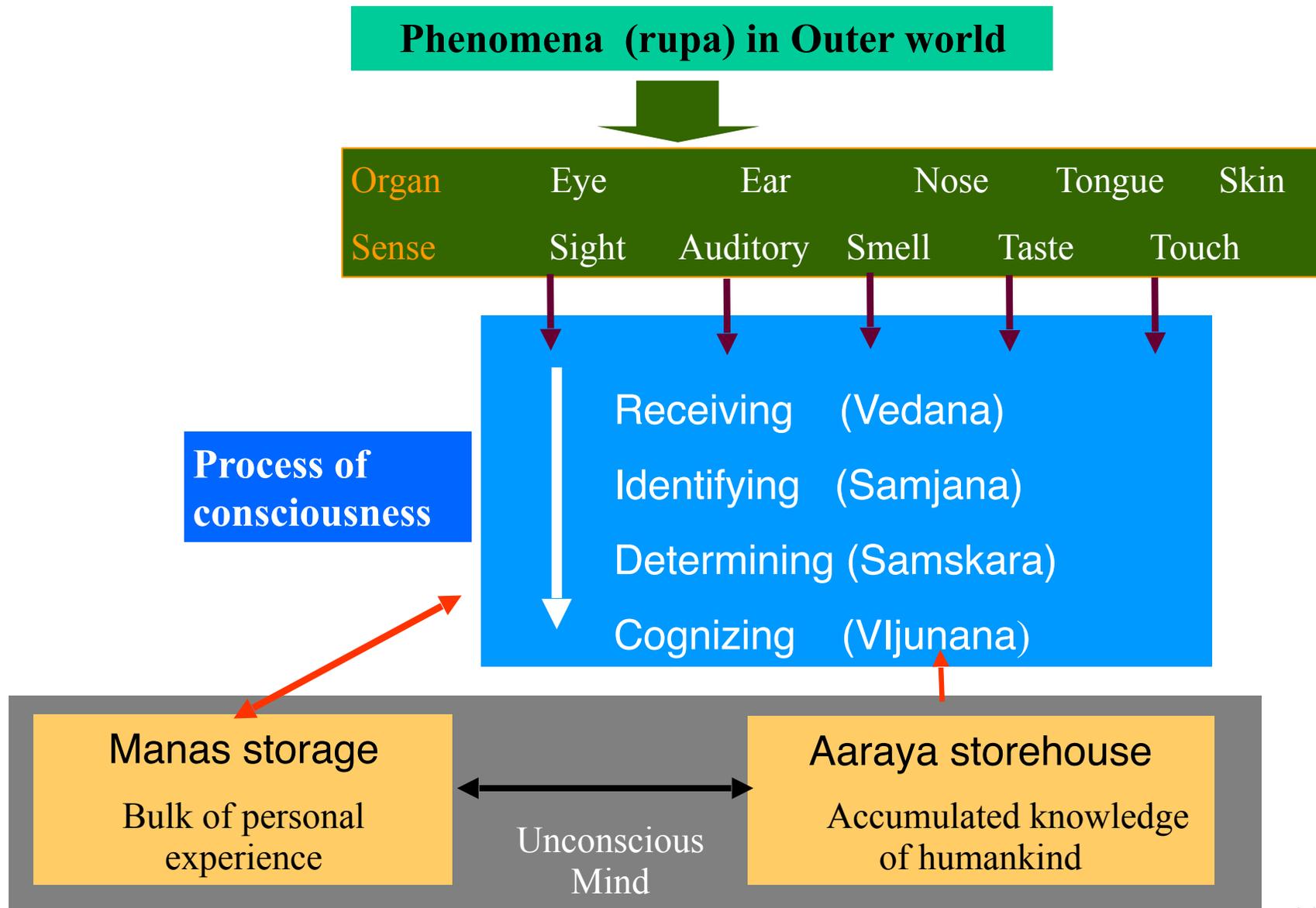
Understanding of Events/Phenomena



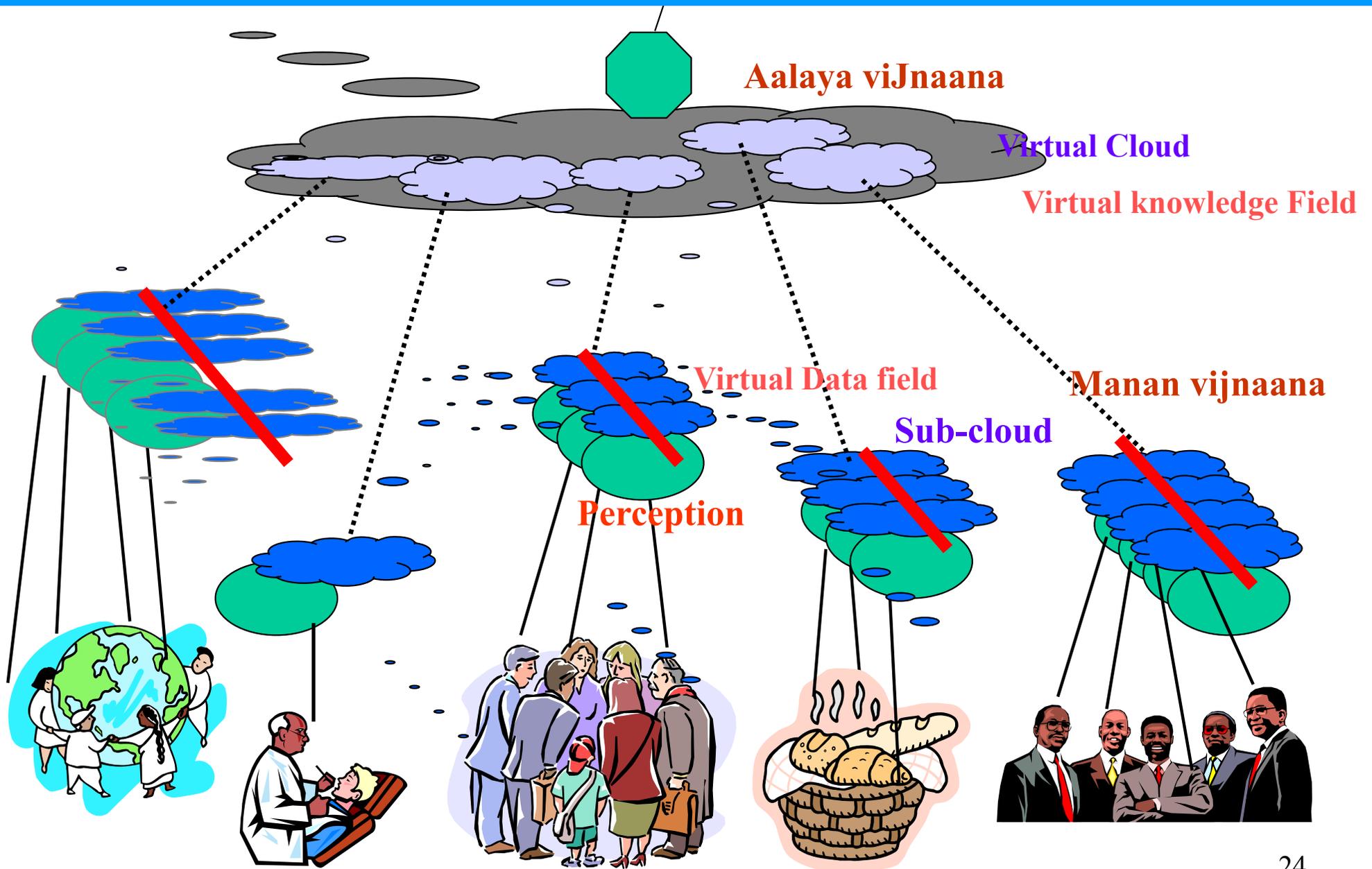
理は本質 (Nature) (=空)、事は見かけ (Artifact)、我々衆生の経験 (Experience)

Consciousness-Only (Emptiness)

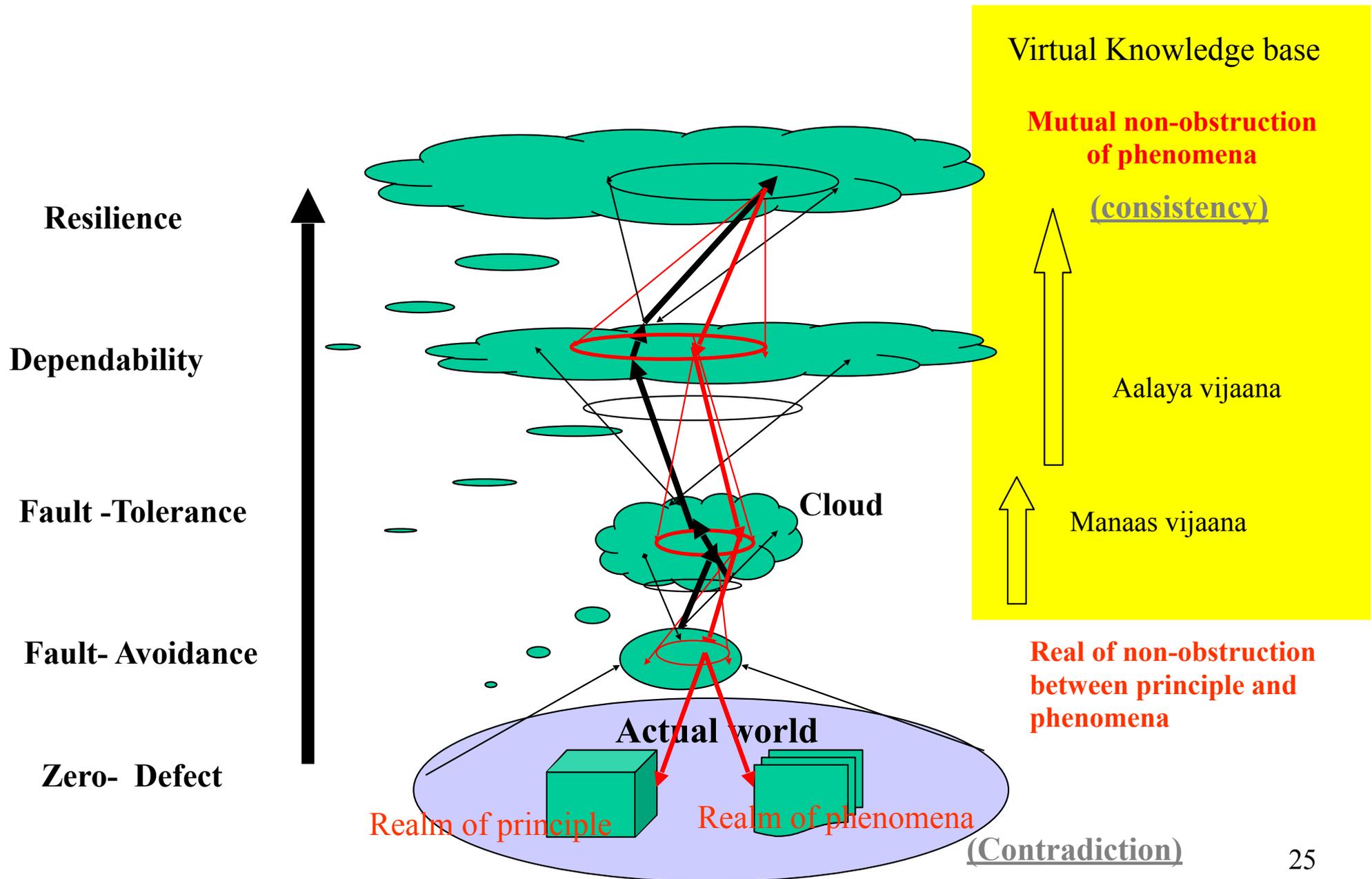
All existence is subjective and nothing exists outside of the mind



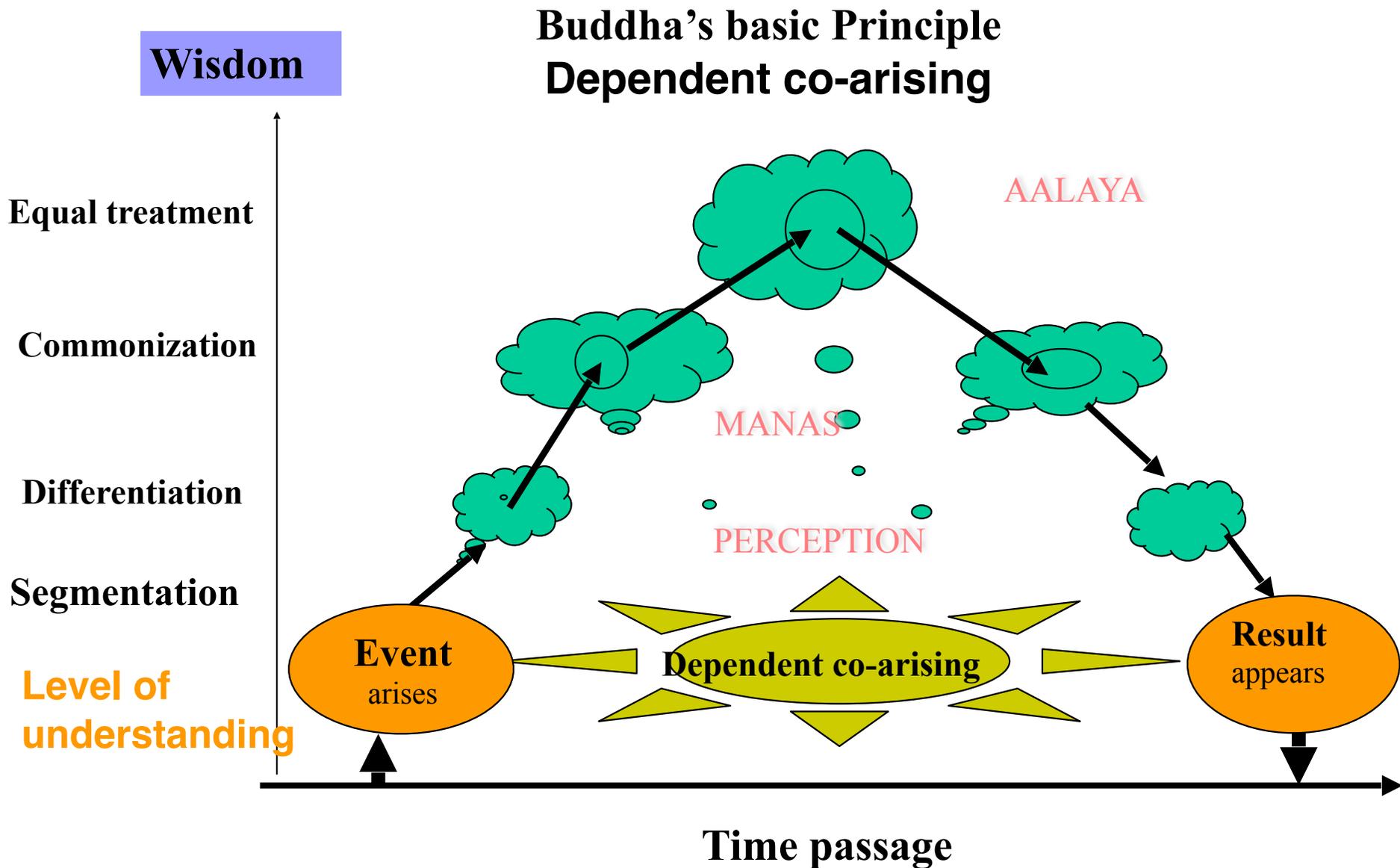
Database of Avatamsaka Universe



Nested structure of layered wisdom



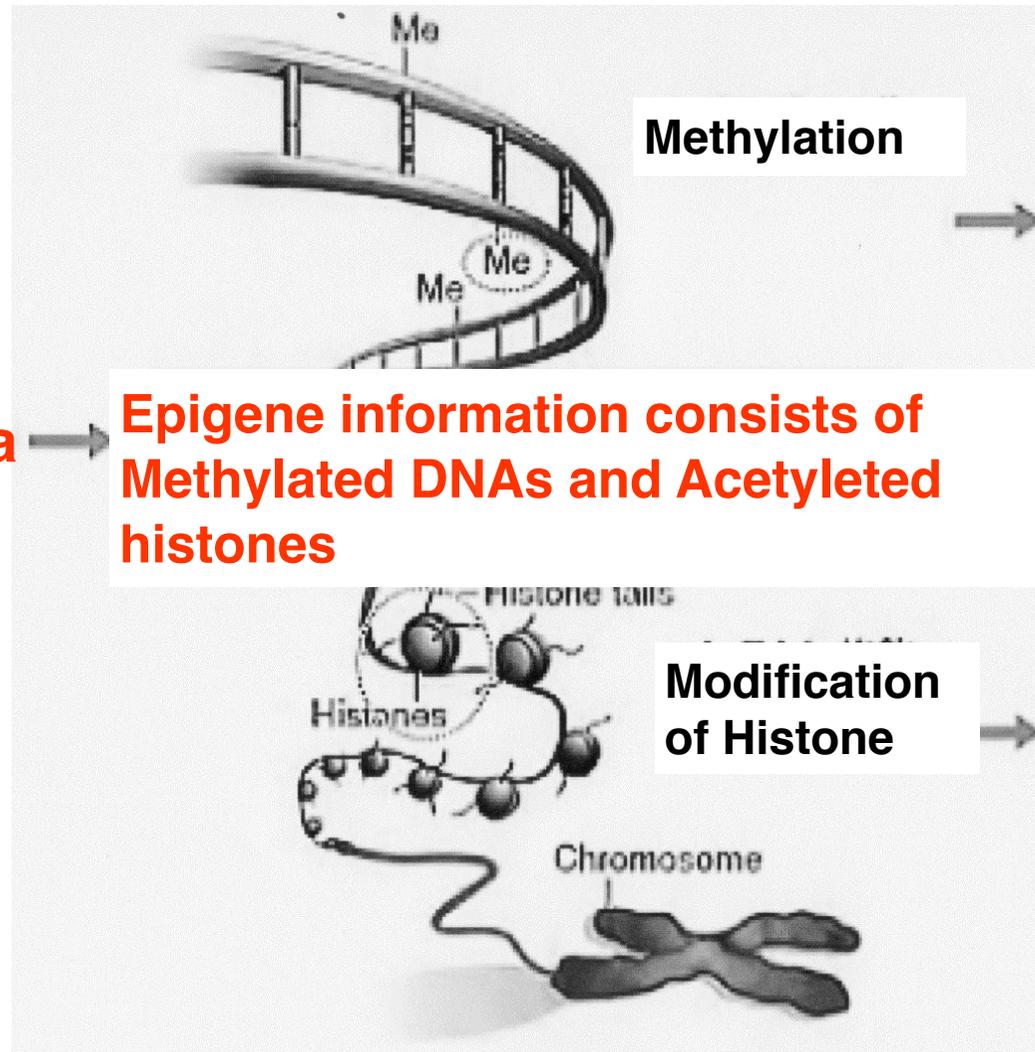
Fermentation/ Fumigation of wisdom



Discovery of Epigenetics

**Environmental
effect**

**Epigene information consists of
Methylated DNAs and Acetylated
histones**



**Epigene is
transferred by
cell division
within a
individual**

**Epigene is
reset by
fertilization**

Another Central Dogma by Epigenetics

Newly discovered Biological Phenomena

(1) Control of Gene expression by Transcription factor

DNA \rightarrow (copy) \rightarrow RNA \rightarrow (transcription) \rightarrow PROTEIN

(2) Effect on control area connected by transcription factor

① Acetylated Histone \rightarrow Gene expression is activated

(modification of Histone—Acetylation and methylation)

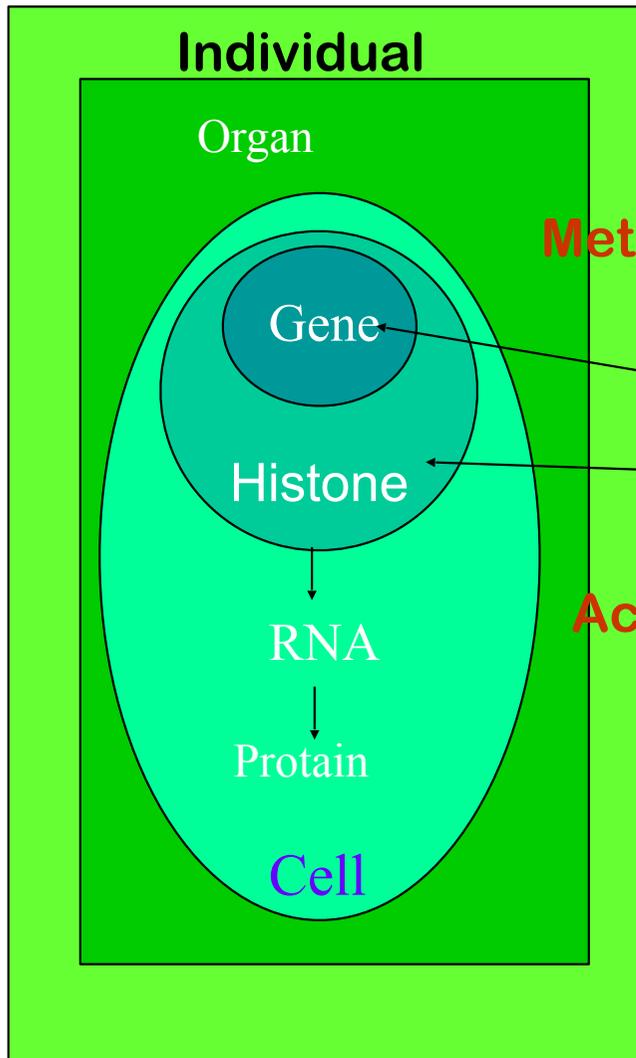
② Methylation of DNA \rightarrow Gene expression is inhibited

(transcriptional repression by methylation of cytosine)

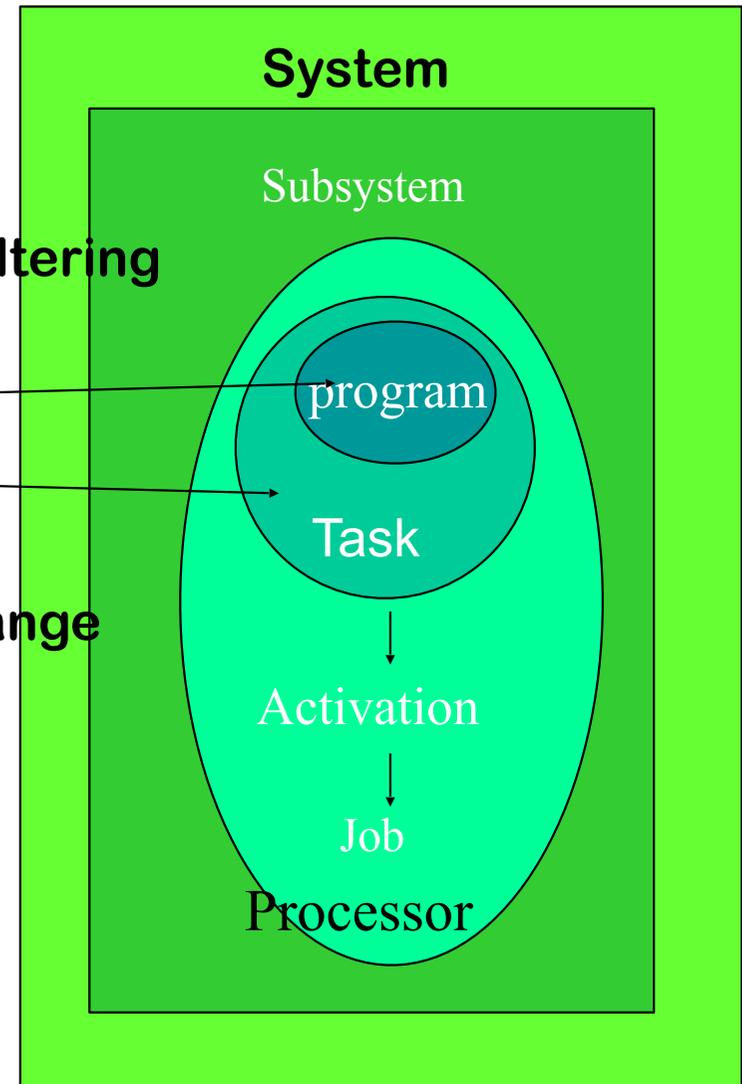
Adenine (A) 、 Cytosine (C) 、 Guanine (G) 、 Thymine (T)

Epigenetic of Living things and information systems

Living thing



Information system



Methylating

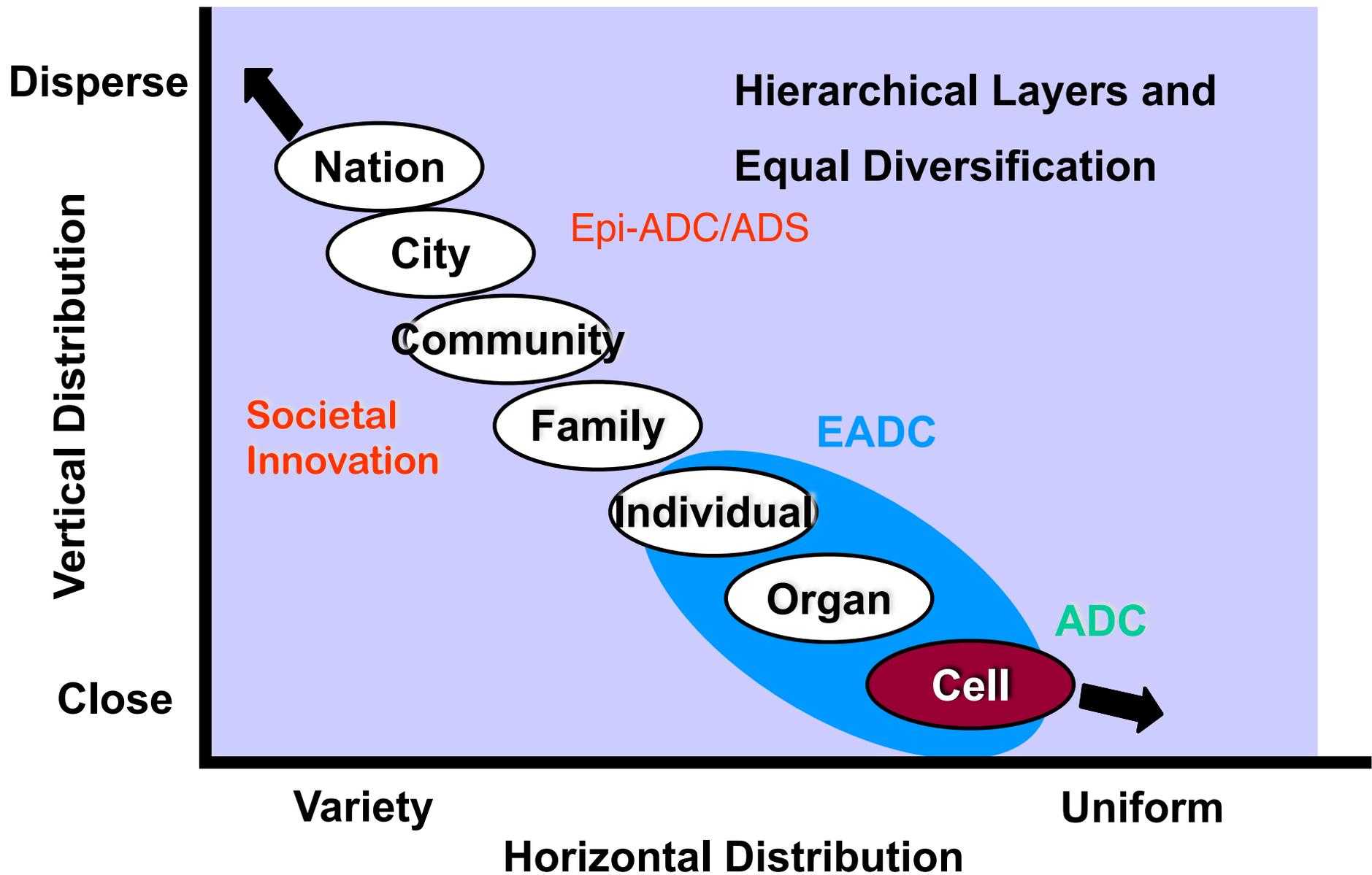
Logical altering

Environmental transition

Acetylating

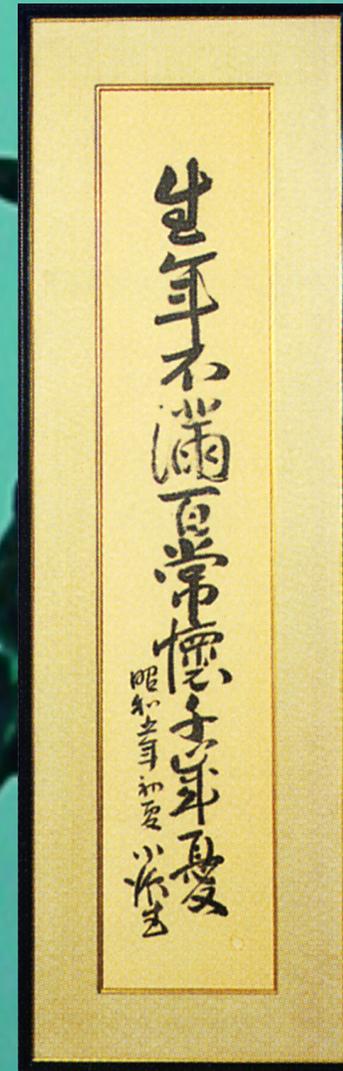
Linking change

Hierarchical Systems of Human-beings



Societal Innovation by philosophy and Technology

Although our lifetime may not span a
hundred years,
we have concerns of a thousand
years



Calligraphy by Mr. ODAIRA
Namihei
(Founder of Hitachi, Ltd.)

Sculpture by Ryoji Goto

