

## 9 Technology and Competitive Advantage

### 9-3 Industry-Wide Standard and Competitive Strategies

#### Bibliography

- Yamada, Hideo, *Specification Strategy for Competitive Advantage*, Diamond, Inc.  
*De Facto Standard*, Nihon Keizai Shimbun, Inc.
- Shintaku, Konomi, Shibata, *Substance of De Facto Standard*, Yuhikaku Publishing, 2000
- Asaba, Shigeru, *Strategies for Competition and Cooperation*, Yuhikaku Publishing
- Kokuryo, Jiro, *Open Architecture Strategy*, Toyo Keizai Inc., 1999

#### 1 Impact of Industry-Wide Standard

##### 1.1 Cases of Failure among Japanese Major Companies (Electronics)

- ◆ Electronic desktop calculator industry
  - Commitment to quality, quality standard ...Development speed
  - Diversification of business lineup
- ◆ Personal computer
  - Persistency about independent specifications ...Open type
  - Vertical integration
- ◆ TV game
  - Persistency about hardware ...Central hub considered being complementary product
  - Software considered being a bonus added to the hardware
- ◆ Each of these has no shortage of technological power or resources; Strategic issues.

##### 1.2 Advanced Technology Industry

- ◆ Fast pace of technological change
- ◆ Management of changes
  - Incremental technology change: Product change
  - Radical technology change: Generation transition, de-maturity
- ◆ Standardization
  - Constraint on technological progress
  - Toward the open-format
  - Importance of complementary products

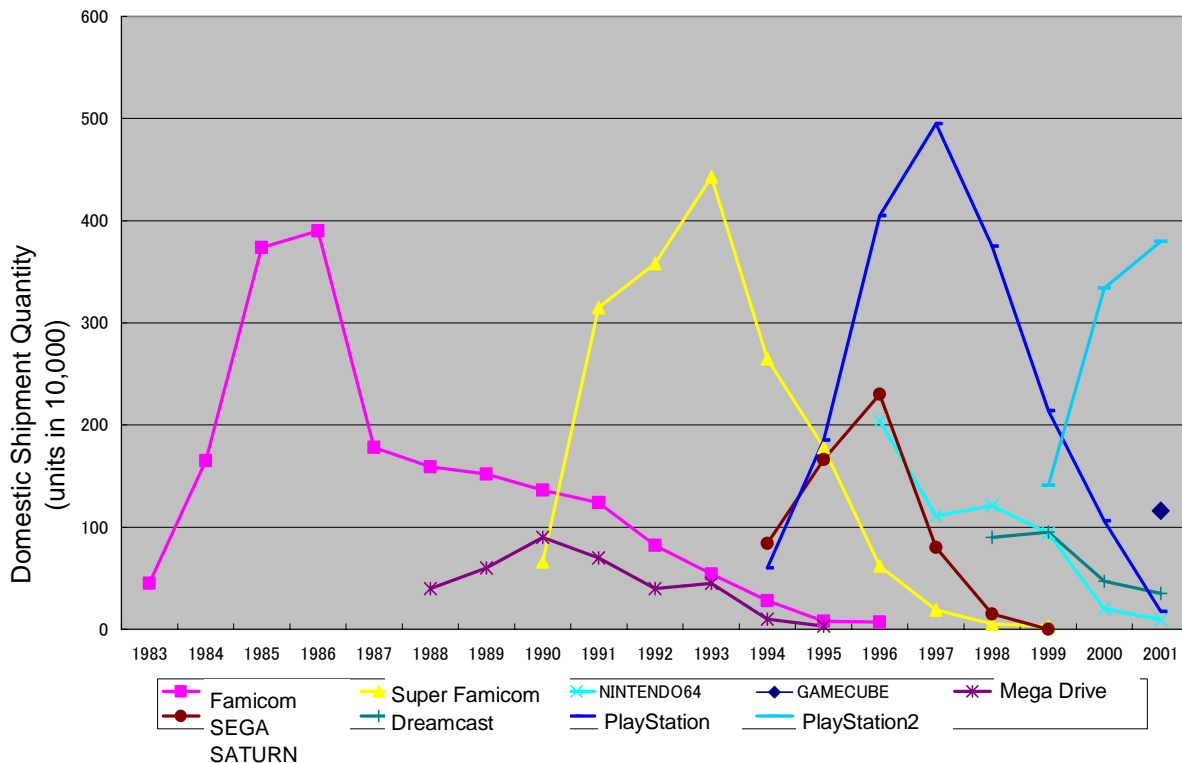
##### 1.3 Issues over Industry-Wide Standard

- ◆ Competitiveness of the standard and the products
  - VCR: VHS vs.  $\beta$  for 1977-1988
- ◆ Change in recognition of the industry-wide standard
  - Toshiba and Sony on DVD: Prior coordination

-Generation shift of the industry-wide standard

- Music media: LP → CD
- Audio recording media: Cassette tape → MD
- TV game: 8 bits → 16 bits → 32 bits (ref. Diagram below)

#### 1.4 Generation Change of Game Machines



#### 1.5 Broadening of Industry-Wide Standard

◆ System and network products related to softwares and media

- AV, internet, communication
- PC: Failure of IBM's PC, better-than-expected success of Microsoft and Intel

◆ Market globalization

- Success and failure of NEC98
- Broadcasting industry: Failure in high-vision, digital broadcasting
- Communication: Though superb in the equipment per se, the handset cannot conquer the world. Will PHS end up with a Japan's standard?
- Number of incidences countries have assumed the mantle to organize duties for designing international specifications: 171 on Germany, 161 the U.S., 140 U.K., 126 France, 46 Sweden, and Japan in the 6th with 42

◆ Standardization in industry goods

- 3D-CAD, system LSI, PC network

## 1.6 International Standard: Strategizing Standards as Means to Capture Markets

International Affairs Panel, Japanese Industrial Standards Committee, "The modality of our country's future measures for the international standardization", 1997

- ◆ Europe: Strategizing standards as means to capture markets
  - Prompt internationalization of European standards
  - To take on the mantle of organizing duties for ISO and so on
  - Standardization in parallel with R&D: Collaborative research = European standard → International standard
- ◆ The U.S.: To strengthen the undertaking of de jure standards
- ◆ Japan: Lack in strategic responsiveness in levels of companies, industries and the country

## 2 Fundamental Strategies to Obtain Industry-Wide Standard

### 2.1 Network Externality

- ◆ Value of normal products
  - Function and price of the product per se
    - Other person's choice doesn't influence my own choice.
- ◆ Network Externality:
  - Disposition that, as the number of users of the same (or similar) product increases, so does the users' benefit acquired from that product
  - Other person's choice influences my own choice.

### 2.2 Process of Standardization

- ◆ De jure standard
  - ↓ - CCITT of communication protocol, CCIR and ISO of broadcasting standard
- ◆ De facto standard
  - ↓ - Standard as result of competition: PC
- ◆ Standard by consortium
  - Prior coordination by industry: DVD
- ◆ Format of internet?
  - Standardization led by users

### 2.3 Points in De-Facto-Standard Strategy

- ◆ Jump start: Key is the early adopters with a 3-percent-diffusion rate (Yamada, Shibata)
  - If lost, change the arena. (It's tough to mount a comeback in the same arena.)
- ◆ Open strategy

- Conditions for the open/close: Competitive position (weak), homogeneous market, payoff for achievement (Asaba)
- Strengthen complementary products
- ◆ Horizontal-type (platform-type) business structure
  - ← Vertical-type/ enclosure-type
  - “All of the part, or the part of all?” (Kokuryo)

## 2.4 Need for Jump Start

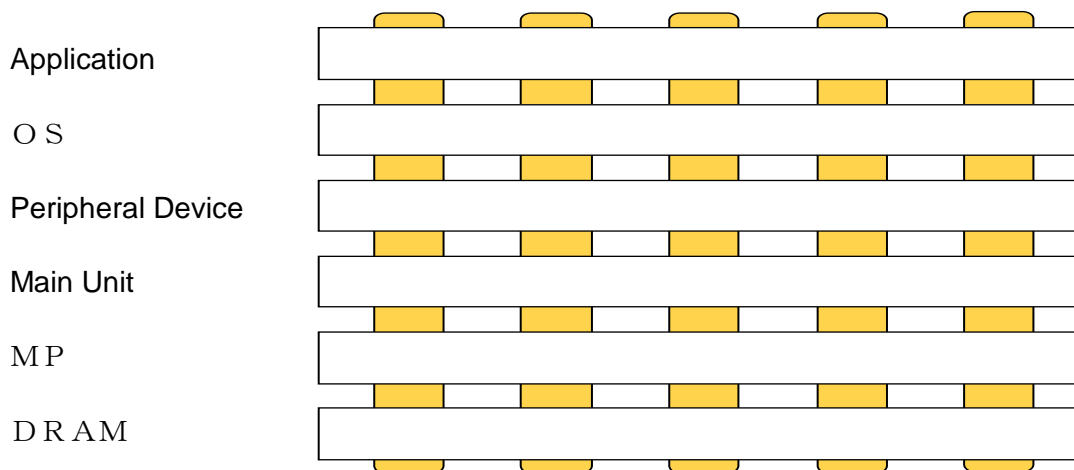
- ◆ Point in this competition is to establish the market at an early date.
- ◆ Coordination among competitors: Open-format
- ◆ Coalition with suppliers of complementary products
- ◆ To form prospects on users
  - Create positive feedback

## 2.5 Open Policy

- ◆ IBM— PC
- ◆ Incentives to other companies
  - Reduction of license fee
  - Assertion of the advantage of own firm's format
  - Commitment in resources to establish credibility
- ◆ Pioneer's laser disc
  - Product development (equipped with the semiconductor laser, CD-compatible machine)
  - Production: OEM supply
  - Complementary product



### 2.5.1 Structure of PC Industry: from Enclosure-Format to Open



### 2.5.2 Apple's Failure

#### ◆Launch of Machintosh, 1984

- Competing products against IBM-PC ... GUI interface
- Vertical integration of hardware, OS, etc.

#### ◆Letter from Bill Gates to Chairman Sculley, 6/25/1985

"Apple Licensing of Mac Technology"

### 2.5.3 "Apple Licensing of Mac Technology"

Apple must make Macintosh a standard. But no personal computer company, not even IBM, can create a standard without independent support. ....The significant investment (especially independent support) in a "standard personal computer" results in an incredible momentum for its architecture. .... The IBM architecture, when compared to the Macintosh, probably has more than 100 times the engineering resources applied to it, .....

### 2.5.4 Formation of Industrial Standard on System LSI

#### ◆System LSI: Downsizing and electric-power saving of mobile handsets

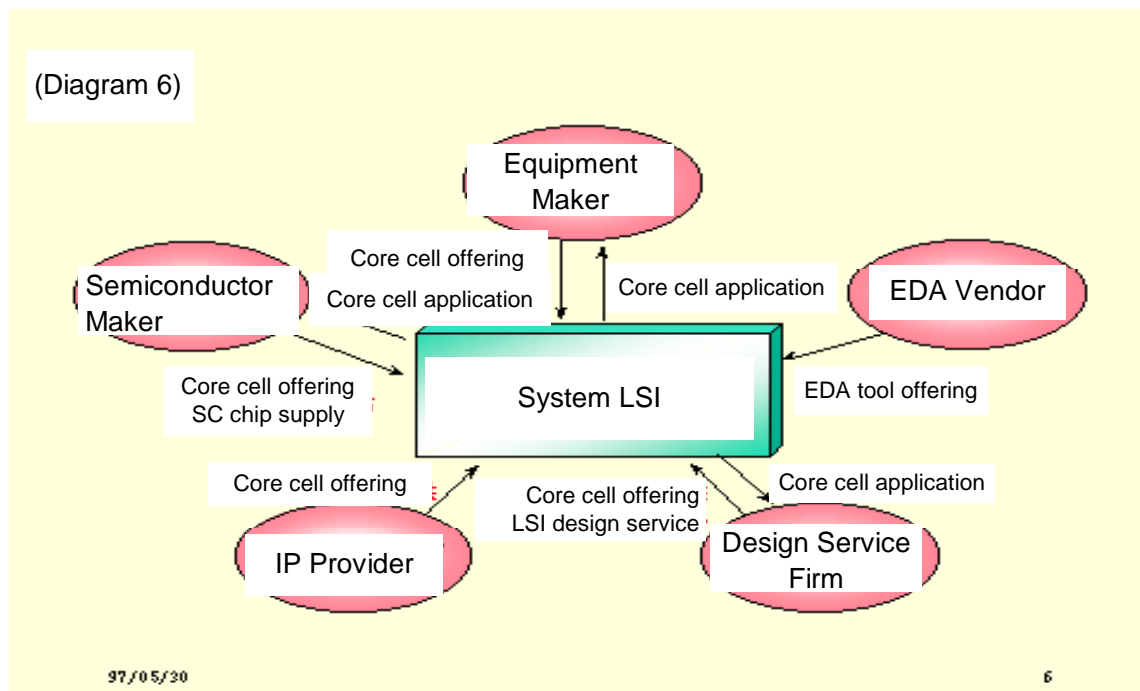
- Mixed loading of memory circuit and logical circuit → Specialized manufacturing technology
- Complexity and lengthening of design tasks
- Design knowledge gets buried in the designer's head.

#### ◆Standardization of design

- Reutilization of the past design knowledge, specialization of design works
- Divide into the function blocks called IP
  - CPU, memory, IC for processing picture image/audio data, communication IC
- Standardization of interface between IPs

### 2.5.5 Change in Industrial Structure by Design Standardization

- ◆ In the past, it has been the two-firm relationship between a semiconductor maker and its user company: ASIC.
- ◆ IP-specialized company, design-supporting company (Cadence Design Systems)
- ◆ Are semiconductor makers general contractors in LSI industry?



Origin: Data in the study by Mr. Haruji Miwa (1988)

### 2.5.6 Open-Format Industry: Securement of Profit-Exclusivity Potential

- ◆ Installation of license fee
  - Victor Co. of Japan: Large amount of patent-fee income
- ◆ Securement of profit in complementary products
  - Pioneer's disc production
  - Nintendo's soft-house policy.... +Supplies
- ◆ Module exclusivity
  - Intel's MPU, Microsoft's OS
  - Sony's optical pickup for CD (50% share)  
Laser diode (+Sharp+Rohm=80%)
  - CCD for digital camera (Sony), LCD (Casio)



### 2.6 Establishing Module and Open Format

### 2.6.1 Modular Product and Integrated Product

	Module Format	Integration Format
Information Device	Desktop PC	Laptop PC
	PC peripheral device	Japanese word processor
	IBM-PC compatible machine	PD A (Palm Computing)
	Sun Microsystems	Apollo
Communication	Internet	Bank online
Software	PC soft	Game soft
AV Device	Stereo component	Portable stereo
Machine	Bicycle	Motorcycle
	Truck	Passage car

### 2.6.2 Progress in Modularization

- ◆ Standardization = Establishment of product architecture
- ◆ Interface among parts gets standardized, and each part becomes independent as a module.
- ◆ Emergence of firms specialized in independent modules
- ◆ Competitions and innovations within the module advance the whole industry.
  - Passage car: Product Integrity, optimal design of individual part
    - Platform, establishing parts' commonality
- ◆ Truck: Engine compatibility

### 2.6.3 Modularization of Design

#### IBM System/360, 1964

- ◆ Response to uncertainty/complexity of technology
- ◆ Independence of each module — Securement of an integrated function of the whole system
- ◆ To segment into visible design rules and hidden design parameters; With this segmentation being accurate, clear-cut and perfect, the modularization can exert its effect.
- ◆ Visible design rule (setup in advance)
  - Architecture: Definition of a module comprising the system and its function
  - Interface: Modality of link-up/interplay among modules
  - Standard: Assessment criteria for modules

- ◆ Hidden design parameter (possible to choose ex post facto)
  - Not to influence designing beyond each module's confine

#### **2.6.4 Modularization of Organization**

- ◆ Decentralization compatible with constituent modules
- ◆ Integration of decentralized teams
  - Visible information, installation of business-operation framework, familiarization
- ◆ Microsoft's development of application softwares
  - Bugs owing to complexity intensification of PC softwares, problems of adjourned release
  - Product planning being contingent in advance
  - To segment by feature, and organize small-scale teams
  - Synch and stabilize (repetitive process of design → Building → Test)
  - Waterfall model (Plan → Coding → Test)

#### **2.6.5 Key to Modularization**

- ◆ To appropriately design in advance architectures, module definitions and interfaces
- ◆ Visible design rule
  - Excessively minute → to limit variations within modules
  - Excessively ambiguous → to depress system functions
- ◆ Comprehension of the technology/market with respect to the system is indispensable.
- ◆ Redundancy in design requests

### **2.7 Generation Transition of Open-Format Standard**

#### **2.7.1 Vertical Integration by Leader**

- ◆ Leaders of modules implement their vertical integrations based on old standards, and turn into system leaders, spearheading the generation transition to new standards.
- ◆ Intel's integration of its hardware area, strengthening its relationship with software makers
- ◆ Microsoft's bundling

#### **2.7.2 New Inter-Enterprise Alliance, Formation of Standardization Organization**

- ◆ As there is no apparent leader company, it's possible for one to be constrained by variations within the module.
- ◆ Conceptual ability for the overall system is more important than an idea on an individual module.
- ◆ System LSI, palmtop



- ◆ Is a mechanism to insure the relationship of mutual trust necessary? (Silicon Valley consortium)

### **2.7.3 Generation Transition of Industry-Wide Standard and Consumer Behavior**

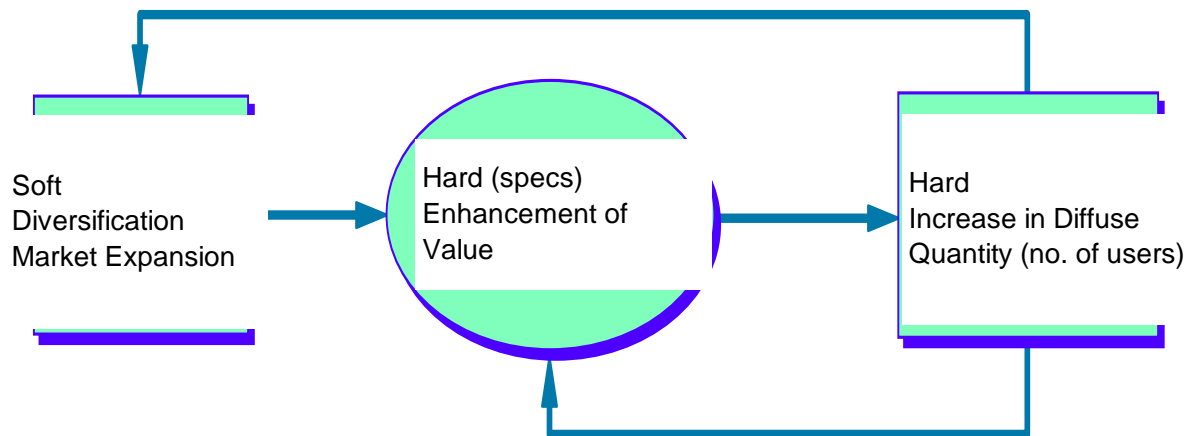
- ◆ Generation transition of the standard
  - Introduction of a new product which has no compatibility with the existing industry-wide standard
  - Prediction on other persons' purchase behavior → Own choice
- ◆ Excess Inertia
  - While the new product is desirable to all users, all users stick to the old product.
  - Large installation base of the old product
  - Large cost of incompatibility → QWERTY keyboard
- ◆ Excess Momentum
  - While it's socially desirable to hold on to the old product, all users switch to the new product. (Upgrade of software)

### **2.7.4 Intel: From Separation of Works to Integration**

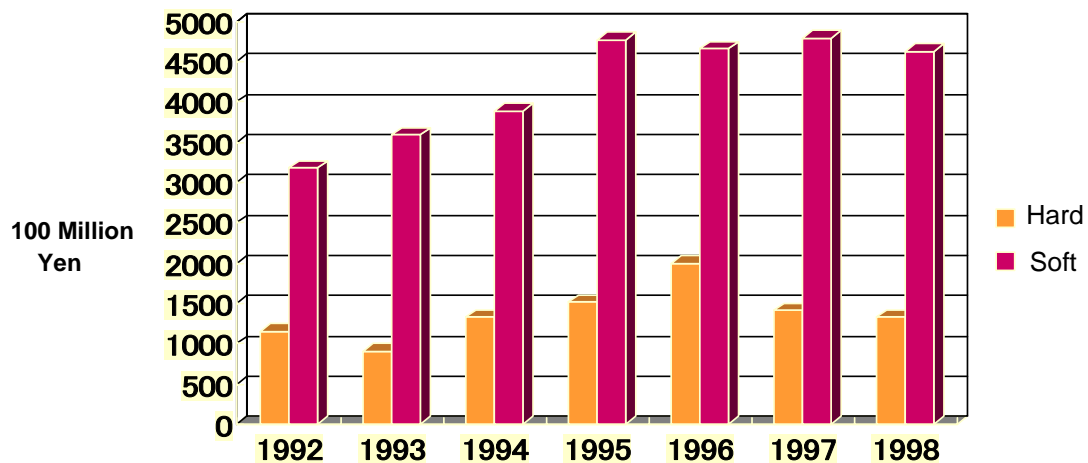
- ◆ Vice president Eimerl, "Intel's cutting-edge MPU cannot show its true ability unless peripheral chips and DRAM advance their performance as high as MPU. It's just like a car cannot run fast with an enhancement of its engine's capacity alone."
- ◆ Enlarging the business coverage over to peripheral chip sets and mother boards, etc.
- ◆ Subsidizing software makers
- ◆ Architectural reform: Dual independent path
- ◆ Speed limit of bus (66 megahertz)
- ◆ Separation of system bus from cash bus

## **2.8 Alliance with Complementary Products**

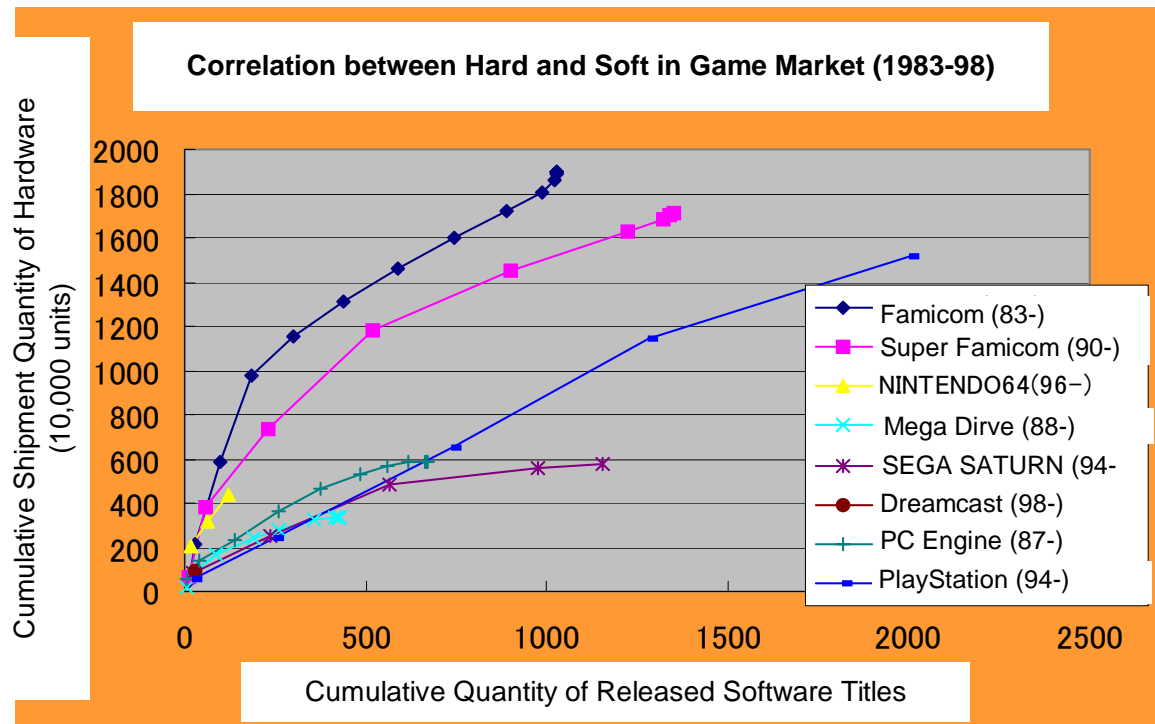
### **2.8.1 Virtuous Circle of Hard and Soft**



### 2.8.2 Hard and Soft: Huge Market of Complementary Products



### 2.8.3 Linkage between Hard and Soft for Home TV Game



### 3 Epilogues

- ◆ Wave of social pressure on the company (industry) that sweeps the board
  - Problem of intellectual property rights, antimonopoly law
  - What is public property ?
- ◆ Open format of the de facto (standard)
  - Consortium format? Reexamination of the de jure type
  - Internet style: Platform is a public property.
  - LINUX: OS is a public property.
- ◆ Formation of new standards, generation transition
  - Modularization and system-conception power

