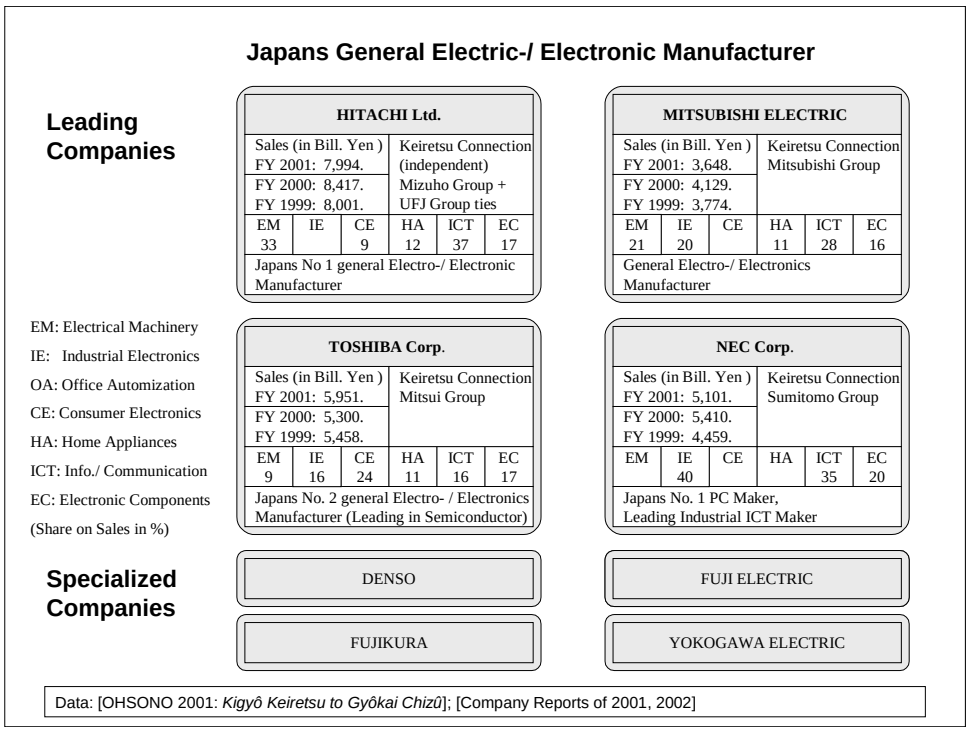
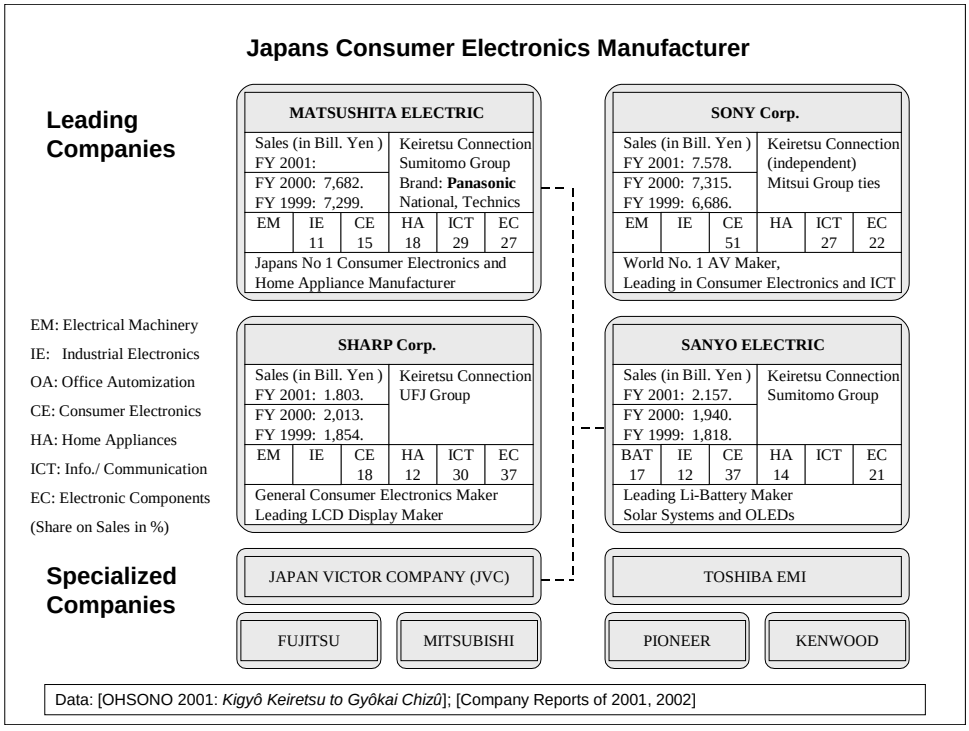
Anhang A:

Industriestruktur der japanischen Elektronikindustrie



Data: [OHSONO 2001: *Kigyô Keiretsu to Gyôkai Chizû*]; [Company Reports of 2001, 2002]



Data: [OHSONO 2001: *Kigyô Keiretsu to Gyôkai Chizû*]; [Company Reports of 2001, 2002]

Japans Computer Manufacturer

Leading Companies

FUJITSU Ltd.					
Sales (in Bill. Yen) FY 2001: 5,484. FY 2000: 5,255. FY 1999: 5,243.			Keiretsu Connection Mizuho Group		
EM	IE	CE	HA	ICT	EC
Japans No. 1 Mainframe Computer Maker					

NEC Corp.					
Sales (in Bill. Yen) FY 2001: 5,101. FY 2000: 5,410. FY 1999: 4,459.			Keiretsu Connection Sumitomo Group		
EM	IE 40	CE	HA	ICT 35	EC 20
Japans No. 1 PC Maker, Leading Industrial ICT Maker					

EM: Electrical Machinery
IE: Industrial Electronics
OA: Office Automization
CE: Consumer Electronics
HA: Home Appliances
ICT: Info./ Communication
EC: Electronic Components
(Share on Sales in %)

TOSHIBA Corp.					
Sales (in Bill. Yen) FY 2001: 5,951. FY 2000: 5,300. FY 1999: 5,458.			Keiretsu Connection Mitsui Group		
EM 9	IE 16	CE 24	HA 11	ICT 16	EC 17
Japans No. 2 general Electro- / Electronics Manufacturer (Leading in Semiconductor)					

SONY Corp.					
Sales (in Bill. Yen) FY 2001: 7.578. FY 2000: 7,315. FY 1999: 6,686.			Keiretsu Connection (independent) Mitsui Group ties		
EM	IE	CE 51	HA	ICT 27	EC 22
World No. 1 AV Maker, Leading in Consumer Electronics and ICT					

Specialized Companies

IBM JAPAN Corp.

HITACHI Ltd.

SONY Corp. | CASIO Corp.

MATSUSHITA | SHARP Corp.

Data: [OHSONO 2001: *Kigyô Keiretsu to Gyôkai Chizû*]; [Company Reports of 2001, 2002]

Japans Semiconductor and Device Manufacturer

Leading Companies

NEC Corp.					
Sales (in Bill. Yen) FY 2001: 5,101. FY 2000: 5,410. FY 1999: 4,459.			Keiretsu Connection Sumitomo Group		
EM	IE 40	CE	HA	ICT 35	EC 20
Japans No. 1 PC Maker, Leading Industrial ICT Maker					

TOSHIBA Corp.					
Sales (in Bill. Yen) FY 2001: 5,951. FY 2000: 5,300. FY 1999: 5,458.			Keiretsu Connection Mitsui Group		
EM 9	IE 16	CE 24	HA 11	ICT 16	EC 17
Japans No. 2 general Electro- / Electronics Manufacturer (Leading in Semiconductor)					

EM: Electrical Machinery
IE: Industrial Electronics
OA: Office Automization
CE: Consumer Electronics
HA: Home Appliances
ICT: Info./ Communication
EC: Electronic Components
(Share on Sales in %)

FUJITSU Ltd.					
Sales (in Bill. Yen) FY 2001: 5,484. FY 2000: 5,255. FY 1999: 5,243.			Keiretsu Connection Mizuho Group		
EM	IE	CE	HA	ICT	EC
Japans No. 1 Mainframe Computer Maker					

HITACHI Ltd.					
Sales (in Bill. Yen) FY 2001: 7,994. FY 2000: 8,417. FY 1999: 8,001.			Keiretsu Connection (independent) Mizuho Group + UFJ Group ties		
EM 33	IE	CE 9	HA 12	ICT 37	EC 17
Japans No 1 general Electro-/ Electronic Manufacturer					

Specialized Companies

MITSUBISHI | SHARP Corp.

SONY Corp. | SANYO

SEIKO EPSON | OKI

MATSUSHITA | SENKEN DENKI

Data: [OHSONO 2001: *Kigyô Keiretsu to Gyôkai Chizû*]; [Company Reports of 2001, 2002]

Japans Electronic Parts Manufacturer

Leading Companies

KYOCERA	
Sales (in Bill. Yen) FY 2002: 1,069.	

TDK	
Sales (in Bill. Yen) FY 2002: 0,608.	

ALPS ELECTRIC	
Sales (in Bill. Yen) FY 2002: 0,601.	

NITTO DENKO	
Sales (in Bill. Yen) FY 2002: 0,378.	

MURATA MFG.	
Sales (in Bill. Yen) FY 2002: 0,394.	

ROHM	
Sales (in Bill. Yen) FY 2002: 0,350.	

NIDEC ELECTRIC	
Sales (in Bill. Yen) FY 2002: 0,298.	

MITSUMI ELECTRIC	
Sales (in Bill. Yen) FY 2002: 0,253.	

Data: [OHSONO 2001: *Kigyô Keiretsu to Gyôkai Chizû*]; [Company Reports of 2001, 2002]

Japans Precision Machinery Manufacturer

Leading Companies

CANON Inc.					
Sales (in Bill. Yen) FY 2001: 2,907. FY 2000: 2,696. FY 1999: 2,531.			Keiretsu Connection Mizuho Group		
EM	OA 76	CE 13	HA	ICT	EC
World No 1 Copying Machines and Laser Beam Printer Manufacturer, Cameras					

RICOH Ltd.					
Sales (in Bill. Yen) FY 2001: 1,672. FY 2000: 1,538. FY 1999: 1,447.			Keiretsu Connection		
EM	OA 62	CE	HA	ICT 26	EC 11
Leading Copying and Fax Machine Manufacturer, Printers, Digital Cameras					

EM: Electrical Machinery
IE: Industrial Electronics
OA: Office Automization
CE: Consumer Electronics
HA: Home Appliances
ICT: Info./ Communication
EC: Electronic Components
(Share on Sales in %)

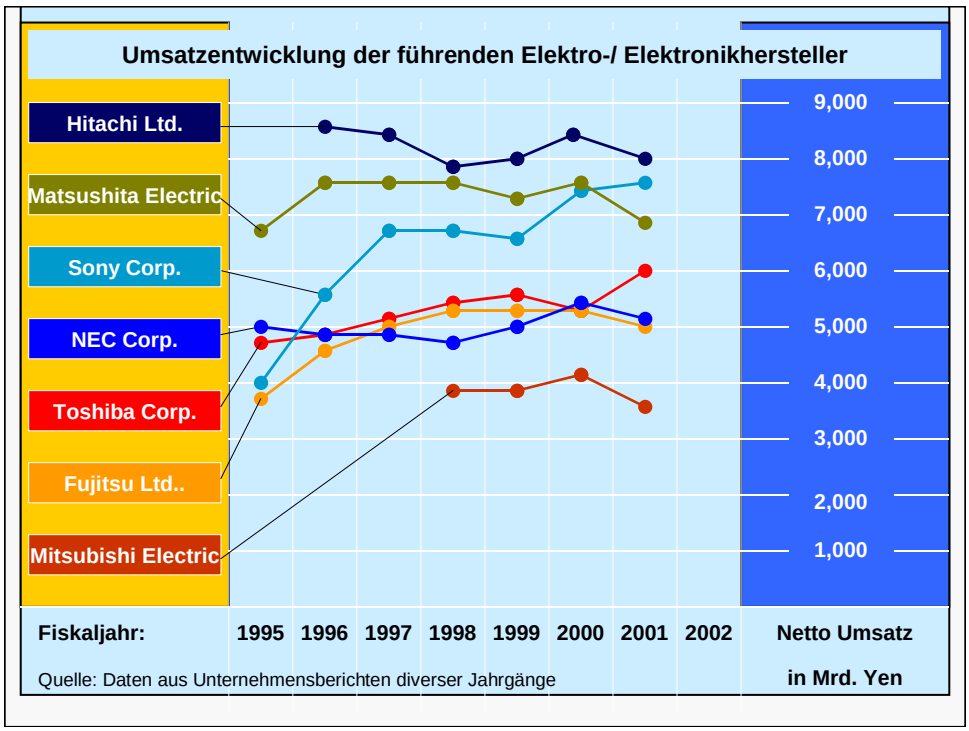
SEIKO EPSON Corp.					
Sales (in Bill. Yen) FY 2001: 1.274. FY 2000: 1,050. FY 1999: 0,903.			Keiretsu Connection		
EM	OA 8	CE	HA	ICT 63	EC 29
Computer Peripherals, Printer, Scanner, Semiconductor, LCD, Optic					

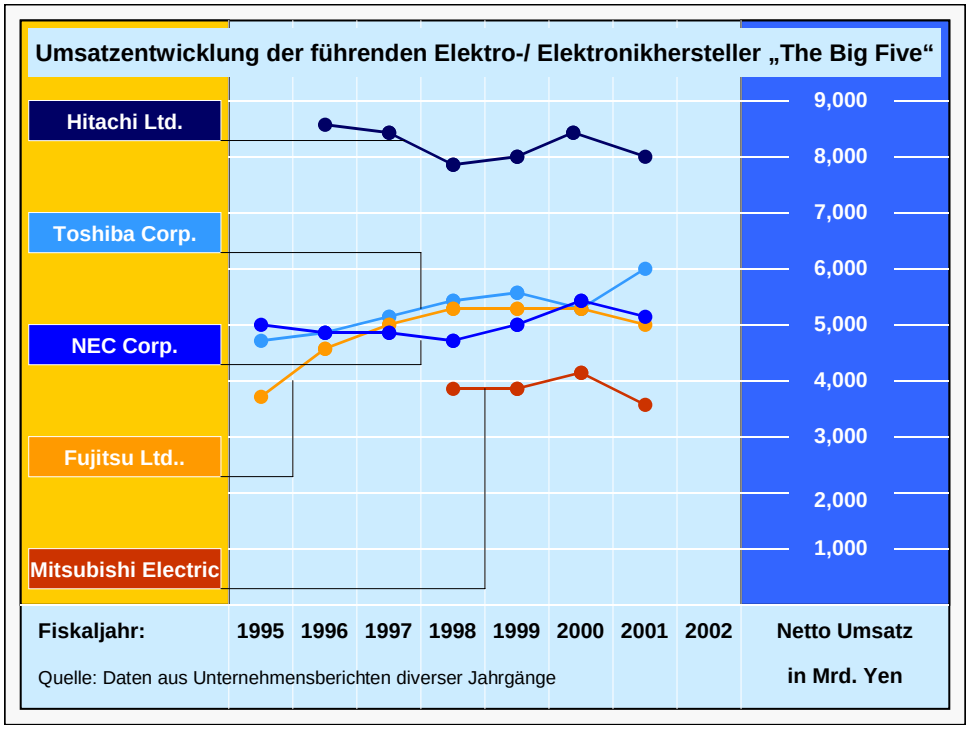
FUJI XEROX					
Sales (in Bill. Yen) FY 2001: 0,942. FY 2000: 0,905. FY 1999: 0,876.			Keiretsu Connection Mizuho Group (Fuji-Denki)		
EM	OA	CE	HA	ICT	EC
Copying Machine, Digital Printing Systems, Multifunction Office Machines, ICT					

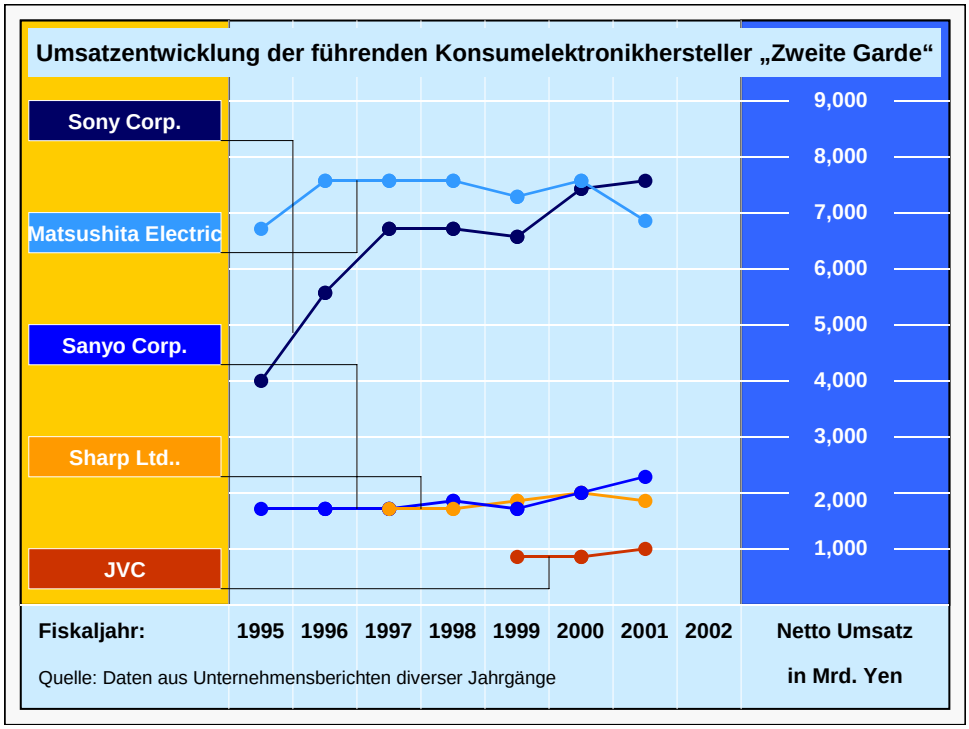
Specialized Companies

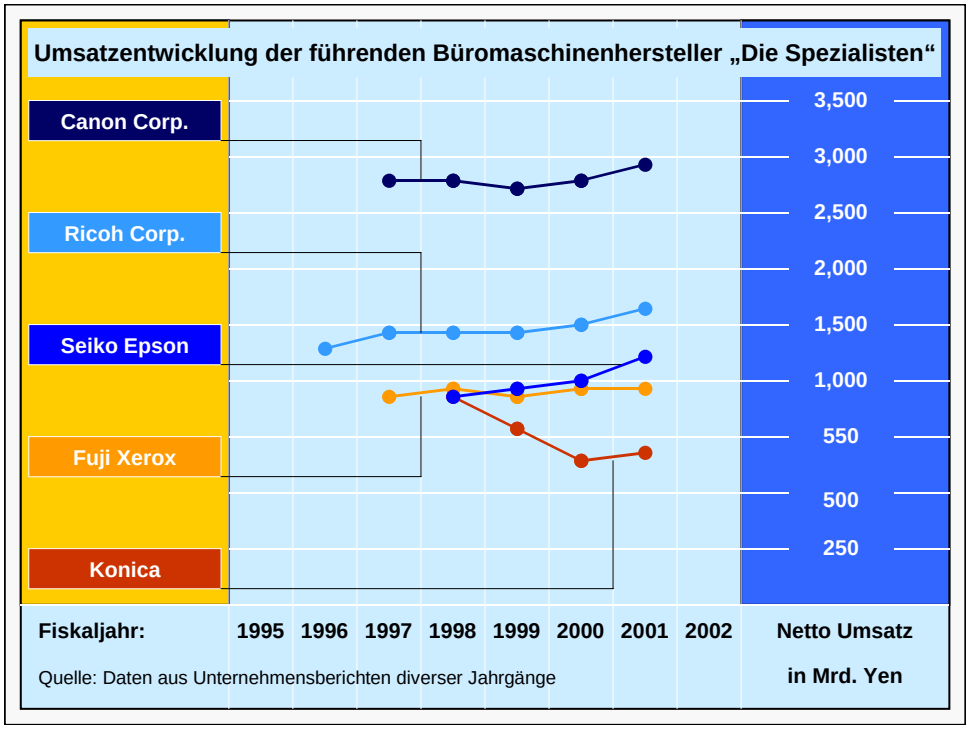
KONIKA | MINOLTA | NIKON | OLYMPUS

Data: [OHSONO 2001: *Kigyô Keiretsu to Gyôkai Chizû*]; [Company Reports of 2001, 2002]


Umsatzentwicklung der führenden Elektro-/ Elektronikhersteller
Hitachi Ltd.
Matsushita Electric
Sony Corp.
NEC Corp.
Toshiba Corp.
Fujitsu Ltd..
Mitsubishi Electric
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
Fiskaljahr:
1995 1996 1997 1998 1999 2000 2001 2002
Netto Umsatz
in Mrd. Yen
Quelle: Daten aus Unternehmensberichten diverser Jahrgänge

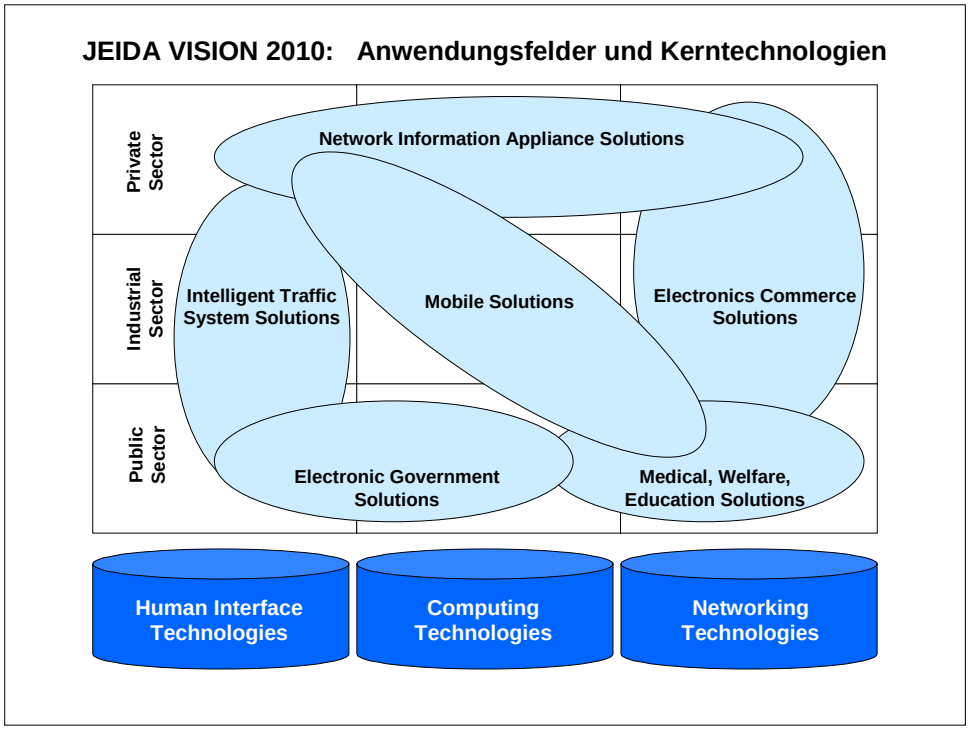

Umsatzentwicklung der führenden Elektro-/ Elektronikhersteller „The Big Five“
Hitachi Ltd.
Toshiba Corp.
NEC Corp.
Fujitsu Ltd..
Mitsubishi Electric
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
Fiskaljahr:
1995 1996 1997 1998 1999 2000 2001 2002
Netto Umsatz
in Mrd. Yen
Quelle: Daten aus Unternehmensberichten diverser Jahrgänge


Umsatzentwicklung der führenden Konsumelektronikhersteller „Zweite Garde“
Sony Corp.
Matsushita Electric
Sanyo Corp.
Sharp Ltd..
JVC
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
Fiskaljahr:
1995 1996 1997 1998 1999 2000 2001 2002
Netto Umsatz
in Mrd. Yen
Quelle: Daten aus Unternehmensberichten diverser Jahrgänge


Umsatzentwicklung der führenden Büromaschinenhersteller „Die Spezialisten“
Canon Corp.
Ricoh Corp.
Seiko Epson
Fuji Xerox
Konica
3,500
3,000
2,500
2,000
1,500
1,000
550
500
250
Fiskaljahr:
1995 1996 1997 1998 1999 2000 2001 2002
Netto Umsatz
in Mrd. Yen
Quelle: Daten aus Unternehmensberichten diverser Jahrgänge

Anhang B:

JEIDA Industrievision 2010



Computing Technology Development Trends I (Hardware Technology)

Technology Area	Necessity of Technology Acceleration (mid term ~2005)	Necessity of Technological Leap (long term ~2010)
Scalable Computing	1 : Increase of high-end computing in the business computing area > main frame, server, router 2 : In addition to the existing PCs, increase in mobile, web accessible computers > Mobile Phone, PDA, Notebook/ Sheet PCs A so called universal information society with all people connected to the Internet (web) is realized. For Web computing, characteristics and frequency of accesses cannot be predicted and they can fluctuate largely. Immediate adaptation to a large demand change will be required.	1 : Scalable shared Memory Technology > High-speed large capacity latency mutual connection network > Memory-intensive applications in parallel 2 : Scalable NUMA > Multiprocessor on chip, memory mixed processor, cache coherence maintenance mechanism, optical interconnection 3 : Parallel Programming Technology > Memory hierarchical processing support, parallel extraction compiler, parallel description language, parallel algorithm 4 : Capacity on Demand > Technology to expand system without stopping as required 5 : Data Load Technology > Uploads software without stopping as required. Recognizes load and balances the communication lines 6 : I/O Technology > Scalable I/O according to load
Middleware	1 : Sophisticated Reuse and Abstraction Technologies > problem of magnitude 2 : Sophisticated High Quality Technologies > problem of reliability 3 : Multidimensional Open Technologies > problem of relevance	

Quelle: Vision for Electronic and Information Technology Industry 2010 [JEIDA Industrievision 2010]

Computing Technology Development Trends II (Memory Technology)

Technology Area	Necessity of Technology Acceleration (mid term ~2005)	Necessity of Technological Leap (long term ~2010)
Memory Devices (disk)	1 : Magnet disk devices one-order faster than optic disk 2 : Increase of positioning accuracy 3 : Increase of surface density 4 : Cost reduction	1 : High-precision plastic substrates 2 : Removable drum 3 : Head disk interface 4 : Integration of OAW and magnetic recording 5 : Effective production of optical parts and simple designs
Semiconductor RAM	1 : Fosterage of development of ferro-electric memory (FeRAM) 2 : High speed DRAM technology 3 : Material technology > Ferro-electric materials, MRAM 4 : Memory mixture system LSI design Technology	1: Micro machining process for 100nm or small 2 : MRAM 3 : One-gun memory

Quelle: Vision for Electronic and Information Technology Industry 2010 [JEIDA Industrievision 2010]

Network Technology Development Trends I (Radio Technology)

Technology Area	Necessity of Technology Acceleration (mid term ~2005)	Necessity of Technological Leap (long term ~2010)
Radio Technologies	1 : High-speed and large capacity Radio Communication Technology 2 : High-speed Transmission Method (dev.) 3 : Development of Frequency Resources > Application technology development considering characteristics of radio. (wireless compatible TCP/IP protocol as Internet standard and assurance of QoS) > Communication added value technology utilizing characteristics of mobile env. (Technology for extracting and providing positional information using accommodated area information; Antenna directivity control technology to improve accuracy of positional information measurement from the mobile network; Integration, search, and filtering technologies for contents with positioning information)	1 : New high speed transmission method and frequency resources > Development of high efficiency amplifier, high performance antenna, new high speed modulation method as the technology for the use of quasi-milli waves / milli waves 2 : Great sophistication of wireless network configuration > Research on consistency between communication architectures; Development of mutual connection technologies such as wireless LAN, mobile public network, and optic high speed communication network. > Packet (IP) communication technology on wireless network. Adaptation to line break utilizing wireless TCP + agent technology > Contents will evolve from data to real-time information such as video. QoS research in wireless TCP is needed. > The VoIPon wireless technology to carry real-time media such as voice via wireless TCP/IP is not complete in a large system. 3 : Great sophistication of wireless terminals > Direct control of radio by software becomes possible such as software radio which adapts to many radio methods by a single hardware unit (research needed).

Quelle: Vision for Electronic and Information Technology Industry 2010 [JEIDA Industrievision 2010]

Network Technology Development Trends II (Cable and Broadcasting Technology)

Technology Area	Necessity of Technology Acceleration (mid term ~2005)	Necessity of Technological Leap (long term ~2010)
Cable Technologies	1 : Cable very high-speed network > Very high speed router compatible to IP > Promotion of wavelength multiplexing technology	1 : WDM optical fiber network > Innovation of IPV6 technology Optical parts/devices for flexible network configuration by optical Add/Drop are essential.
Content / Broadcast Technologies		1 : Great sophistication and improvement of IP network technology > Establishment of band reservation technology to cover broadcasting services regardless of types of backbone and access networks > Establishment of QoS technology according to the characteristics of contents in multicast > Establishment of network policy management technology including QoS 2 : Protection of rights in production and distribution of contents > Establishment of standards and methods 3 : Efficient contents search Technology > Search engine for multimedia contents > Service agent handling multimedia contents 4 : Capturing to mobile multimedia > Establishment of technology system supporting mobile multimedia

Quelle: Vision for Electronic and Information Technology Industry 2010 [JEIDA Industrievision 2010]

Network Technology Development Trends III (Information Security Technology)

Technology Area	Necessity of Technology Acceleration (mid term ~2005)	Necessity of Technological Leap (long term ~2010)
Information Security Technologies	1 : Continuous Development of Cipher Technology 2 : Electronic signature system implementing the person's intention reliably 3 : Establishment of Public Key Infrastructure(PKI) > Establishment of interoperability > Large scale and high performance > Authentication technology for attributes > PKI application technology for the existing application system resources 4 : LSI Development and Production Technology for IC Cards 5 : Network security technology allowing access control by user or by device 6 : Illegal access automatic trace technology	1 : Practical use of quantum cipher 2 : Electronic signature system assuring safety in the future 3 : Breakthroughs in IC Cards > Low power LSI technology > Public key cipher method with computation a few order smaller > Antenna technology with EMF a few order larger > Micro Miniature Battery 4 : Anti-tamper technology > Advanced information filtering system

Quelle: Vision for Electronic and Information Technology Industry 2010 [JEIDA Industrievision 2010]

Human Interface Technology Development Trends I (Input / Output Technology)

Technology Area	Necessity of Technology Acceleration (mid term ~2005)	Necessity of Technological Leap (long term ~2010)
Knowledge Acquisition Technologies	1 : Increase of information traffic 2 : Added values to information due to digitization 3 : Integration of info flow and distribution 4 : Change in lifestyle due to global network	1 : Implementation of natural interface 2 : Establishment of agent technology 3 : Extension of digital archives 4 : Development of auto translation software 5 : Language understanding technology
Input Technologies Voice and Image Recognition	1 : So called natural interfaces such as character and voice recognition are in practical use but in an ideal environment with operation training. 2 : Input and response are not divided. 3 : Input and output technologies are investigated individually. Interaction technology to integrate them is needed.	1 : Universal and generic interface > Voice recognition which can be used in any environment, interface which can be used without training and transparent interface 2 : Development of interface technology > integrating input and output technologies, and comprehensive interaction technology including support such as translation and meaning extraction
Output Technologies Display and Graphics	1 : Produce processor and peripherals on the same substrate > Formation of electronic circuit including MPU, decoder, tuner, memory on glass substrate (System Integration SoC)	1 : Display in nano silicon structure > Construction of system on paper device on forming on plastic film 1 : Virtual reality superimposing technology 2 : Researches on borders between image, voice spaces and real space in 3D media production 3 : Cerebrophysiology study regarding system 4 : New architecture processor for 3D > Development of FPGA / PCA technologies 5 : Real-time 3D video data communication technology > Large capacity optical space transmission, milli-wave communication

Quelle: Vision for Electronic and Information Technology Industry 2010 [JEIDA Industrievision 2010]

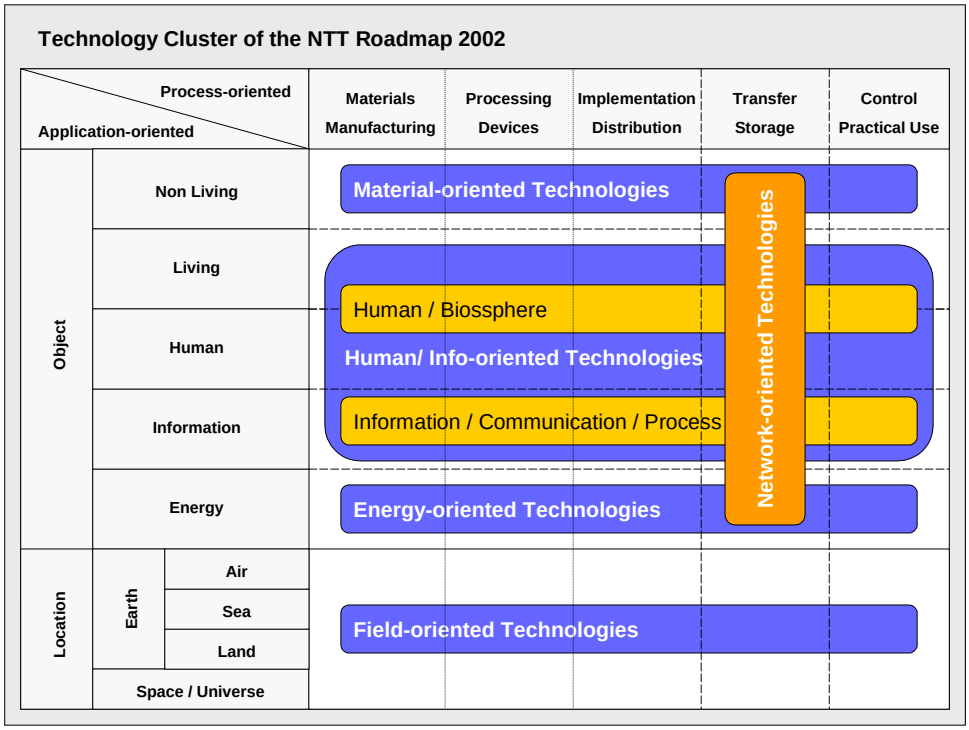
Human Interface Technology Development Trends II (Micro Machine Technology)

Technology Area	Necessity of Technology Acceleration (mid term ~2005)	Necessity of Technological Leap (long term ~2010)
Micro machining Technologies	1: Accelerated development of lithography technology 2 : Accelerated development of film forming process 3 : Accelerated development of design and test technology	1 : Overcoming critical technology <100nm > any other technologies such as wiring, CMOS, design, test, and methodology have reached their limits. The development of critical technologies is necessary. 2 : Development of new architecture with ultrahigh speed operation
Power Management Technologies	1 : Increase of energy density of secondary battery 2 : Power saving technology to realize mobile solutions 3 : High energy density accumulation technology 4 : Development of Mn positive materials stable for a long time under high voltage 5 : Development of large lithium batteries which are small and safe for the early realization of electric and hybrid cars.	1 : Development of polymer type thin and light secondary batteries

Quelle: Vision for Electronic and Information Technology Industry 2010 [JEIDA Industrievision 2010]

Anhang C:

NTT Vision 2015



Material-oriented Technology Development Trends I (optical, bio, nano)

Technology Area	~ 2005	2010 ~ 2015
Optical Fiber > transmission speed	1 ~ 10Tbit/s	(high speed/ large capacity) ~ 40Tbit/s
Optical Devices - Semiconductor Laser > transmission speed > frequency stability > wave length (channels) - Planar optical circuit device > optical filter (channels) > optical switch (channels)	 40 ~ 80Gbit/s 10 ~ 1GHz 200 ~ 1.000 300 ~ 1.000 256 X 256	 ~ 160Gbit/s 0.1GHz 3.000 3.000 1.000 X 1.000
Superconductor > material conditions	-100°C	-70°C
Bio Devices - Molecular Switch	Molecular switch (research); Molecular memory switch (tests)	Realization of simple electron transistor in LSI technology (2015); Realization of 1 molecule switching as basic device; logic, memory in LSI technology (2020
Nano Technology - Simple Molecule Device	Inverter (simple molecule IC)	Simple molecule LSI)
Micro Machine (MEMS)		
Sensor Devices > organic gas	0.1ppm	.ppb

Quelle: 2015, Next Generation Information Communication Technology Vision [NTT Roadmap 2002]

Material-oriented Technology Development Trends II (Semiconductor Technology)

Technology Area	~ 2005	2010 ~ 2015
Semiconductor IC (Logic) - CMOS LSI - chemical compound IC	 ~ 40M gate/chip ; ~ 40ps gate ; ~5GHz ~ 200k gate/chip ; ~10ps gate	 500~M gate/chip ; ~ 10ps gate ; 10GHz ~ 500k gate/chip ; ~ 5ps gate
Semiconductor IC (Memory) - Volatile Memory > DRAM capacity - Non Volatile Memory > Flash > FeRAM > MRAM	(low cost, mass production, capacity) ~ 2Gbit/chip (in research 8Gbit/chip) mass production (parallel to DRAM) first products first products	(trend to non volatile memory) ~ 16Gbit/chip (in research 64Gbit/chip
Memory Devices (disk) > Memory capacity	 ~ 100Gbit/inch^2	 1.000 ~ 10.000Gbit/inch^2
Display Devices - Projection Display - Flat Panel Display > PDP, Plasma Display Panel > TFT-LCD, Thin Film Transistor LCD > OLED, Organic light emitting Diode	 ~ 8 Mill. Pixel ; 12bit ~60inch ; 2 Mill. Pixel ; ~150W Power ~40inch ; 2 Mill. Pixel ; ~15inch ; 1.2 Mill Pixel ;	 ~ 30 Mill. Pixel ; 16bit ~80inch ; 4 Mill. Pixel ; 100W Power ~60inch ; 4 Mill. Pixel ; ~20inch ; 2 Mill. Pixel ;

Quelle: 2015, Next Generation Information Communication Technology Vision [NTT Roadmap 2002]

Human-oriented Technology Development Trends I (Media Technology)

Technology Area	~ 2005	2010 ~ 2015
Media - Voice - Image	 Scalable Sign	
Media Recognition - Voice Recognition > Sound > Telephone Word Recognition > Serial Word Recognition - Writing Recognition (kanji signs) - Picture Recognition - Condition Recognition	 10 ~ 0 dB 10.000 Words (already achieved) ~100.000 Words Handwritten + multimedia documents Sense of sight like a baby Shaping of sensor networks	 -10 dB 10.000 Words (already achieved) Unlimited (self-acquisition of unknown words) Real world documents Sense of sight like a 5 - 6 year old Network build-up sensor integration
Media Processing - 3D Surround Generation - Voice Synthesizing > Voice quality >	 2D Virtual Surround One's voice like quality	 3D Virtual Surround One's voice like quality natural conversation synthesizing
Media Description Language	Interactive Media Description	extensive use content realization; control data

Quelle: 2015, Next Generation Information Communication Technology Vision [NTT Roadmap 2002]

Human-oriented Technology Development Trends II (Computing Technology)

Technology Area	~ 2005	2010 ~ 2015
Computer		
- Processor	~128bit	>128bit
- processing ability	4.000 SPECint2000	40.000 SPECint2000
- Main Memory	~640MB	~6.400MB
- Operating System	> Break-up OS development ; Ubiquitous device integrating management	> autonomic break-up OS ; ultra high reliable OS
- Programming	> Practical use oriented component programming	> Semi self composition of large scale program
- Security	> Electronic signature, certification	> Code application function
Mobile / Information Terminals		
- Use and Shape Conditions		
> Information Terminal	> Information Telephone integrated in Home Network System Structure	> All objects have ID Tags; ubiquitous computing Environment realized
> Mobile Terminal	> Wearable, always-on Terminals	> Implanted Terminals
- Terminal specific Network		
> local communication	> Bluetooth and IrDA with wide area gateware cooperation	> Body use communication
> Power supply	> Integrated power supply	> Body generated power supply

Quelle: 2015, Next Generation Information Communication Technology Vision [NTT Roadmap 2002]

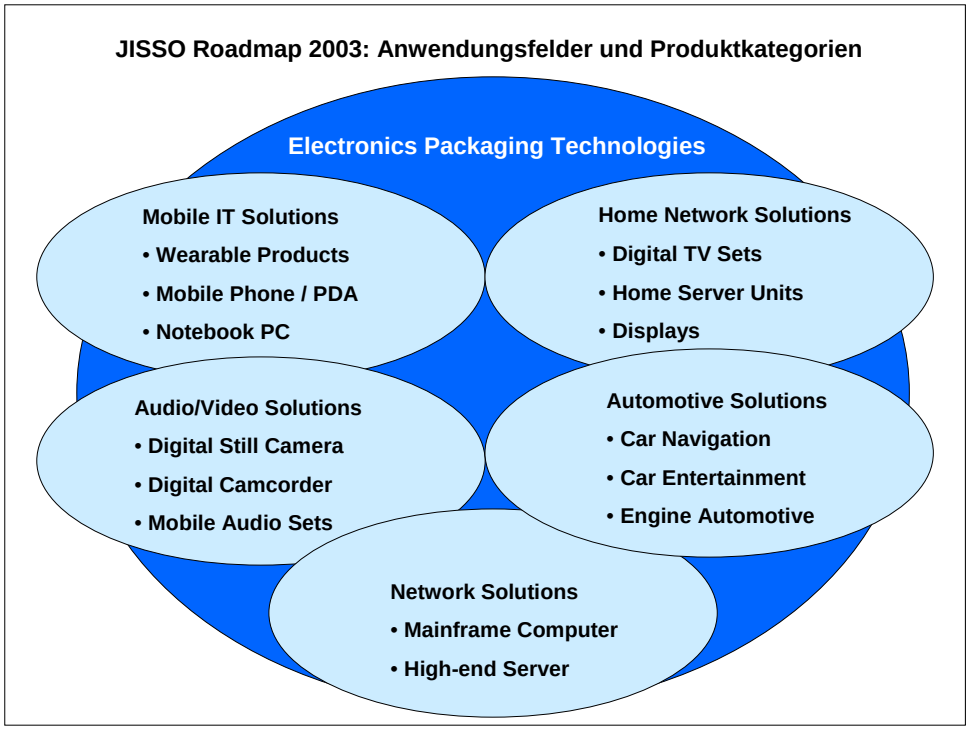
Human-oriented Technology Development Trends III (Interface Technology)

Technology Area	~ 2005	2010 ~ 2015
Interface Hardware		
- Mobile Interface	> Always-on Devices	> Embedded interface chip
- Cyber Interface	> If high recognition functionality training unnecessary	> Nerve sensitive signal use in a beginning stage
- Visual Interface	> Tangible and natural interface	> computer is not be seen
- Universal Interface	> Good scenario: corresponding with wide variety of devices; Bad scenario: corresponding with only one particular device	> Good scenario: naturally easy to use (universal design) > Bad scenario: as ever, stylish and always changing design

Quelle: 2015, Next Generation Information Communication Technology Vision [NTT Roadmap 2002]

Anhang D:

JISSO Roadmap 2003



Jisso Roadmap 2003: New Product Categories and Basic Conditions

Product Category Jisso Roadmap (2001)		Product Category Jisso Roadmap (2003)		User Environment		Size	Weight	Cool
				Use Condition	Temperature			
1	Wearable Product	1	Wearable Product	Wearable	0 ~ 40°C	~100cc	~100g	--
2	Mobile Audio Set	2	Mobile Audio Set	Portable	0 ~ 40°C	~100cc	~100g	--
3	Mobile Phone	3	Mobile Phone / PDA	Portable	-20 ~ 70°C	~100cc	~100g	--
4	Digital Still Camera	4	Digital Still Camera	Portable	0 ~ 40°C	~500cc	~500g	--
5	Digital Camcorder	5	Digital Camcorder	Portable	0 ~ 40°C	~500cc	~500g	--
6	DVD Player	6	Car- Navigation / Car-Entertainment	Automotive	-20 ~ 70°C	~1000cc	~1000g	Yes
7	Car-Navigation	7	Notebook PC	Portable Stationary	0 ~ 40°C	~1000cc	~2000g	Yes
8	Notebook PC	8	Digital TV Set / STB Home Server Unit	Stationary	0 ~ 40°C	1000cc~	~30kg	Yes
9	Digital TV	9	Mainframe Compute. High-end Server	Stationary	20°C	1000cc~	~30kg	Yes
		10	Engine Automotive	Automotive	-20 ~ 70°C	1000cc~	~1000g	--
	New Topics	11	Displays	Stationary	0 ~ 40°C	--	--	?

Quelle: Proceedings of Jisso/Protec Forum Japan 2002 [JISSO Roadmap 2003]

Requirements for Advanced Semiconductor Packaging: CSP ball pitch (mm)

	2002	2006	2012
Wearable Products	0.5	0.3	0.15
Mobile Audio Sets	0.5	0.4	0.4
Mobile Phone/ PDA	0.5	0.3 ~ 0.4	0.3
Digital Still Camera	0.4 ~ 0.5	0.4 ~ 0.5	0.3
Digital Camcorder	0.4 ~ 0.5	0.4 ~ 0.5	0.3
Car-Navigation	--	--	--
Notebook PC	0.8	0.4 ~ 0.5	0.3
Digital TV Sets	0.5	0.4	0.3
High-end Server	0.8	0.5	0.5
Engine Automotive	--	0.5 ~ 0.8	0.3 ~ 0.5
Displays	0.8	0.5	0.5

Quelle: Proceedings of Jisso/Protec Forum Japan 2002 [JISSO Roadmap 2003]

Requirements for LSI Packaging: Height (mm)

	2002	2006	2012
Wearable Products	0.8	0.4	0.1 ~ 0.3
Mobile Audio Sets	1.0	0.5	0.3 ~ 0.5
Mobile Phone/ PDA	1.2	0.8	0.5
Digital Still Camera	0.8 ~ 1.0	0.6 ~ 0.8	0.4 ~ 0.6
Digital Camcorder	0.8 ~ 1.2	0.6 ~ 1.0	0.4 ~ 0.8
Car-Navigation	1.5	1.0	1.0
Notebook PC	1.0 ~ 1.5	0.8 ~ 1.2	0.6 ~ 1.0
Digital TV Sets	1.0 ~ 2.0	0.8 ~ 2.0	0.5 ~ 2.0
High-end Server	1.0 ~ 1.2	0.5 ~ 1.0	0.3 ~ 0.5
Engine Automotive	1.6 ~ 2.5	1.5 ~ 2.0	2.0
Displays	--	--	--

Quelle: Proceedings of Jisso/Protec Forum Japan 2002 [JISSO Roadmap 2003]

Requirements for PWB Structure:

	2002	2006	2012
Wearable Products	build-up 4 layers	build-up 6 layers	build-up 6 layers
Mobile Audio Sets	build-up 6 layers	Film 6~10 layers	3D PWB, embedded 10~15 layers
Mobile Phone/ PDA	build-up 6 layers	build-up IVH 8~10 layers	build-up IVH 8~10 layers
Digital Still Camera	build-up 6 layers	build-up 6~8 layers	build-up 6~8 layers
Digital Camcorder	build-up 8~10 layers	build-up 8~10 layers	build-up 10 layers
Car-Navigation	IVH 4~6 layers	build-up 6~8 layers	build-up 8 layers
Notebook PC	build-up, PTH 8~10 layers	build-up, PTH, IVH 8~10 layers	build-up, PTH, IVH 8~10 layers
Digital TV Sets	Cu PTH 6 layers	Cu PTH, build-up 6~8 layers	Cu PTH build-up 6~10 layers
High-end Server	build-up 6 layers	Film 10 layers	3D PWB, embedded 15 layers
Engine Automotive	Cu PTH, IVH 2,4,6 layers	IVH, build-up 4~6 layers	IVH, build-up, embedded 6~8 layers
Displays	Cu PTH 4 layers	build-up 6 layers	build-up 8 layers

Quelle: Proceedings of Jisso/Protec Forum Japan 2002 [JISSO Roadmap 2003]

Requirements for minimum Line and Space: Width (µm/ µm)

	2002	2006	2012
Wearable Products	100 / 100	50 / 50	20 / 20
Mobile Audio Sets	100 / 100	50 / 50	30 / 30
Mobile Phone/ PDA	75 / 75 100 / 100	50 / 50 75 / 75	30 / 30 50 / 50
Digital Still Camera	100 / 100	50 / 50	20 / 20 50 / 50
Digital Camcorder	75 / 75	50 / 50	25 / 25 40 / 40
Car-Navigation	100 / 150 150 / 150	100 / 100	50 / 50 100 / 50
Notebook PC	100 / 100	50 / 50 75 / 75	25 / 25 50 / 50
Digital TV Sets	100 / 100 150 / 150	50 / 50 150 / 150	20 / 20 150 / 150
High-end Server	75 / 100	50 / 50	30 / 30
Engine Automotive	130 / 130 200 / 150	100 / 100	80 / 80
Displays	100 / 100	80 / 80	60 / 60

Quelle: Proceedings of Jisso/Protec Forum Japan 2002 [JISSO Roadmap 2003]

Requirements for Wrap (Bow) Tolerance Range of PWB: (% or mm)

	2002	2006	2012
Wearable Products	0.4 mm	0.2 mm	0.1 mm
Mobile Audio Sets	0.5 mm	0.2 mm	0.1 mm
Mobile Phone/ PDA	0.5 mm	0.2 mm	0.1 mm
Digital Still Camera	1.0%	0.7%	0.5%
Digital Camcorder	0.5%	0.5%	0.5%
Car-Navigation	< 1.0%	< 1.0%	< 1.0%
Notebook PC	1.0 mm 1.0~1.5%	0.5 mm 0.8~1.0%	0.1 mm 0,5~1.0%
Digital TV Sets	1.0%	1.0%	1.0%
High-end Server	0.5 mm	0.2 mm	0.1 mm
Engine Automotive	0.1~0.5 mm	0.15~0.2 mm	0.05~0.1 mm
Displays	--	--	--

Quelle: Proceedings of Jisso/Protec Forum Japan 2002 [JISSO Roadmap 2003]

Requirements for Embedded Passive Components:

	2002	2006	2012
Wearable Products	0%	C	R, L, Filter
Mobile Audio Sets	0%	LSI, R, L, Filter	C
Mobile Phone/ PDA	0%	C, R: 2004, L, Filter: 2005	LSI: 2006 ~ 2012
Digital Still Camera	0%	C, R: 2007	--
Digital Camcorder	0%	C,R, L, Filter	LSI
Car-Navigation	0%	--	--
Notebook PC	0%	C,R, L, Filter	C,R, L, Filter
Digital TV Sets	0%	C, R, L, Filter: 2006 ~ 2008	LSI: 2008 ~ 2012
High-end Server	0%	R: 2004 ~ 2006 L, Filter: 2005 ~ 2006 LSI: 2005 ~ 2010	C: 2010
Engine Automotive	0%	R: 2006 ~ 2010	C, L, Filter: 2010 ~ LSI: 2012 ~
Displays	0%	C, R, L, Filter: 2008 ~	C, R, L, Filter

Quelle: Proceedings of Jisso/Protec Forum Japan 2002 [JISSO Roadmap 2003]

Kurzbiographie

Lutz Stobbe, geboren am 03.02.1968 in Potsdam-Babelsberg.

Abitur im Jahr 1986 in Potsdam, studierte nach dreijährigem Militärdienst in der NVA zunächst Geschichte und Japanologie an der Humboldt Universität zu Berlin und wechselte 1996 an die Freie Universität Berlin.

Graduierte im Jahr 2000 im Hauptfach Japanologie am Ostasiatischen Seminar der Freien Universität Berlin. Die freie wissenschaftliche Arbeit zur Erlangung des Grad eines Magister Atrium (M.A.) hatte einen wirtschaftswissenschaftlichen Schwerpunkt und erfolgte zum Thema „Umweltmanagement in der japanischen Elektronikindustrie“.

Seit November 2000 wissenschaftlicher Mitarbeiter der Abteilung Environmental Engineering des Fraunhofer Institut für Zuverlässigkeit und Mikrointegration IZM, Berlin. Die bisherige wissenschaftliche Tätigkeit konzentrierte sich auf das Thema der Operationalisierung des Leitbildes einer Nachhaltigen Entwicklung in der Elektronikindustrie. Entwicklung von Nachhaltigkeitsstrategien und Roadmaps. In diesem Zusammenhang Bearbeitung des Fokusthemas „Mobile Kommunikation“ im BMBF geförderten NIK-Roadmap-Projekt „Nachhaltige Informations- und Kommunikationstechnik“.

Koordiniert seit 2003 Japan-spezifische Akquisitionstätigkeiten des Fraunhofer IZM und betreut ein gemeinsames Forschungslabor des IZM mit der School of Engineering der University of Tokyo.

Lutz Stobbe ist verheiratet und hat zwei Töchter (Zwillinge).