



Die Products Markets in Europe

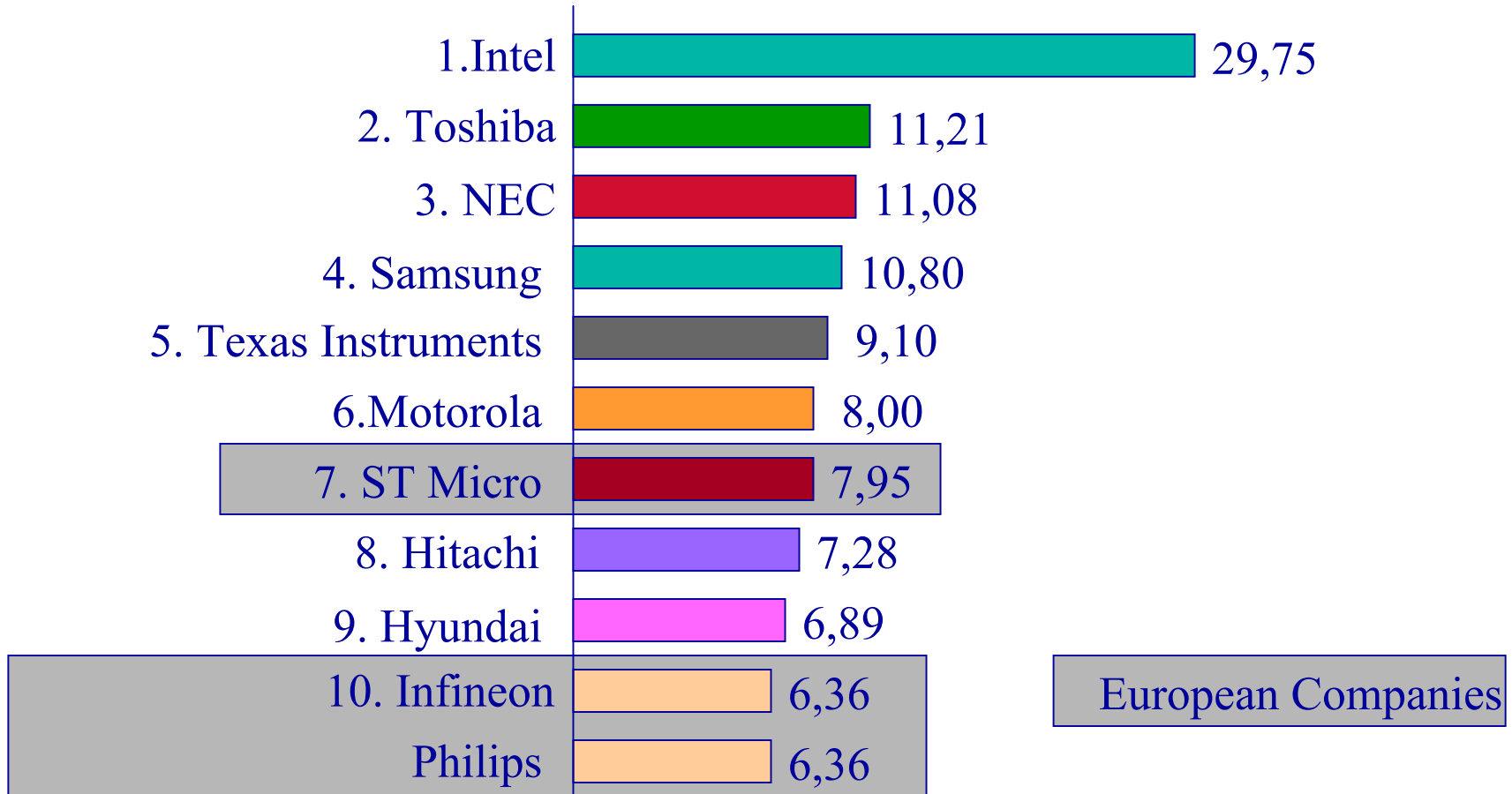
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The IST vision

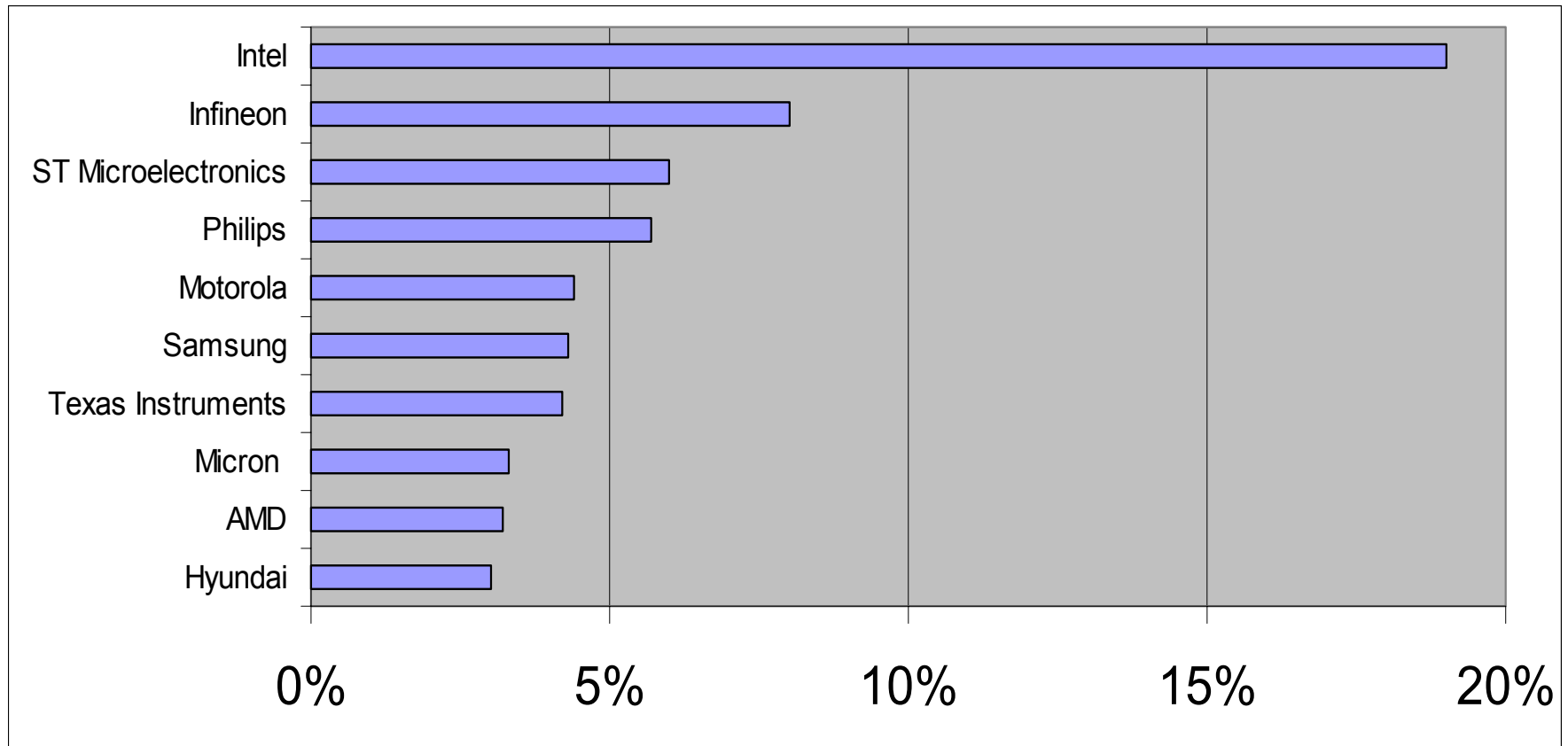
European Semiconductor Companies in the Global Top 10

2000 Ranking of Semiconductor Companies Worldwide (Sales in US \$)



Source: Dataquest, December 2000

European Market Share 2000



Source: Future Horizons

2000 European Semiconductor Market

- **Market size: \$42.0b**
- **Growth rate: 31.8%**
- **Highest growth products**
 - Flash (127%)
 - FPLDs (102%)
- **Highest growth applications**
 - Smartcards (96%)
 - Set-top boxes (67%)
- **Highest growth regions**
 - Germany (37.8%)
 - Nordic (33.0%)

Source: WSTS/Future Horizons

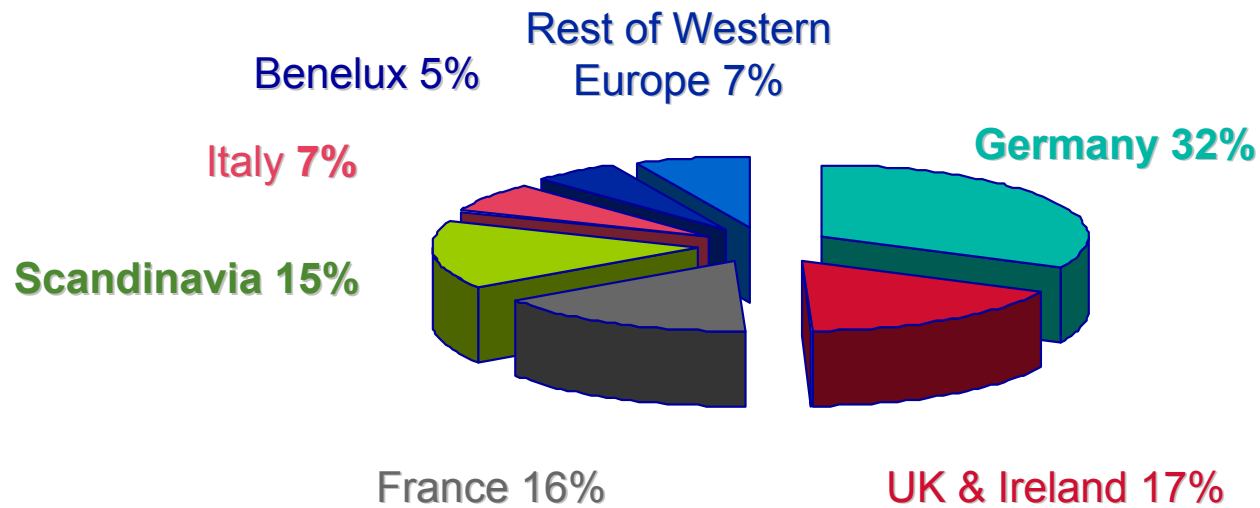
2001 Electronics Equipment Production

- **Europe: \$249b (22% of WW production)**
- **Application markets:**
 - **Automotive 33%**
 - **Telecom 30%**
 - **EDP/PCs 20%**
 - **Consumer 15%**
- **High volume growth drivers**
 - **45% of Set-Top Boxes**
 - **40% of Mobile Phones**
 - **84% of Smart Cards**
 - **40% of Navigation Systems**
 - **23% of PCs**

Source: WSTS/Future Horizons

HDP Products

European geographical distribution

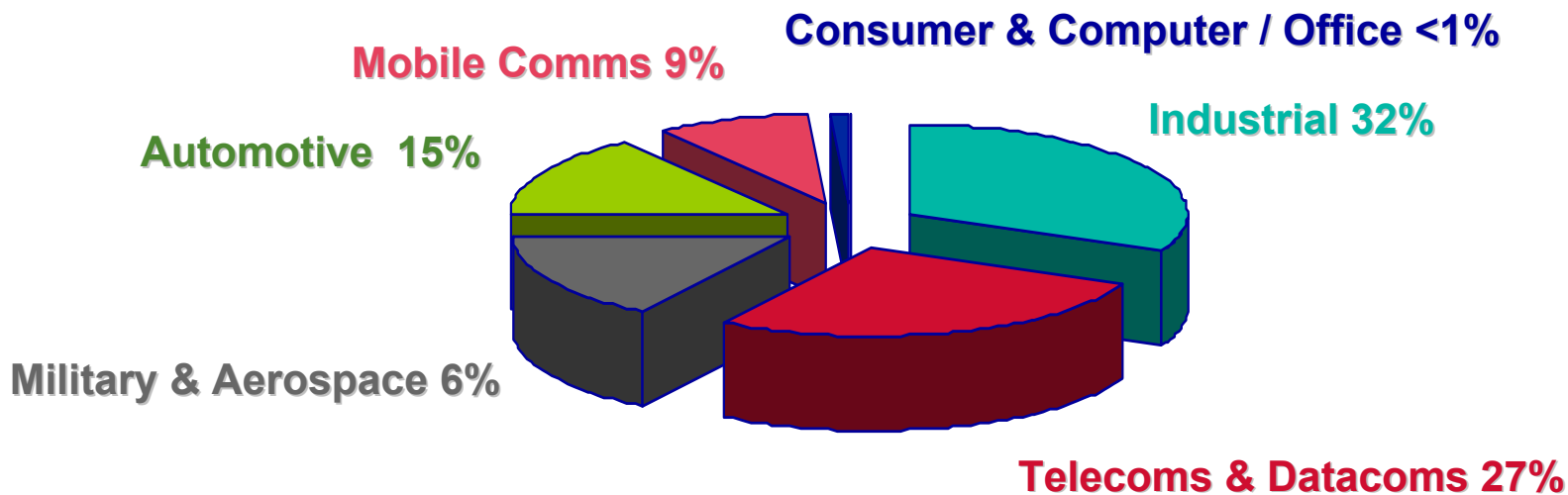


2001-2004

Source: Intex Mgmt. Services

HDP Products in Europe

Market sector distribution



2001-2004

Source: Intex Mgmt. Services

European HDP Applications, by Market Sector and Products

Market Sector	Products	Principal Product Category ¹			Typ. Update Interval ²	
COMPUTER / BUSINESS / RETAIL	Memory, Processor, Comms Modules	4	Cost		S	
	Smart Card / POS-EFT Terminals	4	Cost	4	S	M
	Workstations		Perf		M	
	Wearable Computers	Port	4	4	M	L
TELECOMS / COMMUNICATIONS	Mobile 'Phones, Smart Pagers	Port	4	4	S	
	Communicators, Mobile Terminals, Wireless Comms	Port	4	4	S	M
	Optoelectronic Transceivers	4	Cost	4	M	
	Switch Systems		Perf	4	M	L
CONSUMER	Palmtops, PDAs, Video Cams, Personal GPS	Port	4	4	S	M
	TVs / Hi-Fis, etc.	4	Cost	4	S	M
	Internet & Cable Terminals, Smart Appliances	4	Cost		M	
	Intelligent House Controls, Domestic Robots		Cost		M	L
INDUSTRIAL & CONTROL	Motor Drive Units, Pump Controls, Factory Automation	4	Cost	4	M	L
INSTRUMENTATION & TEST	Test Probes / Ancillaries		4	Perf	S	M
	High Speed Logic/Spectrum Analysers	4	4	Perf	M	
AUTOMOTIVE	ICE / GPS / Traffic Information		Cost	4	S	M
	Engine / Gearbox / ABS / Traction Control		4	Safe Harsh	M	
	Communications Terminals		Cost	4	M	L
	Autopilot / Collision Avoidance		Cost	Safe 4	M	L
AEROSPACE (Civil & military)	Memory Modules	4		4 Harsh	M	L
	A / D & D / A Converters	4		Perf 4	M	L
	Computer Modules (basic & complex))	4		Perf Safe Harsh	L	
MEDICAL	Wearable / Injectable Monitors, Pacemakers, Implants	Port	4	Safe 4	S	M
	Drug / Toxin Screeners	4	Cost	Safe 4	S	M
	Diagnostic Toilets		4	Harsh	M	
	Imaging Systems, Scanners	4		Perf Safe	M	L

Source: EuroPractice HDP

Notes : 1. Principal product category: "Port" = Portable; "Cost" = Low Cost, High Quantity; "Perf" = High Performance; "Harsh" = Harsh Environment.
 "Safe" = the product's function may be crucial for health or safety. "4" indicates other aspects in some or all products.
 2. Typical Update Interval (next generation product re-design) : S = < 1 year; M = 1 - 3 years; L = > 3 years.

European HDP Applications : Prospects of Need for HDP

Table 2.

Market Sector	Products	Principal Driver (Notes 1 & 2)		Rate of New Designs (Note 3)	Comments	Prospect of Need for HDP
		Size	Perf.			
COMPUTER / BUSINESS / RETAIL	Memory, Processor, Comms Modules	4		Very High	Very cost sensitive	Very good
	Smart Card / POS-EFT Terminals	4		Medium	Very cost sensitive	Medium
	Workstations		P	Low	High value products	Good
	Wearable Computers	P		Medium	High novelty value	Very good
TELECOMS / COMMS	Mobile 'Phones, Smart Pagers	P	4	High	Very cost sensitive	Very good
	Communicators, Mobile Terminals, Wireless Comms	P	4	High	Many designers	Very good
	Optoelectronic Transceivers	4	4	Medium	Cost sensitive	Good
	Switch Systems		P	Medium	High value products	Good
CONSUMER	Palmtops, PDAs, Video Cams, Personal GPS	P	4	Medium	Many designers	Very good
	TVs / Hi-Fis, etc.	4	4	Low	Very cost sensitive	Low
	Internet & Cable Terminals, Smart Appliances	4		Medium	Very cost sensitive	Medium
	Intelligent House Controls, Domestic Robots			Low	Very cost sensitive	Low
IND. & CONTROL INSTRUMENT'N & TEST	Motor Drives, Pump Controls, Factory Automation	4		Medium	Very cost sensitive	Medium
	Test Probes / Ancillaries		P	Medium	Frequent updates ?	Good
AUTOMOTIVE	High Speed Logic / Spectrum Analysers	4	P	Low	Some high value products	Specialist
	ICE / GPS / Traffic Information	4	4	Medium	Very cost sensitive	Medium
	ECU, Gearbox, ABS, Traction Controls			Low	Cost & safety sensitive	Low
AEROSPACE (Civil & military)	Communications, Autopilot, Collision Avoidance		4	Low	Cost & safety sensitive	Low
	Memory Modules	4	4	Medium		Specialist
	A / D & D / A Converters	4	P	Low	Very low noise required	Specialist
MEDICAL	Computer Modules (basic & complex)	4	P	Medium	Safety sensitive	Good
	Wearable / Injectable Monitors, Pacemakers, Implants	4		Medium	Cost & safety sensitive	Medium
	Drug / Toxin Screeners	4		Medium	Cost & safety sensitive	Medium
	Imaging Systems, Scanners	4	4	Low	Very high value products	Low

Notes : 1. Principal Product Driver : "Size" = Size, Portability; "Perf" = High Performance

2. "P" = Principal Product Driver, "4" indicates other important aspects in some or all products, e.g. cost, safety, harsh environment

3. A combination of growth rate, product value, product run size and typical update interval

Source: EuroPractice HDP

Summary of HDP Market Needs

<u>Market Sector</u>	<u>Main Product Attributes</u>	<u>Main Technical Attributes</u> (see also Table 4)	<u>Comments</u>
Computers (portable & smaller)	Small, thin, light, rugged Long battery life Low cost	"Low Cost" technology Low power	Good candidates for "Few Chip" & complex HDP. Long battery life is a key factor.
Telecoms / Comms / GPS (portables)	Small, thin, light, rugged Long battery life Low cost Modularity	"Leading Edge" & "Low Cost" technology Low power RF / microwave Some passive integration	Good candidates for "Few Chip" HDP Long battery life. Analogue content & passive integration important.
Consumer	Low cost Small and thin Fairly rugged	"Leading Edge" & "Low Cost" technology RF / microwave / optical	Cost is major driver but some need "Leading Edge" technology.
Computers (incl. Desktops, Servers & Workstations)	High performance & reliability High speed & signal integrity Good cost/performance	"Low Cost" technology RF / microwave / optical 3D technology	Very wide buses & high density memory. High speed interfaces important.
Telecoms / Comms (fixed installations)	High performance & reliability High speed & signal integrity Good cost/performance	"Low Cost" technology RF / microwave / optical Some passive integration Efficient cooling at low cost	Most high speed; RF/mw, some optical. Most systems dense & complex but some will use "Few Chip" HDP. Small size may be major benefit.
Industrial Controls / Instrumentation	Good cost/performance High reliability Compactness Modularity	"Leading Edge" & "Low Cost" technology Some optical I/Os Some passive integration	Good candidates for "Few Chip" & re-useable HDP. Sensor inclusion may be important. .
Automotive (excluding cabin items)	Harsh environment High reliability Small Low cost	"Low Cost" technology High Temperature ability	Sensor inclusion is important. Cost is a major factor. IC variety probably low.
Civil Avionics	Harsh environment, High performance & reliability Cabin items low cost	"Low Cost" technology Some High Temperature RF / microwave / optical	Sensor inclusion could be important. Passenger-related items probably best growth area.
Govt. / Military / Space	Harsh environment High signal integrity High performance & reliability Very high density	"Leading Edge" & "Low Cost" technology 3D technology RF / microwave / optical Some High Temperature	Specialised sector but some HDP in common with other areas. Sensor inclusion important for some.
Medical	Equipment : high reliability Disposables : low cost Minimal thickness for some	"Leading Edge" & "Low Cost" technology Possibly 3D technology	Specialist needs. Low cost disposables may be important. Source: EuroPractice HDP

KGD Initiatives in Europe

IST Programme

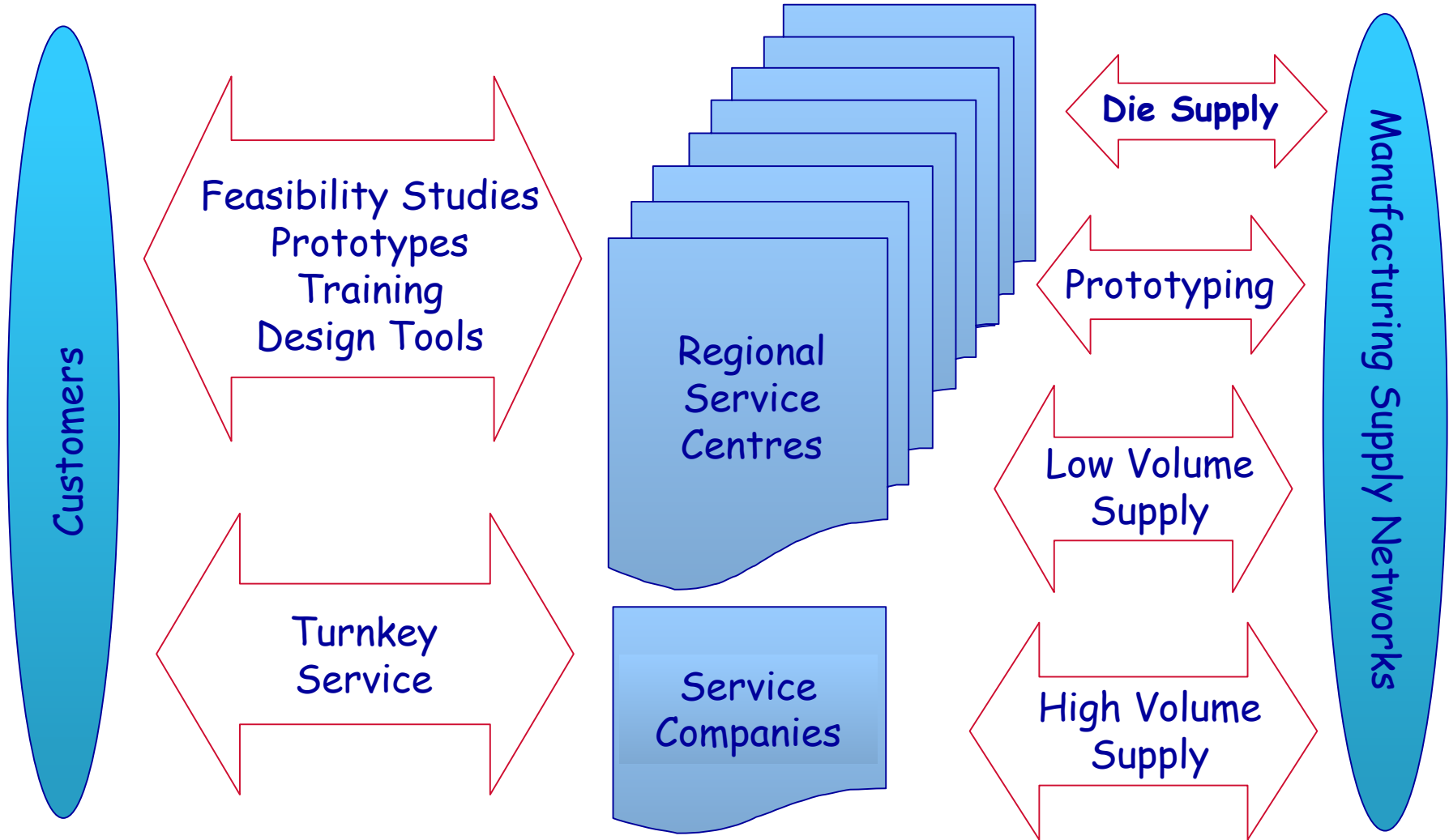
- **Good Die**
 - Network of Excellence on KGD and related topics
- **EuroPractice HDP**
 - Service to facilitate user access to HDP technologies
- **Research**
 - Provision and use of bare die

Good Die Network

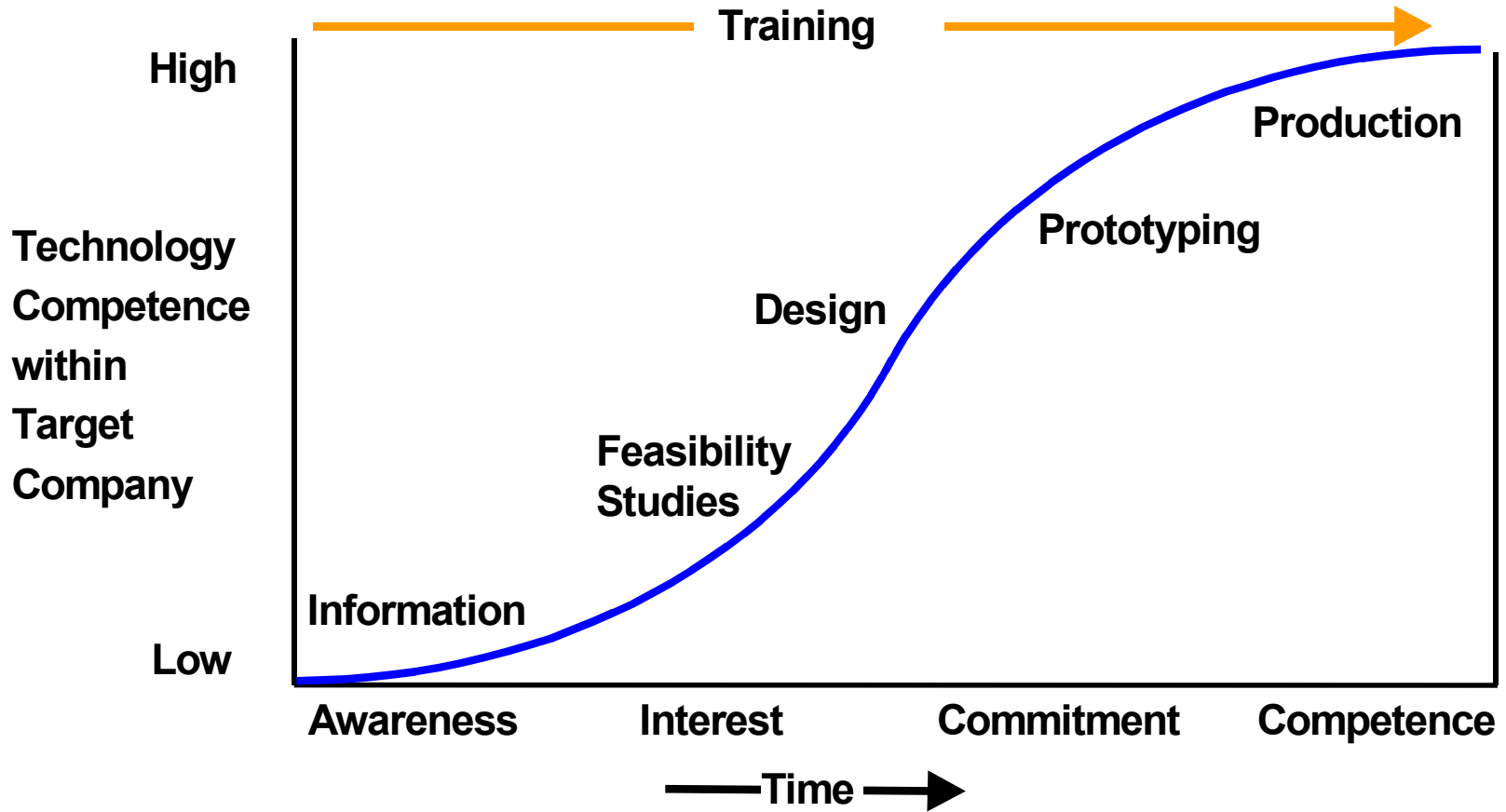
- **Generate awareness**
- **Dissemination (newsletter, workshops)**
- **Exchange throughout Europe**
- **Interaction with the US, Japan and RoW**
- **Generate Int'l and European standards for die**
- **Assess handling and delivery methods**
- **Assess testing and reliability techniques**
- **Organize an international workshop in 2002**
- **Analyze the issues related to KGD and MEMS**

EuroPractice-HDP

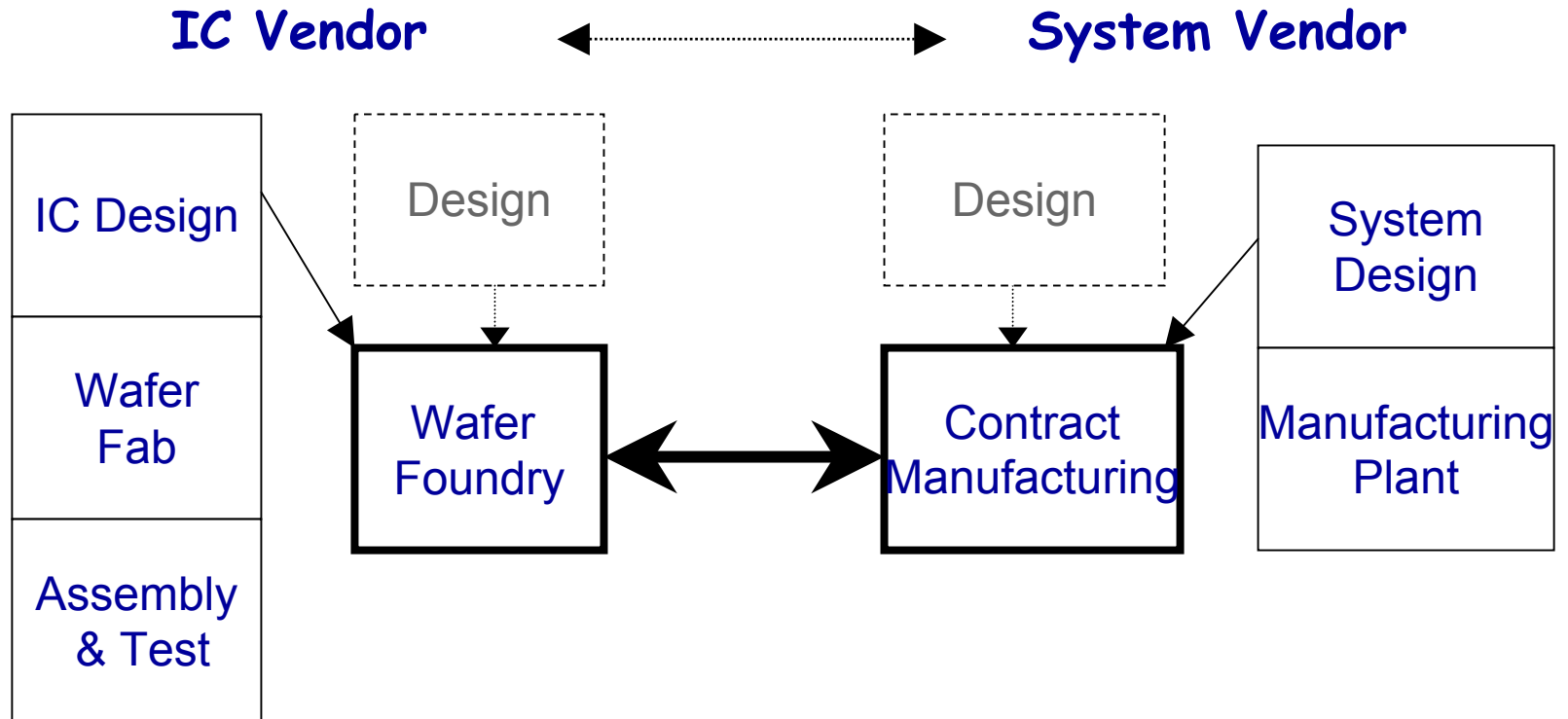
Overview



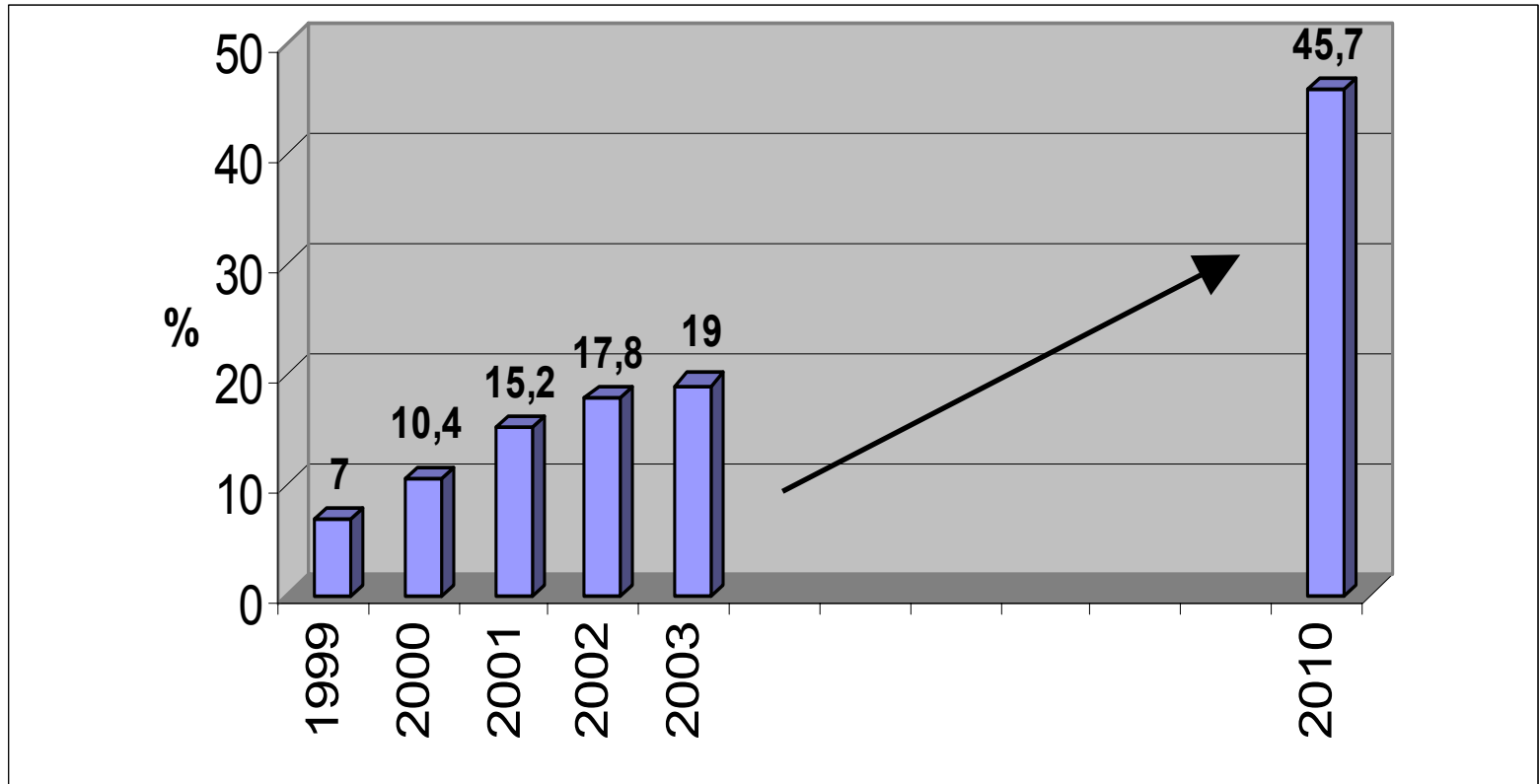
EP-HDP Services



Structural Changes in Industry



Foundry Share of WW IC Market 1999-2010



Source: Dataquest, WSTS

The Future

IST Program's vision:

Create an ambient intelligence landscape, for seamless delivery of services and applications, develop user-friendliness, and develop and converge the networking infrastructure in Europe