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ARAB REPUBLIC OF EGYPT



WORLD INTELLECTUAL
PROPERTY ORGANIZATION

WIPO NATIONAL TRAINING WORKSHOP ON INTELLECTUAL PROPERTY FOR DIPLOMATS

organized by
the World Intellectual Property Organization (WIPO)
and
the Institute for Diplomatic Studies

Cairo, December 13 to 16, 2004

**CHALLENGES AND OPPORTUNITIES FOR A COMPETITIVE SOFTWARE
INDUSTRY IN EGYPT**

*Document prepared by Dr. Sherif El Kassas, Deputy Director, Center for Academic
Computing, The American University, Cairo*

Outline

- The global software industry
- Software Products services and solutions
- Software Development
- The Local Industry
- Trends to watch for
- The Way Forward

The global software industry

Software remains one of the most innovative and fastest growing sectors of the global economy, generating revenues of more than **\$150 billion** every year [reported 2000]

Worldwide software revenue increased to **US\$178 billion** in **2003** and is projected to rise to **US\$189 billion** in **2004**.

biz.yahoo.com/ic/14.html

www.internationalgrowth.org/page.asp?grand=595&parent=1141&pageid=1835

The global software industry (cont.)

- **Challenges and Opportunities: The Talent Shortage**
 - In 1997 Information Technology Association of America estimated 190,000 open IT positions in the U.S
 - ITAA's 1998 survey shows 340,000 unfilled positions
 - USA Secretary of Commerce estimates the shortfall in the IT workforce will be 1.3 million (1997--2007).

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4

The global software industry (cont.)

- **USA projected employment growth**

US Bureau of Labor Statistics' projections of the 10 domestic industries with the fastest employment growth, 1996-2006

Industry description	Employment (thousands)		Change, 1996-2006	
	1996	2006	Number (thousands)	Percent
Computer and data processing services	1,208	2,509	1,301	108
Health services	1,172	1,968	796	68
Management and public relations	873	1,400	527	60
Transportation services	204	327	123	60
Residential care	672	1,070	398	59
Personnel supply services	2,646	4,039	1,393	53
Water and sanitation	231	349	118	51
Social services	846	1,266	420	50
Offices of health practitioners	2,751	4,046	1,295	47
Amusement and recreation services	1,108	1,565	457	41

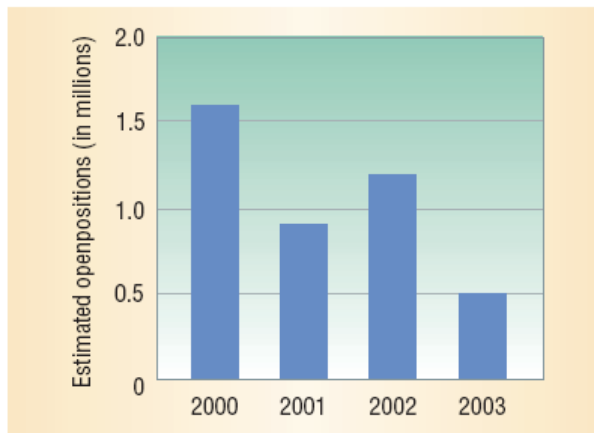
, Lee Garber, Employment in 1998: Focus on Y2K and the Internet, IEEE Computer
January 1998

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5

Figure 1. US IT workforce demand based on estimated open positions indicates a loss of more than 1 million positions between 2000 and 2003.

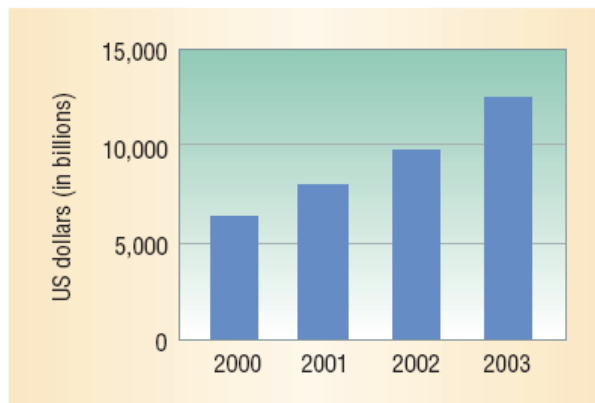


.Fred Niederman, IT Employment Prospects in 2004: A Mixed Bag, IEEE Computer, January 2004

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6



Ecommerce in the United States doubled from 2000 .to 2003, even as the workforce decreased

.Fred Niederman, IT Employment Prospects in 2004: A Mixed Bag, IEEE Computer, January 2004

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7

Table 1. Average annual IT salaries by country, June 2003.

Country	Average annual salary in local currency	Average annual salary in US dollars
United Kingdom	50,757 GBP	81,553
United States	80,286 USD	80,286
Europe	59,406 EUR	68,218
Australia	95,559 AUD	62,257
Canada	79,117 CAD	56,599
Singapore	75,319 SGD	43,058
South Africa	225,922 ZAR	30,055
Brazil	57,427 BRL	19,982
India	397,818 INR	8,593

Source: 2003 Information Technology Toolbox Salary Survey;
<http://crm.ittoolbox.com/Research/survey.asp>. Used by permission.

.Fred Niederman, IT Employment Prospects in 2004: A Mixed Bag, IEEE Computer, January 2004

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8

- **Systemwide benefits.** The *McKinsey Quarterly* published a report outlining four systemwide benefits that accrue to countries that outsource jobs to other countries:
 - cost savings that may lower prices and increase competitiveness in the marketplace;
 - new revenues based on the growth in developing economies;
 - repatriated earnings, which may allow companies to remain in business and return higher profits to their investors—many of whom can reside in the outsourcing country; and
 - redeployed labor to the extent that IT workers can move into higher-value projects, develop entrepreneurial new products, or shift to other industries.

.Fred Niederman, IT Employment Prospects in 2004: A Mixed Bag, IEEE Computer, January 2004

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9

**SLICING THE KNOWLEDGE-BASED ECONOMY IN
BRAZIL, CHINA AND INDIA: A TALE OF 3
SOFTWARE INDUSTRIES**

Francisco Veloso, Antonio J Junqueira Botelho, Ted
Tschang, and Alice Amsden

September 2003

http://www.softex.br/media/mit_final2.pdf

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10

Country	Sales (10 ⁶ USD)	Exports (10 ⁶ USD)	Employees	Sales / GDP	Industry Development Index ^a	Domestic Industry Development Index ^b
US**	200,000	n.a.	1,042,000	2.0%	0.5	0.5
Japan*	85,000	73	534,000	2.0%	0.8	0.8
Germany	39,844	n.a.	300,000	2.2%	0.9	0.9
UK	15,000	n.a.	n.a.	1.0%	0.4	0.5
India	8,200	6,220	350,000	1.7%	7.8	1.9
Brazil	7,700	100	158,000	1.5%	2.2	2.2
Korea	7,694	35	n.a.	1.8%	1.1	1.1
Ireland ³	7,650	6,500/3,000#	25,000	7.4%	3.4	0.5
China	7,400	400	186,000	0.6%	1.8	1.7
Spain*	4,330	n.a.	20,000	0.7%	0.4	0.4
Taiwan*	3,801	349	n.a.	1.2%	0.7	0.6
Israel*	3,700	2,600	15,000	3.4%	1.8	0.5
Finland	1,910	185	20,000	1.6%	0.7	0.6
Singapore	1,660	476	n.a.	1.9%	0.7	0.5
Argentina*	1,340	35	15,000	0.5%	0.4	0.4
Mexico	<1,000	n.a.	n.a.	<0.2%	0.2	0.2

Sources: Authors' compilation from various sources; n.a. – not available; * 2000; ** 2002;

^a Sales divided by the size of the economy, measured by GDP, and its level of development measured through GDP/Capita; ^b Same as Index but considering only domestic sales; # Second number excludes Microsoft exports;

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11

http://www.softex.br/media/mit_final2.pdf

Table 2: Key Statistics for Education, Research and Technology in Selected Countries

Variable	Units (year)	US	Brazil	China	India
Industry VA	% GDP (2001)	25%	34%	52%	27%
Student Enrol.	% 3 rd Level (2000)	73%	17%	8%	11%
R&D Expense	% GDP (2001)	2.5%	0.8%	1.0%	0.6%
Researchers	/ 10 ⁶ pop (2001)	4,103	323	545	158
NS&Eng Grad	/ 10 ⁶ pop (1997)	700	292	159	170
NS&Eng Grad	% of BSc (1997)	17%	20%	62%	24%
NS&Eng Grad	Total / Year (1997)	199,057	50,233	203,238	176,000
IT Graduates	Total / Year (2000)	51,236	17,847	41,000	71,000
IT Graduates	/ 10 ⁶ pop (2000)	180	101	32	69
ICT Expenses	% GDP (2001)	7.90%	8.30%	5.70%	3.90%
PCs	/ 1,000 pop (2001)	585.2	44.1	15.9	4.5

NS&E – Natural Sciences and Engineering; ICT – Information and Communication Technologies; VA – Value Added
Sources: Unesco, World Bank and OECD Databases except for IT Grads: NASSCOM for India; Ministério da Educação for Brazil and NSF for US. CSIA for China (all through respective websites);

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12

Table 4: Main Indicators for the Brazilian Software Industry

Item	2000		2001	
	(USD 10 ⁹)	%	(USD 10 ⁹)	%
Hardware	7,0	40,7	7,2	40,0
Services	3,0	17,5	3,1	17,5
Total Software	7,2	41,8	7,7	42,6
Products (Package, Custom and Embedded)	3,2	18,6	3,6	20,0
Services (Outsourcing, Development, Integration and Consultancy)	4,0	23,2	4,1	22,6
Total IT Industry	17,2	100,0	18,0	100,0

Source: Botelho et. al 2003, based on data in SEPIN, 2002; Revista Exame Informática-Maiores e Melhores, 2002

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13

Table 6: Output of software, computer industry and total GDP (100 million yuan)

Year	Output of software industry	Output of computer industry	Software as proportion of computer industry	Software as proportion of GDP
1999	441.5	1720	25.6%	0.54%
2000	593	2150	27.6%	0.67%
Growth rate	34%	25%	-	-

Source: Tschang and Xue, 2003

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14

Table 8: Sales and Exports in the Indian Software Industry (in USD 10⁶)

Year	Exports	Domestic Sales	Total Revenues	Domestic Sales /Exports
1987-88	52	74	126	142%
1990-91	128	115	243	90%
1991-92	164	122	286	74%
1992-93	225	165	390	73%
1993-94	330	225	555	68%
1994-95	485	339	824	70%
1995-96	735	487	1,222	66%
1996-97	1,110	712	1,822	64%
1997-98	1,790	981	2,771	55%
1998-99	2,650	1,203	3,853	45%
1999-00	4,000	2,195	6,195	55%
2000-01	6,230	2,173	8,403	35%
2001-02	7,680	2,420	10,100	32%

Source: Adapted from Pankaj Ghemawat, 2003

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15

The size of the market in these three nations in 2001 was quite similar, with

- China at USD 7.4 Billion
- Brazil selling 7.7 Billion
- India 8.2 Billion

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16

Table 11: Market Structure in Brazil, India and China

		Brazil	China	India
Market Focus – Sales	Services	56%	58%	80%
	Products	44%	42%	20%
	Exports	1.5%	5.5%	76%
Firms with Software Activity		10,700	10,000	-
Software Firms		5,400	5,700	2,800
Employees		158,000	186,000	350,000

Sources: Adapted from Botelho et al, 2003 for Brazil, Tschang and Xue, 2003 and Saxenian, 2003 for China; Tschang et al, 2003 and Athreye, 2003 for India. Some figures are authors' estimates based on values provided in these sources

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17

Software industry: Products, Services and Solutions

- Segmentation of the IT market
 - Hardware products and services
 - Processing and hosting services (including internet services)
 - Software services
 - Embedded software and services
 - Professional software services
 - Software products
 - Enterprise solutions
 - Packages mass-market software

Secrets of software success, D. J. Hoch et al, 2000

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19

The global software industry (cont.)

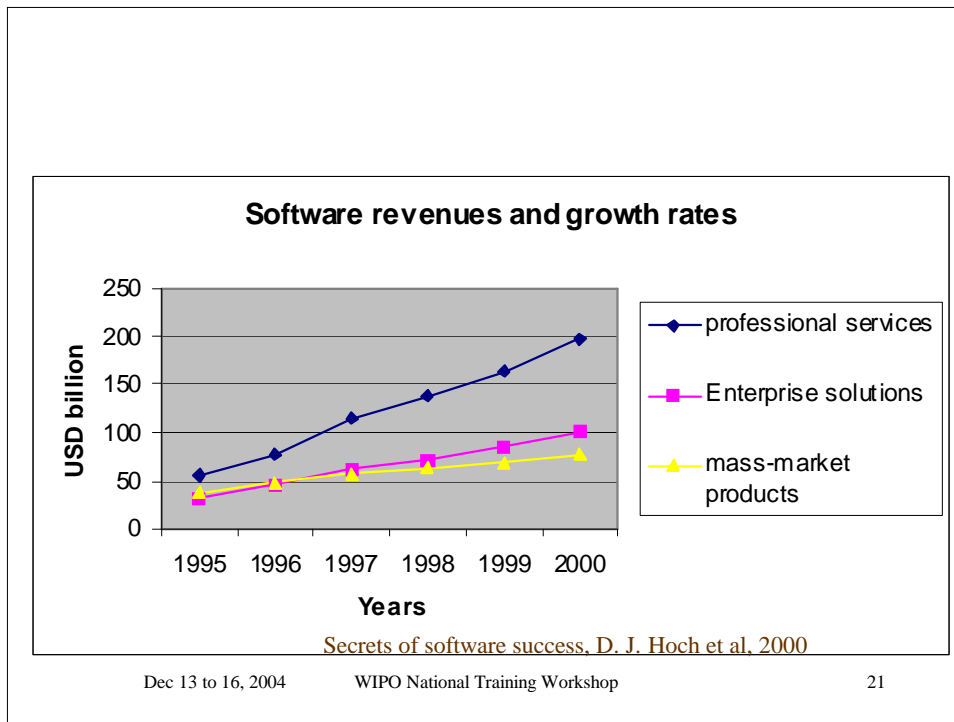
- Professional software services
 - 20% annual growth rate
 - top 10 companies account for 23% of the market
- Enterprise solutions
 - 18% annual growth rate
 - top 10 companies account for 45% of the market
- Packages mass-market software
 - 11% annual growth rate
 - top 10 companies account for 33% of the market

Secrets of software success, D. J. Hoch et al, 2000

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20



	Professional Services	Product business
Marginal costs	Almost constant	Almost zero
Market structure	Highly fragmented	Drive towards high concentration
Regional appearance	Mainly regional, with increased tendency towards globalization	Highly globalized
Customer relationship	One to one	One to few, one to many
Most important number to watch	Capacity utilization rate	Market share (installed base)
Relevance of management area	1- Human resources 2- Software development 3- Marketing and sales 4- Strategy	1- Strategy 2- Marketing and sales 3- Human resources 4- Software development

Secrets of software success, D. J. Hoch et al, 2000

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Professional Services

- Relevance of management area
 - 1- Human resources
 - 2- **Software Development**
 - 3- Marketing and sales
 - 4- Strategy

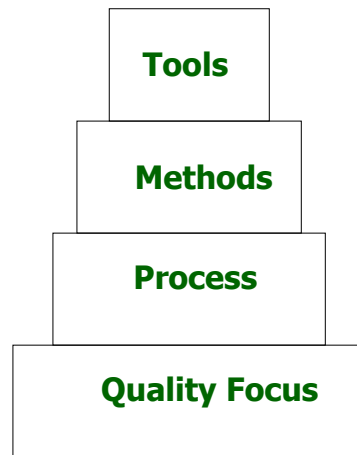
Software Development

- Software Engineering

“Software engineering is the establishment and use of sound engineering principles in order to obtain economically software that is reliable and works efficiently on real machines.”

---Fritz Bauer, Report on NATO 1969

Software Engineering



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Software Engineering Certification Center

Process Quality Approaches

“It is commonly believed that the implementation of sound software engineering process is strongly correlated with the production of high quality software products”

---James M. Moore, *Software Engineering Standards*

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26

The Local Industry

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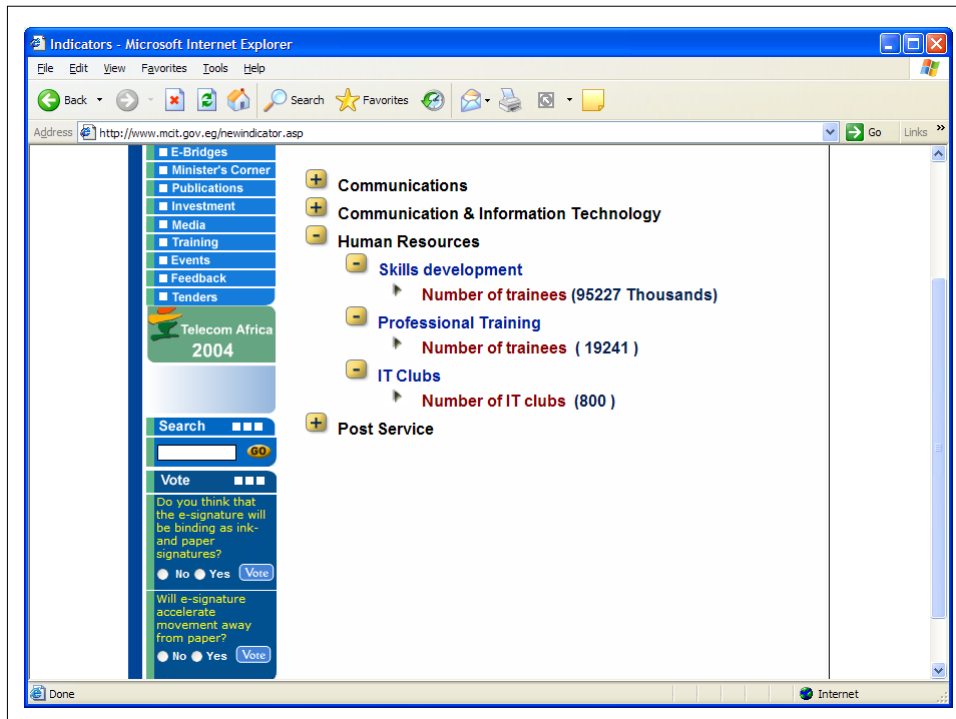
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27

The screenshot shows a Microsoft Internet Explorer browser window with the address bar displaying <http://www.mct.gov.eg/newindicator.asp>. The page content includes a navigation menu on the left with items like Home, E-Bridges, Minister's Corner, Publications, Investment, Media, Training, Events, Feedback, and Tenders. The main content area is titled 'Monthly Indicators September 2004' and features a tree view of indicators. A 'Telecom Africa 2004' banner is visible on the left side of the main content area. At the bottom, there is a 'Vote' section with a poll question: 'Do you think that the e-signature will be binding as ink- and paper signatures?' with 'No' and 'Yes' options.

Monthly Indicators September 2004

- + Communications
 - Communication & Information Technology
 - ▶ Number of established Companies
 - Information Technology (1150 Companies)
 - Communication (43 Companies)
 - ▶ Capital issued
 - Information Technology (2250.7 Million)
 - Communication (2999.4 Million)
 - ▶ Capital Investment
 - Information Technology (3569.3 Million)
 - Communication (5693.7 Million)
 - ▶ Labor Force (IT Companies)
 - Information Technology (31193 Job opportunities)
 - Communication (4713 Job opportunities)
 - ▶ Telecom Egypt Investment 3001 Million
 - + Human Resources
 - + Post Service



- **Software Engineering Competence Center (SECC)** is a governmental entity. Its mission is to support the development of the software industry in Egypt by improving the software engineering practices to higher maturity levels and achieving a strong global market presence.
- Established in 2001

[/http://www.secc.org.eg](http://www.secc.org.eg)

Trends to watch for

- Services remain the easiest entry point to the global IT market
- Products (mostly IP centric) have a higher barrier to entry, but remain the most profitable
- Open Source Software and System may well become a paradigm shift that could change the industry and possibly **copyright** as we know it!

The Way Forward

- Education
- Attracting investment
- Effective business environment
- Effective domestic software market
- Telecommunications and Internet infrastructure
- Intellectual property and piracy
- Watch for shifts: OPEN SOURCE SOFTWARE!