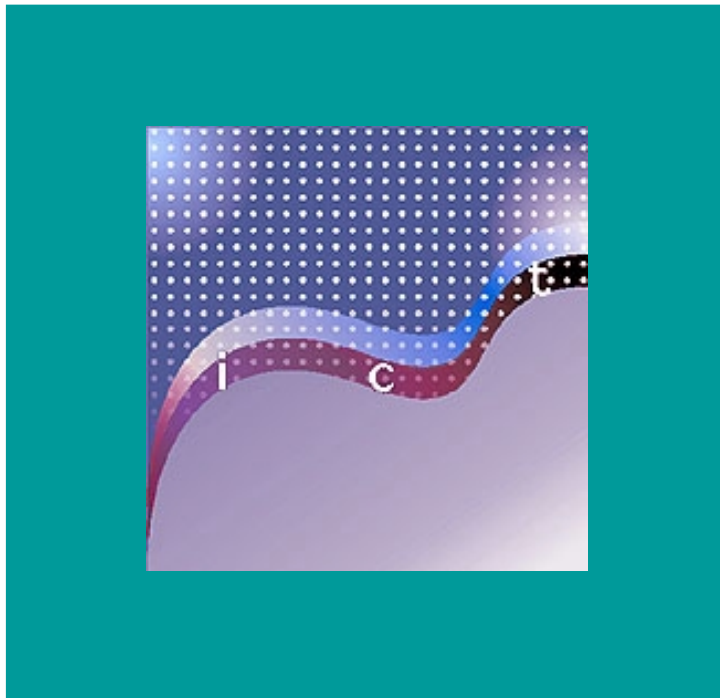**United Nations Conference on Trade and Development**

E-COMMERCE AND DEVELOPMENT REPORT 2003

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Chapter 1: Recent Internet trends: Access, usage and business applications

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Chapter 1

RECENT INTERNET TRENDS:
ACCESS, USAGE AND BUSINESS APPLICATIONS

The disappointment created by the failure of many dot-coms in 2000 and 2001 seems to be giving way to a more positive assessment of the Internet's impact on the performance of enterprises. The trend started in the United States, by far the largest economy among the leading adopters of e-business, but is now spreading to other economies. However, this renewed confidence in the capacity of technology to improve business operations is manifested in more nuanced ways than the overly optimistic visions of sweeping, revolutionary change that prevailed in the late 1990s.

The realities of the business cycle have imposed themselves, putting to rest the idea that information and communication technologies (ICT) would in the future spare economies the need for more or less painful adjustment of macroeconomic imbalances. At the same time, more realistic expectations about the economic benefits of the Internet – that it can help enterprises cut costs, generate more income and generally be more efficient – seem to be coming true.

These statements refer not only to the most obviously Internet-related enterprises (for example, at the end of 2002, 40 per cent of surviving dot-coms and 70 per cent of online retailers in the United States were reporting profits; see *Business Week* 2003, Forrester Research 2003b) but also to the "traditional" sector – that is, enterprises in industry and services sectors that until now conducted nearly all of their business offline. Indeed, the Internet's impact on productivity (an issue explored in chapter 2 of this report) affects the economy as a whole mostly through the changes that use of the Internet and other ICT applications is introducing in the conduct of business operations.

There is mounting evidence of the gains that enterprises derive from adopting e-business. For example, a survey (Varian et al. 2002) of the impact of Internet use on a sample of some 2,000 corporations in the United States showed that the corporations achieved accumulated savings of $155.2 billion and revenue

increases of $443.9 billion between 1998 and 2001. The same study surveyed 634 corporations in France, Germany and the United Kingdom, where the Internet-generated savings amounted to $8.3 billion and the additional revenue to $79 billion. By 2010 the accumulated savings for the US sample of enterprises alone are expected to rise to $528.3 billion, and the accumulated additional revenues are projected to be $1,551.9 billion. A sign that enterprises believe preparing themselves for e-business pays off is the fact that, while investment in information technology (IT) in general decreased by 6.2 per cent in 2002, e-business budgets (for projects in areas such as customer relationship management, procurement, supply chain management, electronic payment and settlement, and enterprise application integration) rose an estimated 11 per cent; in 2003 growth in e-business investment fell to 4 per cent, but this rate was twice as high as the growth in overall IT investment.[1] Chapter 2 of this report discusses in detail the evidence of the impact of ICT on productivity.

In this broad context, the current chapter surveys the most salient aspects of the Internet's expansion and its adoption by enterprises around the world, as well as of the effects that the Internet and other ICT have on the operation of enterprises, especially in terms of e-commerce activity. This chapter also briefly examines the implications for economic development of a number of technology-related trends concerning Internet use by individuals and the adoption of e-business practices by enterprises. Some trends (e.g. the spread of broadband) may have an expansionary effect on the economy, while others (e.g. security concerns) may be holding it back. Other topical questions – such as those related to the policy framework for the promotion of e-business for development, the increasing social and economic importance of open-source software, and the development of business process outsourcing – are only mentioned here, since they are discussed in detail in chapters 3, 4 and 5.

A. Internet access, readiness and use

1.   Measuring access and use

The number of Internet users cannot by itself give a full picture of the extent of ICT diffusion and adoption across an economy.[2] Reasonable levels of Internet penetration are a necessary condition, although not a sufficient one, for the development of e-business. While a high number of Internet users does not necessarily mean a high rate of e-business activity, it can be argued that if citizens find it difficult to use the Internet (i.e. if access is scarce or language represents an important barrier), then the technological conditions for the adoption of ICT by businesses are probably not being met. In addition, access is by no means the only bottleneck in the development of a digital economy. The latter also requires, among other things, changes in the legal framework, in the managerial culture of enterprises, and in consumer attitudes and habits. Many of the trends affecting these issues are not easy to capture in figures obtainable through objective statistical methodologies. In the absence of sufficiently comparable and truly global information about the *intensity* of Internet use, as opposed to the mere absolute number of people with access, estimates of the number of users provide a straightforward, objective – even if imperfect – indication of whether the foundations of a "digital economy" – for example, awareness, access, experience and trust – are present in a society. The recent evolution in the global number of Internet users is presented in tables 1.1 and 1.2, which use data from the International Telecommunication Union (ITU). Chart 1.1 shows the distribution of Internet users among regions of the world. Disaggregated information is provided for a variable number of countries in each region. These countries have been selected on the basis of either the weight of their economies in the respective region or the above-average performance growth in their number of Internet users.
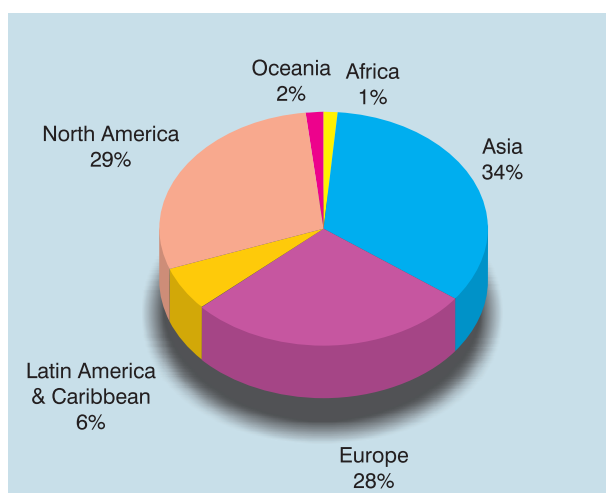
Table 1.1

Internet users (thousands) by region, 2000-2002

	2002	2001	2000	% change 2001-2002	% change 2000-2001
Africa	7 943	6 510	4 559	22.0	42.8
Asia	201 079	150 472	109 257	33.6	37.7
Europe	166 387	143 915	110 824	15.6	29.9
Latin America & Caribbean	35 459	26 163	17 673	35.5	48.0
North America	170 200	156 823	136 971	8.5	14.5
Oceania	10 500	9 141	8 248	14.9	10.8
Developing countries	189 882	135 717	93 161	39.9	45.7
Developed countries	401 686	357 307	294 371	12.4	21.4
World	**591 567**	**493 024**	**387 531**	**20.0**	**27.2**

Source: ITU (2003a) and UNCTAD calculations.
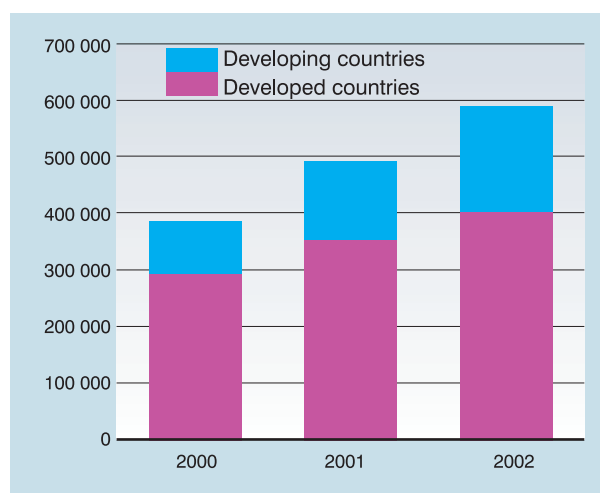
Chart 1.1

Internet users by region, 2002

Source: UNCTAD elaboration of ITU (2003a).

Chart 1.2

Internet users (thousands), 2000–2002

Source: UNCTAD elaboration of ITU (2003a)..

Table 1.2

Internet users (thousands), selected countries, 2000-2002

	2002	2001	2000	% change 2001-2002	% change 2000-2001
Africa	**7 943**	**6 510**	**4 559**	**22.01**	**42.81**
Algeria	500	200	150	150.00	33.33
Egypt*	600	600	450	..	33.33
Kenya*	500	500	200	..	150.00
Morocco	500	400	200	25.00	100.00
Nigeria	200	115	80	73.91	43.75
South Africa	3 100	2 890	2 400	7.27	20.42
Togo	200	150	100	33.33	50.00
Tunisia	506	400	250	26.38	60.00
Zimbabwe	500	100	50	400.00	100.00
Others	1 337	1 155	679	15.76	70.21
Latin America & Caribbean	**35 459**	**26 163**	**17 673**	**35.53**	**48.04**
Argentina	4 100	3 650	2 600	12.33	40.38
Brazil	14 300	8 000	5 000	78.75	60.00
Chile*	3 102	3 102	2 537	..	22.26
Colombia	1 982	1 154	878	71.75	31.44
Mexico	4 663	3 636	2 712	28.27	34.04
Peru*	2 000	2 000	800	..	150.00
Venezuela	1 274	1 153	820	10.58	40.55
Others	4 037	3 469	2 325	16.37	49.18
North America	**170 200**	**156 823**	**136 971**	**8.53**	**14.49**
United States	155 000	142 823	124 000	8.53	15.18
Canada	15 200	14 000	12 971	8.57	7.93

Table 1.2 (*continued*)

	2002	2001	2000	% change 2001-2002	% change 2000-2001
Asia	**201 079**	**150 472**	**109 257**	**33.63**	**37.72**
China	59 100	33 700	22 500	75.37	49.78
Hong Kong (China)	2 919	2 601	1 855	12.21	40.22
India	16 580	7 000	5 500	136.86	27.27
Indonesia*	4 000	4 000	2 000	..	100.00
Israel	2 000	1 800	1 270	11.11	41.73
Japan	57 200	48 900	38 000	16.97	28.68
Korea, Rep. of	26 270	24 380	19 040	7.75	28.05
Malaysia*	6 500	6 500	4 000	..	62.50
Philippines*	2 000	2 000	1 540	..	29.87
Singapore	2 247	1 700	1 300	32.18	30.77
Taiwan P. of China	8 590	7 820	6 260	9.85	24.92
Thailand	4 800	3 536	2 300	35.75	53.74
Others	8 873	6 534	3 692	35.80	77.00
Europe	**166 387**	**143 915**	**110 824**	**15.61**	**29.86**
France	18 761	15 653	8 460	19.86	85.02
Germany	35 000	30 800	24 800	13.64	24.19
Italy	17 000	15 600	13 200	8.97	18.18
Netherlands	8 590	7 900	7 000	8.73	12.86
Poland*	3 800	3 800	2 800	..	35.71
Russia	6 000	4 300	2 900	39.53	48.28
Spain	7 856	7 388	5 486	6.33	34.67
Sweden	5 125	4 600	4 048	11.41	13.64
Turkey	4 900	4 000	2 000	22.50	100.00
United Kingdom	24 000	19 800	15 800	21.21	25.32
Others	35 355	30 074	24 330	17.56	23.61
Oceania	**10 500**	**9 141**	**8 248**	**14.87**	**10.83**
Australia	8 400	7 200	6 600	16.67	9.09
New Zealand	1 908	1 762	1 515	8.29	16.30
Others	192	179	133	7.43	34.97
Developing countries	**189 882**	**135 717**	**93 161**	**39.91**	**45.68**
Developed countries	**401 686**	**357 307**	**294 371**	**12.42**	**21.38**
World	**591 567**	**493 024**	**387 531**	**19.99**	**27.22**

Source: ITU (2003a) and UNCTAD calculations.

The global number of Internet users continued to grow in 2002, reaching 591 million people at year's end. The annual rate of growth, however, slowed from 27.3 per cent to 20 per cent. This trend was visible in all regions except Oceania, where the rate of growth of the Internet population increased from 10.8 per cent to 14.9 per cent. Developing countries continue to experience faster growth in the number of Internet users, partly because of their demographic patterns (younger populations, faster overall population growth). At the end of 2002, developing countries had 32 per cent of the world's Internet users, up from 28 per cent in 2001. If current trends continue, Internet users in developing countries could constitute 50 per cent of the world total in the next five years. Chart 1.2 shows the evolution from 2000 to 2002 in developed and developing countries' respective shares of Internet users.

Table 1.3

Internet users per 10,000 people, by region, 2000-2002

	2002	2001	2000	% change 2001-2002
Africa	100	83	59	20.61
Asia	558	416	307	33.88
Europe	2 079	1 799	1 391	15.59
Latin America & Caribbean	669	499	342	34.06
North America	5 322	4 982	4 401	6.84
Oceania	3 330	2 939	2 694	13.32
Developing countries	391	280	195	39.67
Developed countries	3 262	2 914	2 416	11.94
World	**972**	**812**	**647**	**19.70**

Source: ITU (2003a) and UNCTAD calculations.

Slightly less than 10 per cent of the world's population had access to the Internet by the end of 2002. Yet, while in developed countries about one-third of the population uses the Internet, in the developing world the corresponding figure is eight times lower (see tables 1.3 and 1.4 and chart 1.3). Wide differences persist within each group of countries. Countries with comparable income levels, such as Nigeria and Togo,[3] may show Internet penetration rates that vary by as much as a factor of 25. Colombia and Mexico, on the other hand, have identical Internet penetration rates but vastly different per-capita incomes.[4] Similar contrasts can be found in every region of the world (e.g. between Chile and Venezuela, Estonia and Poland, Bahrain and Kuwait) and are also evident when one considers more sophisticated measures of the development of the information society.[5] Even

Chart 1.3

Internet users per 10,000 people, 2002
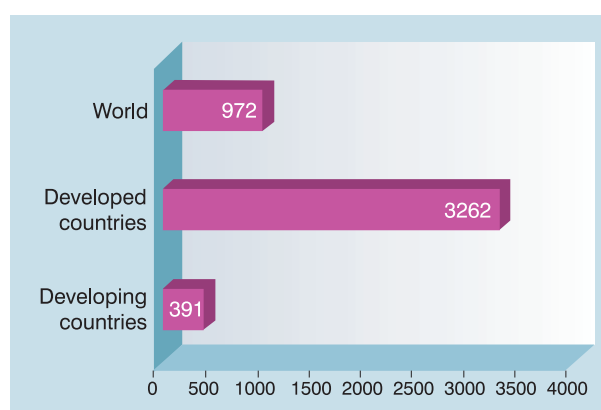
Source: UNCTAD elaboration of ITU (2003a).

Table 1.4

Internet users per 10,000 people, selected countries, 2000–2002

	2002	2001	2000
Africa	**100**	**83**	**59**
Algeria	160	65	49
Egypt*	93	93	71
Kenya*	160	160	65
Mauritius	1 487	1 316	729

Table 1.4 (*continued*)

	2002	2001	2000
Morocco	169	137	70
Nigeria	17	10	7
South Africa	682	649	549
Togo	427	322	216
Tunisia	515	412	261
Zimbabwe	430	87	44
Others	26	22	14
Latin America & Caribbean	**669**	**499**	**342**
Argentina	1 120	1 008	725
Brazil	822	466	294
Chile*	2 014	2 014	1 668
Colombia	458	270	207
Mexico	458	362	274
Peru*	766	766	312
Venezuela	504	468	339
Others	376	325	221
North America	**5 322**	**4 982**	**4 401**
Canada	4 839	4 666	4 357
United States	5 375	5 015	4 406
Asia	**558**	**416**	**307**
Bahrain	2 475	2 034	630
Brunei Darussalam*	1 023	1 023	904
China	460	257	173
Hong Kong (China)	4 309	3 868	2 784
India	159	68	54
Indonesia*	191	191	97
Israel	3 014	2 766	2 026
Japan	4 493	3 842	2 994
Korea, Rep. of	5 519	5 211	4 140
Kuwait*	879	879	685
Lebanon	1 171	776	913
Macao (China)	2 627	2 254	1 364
Malaysia*	2 731	2 731	1 719
Philippines*	256	256	201

Table 1.4 (*continued*)

	2002	2001	2000
Singapore	5 397	4 115	3 236
Taiwan Prov. of China	3 825	3 490	2 810
Thailand	776	577	379
United Arab Emirates	3 674	3 148	2 604
Others	100	71	36
Europe	**2 079**	**1 799**	**1 391**
Austria	4 094	3 870	3 325
Denmark	4 652	4 295	3 921
Estonia	4 133	3 005	2 721
Finland	5 089	4 303	3 723
France	3 138	2 638	1 437
Germany	4 237	3 736	3 015
Iceland	6 076	5 993	5 979
Italy	3 011	2 689	2 304
Netherlands	5 304	4 905	4 379
Norway	5 048	4 638	4 348
Poland*	984	984	725
Russia	409	293	197
Slovenia	4 008	3 008	1 508
Spain	1 931	1 827	1 367
Sweden	5 731	5 163	4 558
Turkey	728	604	306
United Kingdom	4 062	3 296	2 644
Others	1 168	973	756
Oceania	**3 330**	**2 939**	**2 694**
Australia	4 272	3 714	3 445
New Zealand	4 844	4 612	4 013
Developing countries	**391**	**280**	**195**
Developed countries	**3 262**	**2 914**	**2 416**
World	**972**	**812**	**647**

*2001
Source: ITU (2003a) and UNCTAD calculations.

allowing for the influence of problems in the statistical measurement of Internet penetration, it is clear that, while developing countries face many common challenges in their efforts to participate in the information society, other factors such as levels of awareness, the vitality of civil society, and the priority that government, business and other social agents give to these challenges (as well as the explicit or implicit policy choices they make) matter as much as, if not more than, the availability of financial resources. These are some of the issues explored in chapter 3.

Equality between men and women (or, rather, the lack of it) is an important aspect to consider in any analysis of a society's Internet access in a development context.[6] As ICT and the Internet become more widely used business instruments, differences in men and women's opportunities to access information will increasingly aggravate existing gaps in their levels of income and welfare, and more generally in their capacity to contribute to and benefit from economic and social development. Table 1.5 shows data on female participation in Internet use for selected developed and developing countries. In general, there seems to be no relationship between a country's level of economic development and women's share in the total number of Internet users. Two developing countries rank among the five most egalitarian countries, which have achieved virtually equal participation or are close to it. At the other end of the table, three developed countries rank among the five with the lowest score. However, the results of the exercise would probably have been much less encouraging if the sample had included a larger number of developing countries, particularly from Africa and the Middle East, where women tend to represent less than the 35 per cent of the total Internet user population they have reached in Indonesia, the last country included in table 1.5.

Table 1.5

Percentage of women among Intenet users, selected countries, 2002

United States 1a	51	Luxembourg 1a	42
Canada	51	Venezuela 1	42
Hong Kong (China) 1	49	Brazil 2a	42
Thailand 1b	49	Poland 3	42
Iceland 1a	49	Mexico 3	42
Australia 2a	48	Israel 2a	42
Sweden 1	48	Japan 2a	41
Chile 1b	47	Philippines 2	41
Singapore 1b	47	Netherlands 2a	41
New Zealand 2a	46	South Africa 2a	40
Finland	46	China 1	39
Rep. of Korea	45	Belgium 2a	39
Ireland	45	Switzerland 1	39
Denmark	45	France 2a	39
Czech Republic 3	45	Italy 2a	37
Taiwan P. of China 2a	44	Germany 2a	37
Spain 1	43	Malaysia 3	36
Norway 2a	43	Indonesia 1b	35
Austria 2a	43	Luxembourg 1a	42
Argentina 1b	43	Venezuela 1	42
United Kingdom 2a	43		

Note: 1 = national source; 2 = Nielsen//NetRatings; 3 = TNS; a = 2001; b = 2000
Source: ITU (2003b)

Table 1.6

Internet hosts (thousands) by region, 2000–2002

	2002	2001	2000	% change 2001-2002	% change 2000-2001
Africa	281	274	217	2.68	25.92
Asia	10 803	10 809	7 172	-0.05	50.70
Europe	18 363	15 325	12 533	19.83	22.27
Latin America & Caribbean	3 412	3 413	1 968	-	73.40
North America*	109 084	109 084	82 931	-	31.54
Oceania	3 035	2 732	1 973	11.09	38.48
Developing countries	7 279	7 212	12 392	0.93	-41.81
Developed countries	137 700	134 424	94 402	2.44	42.39
World	144 979	141 636	106 795	2.36	32.62

*2001
Source: ITU (2003) and UNCTAD calculations.

While the ITU data (tables 1.6 and 1.7) seem to indicate a drastic slowdown in the growth of the number of Internet hosts in 2002, according to the Internet Domain Survey, sponsored by the Internet Software Consortium, the total number of hosts around the world increased by 16.48 per cent between January 2002 and January 2003 (Internet Software Consortium 2003).[7] This is considerably less than the 34 per cent increase that the same survey detected from January 2001 to January 2002, but points to the Internet's continued rapid growth.

Internet hosts are even more markedly concentrated in the developed world than are users. Chart 1.4 shows the distribution of Internet hosts among the world's regions. North America and Europe account for as much as 89 per cent of all the Internet hosts in the world. Contrary to the trend in the number of users, the number of Internet hosts is growing faster in the developed countries than in the developing world. However, it is in the concentration of Internet hosts relative to populations that the difference between the developed and the developing world is most dramatic. While in 2002 the number of Internet users per 10,000 people was 53 times larger in North America than in Africa, in the same year the proportion between the numbers of Internet hosts per 10,000 people living in those two regions was 984 to 1. In other words, the relatively few people who use the Internet in developing countries compete among themselves for access to a proportionally much

smaller number of computers connected to the Internet, and they have access to little locally hosted Internet content.[8] It must be noted, however, that hosting content in a server located in a developed country may be the best option for some enterprises in developing countries: for example, it may be preferable to host information about a tourist destination on a server located in or near the countries where the potential tourists reside.

Chart 1.4

Internet hosts by region, 2002
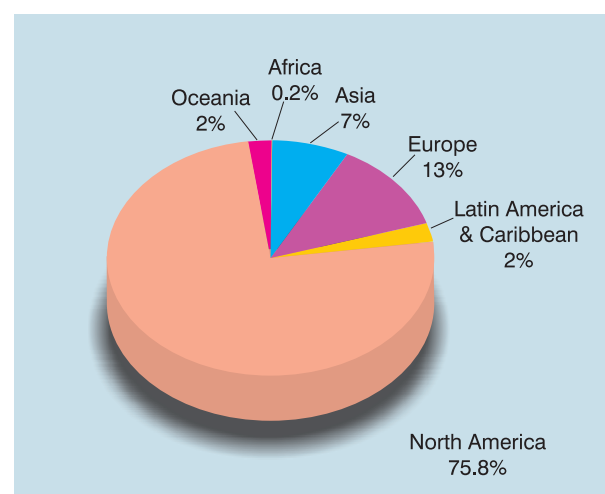
Source: UNCTAD elaboration of ITU (2003a).

Table 1.7

Internet hosts per 10,000 people, by region, 2000–2002

	2002	2001	2000	% change 2001-2002	% change 2000-2001
Africa	4	3	3	1.44	22.61
Asia	30	30	20	-0.20	48.51
Europe	230	192	157	19.91	21.75
Latin America & Caribbean	65	66	38	-0.60	72.08
North America*	3 465	3 465	2 665	..	30.03
Oceania	956	877	643	8.98	36.33
Developing countries	15	15	25	-0.15	-40.96
Developed countries	1 124	1 067	855	5.42	24.77
World	238	233	179	2.08	30.74

*2001
Source: ITU (2003) and UNCTAD calculations

The Netcraft Web Server Survey complements the information provided by the ITU with specific information about the evolution in terms of World Wide Web servers in 2002. In May 2003 this survey obtained responses from 40,936,076 sites worldwide, an increase of 15.17 per cent since December 2002, following a 3.12 per cent decrease in the number of hostnames in 2002 (Netcraft.com 2003).[9] Other indicators collected by Netcraft (table 1.8) point to the Web's rapid growth in terms of active sites, whose number grew 17 per cent in 2002. The number of Internet protocol (IP) addresses using some kind of scripting language also increased 52.1 per cent, indicating higher levels of interactivity and a richer experience for users.[10] Similarly, the 14 per cent increase in the number of sites using the secure sockets layer (SSL) protocol points to the continued expansion of business-oriented sites, which require secure transaction capabilities.[11] Another interesting trend detected by the Netcraft survey was a decrease in 2002 in the number of hostnames in the United States, while Europe, Asia and the Pacific region registered an increase of over 4 million hosts. This geographical diversification of the Web may be related to a delocalization of sites previously hosted in the United States but owned by companies from other countries.

Table 1.8

The World Wide Web in 2002

	January 2002	December 2002	% growth
Hostnames	36 689 008	35 543 105	-3.12
Active sites	14 134 142	16 629 876	17.66
IP addresses	3 801 101	4 007 918	5.44
IP addresses using scripting languages	612 420	931 468	52.10
SSL servers	153 072	174 745	14.16

Source: Netcraft (2003).

Table 1.9

International Internet bandwidth (Mbps), by region, 2000–2002[a]

	2002	2001	2000
Africa	2 118	1 231	649
Asia	78 584	51 044	22 965
Europe	909 159	675 348	232 317
Latin America	26 287	15 893	2 785
North America	381 904	272 187	112 222

[a] *The data represent Internet bandwidth (not traffic) connected across international borders as of mid-year. Domestic routes are not included.*
Source: TeleGeography (2002).

International Internet bandwidth, which had doubled every year for at least a decade, slowed its growth to 40 per cent in 2002, from 122 per cent in 2001 (Tele-Geography 2002). The deceleration affected all regions of the world. It was most visible in Latin America (where bandwidth growth fell from 471 per cent in 2001 to 65 per cent), followed by Europe (with a fall from 191 per cent growth in 2001 to 35 per cent in 2002), North America (from 143 per cent to 40 per cent growth), Asia (from 122 per cent to 55 per cent) and Africa, where international bandwidth growth, at 72 per cent, was the fastest in the world but still down from the 90 per cent growth it had experienced in 2001. A combination of the private sector's reluctance to make new investments in the context of existing excess capacity and the general economic situation, on the one hand, and capacity reductions in corporate networks on the other seems to account for the global slowdown in bandwidth expansion. Excessive capacity brought down prices in the major North American and European markets,

where they have fallen drastically for the last three years, although as of mid-2003 there were signs that prices might stabilize.

International bandwidth availability (tables 1.9 and 1.10) is especially important for developing countries because, given the relative scarcity of locally generated content, a large part of Internet traffic in developing countries (between 70 and 80 per cent by most estimates) tends to be international. A rough estimate of the availability of international bandwidth in each region can be made by comparing the information in tables 1.1 and 1.9. Despite the relatively fast growth of the last three years, the average African Internet user still enjoys about 20 times less capacity than the average European user, and 8.4 times less than a North American one. Even these rather grim overall figures hide the virtual digital isolation of some of the poorest African countries, where the international bandwidth available can be measured in terms of kilobits per second (Kbps) and may correspond to the

Table 1.10

Mbps of international Internet bandwidth per 1,000 users, by region

	2002	2001	2000
Africa	0.27	0.19	0.14
Asia	0.39	0.34	0.21
Europe	5.46	4.69	2.10
Latin America & Caribbean	0.74	0.61	0.16
North America	2.24	1.74	0.82

Source: UNCTAD elaboration of data from ITU (2003a) and TeleGeography (2002).

needs of a midsize European or US enterprise. What-ever limited international links are available tend to connect to the United States or Europe, with only a handful of African countries (mostly in southern Africa, and more recently in West Africa) having established links with their neighbours. This forces a high percentage of intra-African Internet traffic to flow through expensive intercontinental circuits. The deployment of Very Small Aperture Terminal (VSAT)[12] technology across the continent (provided that its potential is not undone by inadequate regula-tory action) and the establishment of new submarine cable links could greatly improve the availability of bandwidth in a number of countries. The situation in Asia and Latin America, although generally better than in Africa, also continues to seriously limit these regions' participation in the global information econ-omy.

In general, improvement in bandwidth availability and a parallel decline in prices tend to be associated with a regulatory environment that promotes competition. Bandwidth scarcity may reflect the high cost of con-necting small, low-income (and therefore low-usage) or landlocked markets to the Internet backbone.[13] In other cases, the consequences of the lack of econo-mies of scale can be aggravated by public or private

monopolies or other anti-competitive arrangements[14] that can lead to limited bandwidth availability and comparatively high charges. High international band-width costs can also be determined by international charging practices whereby developing-country Inter-net service providers ISPs) must pay the full cost of an Internet connection with a developed country.[15] Since for many ISPs in developing countries the cost of international bandwidth represents a very large component of their total costs, they have to pass it on to their subscribers (see chart 1.5); in the end, such arrangements imply that developing-country users subsidize developed-country users' access to informa-tion hosted in the developing country.

2.   Assessing e-readiness

The preceding discussion dealt with aspects of the material base of the digital economy that are relatively easy to present in quantitative terms. However, coun-tries' preparedness to take part in the global informa-tion society cannot be evaluated without comple-menting this category of data with other indicators that capture information about qualitative aspects of countries' economic, legal and policy framework. Var-ious academic institutions, private organizations and

Chart 1.5

Cost of a 1 Mbps international
half-circuit in selected Asia-Pacific countries (in US dollars)
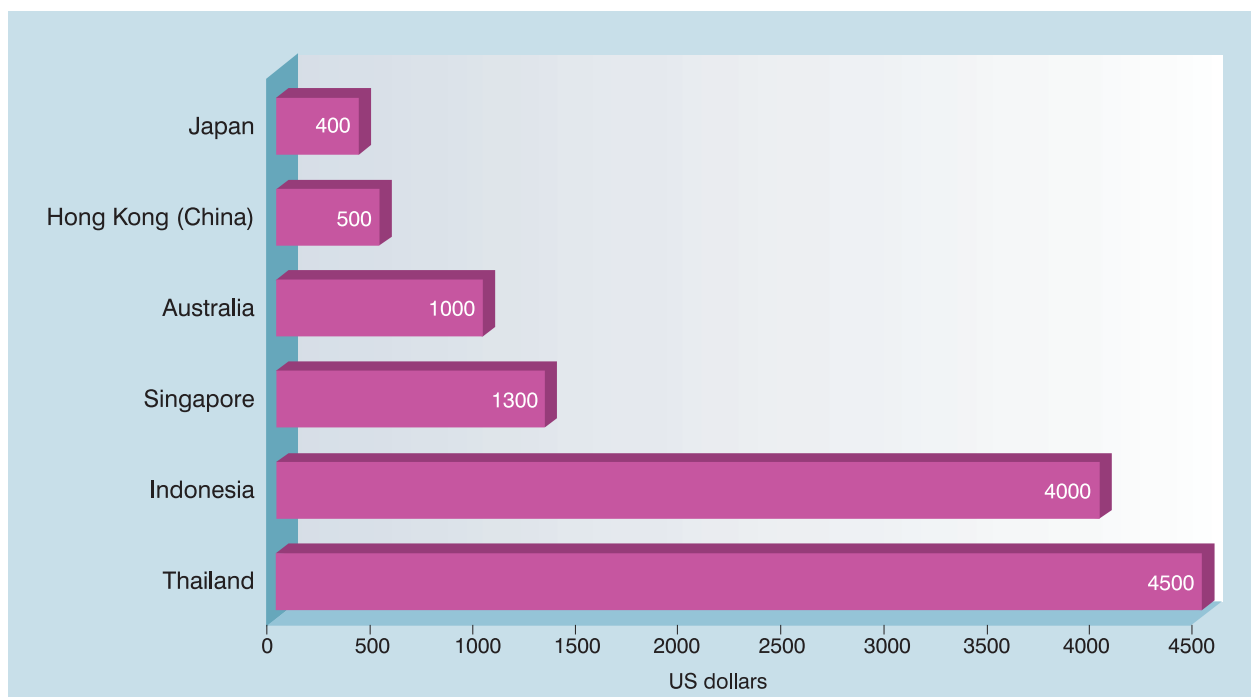
Source: Gartner (2003).

commercial publishers issue e-readiness indicators that synthesize this information into e-readiness indexes. Two recent examples are the *Global Information Technology Report 2002–2003* published by the World Economic Forum and INSEAD, and the e-readiness rankings of the Economist Intelligence Unit.

The *Global Information Technology Report* (*GITR*) ranks 82 economies according to a Networked Readiness Index (NRI) defined as the "degree of preparation of a nation or community to participate in and benefit from ICT developments" (Dutta, Lanvin and Paua 2003). The NRI, which has a strong policy orientation, measures three dimensions related to ICT: environment, readiness and usage. The environment dimension assesses the extent to which a country's markets, political and legal system, and infrastructure support the development and use of ICT. Readiness relates to the ability of three key economic agents – individuals, firms and government – to capitalize on the use of ICT. The usage dimension measures the incidence of ICT use by these agents.

The Economist Intelligence Unit (EIU) follows a similar approach, although with more emphasis on the economic applications of ICT, and its ranking (ERI), which includes 65 economies, measures "the extent to which a market is conducive to Internet-based opportunities" (Economist Intelligence Unit 2003).

An important consideration in trying to draw general conclusions applicable to developing countries and the relative performance of various regions of the world is the lack of good statistical information about the extent to which the preconditions for ICT adoption exist in certain developing countries. Many developing countries are therefore not included in either of these rankings. Six developing countries, including the lowest-ranking four in the EIU's survey, are not included in the *GITR,* while 21 of the 22 countries not covered by the EIU that are ranked in the *GITR* are developing countries. One should also keep in mind the differences in, among other things, the choice of the variables considered, the techniques used to transform data, and the criteria used to assess qualitative information.

In spite of all these factors, the degree of coincidence in the results of these benchmarking exercises is remarkable. Six of the first 10 countries in both rankings coincide: Canada, Denmark, Finland, Sweden, the United Kingdom and the United States. When the first 15 countries in both lists are considered, the

inclusion of Australia, Germany, the Netherlands, Singapore and Switzerland brings the number of overlapping countries to 11. Unsurprisingly, all these countries are high- or middle-income ones. Because the size of the sample is not the same in both surveys, it is not possible to make a similar comparison between the lower ends of both tables. However, although the level of overlapping is significantly smaller, the last 15 places in both rankings are occupied by developing countries. This is not to say that all developing countries show similar scores. In every region, a number of advanced ICT adopters can be identified in both the *GITR* and EIU rankings:

- In Latin America, Brazil and Chile score above the median value in the *GITR,* while only Chile does so in the EIU's smaller sample. (Mexico ranks 31 of 60 and scores 5.56, the median score being 5.565.)

- Among the developing countries in Asia, Singapore, Taiwan Province of China, the Republic of Korea, Hong Kong (China), Malaysia, India and Thailand score above the *GITR*'s median value. The EIU's e-readiness ranking places Hong Kong (China), Singapore, the Republic of Korea and Taiwan Province of China above the ranking's median value.

- Tunisia and South Africa are the only African countries (out of nine) scoring above the median of the *GITR*'s ranking. None of the four African countries listed in the EIU's survey ranks in the top half of the table. South Africa, which ranks 31 in a tie with Mexico, is 0.05 points below the median score.

- Estonia, the Czech Republic, Hungary, Slovenia, Latvia, Poland and the Slovak Republic are the Eastern and Central European countries with scores above the median ranking in the *GITR.* The Czech Republic, Hungary and Poland are the countries in that region that feature in the top half of the EIU's table.

A comparison of NRI and ERI indexes and rankings is presented in table 1.11. Although they generally show similar patterns, some differences emerge. Scores in the ERI show wider spreads, with the scores of the 25 best performers ranging from 8.67 (Sweden) to 6.96 (Israel), while for the NRI the highest score is 5.92 (Finland) and the country ranking 25 (Spain) scores 4.67. Note that the lowest indices are respectively 2.37 (Azerbaijan, ranking 60 in the ERI) and 2.07 (Haiti, ranking 82 in the NRI).

Table 1.11

A comparison between the NRI and the ERI

Country	NRI Score	NRI Rank	ERI Score	ERI Score
Finland	5.92	1	8.38	6
United States	5.79	2	8.43	3
Singapore	5.74	3	8.18	12
Sweden	5.58	4	8.67	1
Iceland	5.51	5	-	-
Canada	5.44	6	8.2	10
United Kingdom	5.35	7	8.43	5
Denmark	5.33	8	8.45	2
Taiwan Prov. of China	5.31	9	7.43	20
Germany	5.29	10	8.15	13
Netherlands	5.26	11	8.4	3
Israel	5.22	12	6.96	25
Switzerland	5.18	13	8.26	8
Republic of Korea	5.1	14	7.8	16
Australia	5.04	15	8.2	9
Austria	5.01	16	8.09	14
Norway	5	17	8.2	7
Hong Kong (China)	4.99	18	8.2	11
France	4.97	19	7.76	19
Japan	4.95	20	7.07	24
Ireland	4.89	21	7.81	15
Belgium	4.83	22	7.78	17
New Zealand	4.7	23	7.78	18
Estonia	4.69	24	..	..
Spain	4.67	25	7.12	23
Italy	4.6	26	7.37	21
Luxembourg	4.55	27	-	..
Czech Republic	4.43	28	6.52	27
Brazil	4.4	29	5.25	36
Hungary	4.3	30	6.23	29
Portugal	4.28	31	7.18	22
Malaysia	4.28	32	5.55	33
Slovenia	4.23	33	..	..
Tunisia	4.16	34	..	..
Chile	4.14	35	6.33	28
South Africa	3.94	36	5.5	32
India	3.89	37	3.95	46
Latvia	3.87	38	-	-
Poland	3.85	39	5.57	30
Slovak Republic	3.85	40	5.47	34
Thailand	3.8	41	4.22	42
Greece	3.77	42	6.83	26
China	3.7	43	3.75	50
Botswana	3.68	44	..	..
Argentina	3.67	45	5.41	35
Lithuania	3.65	46	..	..

Table 1.10 (*continued*)

Country	NRI Score	NRI Rank	ERI Score	ERI Score
Mexico	3.63	47	5.56	31
Croatia	3.62	48	..	..
Costa Rica	3.57	49	..	..
Turkey	3.57	50	4.63	39
Jordan	3.51	51	..	..
Morocco	3.5	52	..	..
Namibia	3.47	53	..	..
Sri Lanka	3.45	54	4.13	44
Uruguay	3.45	55	..	..
Mauritius	3.44	56	..	..
Dominican Republic	3.4	57	..	..
Trinidad and Tobago	3.36	58	..	..
Colombia	3.33	59	4.86	37
Jamaica	3.31	60	..	..
Panama	3.3	61	..	..
Philippines	3.25	62	3.93	47
El Salvador	3.17	63	..	..
Indonesia	3.16	64	3.31	53
Egypt	3.13	65	3.72	51
Venezuela	3.11	66	4.75	38
Peru	3.1	67	4.47	41
Bulgaria	3.03	68	4.55	40
Russian Federation	2.99	69	3.88	48
Ukraine	2.98	70	3.28	54
Viet Nam	2.96	71	2.91	56
Romania	2.66	72	4.15	43
Guatemala	2.63	73	..	..
Nigeria	2.62	74	3.19	55
Ecuador	2.6	75	3.79	49
Paraguay	2.54	76	..	..
Bangladesh	2.53	77	..	..
Bolivia	2.47	78	..	..
Nicaragua	2.44	79	..	..
Zimbabwe	2.42	80	..	..
Honduras	2.37	81	..	..
Haitì	2.07	82	..	..
Countries not listed in the NRI				
Saudi Arabia	..	..	4.1	45
Iran	..	..	3.4	52
Pakistan	..	..	2.74	57
Algeria	..	..	2.56	58
Kazakhstan	..	..	2.52	59
Azerbaijan	..	..	2.37	60

Source: Dutta, Lanvin and Paua (2003) and Economist Intelligence Unit (2003).

The *GITR* relates gross domestic product (GDP) to NRI scores and concludes that low per-capita GDP levels strongly influence NRI scores, that NRI scores improve rapidly with small GDP increases, and that the influence of GDP diminishes quickly beyond $9,000 per capita. As for ICT spending, large spreads are observed in NRI scores at any given levels of ICT expense as a percentage of GDP. The fact that a dollar spent on ICT may yield widely varying results in terms of e-readiness underlines the importance of other variables such as market and regulatory factors. Another point corroborating this is the relatively low ranking of Japan, the world's second leading ICT producer (20 in the NRI and 24 in the ERI).

Public policies supportive of the extension of the information society (including measures to foster competition in the telecommunication sector; support for investment in infrastructure; initiatives to lead by example through e-government projects, IT awareness and skill-building activities; and enhancement of the regulatory environment) are among the factors that explain the relative advantage of these countries. Higher-density population patterns, which facilitate and reduce the cost of infrastructure deployment, and relatively small size also seem to place countries in a better position.

On the other hand, the majority of developing countries face limitations on the development of their e-economy that are difficult to overcome directly through measures designed to promote e-business adoption: low income levels, which limit the potential for growth for any online business as much as for any offline one, and reduce incentives for investment; low literacy levels that make it difficult for many people to benefit from many IT tools; the absence of well-developed payment systems that can support online transactions; and cultural resistance to online trade. These and other obstacles need to be addressed in the wider context of national development strategies. At the same time, the development of the information society in general and of a vibrant digital economy in particular can make a tangible contribution to reaching general development goals. Considerations relevant to the development of e-business should therefore be part and parcel of national development strategies. The issue of how to develop and implement e-strategies specifically geared towards boosting the adoption of e-business practices by the enterprise sector has been the focus of a series of high-level regional events organized by UNCTAD in 2002 and 2003 with the participation of Governments, businesses and civil-society stakeholders.[16] The outcome of this process, among other inputs, serves as a basis for the discussion in chapter 3.

B. Sizing up global e-commerce

Many dimensions of the physical aspect of the digital economy are relatively easy to measure: the number of computers in use around the world, the bandwidth available to interconnect them, the number of enterprises that use the Internet, and so forth. Some of these dimensions were mentioned in the preceding paragraphs. For example, a physical, measurable manifestation of Internet-mediated social activity is the volume of traffic, the information encoded in binary digits that flows around the Internet.[17] Thus, according to some estimates, Internet traffic may double annually between 2002 and 2007, from 180 petabytes[18] per day to 5,175 petabytes (IDC 2003b).[19] Of this traffic, about 60 per cent is expected to originate from consumers and 40 per cent from business activities (IDC 2003d). This prediction is consistent with research that, contrary to many popular estimates of the growth of Internet traffic in the late 1990s (i.e. that Internet traffic doubled every three or four months), concludes that Internet traffic has been doubling every year since 1997 and that it continues to grow at the same rate (Odlyzko 2003).

The infrastructure used to conduct e-commerce can provide an indirect way to measure its evolution, if not its size in dollar terms. One way to do this is by counting the number of secure servers (those that can handle strong encryption). Chart 1.6 seems to support the idea that the growth of e-commerce continued uninterrupted through the difficulties of 2000 and 2001, and that players from outside North America have an increasingly important role.

Official statistical data concerning e-commerce transactions are unavailable in all but a handful of countries. In the case of the vast majority of developing countries, such data simply do not exist yet, and even in developed countries the picture is sketchy.[20] For the most part, the information available about the amounts involved in e-transactions takes the form of forecasts or estimates published by market research or IT consulting firms that frequently limit their coverage to the largest business-to-consumer (B2C) e-commerce markets. In this regard, little additional information is available that could significantly change the picture of global e-commerce painted by the figures previously published by UNCTAD.[21] The situation is

Chart 1.6

Number of secure servers worldwide with strong encryption[a]
(thousands), 1997–2002
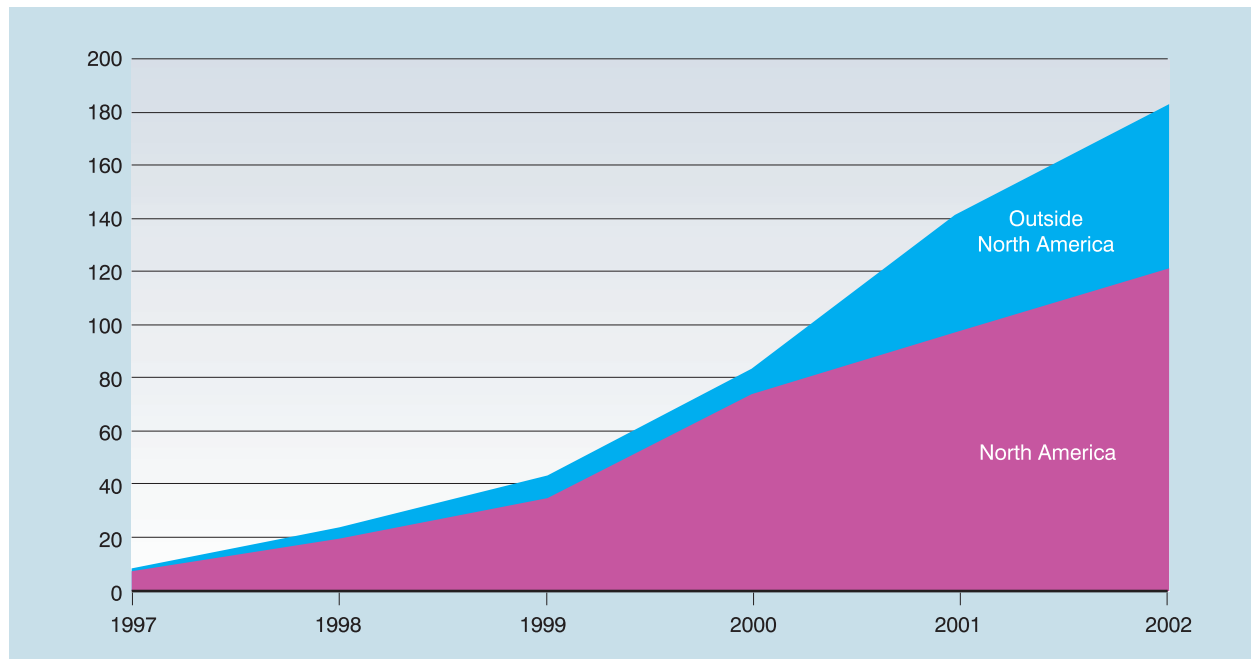
[a] Strong encryption implies key lengths longer than 40 bits.
Source: Netcraft (www.netcraft.com).

particularly serious for Africa, where no substantive information to supplement that given in last year's *E-Commerce and Development Report* has been identified. Some of those figures are reproduced here in order to provide the reader with at least a general idea of the size of global e-commerce. Forecasts of the value of global e-commerce in 2003 range between $1,408 billion and $3,878 billion, with growth projections that in the most optimistic scenario put the global volume of e-commerce at $12,837 billion by 2006.[22] Over 95 per cent of these transactions were attributed to e-commerce in developed countries. In some estimates, Africa and Latin America combined accounted for less than 1 per cent of global e-commerce in 2002. The share of business-to-business (B2B) transactions in the total of world e-commerce was commonly calculated around 95 per cent, and the relative importance of B2B and B2C transactions was not expected to change in the medium term.

1. Business-to-consumer E-commerce

Almost all estimates of e-commerce activity emanating from official sources refer to the high-income market economies, and the Organisation for Economic Co-operation and Development has compiled several surveys carried out in this category of countries (OECD 2002). At the time of the surveys (2000–2001 in most cases), the share of Internet users buying online was highest in the Nordic countries, the United Kingdom and the United States, where 38 per cent of users had made purchases online; it was lowest in Mexico, where fewer than 0.6 per cent had done so. The share of sales to households in total Internet sales ranges from a maximum of about 30 per cent (Finland and Luxembourg) to about 1 per cent (Singapore). At the time of the surveys, Internet retail sales were a very small part of total retail trade sales, ranging from 0.1 per cent in France to just over 1 per cent in the United Kingdom.[23]

For more recent information, it is almost always necessary to turn to sources other than official statistics. The following paragraphs present mainly information emanating from consulting and market research firms.

In the more advanced markets of **North America and Europe,** the attitudes of online consumers seem to be converging. In the United States, 22.5 per cent of the households in the 85 largest metropolitan markets made more than five online purchases in 2002 (eMarketer 2003b). In the largest European markets, 20 per

cent of adults bought online in 2002, compared to 14 per cent in 2001. An even larger number of them (41 million) used the Internet to decide on a purchase that they later made in a physical store (Forrester Research 2002d). In terms of expenditure per person, the average buyer in the European Union spent €527 ($498) in 2002 (Forrester Research 2002d), compared to the $717 that US consumers are expected to spend in 2003 (eMarketer 2003a).

In the United States, official figures provided by the US Bureau of the Census indicate that online retail sales in 2002 amounted to $43.47 billion, 25.64 per cent more than in 2001. This increase was all the more remarkable because overall retail sales in the United States grew only 2.9 per cent in 2002. Thus, the share of online retail sales in overall retail grew in 2002 to 1.34 per cent of total retail sales in the United States, up from 1.1 per cent in 2001 (US Census Bureau 2003b).

As it is often the case with e-commerce quantification, estimates of B2C online sales in the United States for 2002 and forecasts for 2003 vary significantly.[24] Table 1.12 summarizes some of these estimates.

For some products, online sales are becoming very significant. 32 per cent of software, 17 per cent of tickets for events and 12 per cent of books were sold online in the United States in 2002 (Forrester Research 2003b). Travel is an important industry in terms of online sales in the United States. A survey in April 2003 indicated that 52 per cent of those surveyed purchased more than half of their travel needs online, and 29 per cent made all their travel arrangements (ticket purchases, car rentals, hotel reservations) online (CyberAtlas 2003b). The number of people buying travel-related services online in the United States rose by 12 per cent in 2002, generating online sales of $22.6 billion (Forrester Research 2002c). According to other sources, 15 per cent of overall travel spending in the United States takes place online (*International Herald Tribune* 2003). Consumers are aware that they have a better chance of finding a good deal for their money via the Internet than via any other means.

In the European Union, e-commerce sales in 2002 are estimated at €30 billion ($28.29 billion at the average exchange rate of 2002). This would represent about 1.6 per cent of total retail, not far from US levels (Forrester Research 2002b). Differences in the trust that consumers in various countries place in the security of online transactions, as well as differences in the numbers of credit card holders, explain the fact that while Germany is the European country with the largest number of Internet shoppers (18 million), its online sales during the 2002 end-of-year season (€2.2 or $2.07 billion) were lower than in the United Kingdom, where consumers spent over €2.6 billion over the same period (Forrester Research 2002d). A study among credit card users in the major European markets showed that all categories of products registered fast growth in online sales in 2002, from 47 per cent for home electronics to 112 per cent for computing and sports. The fastest-growing retail e-commerce sector in Western Europe, according to this study, was air travel, whose online sales are said to have grown by an astonishing 1,236 per cent in a year.[25] Other sources estimate that online travel sales in Europe will represent 5 per cent of the total in 2003 and will grow

Table 1.12

Some estimates of B2C e-commerce in the United States, 2002 (billions of dollars)

	2002	2003
Bizrate.com (Jan. 2003)	47.98	..
eMarketer (April 2003)	45.54	58.23
eMarketer (April 2003 - incl. travel)	70.3	90.1
Forrester (May 2003)	76	96
Jupiter Research (Feb. 2003)	40.4	51.7
US Census Bureau	43.47	..

Note: Data from Forrester Research include travel sales; data from the US Census Bureau do not include travel, financial brokers and dealers, ticket sales agencies or food services.
Source: All as quoted in eMarketer (2003b and 2003d), except Forrester Research (2003b) and US Census Bureau (2003b).

to 20 per cent by 2007 (International Herald Tribune 2003).

Besides the categories of products that are most often bought online, more and more consumers use the Internet to prepare for purchases of many high-value products for which the final transactions still tend to occur offline (e.g. real estate, automobiles). This preparation may include activities such as obtaining information about the product's specifications, reading press and consumer product reviews, comparing prices and applying for loans. Consumption financing is not the only online banking activity consumers are engaging in. In the European Union, 60 million people, representing 18 per cent of the adult population, use online banking (Forrester Research 2003a).

Outside the EU and US markets, little recent quantitative information has been found to supplement the data provided in the 2002 issue of the *E-Commerce and Development Report.* The generalizations made in that report about the circumstances of e-commerce development in various regions therefore remain essentially valid and are not repeated in the following paragraphs, which focus on completing and, when possible, updating that information.

The transition economies of **Eastern Europe** continue to invest in infrastructure, but the necessary conditions for strong growth in e-commerce are still not present in many of the region's countries. However, the circumstances are better in some of the Central European countries (the Czech Republic, Hungary and Poland). Rates of Internet penetration are increasing; IDC forecast that it will reach 17 per cent in the region by the end of 2003 and 27 per cent by 2006. Increased use of the Internet by consumers should help improve B2C e-commerce sales, but in most countries in the region e-commerce, which some estimates put at $400 million in 2003, is expected to remain a very small share of retail sales for the next few years (IDC 2003a).

B2C levels in the **Asia-Pacific** region remain modest in comparison to B2B transactions. According to some estimates, B2C revenues amounted to some $15 billion in 2002 and will total about $26 billion in 2003 (eMarketer 2002a). This would represent about 10 per cent of global B2C online sales. The vast majority of these volumes were generated by Japan, Australia and the Republic of Korea.

In Japan, according to National Statistics Bureau data for 2001, 10.5 per cent of all enterprises were engaged in e-commerce (B2C and/or B2B) through either the Internet or other networks. The sectors most advanced in the adoption of e-commerce were banks and trust banks (59.2 per cent), information services and research (31.6 per cent), retail trade of general merchandise (28 per cent), retail trade of motor vehicles and bicycles (27.5 per cent) and wholesale trade of general merchandise (23.7 per cent). 3.5 per cent of all enterprises used the Internet in sales to consumers. Among those quoted on the Tokyo Stock Exchange in fiscal year 2000, 58.5 per cent had no plans to introduce B2C e-commerce practices, while 20.9 per cent declared that they would do so in the next three years (National Statistics Bureau of Japan 2002).The National Statistics Bureau of Japan has not published monetary estimates of e-commerce activity in the country.[26] The number of people buying online was estimated at 20 million in 2001 (Visa International Service Association 2002).

In the Republic of Korea, the national statistical office reports that total e-commerce transactions amounted to KRW 177.81 trillion ($148.12 billion) in 2002. This represents an increase of 49.4 per cent over 2001. Of this amount, KRW 5,043 billion ($4.2 billion) was B2C e-commerce, an increase of 95.5 per cent over the figures for 2001 (Korea National Statistical Office 2003).

China's large and fast-growing Internet population remains resistant to buying online. Lack of trust and the very limited availability of credit cards are two commonly quoted obstacles. According to an official survey, 11 per cent of Chinese Internet users visit online shopping sites, 3.6 per cent say they use online banks, and 5.5 per cent visit stock trading sites. Although two-thirds of users say they have never bought anything online, 24.7 per cent say they will do so in the next year, and another 42 per cent say they may join them (China Internet Network Information Center 2003). The impact of the outbreak of severe acute respiratory syndrome (SARS) on B2C activity in China is unclear. On the one hand, by slowing down the Chinese economy during the first quarter of 2003, it may have inhibited the expansion of B2C by reducing disposable incomes. On the other hand, SARS provided an incentive for Chinese to go online as they looked for alternative information sources. Text messaging, which in the first months of 2003 was largely related to the SARS epidemic, has been reported as a key source of income for Chinese Internet portals (*Business Week* 2003).

In **Latin America,** market research sources estimate the total of B2C e-commerce at $2.3 billion in 2002 and $4.5 billion in 2003 (E-Consulting 2003). Brazil, Argentina and Mexico remain the largest markets. Bra-

zil, with a much larger and diversified user population, has reached higher maturity as an Internet market and represents between 50 and 60 per cent of all Latin American online retail sales. A 2002 survey found that 85.6 of Brazilian online consumers were satisfied with the services offered by their country's online retailers (IDG Computerworld do Brasil 2003). Most online sales are of CDs and DVDs (26 per cent), books and newspapers (23.2 per cent) and electronic products (7.5 per cent). There are no official estimates of the value of B2C transactions in Brazil. Private sources give estimates for 2002 that range from $308 million (excluding auctions, air travel and car sales) (BCEC and E-Consulting 2003) to $1.4 billion (E-Consulting 2003). A peculiar feature of Brazilian B2C trade is the importance of car sales, which represent about 60 per cent of all online retail sales. Growth predictions for growth in B2C e-commerce range from close to 100 per cent (Brazilian Chamber of E-Commerce) to a more conservative 36 per cent (E-Consulting Corp.). The value of the average purchase grew by 15 per cent in 2002, reaching $78 (BCEC 2003).

In Argentina and Mexico Internet activity is more confined to the higher socioeconomic strata. However, and in spite of the severe difficulties experienced by the Argentinean economy in 2002, the number of Internet users grew there by over 12 per cent, to more than 4 million people, twice as many as read the daily newspapers (D'Alessio/IROL 2003).[27] The number of online buyers increased slightly in 2002 (from 52 to 53 per cent), while the number of people researching online and buying offline fell from 73 per cent to 65 per cent. In 2003 the number of online as well as offline buyers seems to be declining (to 48 and 46 per cent). As in many developing countries, lack of trust is the reason cited most often by those who do not buy online (52 per cent), followed by lack of direct contact with the seller, higher costs, and delivery difficulties (13 per cent).

A sector in which Latin America seems to be performing better than in other industries is online retail banking. Growth in this area has been driven by traditional banks, which have used the online channel to generate customer loyalty and improve their operating margins. Pure online banks have had little success in the region. In some cases, very specific conditions – such as restrictions imposed by the Argentinean authorities on withdrawals from bank accounts – provided an incentive for the use of online banking services, in particular online payments. In other countries, banks have used free Internet access to lure consumers. Two Brazilian banks, Bradesco and Banco do Brasil, have thus achieved more than 4 million online customers each

(eMarketer 2002b). In Mexico, the number of online bank users more than tripled from 700,000 in 2000 to 2.4 million in 2001, and it could reach 4.5 million in 2005 (eMarketer 2002b). One reason for the success of Latin American banks' online ventures seems to be the attention they have paid to providing retail customers with multiple ways to access their accounts (Internet, telephone, wireless). However, given that the share of the total population that actually has a bank account is relatively small, the expansion of Latin American online banking may be facing a bottleneck. To achieve their objective of reducing the cost of traditional delivery channels, banks will have to attract even more of their users online and give incentives for more intensive use of their Internet services.

Of the smaller e-commerce markets in Latin America, Chile was among the most dynamic, with some $2.5 billion of e-commerce in 2002, 75 per cent more than in 2001. $40 million of this value (0.2 per cent of Chile's total retail trade) was B2C e-commerce.[28] This represents a 30 per cent increase over 2001 values, and double the amount of Chile's B2C e-commerce in 2000.

The latest available estimates of **African** e-commerce were published in the *E-Commerce and Development Report 2002.* Those figures, which correspond to market research forecasts published in 2001, are $4 million of online retail in 2002, growing to $70.6 million in 2003 (Forrester Research 2001).

2.   Business-to-business e-commerce

Official statistical data from the **United States** (table 1.13) confirm the dominance of B2B transactions in that country's e-commerce (US Census Bureau 2003a). In 2001, B2B online sales in the United States amounted to $995 billion, or 93.3 per cent of all e-commerce in that country. E-commerce activity is concentrated in a few industry groups within each sector. The leading adopters are manufacturing, where e-commerce accounted in 2001 for 18.3 per cent of the total value of shipments, and merchant wholesalers, with 10 per cent of total sales. Although B2B e-commerce sales declined in 2001, they fell by only 0.2 per cent, while overall sales decreased by 3.94 per cent. As a result, the share of e-commerce in total B2B trade increased from 14.35 per cent to 14.9 per cent. Once overall B2B transactions recover, the share of online transactions in total B2B trade is expected to grow vigorously, particularly as the integration of Internet-based purchasing systems with companies' back-end systems progresses.

Table 1.13

US B2B shipments, sales, revenues and e-commerce, 2000 and 2001 (billions of dollars)

	2001			2000			% change 2001-2002	
	Total	E-commerce	E-commerce % of total	Total	E-commerce	E-commerce % of total	Total	E-commerce
Total	**6 676**	**995**	**14.90**	**6 950**	**997**	**14.35**	**-3.94**	**-0.20**
Manufacturing	3 971	725	18.26	4 209	756	17.96	-5.65	-4.10
Merchant wholesale	2 705	270	9.98	2 741	241	8.79	-1.31	12.03

Source: US Census Bureau (2003a).

At the time of this writing, no equivalent official figures available for B2B online transactions in the **European Union** have been published. Independent estimates of the value of this trade in the European Union put it at between nearly $185 billion and $200 billion at the end of 2002.[29] Forrester Research forecast approximately $520 billion (the original forecast in euros is €465 billion) for 2003, predicting that the amount would more than double to €945 in 2004 and would reach €2,219 billion in 2006. According to this study, by 2004 B2B e-commerce would represent nearly 10 per cent of all trade between enterprises, a dramatic rate of growth considering that online trade was less than 1 per cent of all B2B trade in Europe in 2001. At the end of the period covered by the forecast, the industries with the highest percentage of B2B e-sales would be electrical equipment (40 per cent), logistics and storage (30 per cent) chemical, rubber and plastics (30 per cent), energy and utilities (28 per cent), mining and metals (27 per cent) and vehicle manufacturing (27 per cent). The largest volumes would concentrate in France, Germany and the United Kingdom, all of which, according to this study, would see at least 26 per cent of their business trade occurring online. In terms of intensity of use, the Nordic countries are expected to be ahead, with 17 per cent of their total B2B trade moving online by 2004, while Italy, Spain and to an even greater extent the other Southern European economies are expected to lag behind. These patterns respond to differences in average annual per-capita IT investment. While Sweden and Denmark spend on IT more than 150 per cent of the EU average of €588 per capita, Italy and Spain invest 57 per cent and 46 per cent of that amount respectively.

In **Central and Eastern Europe** (where 90 per cent of e-commerce takes place in just three countries, the Czech Republic, Hungary and Poland), some projections are that B2B e-commerce will amount to around $4 billion in 2003. This could grow to $17.6 billion by 2006 (IDC 2003a). Although Internet access and use are now fairly common among enterprises in the three countries, particularly among the smaller enterprises use of the Internet clearly remains at a pre-transactional phase.

In the more dynamic economies of the **Asia-Pacific** region, adoption of e-commerce is more and more perceived by enterprises as the natural future of business. Governments in the region tend to prioritize the improvement of infrastructure and upgrading of skills that are necessary to participate effectively in the digital economy. As a consequence, B2B e-commerce should grow rapidly, from about $120 billion in 2002 to around $200 billion in 2003 and $300 billion by 2004 (eMarketer 2002a).

In Japan 8.1 per cent of all enterprises use e-commerce in their business with other enterprises, twice as many as are using e-commerce in their interaction with consumers (National Statistics Bureau of Japan 2002). 4.6 per cent use e-commerce to take orders, 4.2 per cent to place orders, 1.8 per cent for after-sales services and 1.5 per cent for shipping or distribution. Manufacturing, finance and insurance, wholesale and retail trade, general services, and transport and communications are the business sectors making above-average use of B2B e-commerce (National Statistics Bureau of Japan 2002). As for monetary values, which are not estimated by the National Statistics Bureau, a 2001 survey estimated that B2B e-commerce in Japan would reach JPY 34.03 trillion ($281.36 billion) in 2001, JPY 43.95 trillion ($349.89 billion) in 2002 and JPY 61.27 trillion ($516 billion) in 2003 (Electronic Commerce Promotion Council of Japan 2002).

In the Republic of Korea, official statistics indicate that B2B transactions in 2002 amounted to KRW 155,708 billion ($129.71 billion), and e-commerce transactions between businesses and the Government (B2G transactions) amounted to KRW 16,631 billion ($13.85 billion). The combined amount of B2B and B2G e-commerce increased by 48.6 per cent compared to the figures of 2001. Together, B2B and B2G transactions represented 97 per cent of all Korean e-commerce in 2002 (Korea National Statistical Office 2003). 79.4 per cent of the value of B2B e-commerce took place in what the Korean National Statistical Office calls "closed-type" transactions between large corporations and associated suppliers with which they have established a stable trade relationship that is implemented through electronic transactions. Transactions amounting to 94.7 per cent of all B2B e-commerce were carried out over the Internet, which has overtaken all other kinds of electronic networks in the country. Manufacturing, with 75.8 per cent of total B2B e-commerce value, and wholesale and retail trade, with 16.5 per cent, were the two largest B2B sectors.

In China, a survey of a representative sample of enterprises in manufacturing, distribution and finance in several provinces[30] found that 69.5 per cent had a Web site, 28.7 per cent had an extranet accessible by business partners, 21.9 per cent had an extranet which customers could access, and 25 per cent were using electronic data exchange (EDI) (CRITO 2002). After-sales support, advertising and marketing, and exchanges of operational data with customers and suppliers are the most commonly cited uses of the Internet. Of the enterprises surveyed, 23 per cent were selling and 31.3 were buying online. For those who were doing B2B sales online, these sales represented an average of 2.1 per cent of their total sales.

B2B e-commerce in India continues to be concentrated in exports of IT and other business services such as software development and support, call centres, medical record transcription and data mining. India's exports of software and IT services in 2002–2003 reached $9.5 billion, 26.3 per cent more than in 2001–2002 (Nasscom 2003). The Indian IT services industry is a clear success story that has been made possible largely by the adoption of e-business practices. A future challenge for India will be to move its IT services and business process outsourcing (BPO) offerings higher up the value chain, into more lucrative but skill-intensive niches such as research and development or engineering. More extensive information and analysis concerning this industry, both in India and worldwide, is provided in chapter 5.

In **Latin America**, the volume of B2B e-commerce is driven essentially by developments in Brazil, Argentina and Mexico. In the Brazilian market, according to a measurement index that was launched in the first quarter of 2003, the value of all B2B online transactions in the first quarter of 2003 was R$34 billion (approximately $11.6 billion) (BCEC and E-Consulting 2003). This represents a significant departure from previous estimates from the same source that calculated the total value of Latin American B2B e-commerce at $6.5 billion in 2002 and predicted it would reach $12.5 billion in 2003. Of these figures, $3.7 billion in 2002 and a forecast $6.8 billion in 2003 were expected to be generated in Brazil (E-Consulting 2003). In the later estimates, online transactions between businesses and government entities in Brazil were said to amount to $1.2 billion in 2002 and forecast to rise to $2.6 billion in 2003 (E-Consulting 2003). The 30 largest Brazilian companies account for 90 per cent of all Brazilian B2B e-commerce, and therefore for a significant part of all Latin American B2B e-commerce (BCEC and E-Consulting 2003).

The 2002 CRITO survey cited above was also carried out among Brazilian and Mexican businesses. Some information extracted from it is presented in table 1.14 in order to facilitate comparisons between the situations of the two countries. Since the survey was carried out among enterprises in three industries (manufacturing, distribution and finance) that tend to be keener-than-average adopters of e-business practices, it is not surprising that in both cases a fairly sophisticated image of business use of the Internet emerges. Although differences should not be overplayed, the growing importance for some sectors of the Mexican economy of integrating their operations with counterparts in the United States could explain the greater emphasis placed by Mexican users on e-business tools to coordinate operations with partners, while in Brazil cost-cutting and efficiency gains seem to have greater importance. It is worth asking whether export market considerations and the role of foreign-owned firms are playing a greater role in the adoption of B2B e-commerce by Mexico's enterprises, while in Brazil's case competitive pressures in the domestic market could be playing a bigger role.

As for the smaller markets in the region, Chile's B2B e-commerce amounted to $2.47 billion dollars, or 1.6 per cent of all trade between businesses in the country. B2B e-commerce in that country has grown by 75 per cent compared to 2001 and is almost eight times greater than it was in 2000 (Baquia.com 2003). While limited in terms of total sales, in relative terms the

level of adoption of e-commerce practices in Chile could put it on a par with the regional e-commerce champions.

As was indicated in the *E-Commerce and Development Report 2002*, **African** B2B e-commerce in 2002 was forecast to amount to $0.5 billion in 2002 and $0.9 billion in 2003. South Africa was expected to account for 80 to 85 per cent of these amounts (Forrester Research 2001).

Table 1.14

Selected data from CRITO e-commerce survey, Brazil and Mexico (percentages of surveyed companies)

	Brazil	Mexico
Uses...		
Email	100	98.3
Web site	70.7	79
Intranet	37.7	50.9
Extranet	33.2	31.1
Extranet accessible by suppliers/partners	10.7	22.6
Extranet accessible by customers	15.7	16.2
EDI	36.7	58.4
Uses Internet for...		
Marketing/advertising	58.6	72.9
Sales online	28.2	11.8
After-sales customer service and support	23.1	40.2
Purchases online	54.9	64.8
Exchanging operational data with suppliers	51.9	50.1
Exchanging operational data with business customers	49.2	46.7
Formally integrating the same business processes with suppliers or other business partners	48.8	54.8
Sales online		
To other businesses	27.4	24
Mean % of total business sales conducted online (only for those doing B2B sales)	13.4	20.2

Source: CRITO (2002).

C. Some technology trends affecting e-business

The previous sections have outlined the conditions prevailing in various regions of the world with regard to the application of ICT to the activities of enterprises and the extent to which the adoption of e-commerce and e-business manifests itself in quantifiable e-commerce flows. Without aiming to provide exhaustive or even comprehensive coverage of the issues, the following pages will address some aspects of technology use that have been particularly prominent in the e-business arena in recent months and that will probably influence the development of e-business in coming years.

1. The growth of broadband

The intensity with which Internet traffic is growing and is forecast to grow was mentioned above. The spread of broadband Internet access (table 1.15) and related technologies is one reason for this rapid growth.[31] The spread of broadband is not only enabling existing Internet users to exchange information more easily, it is also attracting new users. Some operators report that 30 to 50 per cent of their new broadband subscribers have never had an Internet subscription before (Beardsley, Doman and Edin 2003).

Broadband availability has grown very fast in the past two years. Broadband networks are accessible to almost 320 million households, mostly but not exclusively in high-income market economies (Beardsley, Doman and Edin 2003). Growth in the number of subscribers has not, however, kept pace. Between 55 million (ITU 2003d) and 100 million people (Beardsley, Doman and Edin 2003) worldwide are using broadband Internet access. They are highly concentrated in a small number of countries; six countries have more than 75 per cent of all the subscribers in the world. In relative terms, the Republic of Korea leads the world with more than 21 subscribers per 100 inhabitants. Broadband is progressing fast in several other countries as well. In the United States, for example, broadband may achieve faster adoption than personal computers or mobile phones have (Beardsley, Doman and Edin 2003). In the rest of the world, however, Internet users are not taking up broadband as fast as its promised benefits might warrant. Two dominant technologies have an almost equal share of the world broadband market: DSL (digital subscriber line), with 50 per cent, and cable, with 45 per cent.

Table 1.15

Broadband penetration rates around the world

	Broadband subscribers				Broadband households	
	Total	% change				
Economy	000s	2001-2002	Per 100 inhabitants	% of all subscribers	% of those with Internet	% of all
1　Korea, Rep. of	10 128	24%	21.3	94%	83%	43%
2　Hong Kong (China)	989	38%	14.6	42%	68%	36%
3　Canada	3 600	27%	11.5	50%*	41%	20%*
4　Taiwan P. of China	2 100	86%	9.4	28%	59%	31%
5　Iceland	25	138%	8.6	21%*	12%	9%*
6　Denmark	462	107%	8.6	19%	24%	16%
7　Belgium	869	90%	8.4	51%	41%	17%
8　Sweden	693	48%	7.7	23%	20%	13%
9　Austria	540	123%	6.6	22%*	28%	14%
10　Netherlands	1 060	127%	6.5	10%	29%	19%
11　United States	18 700	46%	6.5	18%*	19%	10%
12　Switzerland	455	308%	6.3	5%	9%	4%
13　Japan	7 806	176%	6.1	27%	18%	5%*
14　Singapore	230	73%	5.5	26%	35%	20%
15　Finland	274	426%	5.3	5%	15%	8%

*Note: Values in italics are estimates. *: 2001*
Source: ITU (2003c).

In most countries, where broadband penetration remains below the 10 per cent mark (see chart 1.7) and prices are still fairly high, the short-term impact of this technology on most business operations will remain limited. However, based on current trends, significant penetration levels (above 40 per cent) could be achieved in several markets in three to five years (Beardsley, Doman and Edin 2003), provided that the regulatory environment ensures sufficient competition among providers, both within and across the various technologies used to deliver broadband (e.g. telecommunications and cable television operators). Particularly in developing countries, where DSL may not face competition from cable, fibre optic or wireless technology, it may be advisable for regulators to issue licences for alternative modes of delivery such as fixed wireless. This will give subscribers a wider choice of providers, greater availability and lower prices. Once penetration rates reach levels around 40 to 50 per cent, the impact of broadband

access will be felt beyond the Internet industry and may start affecting the operations of businesses in general.

How will the widespread adoption of broadband influence businesses? Fast Internet access is the main reason for subscribers to switch to broadband technologies. Because data flow faster and users waste much less time waiting for Web pages to download, and because their connections are always on, broadband adopters tend to spend significantly more time online. In the B2C arena, the online marketing of products in which purchase decisions require a significant amount of information (i.e. high-value items) may be particularly affected by the spread of broadband. Consumers will be able to seek more information (e.g. by downloading information in multimedia formats), compare more options, or sample digital products. In addition to spending more time online, broadband subscribers are more likely to engage in e-

Chart 1.7

Broadband penetration (subscribers per 100 people), by technology, 2002
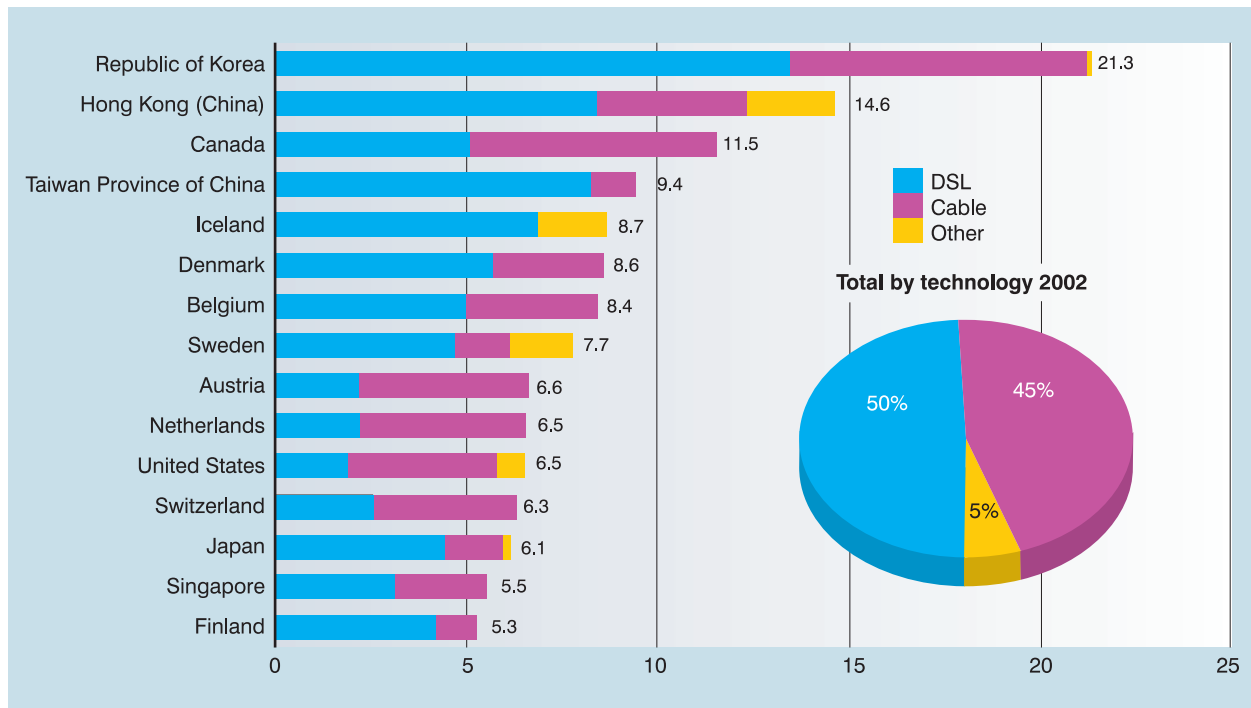
Source: ITU (2003d)

commerce and generally have more positive experiences and attitudes regarding online consumption. They therefore tend to account for a fast-increasing share of online traffic and expenditure.[32] Intense downloading and exchanging of software, media products (video, music and games) and other large files seem to be the activities that most clearly distinguish broadband Internet users from dial-up users. The implications for the media-based industries (essentially news and entertainment, but also educational institutions to some extent) could be significant. Subscription services may also benefit from the expansion of broadband, as its "always-on" nature and speed may make more convenient and therefore more valuable the use of services such as online storage, enhanced e-mail, personal information managers and Web publishing.

With regard to broadband's influence on the organization of enterprises or on transactions between businesses, although a number of initiatives aim at building new business models around broadband, no application of it has emerged with an impact on the functioning of markets or on the management of companies that is substantially different from the effects of earlier commercial applications of the Internet.

This is not to say that broadband will have no impact on businesses. Businesses buy much more online content than consumers, and broadband makes such content more accessible, easier to use, and therefore more sellable, especially to small and medium-size enterprises (SMEs). Broadband allows several users to share an Internet connection, which can reduce the cost of every individual connection, an important consideration for SMEs. For larger enterprises, the ability to centralize data and applications in a single storage facility while enabling many users in distant locations to access and use sizeable amounts of information may facilitate the adoption of new forms of organization: for instance, it may help make telecommuting a practicable idea for wider occupational categories (see box 1.1). Data-intensive operations in sectors such as finance or health care may see BPO accelerate when high-speed data transfers are possible between low-cost processing centres and their customers. Online provision of professional and other services may also be facilitated by the possibility of combining fast transfer of a high volume of data with video and voice links.

Other, broader effects on the economy can also be envisioned (ITU 2003d). Besides improving access to information society services (e.g. e-health, e-educa-

tion, e-government) that have indirect but real effects on the productivity of an economy, broadband adoption, like any major new technology, can encourage innovation and thus stimulate economic growth.

2.   Security issues

A secure environment is not any more essential for e-business than it is for business in the physical world. Every commercial transaction involves a risk with which participants are normally familiar enough to judge whether the expected returns justify accepting the uncertainty of a potential loss. Even in the presence of considerable risk, if the expected returns are sufficiently high, someone will be willing to take that risk. Online casinos, for example, lure more than a few gamblers who may not be absolute certain about the quality – or, for that matter, the existence – of the regulatory authority that is supposed to supervise

them. This being said, since most legitimate industries do not offer extraordinarily high rates of return, a reasonable level of security is needed for the normal conduct of business. In the case of online business, the risk involved in a transaction is generally harder to assess, so for any given level of aversion to risk, higher levels of precaution may be necessary, thus imposing higher costs. As e-business becomes part of the everyday experience of the majority of people, who tend to be more risk-averse than early adopters of technology, security in all its dimensions becomes crucially important. Internet users start to see the Web as a utility that is expected to be operational on a permanent basis and to pose as little risk as water or electricity use. Unfortunately, such levels of security and reliability are not yet available.

Internet security problems can take multiple forms: spam,[33] viruses, Web squatting, fraud, copyright violation, denial of service, unauthorized entry into corporate or personal computers and networks (and

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Box 1.1

E-business uses of Wi-Fi

Wi-Fi, or "wireless fidelity", is a technology that uses radio frequencies to provide high-speed Internet connections for devices such as laptop computers and personal digital assistants (PDAs), whose defining feature is mobility. Wi-Fi "hot spots" (places where Wi-Fi-enabled computers can connect to the Internet) are proliferating in airports, railway stations, hotels, cafes and other public spaces, mainly in the United States and Western Europe. Besides its applications for private users, the technology can be useful for people who work on the move and need to connect to their offices. In industries such as manufacturing, logistics and retailing, and thanks to electronic "tags" that can be attached to products or components and beam information about their location or functioning, Wi-Fi can be used to manage various aspects of production and distribution.

Almost one in five laptops sold in the United States in 2003 are said to be already equipped for Wi-Fi communications, and this is expected to be a standard feature within two years. If this happens, Wi-Fi could become the preferred technology for mobile e-business applications. The main advantage would be that workers with laptops equipped for Wi-Fi could link to systems that businesses already have in place to manage various aspects of their operations (e.g. customer relationship management and enterprise resource planning systems). Wi-Fi's main disadvantages in comparison with 3G (third-generation) mobile telephony are that its reach is limited to a relatively small distance from a "hot spot" (about 300 metres outdoors, about 100 metres in enclosed areas) and that, for the time being, "hot spots" themselves offer rather patchy coverage compared to the networks of telephone operators.

 As with other Internet technologies, security concerns (which have been a problem for Wi-Fi) will have to be addressed before these potential business uses of Wi-Fi materialize on a large scale. For a technology whose main selling point is mobility, widely accepted standards are also essential. Both security and standardization could benefit from the announcement early in 2003 that Cisco Systems was prepared to license software designed to make Wi-Fi connections more difficult to break into, and to enhance Wi-Fi's range and other capabilities. The major chip makers and computer firms have agreed to work with Cisco, so that laptops carrying the improved technology could be on the market by the end of the year.

While Wi-Fi technology clearly offers significant benefits to Internet users and strong growth in its use can safely be anticipated, specific business models for its commercial exploitation are only starting to be developed. For developing countries, Wi-Fi technologies represent an opportunity to provide low-cost broadband access that is relatively simple to deploy, at least in urban areas. In the words of Kofi Annan, Secretary-General of the United Nations, "we need to think of ways to bring wireless fidelity applications to the developing world, so as to make use of unlicensed radio spectrum to deliver cheap and fast Internet access" (Annan 2002).

Chart 1.8

Spam growth by region, 2003–2005, per cent rates
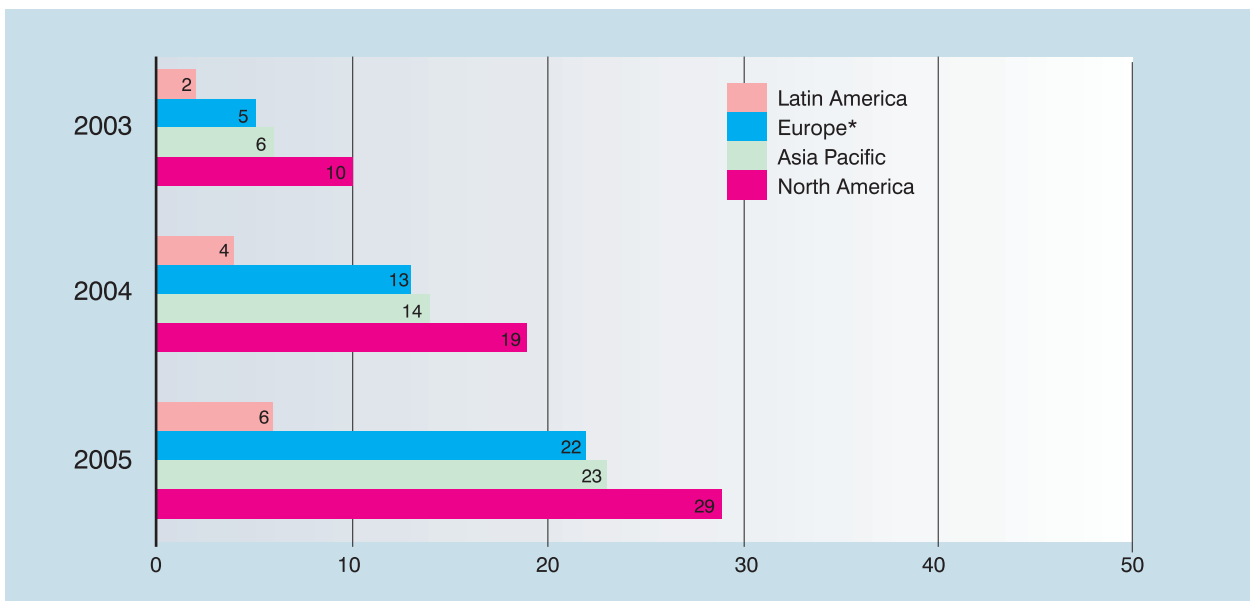
a Includes Africa and the Middle East.
Source: Adapted from Ferris Research (2003).

theft or manipulation of the information stored in them), privacy infringements, and fraud and harassment, among other possibilities.

Some of these problems have acquired serious dimensions, and spam (unsolicited e-mail) is now proliferating at an alarming rate. By some estimates, in January 2003 about 25 per cent of all e-mails that circulated on the Internet were unsolicited; by March the percentage was over 36 per cent, and the 50 per cent mark could be reached before the end of 2003 (MessageLabs 2003). As Chart 1.8 shows, the majority of spam victims are in North America. As for its origin, 58.4 per cent of spam received in the world in March 2003 came from the United States, followed at a great distance by China (5.6 per cent), the United Kingdom (5.2 per cent), Brazil (4.9 per cent) and Canada (4.1 per cent).

In 2001 the European Commission estimated that spam-related costs amounted to over $9.6 billion worldwide in connection charges alone (MessageLabs 2003). Other, more pessimistic estimates put the overall cost of spam to enterprises worldwide in 2003 at $20.5 billion.[34] A tentative breakdown of the different categories of costs imposed by spam on enterprises could be as follows: 44 per cent of costs corresponds to wasted IT resources (wasted bandwidth and consequent slowdown of traffic and potential disruption of service); 39 per cent is attributable to lost

user productivity (the extra time that workers must use to manage their e-mail, which already represents 10 per cent of working time in some occupations); and 17 per cent corresponds to the costs of maintaining help desks.[35] In addition to spammers operating for financial or other profit, often from offshore ISPs, spam is often used to carry out denial of service attacks.[36] A number of techniques are available to combat spam,[37] although spammers are also becoming increasingly sophisticated. In a growing number of countries, Governments are considering or implementing anti-spam legislation.[38]

Spamming has also been associated with other illegitimate uses of the Internet. For example, in order to set up a new e-mail account from which to operate, a spammer may use stolen credit card information. Identity theft has been increasing rapidly in recent years, and resulting losses have been estimated at $221 billion worldwide in 2003, almost three times as much as in 2000. This rise may be attributable to the increased accessibility of personal information, in particular credit card details.[39] For example, in an incident in February 2003 a hacker is reported to have obtained the details of several million credit card accounts in the United States.[40] In this environment, trust in B2C e-commerce may suffer unless measures to address consumers' mounting concerns are taken, including not only stringent technological protection of data but also law enforcement action.

In the first six months of 2003, a total of 91,088 digital attacks around the world were documented by mi2g, a digital risk management company (2003b).[41] This was more than the 87,525 recorded in all of 2002 (*Internetnews.com,* 2003). Symantec Corporation, another Internet security company, found that the number of documented new software vulnerabilities in 2002 was 81.5 per cent higher than in 2001 (Symantec 2003). This last figure may be distorted by the increased resources set aside for identifying vulnerabilities, and by a movement towards more responsible disclosure policies, but it still reflects the vital importance of a reliable and secure e-business infrastructure. Vulnerabilities in Web applications, which have increasing business importance, represent a growing share of new moderate and severe detected vulnerabilities.

Security incidents are not exclusively a problem of developed countries. As chart 1.9 shows, several developing countries rank among the countries that were targeted most often in digital attacks in 2002. The fact that, of the 28 countries where no attack was documented by mi2g in 2002, 21 were African, gives a measure of the technological breach existing between Africa and the rest of the online world.

Developing countries are the leading victims of attacks against government online systems (see chart 1.10). However, attacks against government sites are less frequent than those against commercial entities, are driven by political factors, and have few economic consequences. Their most important effect may be that the media attention they attract helps undermine public confidence in the Internet in those countries where awareness of and trust in the Internet seem to be less advanced.

Most digital attacks in 2002 originated in a few countries, and 10 of them accounted for 80 per cent of all attacks detected according to data from Symantec (see chart 1.11). The United States was at the top of the list, followed by the Republic of Korea,[42] China, Germany and France. In terms of attacks per 10,000 Internet users, the picture changes, and the top 10 includes countries in all regions of the world (see chart 1.12 and Symantec 2003). Yet the perception of a need to take action to enhance Internet security is much more acute in the United States – partly as a result of the attacks of 11 September 2001 and concerns about so-called cyberterrorism[43] – than in other regions of the world.

While the private sector has been reluctant to report security breaches (BBC News 2003), it is well aware of the problem. Security applications are commonly quoted as one of the areas where CEOs expect major developments in the medium term, and the IT secu-

Chart 1.9

Countries suffering most digital attacks, 2002

Chart 1.10

Attacks against government online systems, 2002
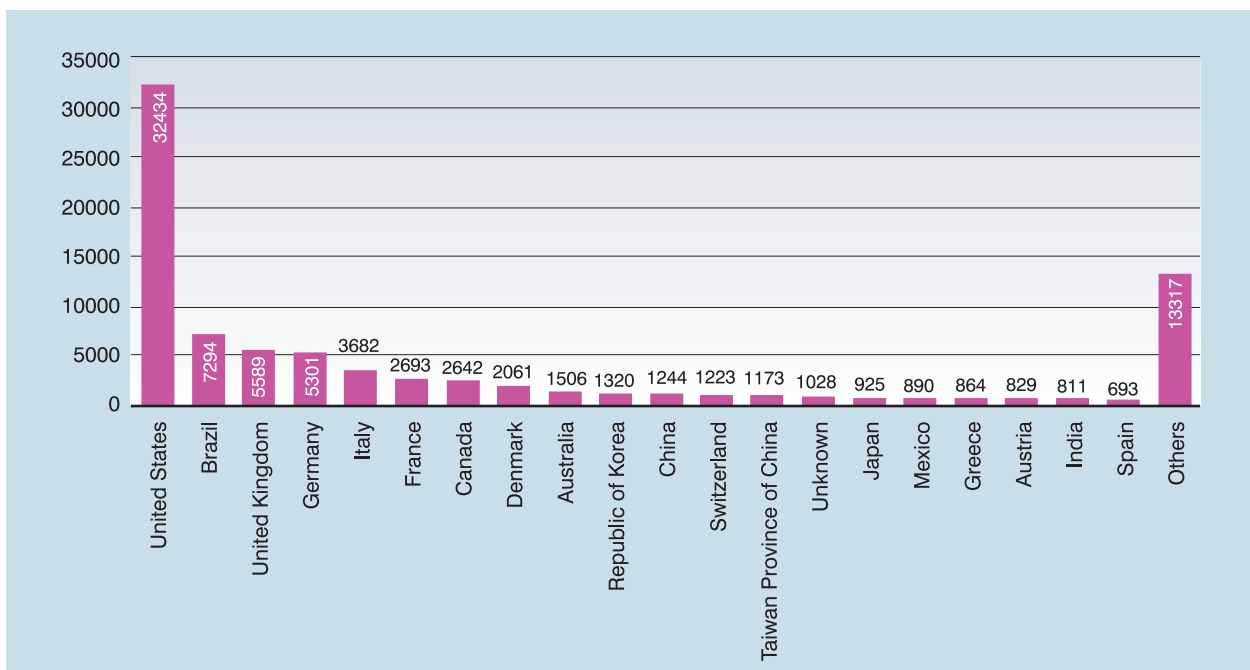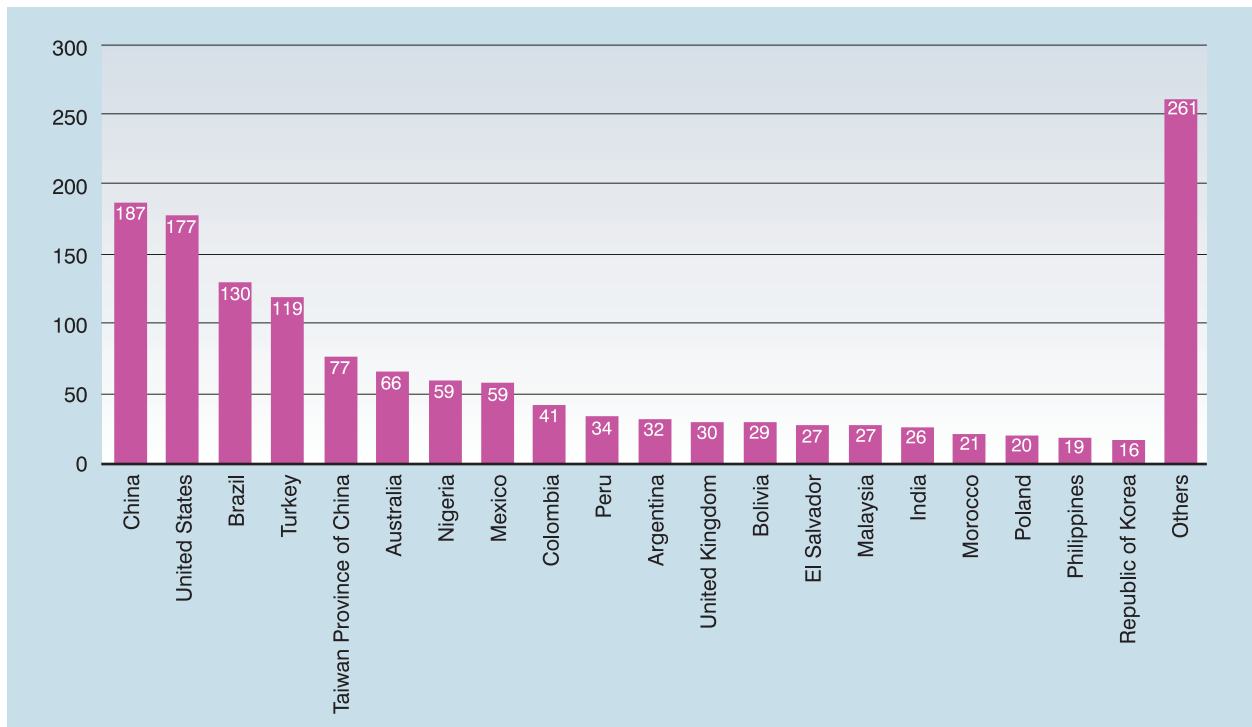
Source: mi2g.com (2003a).

Chart 1.11

**Top 10 attacking countries (percentage of overall volume),
1 July – 31 December 2002**
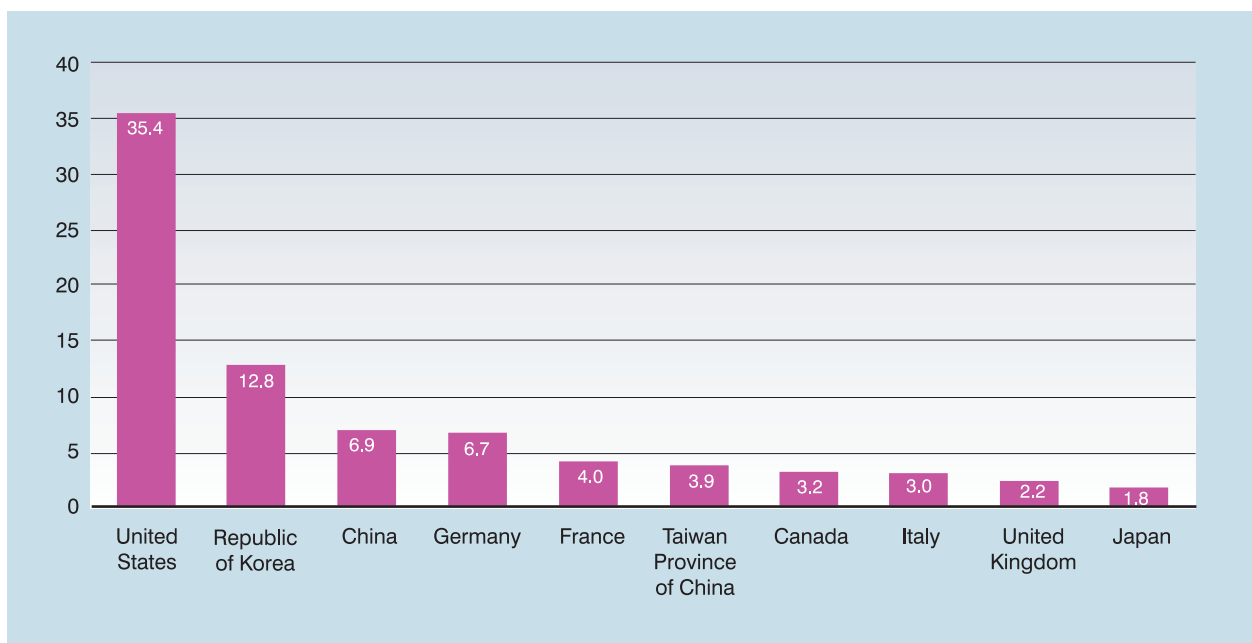
Source: Symantec (2003).

rity market is expanding fast. Total sales of IT security software, hardware and services are expected to reach $45 billion by 2006, compared to $17 billion in 2001 (IDC 2003b). The development of corporate initiatives in areas such as Web services provides a strong incentive for IT security investment.

Reasonable protection against Internet-generated risks can be achieved through a combination of software, hardware and risk management strategies that contemplate all potential sources of liability arising from interactions with customers, workers, suppliers and the general public. Studies[44] based on reported security incidents assess internal threats as being as severe as external ones. For example, the Asian School of Cyber Laws study *Computer Crime and Abuse Report 2001–02* for India showed that over half of the reported incidents were traced to employees (21 per cent) or former employees (31 per cent). In the end, the question of IT security at the firm level is much more a managerial problem than a technical one. It has to do with how penetrable the enterprise wants its business processes to be and how risk management is integrated into those processes. Management must decide what balance to strike between the benefits of open, collaborative business processes and the risks that greater exposure entails.

When plans and technology fail and digital intrusion reaches a critical level, companies tend to take strong

legal action.[45] In addition, the private sector has an array of preventive and response strategies, including market-based incentives such as trustmarks and privacy seal programmes and the use of alternative regulation methods such as alternative dispute resolution (discussed in chapter 7).

While technology can help reduce those risks and costs, the key to a secure and private online environment is the combination of market efficiency and industry initiatives, political will and an appropriate legal environment. Box 1.2 includes information about recent developments in the area of legal and regulatory aspects of e-commerce, including security and other issues.

In the end, just as in the physical world an essential function of governments is to maintain peace and security so that citizens can go about their business, so in the digital economy law enforcement agencies will have to adapt to the new commercial environment and ensure the rule of law on the Internet. For example, the US Department of Justice has instituted "Operation E-Con", involving several government agencies. Investigations under this initiative concern 89,000 victims, and estimated losses of $176 million were associated with 263,000 Internet-related fraud complaints in 2002 (CyberAtlas 2003a). The Department of Homeland Security has launched a new

Chart 1.12

Attacks per 10,000 Internet users, 1 July – 31 December 2002
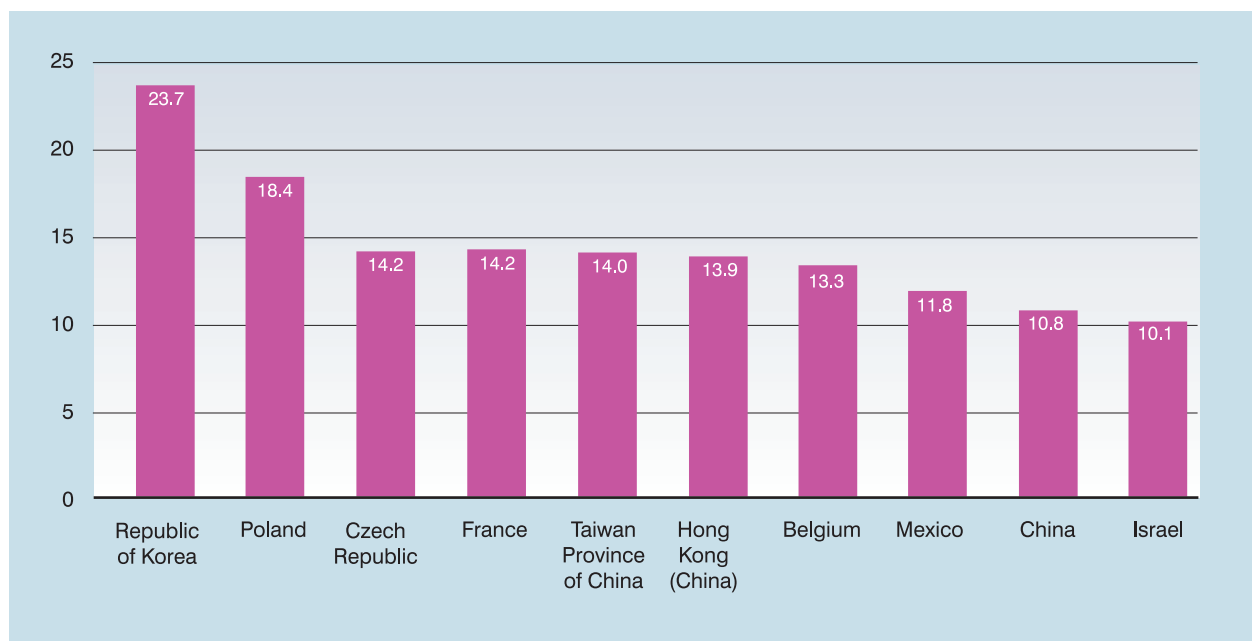
BOX 1.2

Legal and regulatory developments

Although several important legal issues such as applicable law, jurisdiction, consumer privacy, and data protection remain unresolved at the international level, a certain degree of predictability and legal certainty has been achieved by a number of developing countries that have enacted legislation recognizing the legal value of electronic means of communication and the validity of electronic signatures. Thus, legislation based on the 1996 UN Commission on International Trade Law (UNCITRAL) Model Law on Electronic Commerce, whose main objective is to offer legislators a set of internationally acceptable rules allowing some legal obstacles to be removed and a more secure legal environment to be created for e-commerce, has already been adopted by a number of developing countries.[46] Furthermore, other developing nations, mainly in Latin America and Asia, have adopted legislation on electronic transactions and electronic signatures[47] that provides the predictability required by business to engage in e-commerce. Unfortunately, many African countries continue to lag far behind, and several of them do not have any legislation accommodating e-commerce.

Another area requiring special attention to ensure that developing countries do not become havens for intellectual property piracy is intellectual property. Some important issues, such as the definition and scope of rights in the digital environment, and some of the challenges of online enforcement and licensing are addressed in two treaties concluded at the World Intellectual Property Organization (WIPO) in 1996: the WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT) (commonly referred to as the "Internet treaties"). Both treaties have been ratified by a relatively large number of developing countries.[48] The ratification of these treaties assists in the adaptation of intellectual property laws to the digital age and provides developing-country Governments with tools to protect their national intellectual property assets.

Security is another important area where very little progress has been achieved. Thus, lack of an adequate legal framework with respect to information and infrastructure security and computer crime is currently preventing developing countries from grasping the opportunities offered by e-commerce. The Convention on Cybercrime[49] prepared by the Council of Europe, whose main objective is to pursue a common policy to protect society against cybercrime, especially by adopting appropriate legislation and fostering international cooperation, provides a valid alternative for developing countries wishing to enact legislation.

As regards data protection and information privacy, few Governments in developing countries[50] have enacted legislation regulating the collection, use, dissemination and protection of the personal data to which business actors have access over the Internet. The absence of regulation in this field is clearly detrimental to the national economies of many developing countries, since a large number of developed countries,[51] in order to prevent circumvention of the law through the use of third-party countries and to protect individuals' rights over their personal data, prohibit the transfer of personal data to countries where the data are not provided a comparable or adequate level of protection. To avert the negative consequences of such restrictions, developing countries need to enact data protection legislation or adopt suitable contractual arrangements.[52]

cybersecurity division charged, among other objectives, with detecting and responding to online security incidents in coordination with other agencies, other Governments and the private sector. In addition to action by the law enforcement agencies of its member States, the European Union plans to establish a European Network and Information Security Agency that would play an advisory role on Internet security threats and should be operational sometime in 2004.

Priorities in this area should include identifying risks and critical vulnerabilities, reinforcing international and cross-border cooperation in compliance and enforcement, educating consumers and promoting best practices. Partnership and cooperation between government agencies and private-sector bodies will be key. The OECD's recommendation on privacy protection online is highly relevant and generally applicable to online security threats: "The key for the coming years will be to make traditional means of regulatory enforcement even more efficient, while at the same time encouraging the growth of self-regulatory mechanisms" (OECD 2003).

3. The development of web services

The concept of Web services refers to automated interaction over the Internet between computers managing different business processes, in such a way that they generate a "grid" of computers in which each machine is able to feed other machines the input they require and/or obtain from them the information it needs. This interaction occurs via software that

is designed to use other software, the communication between the two being based on Internet standards and protocols.

Web services have the potential to significantly improve the efficiency of processes such as inventory control and routine purchasing. Web services can also be very useful for the integration of disparate systems such as supply chain systems based on electronic data interchange (EDI) or extensible markup language (XML). In the longer term, their use should extend to other business processes, as they enable seamless, automatic interoperability between the software applications used in running the various aspects of a business (procurement, production, sales and marketing, after-sales service, finance, human resources) as well as with the applications of customers and suppliers. Beyond that, Web services will be an essential part of an economy in which "communication" between Internet-enabled objects (e.g. a sensor in a machine that detects the need to replace a part and places an order with the supplier) will be increasingly important. Although the main impact of Web services will be in enterprise operations, there are also many possibilities for consumer-oriented applications. For example, Web services could be used to create virtual travel agents that give access to the reservation systems of airlines and railways, car rental companies and hotels, travel-related content providers, and so on.

Despite the attention that the competing approaches to Web services by the largest players in the IT industry have attracted to the issue, Web services implementation is only starting to gather momentum. By the end of 2002, about 5 per cent of enterprises in the United States had completed a Web services project, although 80 per cent of them are expected to do so in the next five years (IDC 2003c). Large enterprises, particularly in manufacturing and the service sector, are the earliest adopters, but SMEs should eventually adopt the technology en masse as it matures.

The potential of Web services to become an important factor of change derives from the fact that they lie at the junction of several strong currents. Some of these currents are changing business organization and interaction (e.g. supply and demand chain integration and various forms of outsourcing), and others could influence the future of computing (e.g. the replacement of the "client-server" model by a network-centred approach in which the network itself is the source of computing power).

The first trend in business organization that influences the development of Web services is the integration of supply chains and the move towards demand chain management (in which links between manufactures, distributors and retailers extend down the chain that links suppliers to manufacturers). Tightly integrated, Web-based supply chains allow companies to benefit from low-cost data-intensive exchanges with their suppliers, wherever they may be located, thus overcoming the disadvantages of EDI (cost) and just-in-time purchasing and vendor-managed inventory (which were possible only with suppliers based nearby). In companies applying best practice in this area, information moves back and forth along these chains in real time, adjusting delivery closely to the customer's needs, in location as well as in timing. These integrated chains will deliver all their potential efficiency gains only if synchronized, real-time interaction exists between the networks of all participating actors. Web services technologies fit perfectly into this picture.

Another factor in the development of Web services is the refocusing of enterprises, particularly larger ones, on those activities and processes that constitute the core of their business, and where their competitive advantage rests. They are outsourcing many non-core parts of their business to partners who, because they are specialists, are able to generate more value performing those functions. In addition to this more common formulation, other kinds of outsourcing are developing. For example, some enterprises are co-sourcing – that is, pooling their non-core operations when no large-scale specialist exists. This can also be done internally, as when affiliates of a transnational corporation concentrate their operations for a particular product or service in a single centre. In-sourcing consists of adopting best practice in a certain process and adding to efficiency gains by taking business from other companies (not direct competitors), thus benefiting from economies of scale. In all these modalities, there is an exponentially growing need to exchange information seamlessly between computers running different operating systems and applications in distant locations and serving business processes that are the responsibility of different partners.

The technology current moving Web services forward is the mounting popularity of distributed computing, an approach in which computing resources (processing power or storage capacity) are not concentrated in any particular place but pooled together in the network and used when and as needed, thus allowing more efficient allocation of resources. The Internet has given new momentum to this approach because its standards and protocols are designed precisely to let computers using different operating sys-

tems work together well. Similarly, Web services apply the standards embodied in XML to enable a computer to identify the resources (e.g. a piece of software or a set of data) it needs for a given task, locate and access them through the network, formulate a request and deal with what is sent in response. The network operates as if it were a single powerful computer that, like a desktop computer, needs a sort of "operating system" to manage the flow of requests for resources. This role is played by platforms (or "application development environments") that provide developers with the instruments they need to write their Web service applications. Many Web-based applications are built on a *de facto* open-standard platform called J2EE (Java 2 Platform Enterprise Edition) that is an extension of Java. Microsoft for its part has developed its .NET technology, which it controls but claims to also support open standards.

Competition between these platforms is intense; its results may have strongly influence the evolution of the IT industry in the next few years, and the major players' role in it. In the meantime, for Web services to deliver their potential, services from one application vendor must be able to interoperate with those of another vendor, which may have been built on a different platform. In business terms, this means that there must be a guarantee that the Web service handling a company's inventory management can do business with the Web service that the supplier uses to handle orders.[53]

Web services can put outsiders in contact with systems that are at the core of an enterprise's activity. This is a manifestation of a general trend towards greater openness of enterprises in relation to customers and suppliers. Normally enterprises benefit from this greater openness, because they can be more responsive to their customers and get better service from their partners. But it should not be forgotten that any interface with the outside world represents a risk of intrusion, ranging from the merely indiscreet to the seriously malicious. While the industry is taking significant steps to address security concerns, at this stage of the technology's maturity and users' understanding of it, fully addressing security issues (including their implications for project scalability) should remain a central consideration of any major Web service implementation.

A different kind of danger involved in Web services has to do with the familiar tendency of IT innovations to generate unreasonable performance expectations, particularly in earlier phases of their development. Web services do have significant potential to improve the productivity of enterprises. At this stage, this applies particularly to enterprises in which an above-average amount of resources is employed in the standard, repetitive, not very complex interactions that constitute the routine of business relationships. However, Web services cannot substitute for human intervention in the creation of such business relationships. Simple Web services can be implemented at relatively low cost, but large-scale implementations can be challenging given the current state of the technology. In the medium term, Web services will introduce considerable changes in the way businesses use IT; however, this will not happen as a one-off revolution, but as a cumulative, if fairly rapid, process in which the technology will permeate the structure of enterprises and industries. To be ready to participate in this process, enterprises in developing countries, especially those involved in international supply chains, may benefit from starting to experiment with how Web services may be relevant to their specific circumstances and requirements.

D. Conclusion

Now that the dust raised by the collapsed dot-coms has settled, the trend towards a larger role by the Internet in social life and an extension of the reach of e-business to an ever-larger part of the economy of developed countries remains vigorous. Signs of this are visible in the expansion of the number of computers that make up the Internet, in the growth in the number of people using it, in the larger share of the civic debate that concerns (and takes place on) the Internet, and, naturally, in the constant increase of online economic activity.

Continuity is also noticeable in the uneven patterns of inclusion of developing countries in the global digital economy. It is now clear that the Governments, the civil society and the business community of an encouraging number of developing countries have understood the importance of the issues at stake and are moving decisively to help their people connect to the rest of the world and to eliminate obstacles to the adoption by their productive sector of ICT-enabled methods of creation and exchange of value. While immediate effects are not necessarily dramatic, improvements in the e-business environment should eventually result in productivity gains in these economies, the safest way to ensure sustained improvement of average living standards. At the same time, it must be noted that many other developing countries continue to face difficulties in identifying and realizing

the potential benefits of ICT and the Internet for their economic development. There is a need for a better understanding of the mechanisms through which the strategies, policies and instruments that have delivered results in other parts of the developing world can be adapted to fit the economic realities of those countries that are at greatest risk of e-marginalization.

Notes

1. According to figures from AT Kearny Inc., as quoted in Business Week (2003).

2. See UNCTAD (2003) for a discussion of the measurement of the diffusion of ICT capabilities across countries and relevant statistical indexes.

3. According to World Bank figures, Nigeria had per capita gross national income (GNI) of $290 in 2001. Togo's was $270.

4. Mexico's GNI in 2001 was $5,530, almost three times as much as Colombia's $1,890.

5. See, for example, a regression of gross domestic product (GDP) versus the Network Readiness Index in Dutta, Lanvin and Paua (2003).

6. See chapter 3 of UNCTAD (2002) for an in-depth discussion of gender, e-commerce and development.

7. According to this survey there were 171,638,297 hosts worldwide in January 2003, an increase of 24,293,574 from a year earlier.

8. A host is a computer that is connected to the Internet at a given moment and has an Internet protocol (IP) address. Not all hosts are servers, and a server may host one, several or even hundreds of sites.

9. Netcraft is an Internet service company. Its Web server survey examines software usage on computers that are connected to the Internet. The survey collects and collates as many hostnames providing HTTP (hypertext transfer protocol) service as possible, and systematically sends each one of them an HTTP request for the server name.

10. A simple example of this would be a bank website where a Java applet lets a visitor calculate the monthly payments of the loan he or she may be considering taking.

11. SSL is a protocol for authenticated and encrypted transmission of data via the Internet. Many commercial sites use the SSL protocol to handle confidential information, such as credit card details.

12. This satellite-based technology can be installed at relatively little cost.

13. Technologies such as VSAT could significantly ameliorate this problem.

14. For example, requirements that all Internet service providers (ISPs) use the dominant operator's international gateway, or regulations about the ownership of ISPs.

15. This practice originated when, at the earliest stages of the Internet's development, traffic flowed almost exclusively from developing to developed countries (mostly the United States), where almost all Internet content was located.

16. Regional meetings were held for Central America and the Caribbean (CuraÁao, 25–27 June 2002), Asia and the Pacific (Bangkok, 20–22 November 2002), Africa (Tunis, 19–21 June 2003), the transition economies (Geneva, October 2003) and South America (Rio de Janeiro, 18–20 November 2003). An expert meeting on e-strategies for development was held in Geneva on 10–12 July 2002. The recommendations and policy statements resulting from these events are available at www.unctad.org/ecommerce.

17. Internet traffic growth, however, is not determined exclusively by the number of human users of the Internet. Increasingly, new applications (peer-to-peer services for the exchange of music or video files, grid computing and others) allow computers to generate and receive traffic on a permanent basis. The traffic generated by these applications can impose a heavier load on the backbone than human-generated traffic (for example, by making many simultaneous connections).

18. A petabyte equals 250 bytes or 1024 terabytes (approximately 1015 bytes).

19. The forecast means that by 2007 the volume of information exchanged every day through the Internet will be equivalent to the content of books contained on over 54 million kilometres of shelves, slightly less than the minimum distance from Earth to Mars. See www.sims.berkeley.edu/research/projects/how-much-info/datapowers.html for examples of the size of various forms of accumulated information measured in bytes and its multiples.

20. See OECD (2002) for a presentation of available statistical work in the field of the information economy in developed economies. UNCTAD (2001) discusses the problems involved in measuring e-commerce in general and in developing countries in particular. In September 2003 UNCTAD organized an expert meeting on the measurement of the digital economy. The background paper prepared by the secretariat and the experts' conclusions provide an account of the main

issues at hand together with some practical proposals for addressing them. The documentation of the expert meeting is available at www.unctad.org/ecommerce.

21. See UNCTAD (2002).

22. The higher estimates correspond to a study by Forrester Research, while the source for the more modest one is eMarketer. See UNCTAD (2003) for more detailed estimates and the full references for these sources.

23. The preceding sentences merely summarize a few of the points made in the OECD report, which includes a number of charts and tables presenting official statistical information.

24. Not only do different sources provide widely ranging estimates, but the same sources may drastically change their own estimates in a matter of months or even weeks.

25. Visa International study quoted in eMarketer Inc. (2003c).

26. UNCTAD (2002) published data taken from a survey by the Electronic Commerce Promotion Council of Japan. The amount of online retail sales for 2001 was estimated at 1.484 trillion yen ($12.27 billion). Projections for 2002 and 2003 were that business-to-consumer sales would reach 2.831 trillion yen ($22.54 billion) and 5.034 trillion yen ($42.4 billion). Yen figures have been converted into dollars at each year's average annual exchange rate. The projections for 2003 were calculated at the average exchange rate of the first six months of the year.

27. All the data in this paragraph come from this source.

28. Baquia.com (2003), quoting a report by the Chamber of Commerce of Santiago.

29. Forrester Research (2002a) and IDC as quoted in Business Week (2003).

30. Beijing, Shanghai, Guangzhou and Chengdu. These provinces are generally considered to be the ones with a more dynamic economy.

31. In technical terms, broadband refers to telecommunication technologies in which a wide spectrum of frequencies is available for the transmission of information via a given physical medium. This allows data to be sent using many different frequencies or channels within the band at the same time. More information can thus be transmitted in any given amount of time. In practical terms, this means that, for example, a traditional copper telephone line can be used to carry not just a telephone conversation but also, and simultaneously, a high volume of other data (e.g. video). Broadband technologies allow high-speed connection to the Internet: the term broadband access is often considered to imply data transfer rates of at least 256 kbps, compared to the 56 kbps of a typical dial-up connection. In addition to enabling users to rapidly download software, music and video, broadband technologies also allow permanent connection to the Internet. Broadband access can be provided by using various technologies such as digital subscriber line (which uses existing telephone lines), fibre-optic cable, satellite, and wireless data transfer over radio frequencies.

32. Higher expenditure is also influenced by the generally higher income of broadband subscribers.

33. Spam (unsolicited e-mail) is not intrinsically a security threat, but spamming is frequently malicious and its effects are disruptive enough to be included in this category. It also tends to be associated with illegitimate or criminal activities.

34. Radicati Group, June 2003, as quoted in eMarketer (2003e).

35. Ferris Research, January 2003, as quoted in eMarketer Inc. (2003e).

36. Sending massive amounts of e-mail with the intention of disrupting a website by absorbing available bandwidth that a company's Web server may be sharing with its mail server.

37. These include the blacklisting of any IP address known to have been used by a spammer, the use of software that recognizes the "fingerprint" of any particular spam outbreak (as is done to detect software viruses), whitelisting (accepting e-mail from previously identified correspondents only), collaborative filtering (based on voluntary submission of details of spammers to a central database), Bayesian probability tools (which assess the probability of an e-mail's being spam on the basis of the experience accumulated by the system), heuristics (which use sets of rules defining what constitutes spam) and others.

38. As of end June 2003, the US Senate was considering legislation that would stipulate jail penalties for spamming. The European Union's Privacy and Electronic Communications Directive imposes drastic limitations on unsolicited e-mail.

39. CyberAtlas (2003), quoting a report from The Aberdeen Group.

40. CyberAtlas (2003), quoting a report from mi2g.

41. A digital attack is defined as an incident in which a hacker gains access to an online system and makes modifications to any of its publicly visible components. A digital attack can be either a data attack or a command and control attack.

42. It is worth asking whether the substantial number of attacks in Korea can be explained by the fact that broadband connectivity increases risk.

43. Attacks that because of their origin, target or other features can be considered as terrorist remain extremely rare. According to Symantec (2003), fewer than 1 per cent of all attacks originate in areas where other forms of international terrorism have been detected.

44. Computer Crime and Abuse Report (India) 2001-02, at www.asianlaws.org/report0102; Symantec (2003).

45. Thus, the music industry is routinely filing suits against providers of music streaming whom it accuses of violating its intellectual property rights. Microsoft recently filed lawsuits against 15 alleged spammers from the United States and the United Kingdom who had sent over 2 billion unsolicited messages to users of Microsoft's MSN network and its Hotmail e-mail service. See Detroit News, 2003.

46. As of May 2003 these included Bermuda, Colombia, Ecuador, Hong Kong (China), India, Pakistan, the Philippines, the Republic of Korea, Singapore and Thailand. See www.uncitral.org/en-index.htm.

47. As of May 2003 the following 27 developing countries had enacted legislation on electronic/digital signatures: Argentina, Bermuda, Brazil, Chile, China, Colombia, Costa Rica, the Dominican Republic, Ecuador, India, Indonesia, Malaysia, Mexico, Nicaragua, Panama, Pakistan, Peru, the Philippines, the Republic of South Korea, Singapore, South Africa, Thailand, Trinidad and Tobago, Tunisia, Uruguay, Venezuela and Viet Nam. See rechten.kub.nl/simone/ds-lawsu.htm.

48. As of May 2003 the following 23 developing countries had become parties to both treaties: Argentina, Burkina Faso, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Gabon, Guatemala, Guinea, Honduras, Indonesia, Jamaica, Mali, Mexico, Nicaragua, Panama, Paraguay, Peru, the Philippines, Saint Lucia, Senegal and Togo. See www.wipo.int/treaties/ip/wct/index.html.

49. The Convention was adopted in Budapest on 23 Nov-ember 2001. It is open for signature by the member States and by non-member States that have participated in its elaboration, and for accession by other non-member States. The Convention is not yet in force. Its text is available at conventions.coe.int/Treaty/EN/cadreprincipal.htm.

50. Countries like Argentina (www.privacyinternational.org/countries/argentina/argentine-dpa.html), Brazil, Chile (www.privacyexchange.org/legal/nat/omni/chilesum.html), China (www.pco.org.hk/english/ordinance/ordglance.html) and Thailand have enacted data protection legislation to avoid restrictions on the free flow of personal data to countries that have data protection laws.

51. The European Union data protection Directive (95/46/EC) requires all personal data transferred to countries outside the Union to benefit from "adequate protection".

52. See the safe harbour arrangement between the United States and the European Union at www.export.gov/safeharbor and the European Union Model Contracts for the transfer of personal data to third countries at www.europa.eu.int/comm/internal_market/privacy/modelcontracts_en.htm.

53. This is one of the objectives of the Web Services Interoperability Organization created by several major players in the Web services arena. See www.ws-i.org.

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