No. 76 Digital divide in the EU in time

Digital divide in EU-15 in time (s-distance): How many months earlier was the level of selected categories in April 2002 attained by average Internet usage

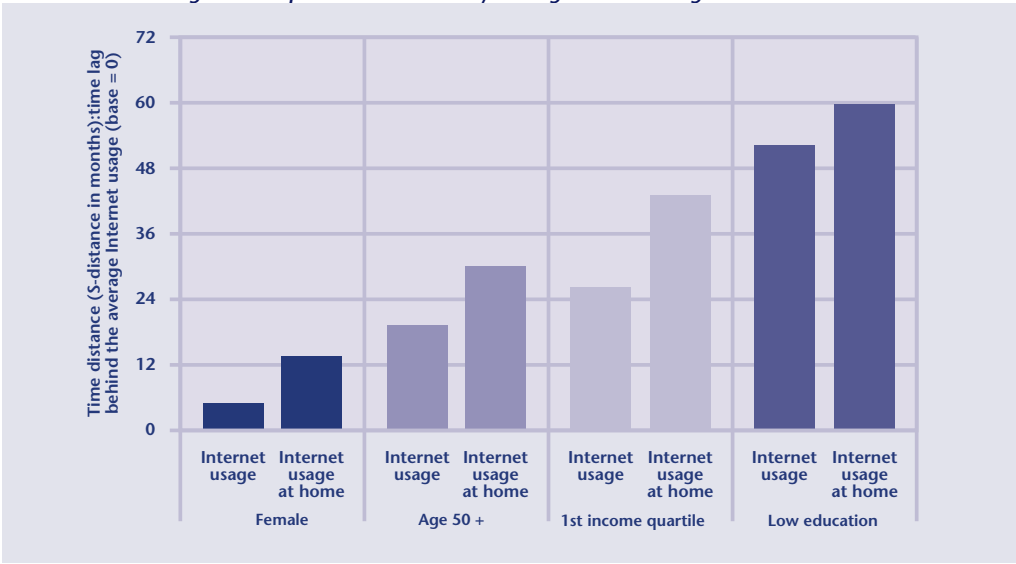
	EU-15	
	Internet usage	**Internet usage at home**
Females	5	13
People aged 50 and more	19	30
People with low income (first quartile)	26	43
People with low education	52	60

Bases: 1997, 2000: N=15,900, weighted by standard Eurobarometer country and EU-15 weights; 2002: all respondents
Questions: 2002: IN1, IN3, Z19, Z21
Sources: 1997: Eurobarometer 47.0, Jan-Feb 1997; 2000: Eurobarometer 54, Oct-Nov 2000; 2002: SIBIS GPS 2002

The magnitude of digital divides can also be expressed in terms of time lags, i.e. in terms of the time delay for particular sub-groups to achieve the same level of Internet usage as the population on average.

Such time distances (s-distances[7]; for further information see Annex 1) were calculated between the April 2002 levels of Internet usage for the selected socio-economic and demographic groups and the (earlier) time when corresponding levels had been achieved by the population overall. The smallest time lag was that for gender, followed by age (50+), income (lowest quartile) and low education (early school-leavers)[8]. The gender time lag for Internet usage overall is only about 5 months, meaning that the population overall reached the April 2002 levels of usage by women five months earlier, whilst for the low education group it was more than 4 years. Time distances can also be used to compare penetration rates for different indicators and different categories. For example, the time lag for "total Internet usage at home" behind "total Internet usage" was generally about 8 months although for some groups it was slightly longer.

Digital divide in EU-15 in time (s-distance): How many months earlier was the levelof selected categories in April 2002 attained by average Internet usage



No. 77 Digital divide by European countries in time

Digital divide in countries in time (s-distance): How many months earlier was the level of selected categories in April 2002 attained by average country Internet usage

	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK	EU-15
Females	6	3	6	13	6	5	1	11	13	13	3	7	4	17	3	5
People aged 50 and more	42	28	14	58	36	42	17	45	24	30	17	54	47	42	24	19
People with low income (first quartile)	41	33	17	54	47	38	35	57	46	62	16	63	48	44	31	26

Bases: 1997, 2000: N=15,900, weighted by standard Eurobarometer country and EU-15 weights;
2002: all respondents
Questions: 2002: IN1, IN3, Z19, Z21
Sources: 1997: Eurobarometer 47.0, Jan-Feb 1997; 2000: Eurobarometer 54, Oct-Nov
2000; 2002: SIBIS GPS 2002

Digital divide patterns expressed in time distances for total Internet usage in the separate EU Member States lead to similar conclusions with some variation. In all cases the gender gap is the smallest by far and the time distance is again the largest for the low education group, with the exception of Austria and Spain. Germany and Austria show the smallest average value of time distances for the four groups analysed. The difference between Internet usage for the age group 50+ and that of low income (lowest quartile) was clear for the EU-15 average, but this was not so for several countries. For Greece, France, Belgium, and Austria the time distance is slightly larger for the older age group than for the low-income group. For other countries the general tendency prevails, but the difference is small for Finland, Sweden and Germany.

Digital divide in countries in time (s-distance): How many months earlier was the level of selected categories in April 2002 attained by average country Internet usage

11.6 Time distance measure (s-distance)

The difference (gap) between two time series is in the present state-of-the-art commonly measured by ratio, absolute or percentage difference at a given point in time. There exists in general an equally universal measure of the difference (gap) between the series for a given level of the indicator expressed in time that is called time distance[10]. The operational statistical measure of the time distance concept is a special category of time distances S-distance : for a given level of XL, XL = Xi(ti) = Xj(tj) the time separating unit (i) and unit (j) is Sij(XL) = DT(XL) = Ti(XL) – Tj(XL).

The time distance approach as a new view of the information, using levels of the variable(s) as identifiers and time as the focus of comparison and numeraire, is theoretically universal, intuitively understandable and can be usefully applied as an important analytical and presentation tool to a wide variety of substantive fields. Being a new complementary view of the information by adding (n+1) dimension to existing measures, no previous results are replaced and adding this time dimension to existing analysis can only enrich understanding. As everybody understands time, from ministers, managers to media and general public, time distance is also an excellent presentation and communication tool.

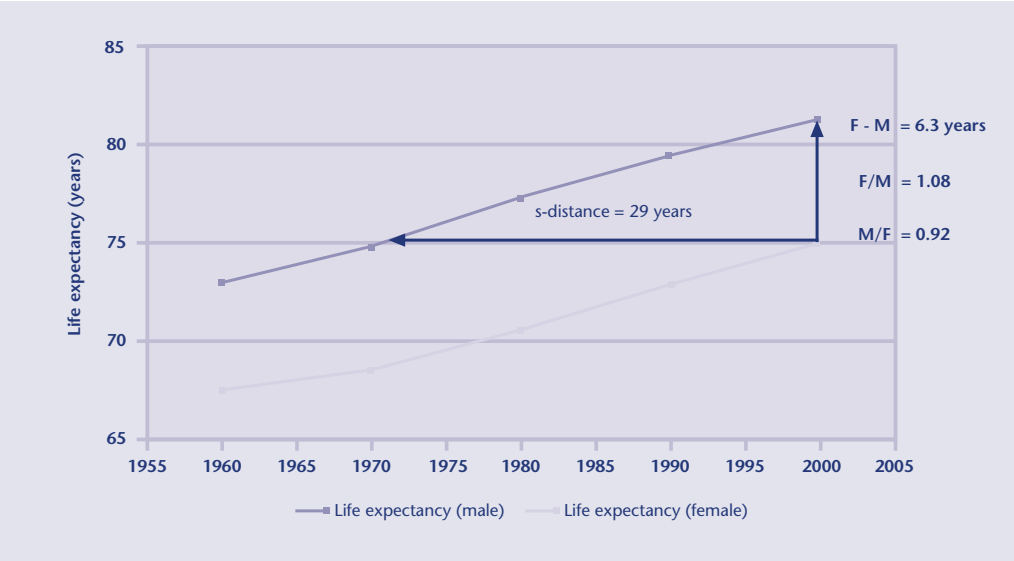
The two empirical examples show that the time distance approach can provide new insights from existing data. That is, degree of disparities may be very different in static terms and in time. A drastic example of this can be found in comparing male-female differences in life expectancy, as an important but slow growing indicator, and the delay in Internet usage for the age group 50+ behind that of total population. In the EU-15 in 2000 the female life expectancy was 6.3 years higher, which amounted to about 8 percent difference in relation to that of men[11]. However, the time distance was an astonishing 29 years. This means that women attained the male life expectancy for 2000 already in 1971, about three decades ago.

With respect to the percent of Internet usage in April 2002, the value for total population was 50.27 percent, while that for the age group 50+ amounted to 25.05 percent[12]. The former category had a 100 percent higher value,or the latter attained only 50 percent of the former. But the time distance was only about 1.6 years (19 months), due to very high growth rates of Internet usage.

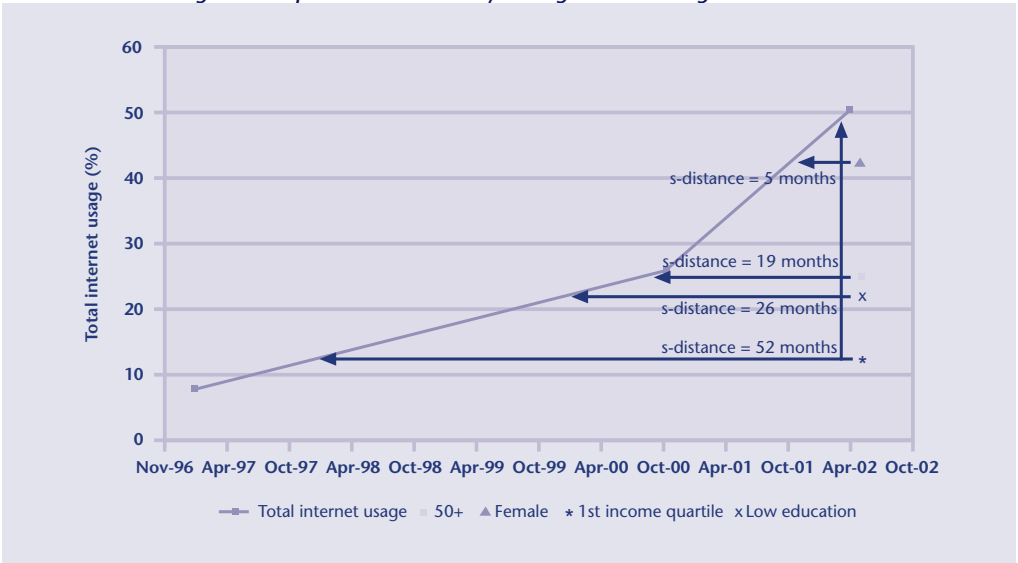
Using only static measures for these indicators, a very biased perception of the overall degree of disparity and of the difficulty in eliminating the gaps in the two domains would be reached. Comparing 100% (or 50%, depending on the formulation of the static relative measure) with 8% would mean that the gap in the Internet usage is a much more prevailing concern, in numerical terms beyond any doubt. Time distance perspective of the gap gives complementary information that leads to a qualitatively different conclusion, 1.6 years against 29 years, respectively. The conclusion is obvious, both dimensions are to be analysed simultaneously to arrive at a more realistic evaluation of the situation.

The novel time distance methodology proposes a new perspective to the problem, an additional statistical measure, and a presentation tool for policy analysis and debate that is readily understood by policy makers, media and general public. This is not a methodology oriented towards a specific substantive problem but an additional view to many problems and applications[13]. In an information age a new view of the existing databases should be evaluated as an important contribution towards a more efficient utilisation of the available information complementing, rather than substituting, the existing methods in extracting the relevant information content and new insights from available data.

Static measures disparity and time distance between life expectancy for females and males for EU-15 in 2000



Digital divide in EU-15 in time (s-distance): How many months earlier was the level of selected categories in April 2002 attained by average Internet usage



1 Statistical Indicators Benchmarking the Information Society.

2 The reports are available at http://www.sibis-eu.org.

3 eCommerce typology is a compound indicator based on the following criteria:
- Offline: Establishments without access to the Internet, e-mail and without a Website.
- Basic online: Establishments without a presence on the Internet (e.g. Website), but with access to the Internet or e-mail.
- Web marketing: Establishments with a presence on the Internet (e.g. website), but none of the following.
- Web sales: Establishments that sell goods or services via the Internet (through own website and/or via eMarketplaces), but none of the following.
- CBNI - Closed Business Network Integration: Establishments that use EDI or Extranets for communication with forward or backward linkages in the communication network, but none of the following.
- All round eCommerce: Establishments that sell online as well as practice value chain integration.

4 DBC synthetic indicator calculated on the basis of the following components: Pervasiveness of Internet technologies in the consumer market - Ranking by country (Source: STAR Issue Report No. 29/ Databank Consulting's elaboration on data from OVUM 2000, European Commission 2000); Share of population using the Internet in the last 4 weeks (Source: SIBIS GPS 2002; question A7); Secure servers for eCommerce (Source: Netcraft - www.netcraft.com, OECD Communications Outlook 2001, p.102); Share of Internet buyers ordering products or services online in the last 4 weeks (SIBIS GPS 2002, question B2); Share of Internet users spending 1-5 hours on the Internet at home (SIBIS GPS 2002, question A9). For more information see SIBIS Topic Report No.7 "eCommerce", available on www.sibis-eu.org.

5 For the AWAI index, SIBIS distinguishes between worker-centred and company-centred flexibility. The AWAI thus consists of two elements: one subindex measuring worker-centred flexibility and another one measuring company-centred flexibility. For each of these, a number of key indicators were identified. The selection of component indicators was not derived using statistical methods, but through consensus-building involving experts and policy-makers at the EU and nation state level, taking the SIBIS model of changes in work relationships as a starting point. Data sources are the SIBIS surveys plus the Community Labour Force Survey, the European Survey on Working Conditions, the European Continuing Vocational Training Survey and the OECD. For more information see www.sibis-eu.org.

6 For more information see SIBIS Topic Report No.4 "Education", available on www.sibis-eu.org.

7 See e.g. Sicherl, P. (2003), Comparing in Two Dimensions: A Broader Concept and a Novel Statistical Measure of the Time Dimension of Disparities, European Societies (forthcoming).

8 Sicherl, P. (2003), 'Different Statistical Measures Provide Different Perspectives on Digital Divide', eWISDOM 2/2003 (forthcoming).

9 Website accessibility initiative WAI: The World Wide Web Consortium's (W3C) commitment to lead the Web to its full potential includes promoting a high degree of usability for people with disabilities. WAI, in coordination with organizations around the world, pursues accessibility of the Web through five primary areas of work: technology, guidelines, tools, education and outreach, and research and development. See http://www.w3.org/WAI/.

10 See e.g. Sicherl, P. (1997), A Novel Methodology for Comparisons in Time and Space, Reihe Osteuropa No. 45, Institute for Advanced Studies, Vienna. Several papers of the author of the time distance concept of measuring differences between time series Professor Pavle Sicherl, SICENTER and University of Ljubljana, can be found on http://www.sicenter.si/td.html. They provide more details on time distance methodology with empirical application to a range of problems. The time distance concept can be generalised to other types of applications - analysis of discrepancy between the estimated and actual values and goodness-of-fit in time series, regressions and models, forecasting and monitoring etc., and extended to variables other than time.

11 Based on data by Eurostat.

12 Based on data from the survey in the SIBIS project, the detailed description of the definition of the disadvantaged groups is found in Hannes Selhofer, Tobias Hüsing: The digital divide index - a measure of social in-equalities in the adoption of ICT. Paper presented at the IST 2002 Conference, Session "Bridging the Digital Divide" Copenhagen, 4-6 Novermber 2002

13 In comparative analyses a better integration of comparisons across time and space is needed. In the dynamic world of today it is hardly satisfactory to rely only on static measures of disparity. Among other problems, the static statistical measu res of disparities like ratios or percentage differences (or Gini coefficient, Theil index or coefficient of variation for the case of many units) are insensitive to the changes in the absolute magnitude of growth rates of the indicator (or differences in growth rates among different indicators) and take into account only differences in growth rates between the units. They have to be supplemented by Sicherl distance to incorporate the temporal relative position of a given unit against the benchmark as an essential element of analysis.

14 For example, check http://www.jupitermmxi.com/europelanding.html.

15 For example, check http://www.jupitermmxi.com/europelanding.html.

16 Regional identifier referring to level 2 regions as defined in the Eurostat publication "Statistical regions in the EFTA countries and the Central European Countries (CEC), November 2001"; level 3 is to be used in case level 2 regions are not defined for the respective country (Baltic states, Slovenia)" (cf. http://europa.eu.int/comm/eurostat/ramon/nuts/statistical_regions_t1_en.html).

17 See note above.