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Delays in delivering Lisbon targets analysed by the novel time distance monitoring method[1]

Povzetek

Metoda časovne distance predstavlja nov praktičen in razumljiv dodaten pogled na spremljanje uresničevanja ciljev. ***S-časovna-distanca (izražena v enotah časa) je tukaj uporabljena na primeru lizbonskih ciljev za EU in ciljev NRP za posamezne članice kot prezentancijsko in komunikacijsko orodje, ki je intuitivno razumljivo politikom, strokovnjakom, menedžerjem, medijem in javnosti.*** *Zato lahko pomaga uresničevati proklamirano usmeritev za večjo transparentnost in komunikacijo s širšo javnostjo. Za dejansko vrednost v določenem letu ugotavljamo, kdaj naj bi bila ta vrednost dosežena na postavljeni liniji do cilja in časovna distanca izraža prednost ali zaostanek v času glede na linijo do cilja.*

Analiza predstavlja dodaten pogled na uresničevanje dveh ciljev, ki sta bila specificirana v statistični prilogi Poročila Komisije. Za indikator stopnja zaposlenosti EU27 v 2007 zaostaja za linijo do cilja za 2,8 let; za delež R&R izdatkov v BDP pa za več kot 6 let, saj je vrednost v letu 2006 nižja od tiste leta 2000. Podrobni rezultati za posamezne države so prikazani v besedilu in prilogi. Analiza je razširjena tudi na uresničevanje za 12 indikatorjev iz 7 tem trajnostnega razvoja za EU15. Kar za 4 indikatorje, povezane z dolgoročnimi problemi v tem obdobju, ni napredka: delež cestnega prometa v tovornem prometu, emisije toplogrednih plinov, delež elektrike iz obnovljivih virov in delež R&R izdatkov v BDP. Le za 4 indikatorje so bile dejanske vrednosti pred linijo cilja.

SICENTER je pripravil spletno aplikacijo s prostim dostopom za monitoring z metodo časovne distance, kar omogoča, da jo za različne namene uporabljajo mednarodne in nacionalne organizacije, strokovnjaki, menedžerji, študentje in mediji.

Ključne besede: *monitoring, S-časovna-distanca, lizbonski in NRP cilji, brezplačno spletno orodje za spremljanje uresničevanja ciljev.*

Summary

This article demonstrates that the novel time distance monitoring method can provide a practical and understandable new view for monitoring implementation of targets. Here, for Lisbon and NRP targets, ***the novel S-time-distance measure (expressed in time units) can function as an excellent presentation and communication tool which is intuitively understood by policymakers, professionals, managers, media and the general public.*** *It serves the proclaimed need for greater transparency and communication with the public. The actual attainment in a given year is compared with the time when such level was supposed to be reached on the line to target. The S-time-distance measure thus deals with a lead or lag in time against the specific line to target.*

First we study the degree of implementation for two targets specified in the European Commission's report. The total employment rate for the EU-27 was in 2007 about 2.8 years behind the line to target. For the share of R&D expenditures in GDP, the time delay was more than six years; the value in 2006 was even lower than the starting value in 2000. Detailed results by country are shown in the text and in the annex. Extending the analysis of implementation to 12 selected structural and sustainable development indicators for the EU-15 across 7 SD themes shows that for four indicators related to long-term issues, no progress was shown: for the road share of inland freight transport, total greenhouse

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gas emissions, share of electricity from renewable resources and share of R&D in GDP. For four other indicators, the S-time-distance showed that the EU-15 was ahead of the line to target.

A free Web monitoring tool was developed by SICENTER that allows a variety of interested users, such as international and national organisations, NGOs, experts, managers, educators, students and the media, to monitor the implementation of Lisbon and NRP targets with S-time-distance.

Key words: *monitoring, S-time-distance, Lisbon and NRP targets, free Web monitoring tool.*

JEL: C490, C880, N100, O520

1. New understanding from existing data for better communication and transparency

The time distance perspective provides a practical and understandable new complementary view to the Commission report about the implementation of targets before the need to turn to more complex methods. The purpose of the article is twofold. On the methodological side, this application demonstrates how the time distance method can enrich the methodology of monitoring the implementation of targets also in many other fields; the available free Web monitoring tool facilitates such applications. It is simple to understand – it is an additional view from existing data to complement other methods, and it enriches the perception of the situation.

In the empirical application, first the implementation of the two EU Lisbon 1 targets for employment rate and R&D in GDP (specified in the annex to the Commission report) are analysed for the EU-27, EU-15 and for individual countries. This is followed by analysis of the implementation of the National Reform Programmes (NRP) for these two targets. The next session extends the analysis for the EU-15 to 12 selected sustainable development indicators across 7 thematic areas to show the applicability and the results for a broader area of policy concerns.

In the Strategic Report on the Renewed Lisbon Strategy for Growth and Jobs: Launching the New Cycle (2008–2010),[2] the Commission in its communication to the European Council indicated that by re-launching the Lisbon Strategy in 2005 and refocusing it on growth and jobs, Europe has come a long way. In the statistical annex, the results of annual progress are provided for Member States for the shortlist of 14 structural indicators.

It is understandable that in such a summary strategic report, there is not enough space to deal with a broader analysis of implementation over a greater number of indicators in several fields of concern. However, no good governance uses target-setting alone to specify the vision and the desired direction; instead, it uses feedback from the implementation to adjust the future actions. In principle, in the methodological framework for assessing progress with the implementation of the Growth and Jobs Strategy, qualitative assessment should be accompanied by quantifications drawing on available quantification techniques.

In the statistical annex, the country fiches provide the raw statistical data for such evaluation against the two sets of targets mentioned: 2010 EU targets and 2010 national targets, and total employment rate and share of gross domestic expenditure on R&D in GDP, respectively. Yet the graphs presented in terms of difference from the EU-27 average do not provide an operationally transparent measure to evaluate the degree of implementation in the past, which would bring a clear political message to policymakers at both the EU and the national levels, as well as to the general public. Much effort over the years has been put into developing indicator systems and data coverage, but not enough attention has been paid to finding new innovative ways to utilise them in the next phases – knowledge-building and policy use.

The S-time-distance[3] measure is a new quantification technique with clear interpretability that is now

[2] Commission of the European Communities (2007), Communication of the Commission to the European Council, COM (2007) XXX final – PART I, Brussels, December 11.

[3] S-time-distance measures the distance (proximity) in time between the points in time when the two series compared reach a specified level of the indicator X. The observed distance in time (the number of years, months, etc.) for given levels of the indicator is used as a temporal measure of disparity between the two series, in the same way that the observed difference (absolute or relative) at a given point in time is used as a static measure of disparity. For general methodology see Sicherl (2007b, 2007c, 2008) or consult e.g. the website http://www.gaptimer.eu/content/view/3/22/. Sicherl (1999) also provided an extension of this approach for variables other than time.

available to complement other techniques. Targets are usually expressed not only in terms of indicator values, but simultaneously also in time. Thus one can establish a line to the target (like a train or bus timetable), and then compare the actual value in a given year with the line to target in two dimensions:

1. deviation in the absolute level or percentage at a given point in time; and

2. deviation in the time of a given actual value from the envisaged time on the line to the target.

The definition of S-time-distance for monitoring is simple and will be mentioned only briefly. The underlying idea is that time series can be compared in two dimensions. In addition to the usual comparisons for a given point in time, the time distance approach uses an additional perspective: it compares the respective time series in the ***horizontal dimension***, i.e. for a given level of the variable. This innovation opens the possibility for simultaneous two-dimensional comparisons of time series data: vertically (standard measures of static difference), as well as horizontally (Sicherl time distance).

S-time-distance for a given level of X_L is defined as

$$S_{ij}(X_L) = \Delta t(X_L) = t_i(X_L) - t_j(X_L).$$

The sign of the time distance comparing two variables is important to distinguish whether we are dealing with time lead (-) or time lag (+) (in a statistical sense, and not as a functional relationship)

$$S_{ij}(X_L) = -S_{ji}(X_L).$$

Figure 1 shows an example for monitoring implementation of the total employment rate in the EU-27 for 2007 in two dimensions: the actual value was 3.2 percent below and 2.8 years behind the line to the 2010 target.

The time distance information (of lead or lag against the line to target) seems to be at least as helpful in providing a proper perception of the progress in implementation or the lack of it as is the percentage difference at a given point in time. The degree of disparity may be very different in static terms and in time; we need both perspectives for a more realistic perception of the situation.

S-time-distance is a generic concept, like the percentage difference or growth rate (Sicherl, 1999). Events are dated in time; therefore in time series comparisons, regressions, models, forecasting and monitoring, the notion of time distance has always been there as a "hidden" dimension. In such capacity its application can be much more complex (e.g. more intersections for a given level). Such problems do not appear in this monitoring application.

2. Analysis of implementation of Lisbon 1 targets for employment rate and R&D in GDP

The EU is performing better, but there is no room for complacency.[4] We shall track the timetable for implementation of the Lisbon Strategy for the two targets specified in the report. For each of them, the line to target is calculated between the actual for 2000 and the target in 2010 under the assumption of a required constant rate of growth of the indicator in this period (exponential line to target). First we explore the results for the EU Lisbon 1 targets.

Figure 1 shows the deviations of actual values from the line to the Lisbon 1 target in two dimensions (for

Figure 1:

[4] EUROCHAMBRES (2007), Progress within the EU but global comparisons underline need for vigilance, Brussels, March, http://www.sicenter.si/pub/2007/070305-TimeDistanceStudy2.pdf.

Table 1: Tracking the timetable to Lisbon

Monitoring implementation of the EU Lisbon 1 targets in the time dimension

	S-time-distance (years)							
European Union	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Total employment rate								
EU (27 countries)	0	0.6	1.9	2.5	3.1	3.3	2.9	2.8
EU (15 countries)	0	0.1	0.7	1.4	1.8	1.9	1.6	1.6
Share of R&D in GDP								
EU (27 countries)	0	0.9	1.8	2.9	> 4	> 5	> 6	
EU (15 countries)	0	0.9	1.8	2.9	> 4	> 5	> 6	
Growth rate of GDP								
EU (27 countries)	0	0.3	0.9	1.5	1.7	2.0	2.0	2.0
EU (15 countries)	0	0.4	1.0	1.6	1.8	2.2	2.2	2.3

S-time-distance (years) = - time lead (ahead of path to target), + time lag (behind the path to target)

> x - Actual value is worse than the starting value, therefore S-time-distance is more than x

Source: Own calculations from data from the Commission of the European Communities (2007) and Eurostat.

more details on using S-time-distance for monitoring, see Sicherl, 2006 and 2007a). For instance, the value of the total employment rate for 2007 of 65.4 is 3.2% below the line to target and 2.75 years behind the line to target. If the EU-27 were on the line to target, this value for 2007 would already have been achieved in 2004.

We have now two bits of information to build a perception of the degree of delay in implementation, which together give a better evaluation of the reality. On the first impression it may seem that a deviation of about 3% does not look like an important difference. A delay in time of nearly three years may bring a different perception of the degree of the problem. Both measures are easy to calculate and to understand, but the present state of the art neglects this additional information and thus leads to an information loss that is unjustifiable.

Obviously, notwithstanding the progress in employment in the last years, the total employment rate for the EU-15 is still 1.6 years and for the EU-27 about 2.8 years behind the line to target. In other words, the actual values achieved in 2007 were envisaged to be reached that much time earlier. The good news is that the time lag behind the line to target did not increase further after 2004; in the coming years, further acceleration might decrease the lag. Yet the time distance of about 2.8 years or percentage shortfall of 3.2% are far from negligible if we look at an illustration in absolute numbers. The shortfall from the line to target would be in the order of magnitude of 7 million employed.

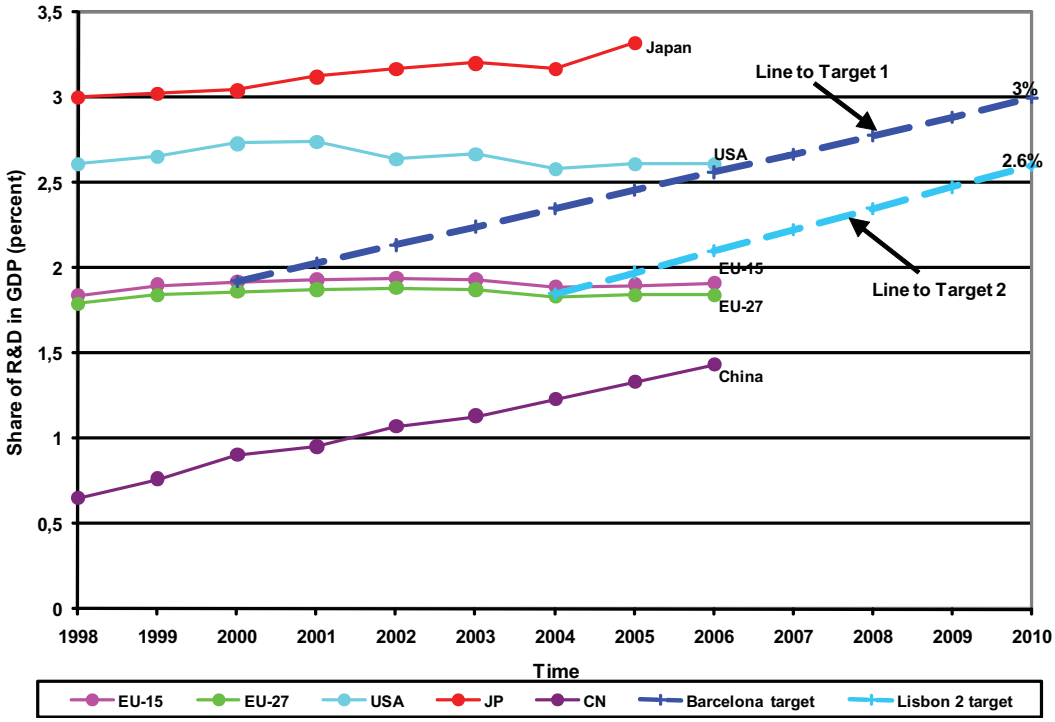
The situation with respect to the share of R&D expenditures in GDP is much worse and totally unsatisfactory. S-time-distance indicates that the time delay is more than 6 years; the value in 2006 was even lower than the starting value in 2000. In other words, no progress was achieved in this indicator. With the initial target of 3% of GDP, the actual value in 2006 was below the line to target by about 26% percent for the EU-27 and about 24 percent for the EU-15.

The stagnation of the indicator over the last eight years is in sharp contrast with the ambitious target of 3% of GDP and convergence with and overtaking of the United States. There is a question of how this target was set. However, even with less ambitious targets arising from the NRP targets, amounting for the EU-27 to about 2.6 percent of GDP in 2010, the problems of implementation and stagnation of the share are continuing. At the same time, China is increasing its share of R&D in GDP at a higher rate than envisaged in the Barcelona target.

The delay of six years for the EU-27 and EU-15 amounts to a huge sum. Using data from the European Commission (2007) for GDP (in EUR 1,000 million purchasing power standard, current prices), R&D expenditures in 2006 amounted to less than EUR 215 billion. The exponential line to the 3% target would imply for 2006 a ratio of 2.48 and an amount of EUR 289 billion; for the 2.6% target, the ratio would be 2.27 and amount EUR 265 billion. In other words, in 2006 alone the actual value was lower by about EUR 75 billion for the 3% scenario and about EUR 50 billion for the 2.6% scenario.

According to Eurostat (2008), R&D expenditures in 2006 increased to more than EUR 210 billion from EUR 170 billion in 2000. Thus the shortfall from the Lisbon 1 and NRP targets in a single year was larger than the increase between 2000 and 2006. When compared with the United States, the actual R&D expenditures in the EU-27 were in 2006 about EUR 69 billion, or 24% lower. Figure 2 shows a large long-term gap between the share in the United States at about 2.6% and the share in the EU below 2%; a calculation of the cumulative difference in R&D expenditures over the last decade or longer would come to very large sums.

Figure 2: Monitoring Attainment of the Barcelona Target for R&D as % of GDP



Source: Eurostat and OECD.

This stagnation in the share of R&D in GDP happened in a situation where the delay in the growth rate of GDP was not so large. With the line to target of GDP growth under the assumed 3% per year, the S-time-distance delay was 2 years for the EU-27 and 2.3 years for the EU-15 (in percentage terms, 5.8% and 6.5%, respectively). Again, as in the case of total employment rate, the time distance lag for GDP growth has not increased since 2005. But the Eurostat projection of GDP growth rates until 2009 shows that the S-time-distances would increase to 2.8 years for the EU-27 and to 3.2 years for the EU-15, even before the current downgrading of projections. In contrast with the total employment rate and growth of GDP, where the delay expressed in S-time-distance was broadly varying in the range of 2–3 years, for the share of R&D in GDP the delay increased to more than 6 years and to about 25%. In simpler terms, tracking the timetable for this indicator, the delay of more than 6 years in a 6-year period means that the train has not yet left the station.

Comparing performance for total employment rate and growth of GDP against the Lisbon 1 Europe targets, the two measures – percentage deviation and S-time-distance deviation from the line to target – can lead to different perceptions. In percentage terms, in the order of magnitude of 3% for the former and of about 6% for the latter, the deviation is greater for growth of GDP than it is for the total employment rate. Comparing in S-time-distance, the ranking is still the same for the EU-15 (2.3 years and 1.6 years, respectively), but not for the EU-27, where the time delay of 2.8 years for employment is higher than 2 years for GDP growth. The two perspectives together can provide better information for asking the right questions.

3. Analysis of implementation of Lisbon 1 targets by country

For four indicators – total employment rate, female employment rate, employment rate for older workers (for 2000–2007) and share of R&G in GDP (2000–2006) – details are provided for 27 countries in Annex 1. Although the Lisbon 1 2010 targets are meant for the EU collectively and not for individual Member States, the distribution of countries against the collective target brings up interesting information. This allows official institutions, experts, civil society and the media to analyse in more detail the situation in particular countries or groups of countries, and to compare it with the implementation of the NRP targets.

Table 2 provides a summary overview for 2006 of the tables for the four indicators in the upper part of the table. As shown before, for the aggregate figures there are wide differences between the employment situation and the situation of R&D in GDP. For the total employment rate, 7 countries have already

Table 2: Number of countries with a given value of S-time-distance deviation from the line to target

Selected indicators	Exponential line to target							Number of countries
	Years ahead of the line to target			Years behind the line to target				
	TA	-4 – -2	-2 – 0	0 – 2	2 – 4	4 – 6	WTS	
Lisbon 1 targets								
Total employment rate	7	1	5	2	4	6	2	27
Female employment rate	15	0	2	1	3	5	1	27
Employment rate for older workers	12	0	2	3	6	2	2	27
R&D in GDP	2	0	0	2	6	8	9	27
Number of countries	36	1	9	8	19	21	14	108
Percentage distribution	33.3%	0.9%	8.3%	7.4%	17.6%	19.4%	13.0%	100.0%
NRP targets								
Total employment rate	4	2	1	4	2	1	2	16
R&D in GDP	0	0	1	3	7	8	7	26
Number of countries	4	2	2	7	9	9	9	42
Percentage distribution	9.5%	4.8%	4.8%	16.7%	21.4%	21.4%	21.4%	100.0%

TA = target already achieved

WTS = actual value is worse than the starting value

Source: Own calculations from data from the Commission of the European Communities (2007) and Eurostat.

achieved the 2010 target, 6 more are ahead of the line to target, and 14 are behind it. As distinct from the total employment rate, the situation is much better for the female employment rate and the employment rate for elderly workers; 15 countries and 12 countries, respectively, already attained the Lisbon 1 2010 targets by 2007. For the share of R&D in GDP, only Sweden and Finland were above the Barcelona target.

4. Analysis of implementation of NRP targets for employment rate and R&D in GDP

In the re-launched Lisbon Strategy, Member States in their National Reform Programmes (NRP) specify their own national targets in line with their circumstances. This means that the more relevant comparison in the monitoring process for countries is between the degree of implementation and their particular NRP targets, rather than comparing implementation with the EU-27 average, as was done in the statistical annex to the Commission report.

In the NRP, the targets were specified by the countries themselves; the analysis of implementation is much more interesting also in political terms when it is made against the national targets. The targets in the NRP are in many cases lower than the EU targets for the two indicators analysed here. There are exceptions – e.g. for Sweden and Finland, their NRP targets of 4% are higher than the EU target. For R&D in GDP, for which practically all countries specified NRP targets, it is possible to estimate the effect on the overall value for the EU. If all NRP national targets would be attained, the summary value for the EU in 2010 would come to around 2.6% percent, as opposed to the Lisbon 1 target of 3%.

Tables 3 and 4 show the results from monitoring the implementation of NRP targets in the time dimension, i.e. showing whether the countries are ahead or behind the line to their national target. The conclusion is very different for employment rate than for R&D in GDP, though in both cases there are diminished overall values of the targets. For the indicator R&D in GDP, from 26 countries only one was ahead; 25 countries were behind their NRP targets, 19 of them more than three years and 7 of them more than six years. The only country ahead of the line to target is Malta, with the low NRP target for 2010 of 0.75% of GDP.

It is interesting to observe that even Finland and Sweden are behind their line to the NRP target, since they raised it to 4%, but the progress has not been fast enough. The median value of the delay measured by S-time-distance is 4.4 years. This means that the median country moved only about one and a half years along the line to target in a six-year period.

If we weight the time distance deviations by the population of the countries, for countries totalling about 95% of the EU-27 population the time delay was more than three years, and for about 55% more than

five years. In Table 2 and Table 3 there is a group of seven countries for which the share in GDP was in 2006 lower than in 2000, with a time delay of more than six years against their own NRP targets. They have shown decreasing rather than increasing trends for this indicator. Their percentage deviation from the line to NRP targets varies from 15% to 57%. This is a significant group, since it encompasses more than 39% of the EU-27 population.

Regrettably, for about one third of the countries no NRP targets for total employment rate were reported in the Commission report; among them were several large countries. The results available for 16 countries for employment rate show that in 2007, seven countries were ahead and nine countries behind in reaching the envisaged values on their line to target. Four countries reached their national targets for total employment rate in 2007.

Table 3: Implementation of NRP targets for the share of R&D in GDP

	S-time-distance (in years)							
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
EU-27	0	0.8	1.7	2.8	> 4	> 5	> 6	
EU-25	0	0.8	1.7	2.8	> 4	> 5	> 6	
EU-15	0	0.8	1.7	2.8	> 4	> 5	> 6	
Malta			0	1.0	-3.5	-2.5	-1.5	
Austria	0	-0.5	-0.3	-0.4	0.7	-0.3	0.1	0.6
Estonia	0	-0.3	0.6	1.0	1.0	1.3	0.5	
Czech Republic	0	> 1	> 2	2.4	3.4	2.1	1.5	
Cyprus	0	0.7	0.5	0.4	1.0	1.4	2.1	
Latvia	0	> 1	> 2	> 3	> 4	3.0	2.2	
Spain	0	1.0	0.9	1.2	2.1	2.4	2.5	
Hungary	0	-1.0	-1.0	0.9	2.6	2.8	3.0	
Denmark	0	-1.2	-1.9	-1.8	0.5	1.9	3.2	
Ireland	0	> 1	> 2	2.3	2.4	3.1	3.4	4.0
Lithuania	0	0.0	1.1	2.0	1.9	2.9	3.5	
Finland	0	> 1	1.7	1.5	2.2	2.7	4.2	6.5
Germany	0	0.8	1.2	1.6	3.2	4.4	4.4	
Slovenia	0	0.0	1.3	> 3	3.9	4.6	4.4	
Italy	0	0.6	1.2	2.4	3.5	4.6		
Romania	0	0.7	1.8	2.7	3.7	4.4	4.8	
Portugal	0	0.4	2.0	> 3	3.9	4.3	5.0	
Sweden				0	> 1	> 2	> 3	
Greece		0		> 2	> 3	4.0	> 5	
United Kingdom	0	> 1	> 2	> 3	> 4	> 5	> 6	
France	0	0.3	0.9	2.7	4.0	> 5	> 6	
Belgium	0	-0.3	> 2	> 3	> 4	> 5	> 6	
Netherlands	0	> 1	> 2	> 3	> 4	> 5	> 6	
Slovakia	0	> 1	> 2	> 3	> 4	> 5	> 6	> 7
Luxembourg	0			2.9	> 4	> 5	> 6	
Poland	0	> 1	> 2	> 3	> 4	> 5	> 6	

S-time-distance: (-) actual ahead or (+) behind the line to target (years)

TA - Target already achieved

> x - Actual value is worse than the starting value, S-time-distance is more than x years

Source: Own calculations based on data from the Commission of the European Communities (2007) and Eurostat.

Table 4: Implementation of NRP targets for total employment rate for the 16 countries for which NRP targets were presented in the Commission Report

	S-time-distance (in years)							
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Slovenia	0	-1.0	0.8	> 3	-0.8	-1.1	-1.3	TA
Cyprus	0	-3.1	-3.6	-3.7	-2.1	-0.4	-1.4	TA
Bulgaria	0	> 1	1.8	1.1	0.6	0.2	-1.1	TA
Latvia	0	-0.2	-1.2	-1.7	-1.2	-1.3	-3.3	TA
Spain	0	-0.7	-0.4	-0.8	-1.2	-2.4	-2.8	-2.6
Estonia	0	0.3	0.2	0.3	1.1	0.7	-2.1	-2.4
Ireland	0	-0.3	1.4	2.4	1.7	-0.1	-1.2	-1.2
Greece	0	> 1	0.6	0.0	0.0	0.1	-0.1	0.4
Czech Republic	0	1.0	-0.3	> 3	> 4	> 5	4.3	0.7
Lithuania	0	> 1	1.1	0.8	1.7	1.2	1.2	0.8
Malta	0	0.6	1.3	3.0	> 4	> 5	3.8	1.6
Finland	0	-0.3	0.7	2.3	3.4	3.2	2.9	2.5
Hungary	0	> 1	> 2	0.0	1.9	2.5	1.8	2.8
Belgium	0	> 1	> 2	> 3	> 4	4.3	5.4	5.3
Portugal	0	-2.8	-0.5	> 3	> 4	> 5	> 6	> 7
Romania	TA	> 1	> 2	> 3	> 4	> 5	> 6	> 7

S-time-distance: (-) actual ahead or (+) behind the line to target (years)

TA - Target already achieved

> x - Actual value is worse than the starting value, S-time-distance is more than x years

Source: Own calculations based on data from the Commission of the European Communities (2007) and Eurostat.

It is unfortunate that for 11 countries, their NRP targets for employment rate as one of the cornerstones of the Growth and Jobs Strategy were not provided in the Commission report. It is suggested that they be invited to specify or re-specify them to confirm the overall political commitment to the process.

5. Extending the analysis for the EU-15 to selected sustainable development indicators

Another application of time distance methodology for monitoring implementation deals with a selection of sustainable development indicators. In Table 5 alone, there is a wealth of clear information about being on or off track to the targets for 12 selected indicators from 7 thematic areas for all years for the EU-15.

The EU-15 was chosen as it is easier to get data and other information, and as these countries were actually members of the EU over the whole period. However, this type of analysis can be repeated in the EU case for all 27 countries across a selected number of available indicators with established targets.

People will intuitively understand the lead or delay in time of actual implementation against the assumed timetable for the proclaimed targets over many indicators from various fields of concern. It is a good example to show that the S-time-distance measure is easy to understand and comparable across variables, fields of concern and units of comparison.

For indicators of sustainable development, it is common that the desired direction over time is a decreasing tendency for some and increasing for others. Out of these 12 indicators, there are 5 indicators for which the policy target is decreasing. Percentage differences between the line to target and actual values are very useful, but their comparison over many indicators with different desired tendencies may be tricky. For positively oriented indicators, it is desirable that the actual value is above the line to target; for negatively oriented indicators, such situation is not desirable. S-time-distance is better in this respect; the time distance for a given level of the indicator can deal with indicators from both tendencies in the same easy, understandable way. It can be used also for benchmarking in preparing targets after 2010.

Table 5: Monitoring implementation of Lisbon 1 targets for EU-15 across 7 SD themes

(S-time-distance deviation from the exponential hypothetical line to target)										
			S-time-distance in years							
Theme		**Proposed SDI**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Theme 1 - Economic development	1	Share of R&D in GDP	0	0.9	1.8	2.9	> 4	> 5	> 6	
Theme 1 - Economic development	2	Total employment rate, %	0	0.1	0.7	1.4	1.8	1.9	1.6	1.6
Theme 1 - Economic development	3	Employment rate, females, %	0	-0.6	-0.6	-0.7	-0.9	-1.4	-1.9	-2.5
Theme 2 - Sustain. consumption and production	4	Municipal waste landfilled, kg per capita	0	0.2	-0.6	-2.3	-4.2	TA	TA	
Theme 3 - Social inclusion	5	Life-long learning, %	0	1.0	1.7	-1.5	-2.5	-2.7	-1.5	-0.7
Theme 3 - Social inclusion	6	Early school-leavers, %	0	0.6	1.4	2.1	2.4	3.0	3.9	4.4
Theme 4 - Demographic changes	7	Employment rate of older workers, %	0	0.1	-0.2	-0.5	-0.2	-0.6	-0.5	-0.5
Theme 6 - Climate change and energy	8	Total greenhouse gas emissions	0	> 1	> 2	> 3	> 4	> 5		
Theme 6 - Climate change and energy	9	Share of electricity from renewable sources	0	0.0	> 2	> 3	3.8	> 5		
Theme 7 - Sustainable transport	10	People killed in road accidents	0	0.7	1.2	1.0	0.6	0.8		
Theme 7 - Sustainable transport	11	Road share of inland freight transport	0	> 1	> 2	> 3	> 4	> 5	> 6	
Theme 9 - Global partnership	12	Official development assistance, % of GNI	0	0.4	0.1	0.5	2.1	-1.8	-0.3	2.2

S-time-distance in years: - actual ahead of line to target, + actual behind the line to target

TA - Target already achieved

> x - Actual value is worse than the starting value, therefore S-time-distance is more than x

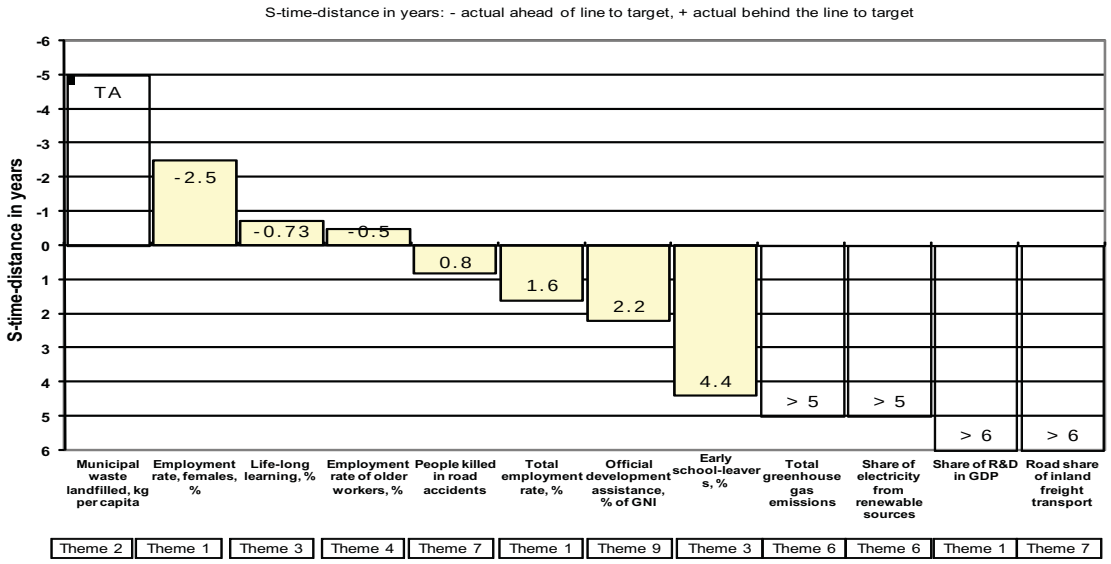
Source: Own calculations based on data from Commission of the European Communities (2007) and Eurostat website.

Table 5 shows the lead and lags against the exponential lines to target for all available years. In this way it is possible to follow not only individual S-time-distance values for a given year, but also any consistent tendencies or variations over time. The purpose of this paper is to show the methodological capabilities of the time distance methodology to complement existing statistical measures, rather than entering into detailed analysis over the wide range of issues.

Figure 3 exhibits the S-time-distances for 12 indicators for the latest available years for the indicators in Table 5 (2007, 2006 or 2005). The essence is to compare delays across indicators from various themes. The picture is clear: delays expressed by the S-time-distance measure are the greatest for road share of inland freight transport, share of R&D in GDP, share of electricity from renewable resources and total greenhouse gas emissions. In all these four cases, the indicators were worse at the end of the period than in the starting year.

Although this is just a small selection of the sustainable development indicators that can benefit from adding time distance analysis to other methods, an interesting observation can follow. The four indicators with the greatest delays in time are related to **long-term issues:** sustainable transport (theme 7), share of R&D in GDP (theme 1), total greenhouse gas emissions and share of electricity from renewable resources (theme 6, climate change and energy).

Figure 3: Monitoring implementation of Lisbon 1 targets for the EU-15 across 7 themes of sustainable development indicators



6. SICENTER has developed a FREE WEB TOOL to monitor implementation of targets with the S-time-distance measure

The purpose of developing the free Web tool is to empower a broad range of stakeholders in Europe and in the world with an excellent presentation and communication tool that is easily understood by policymakers, experts, managers, media and the general public; it can support decision-making as well as influence public opinion.

Potential users could be all stakeholders who would like to take advantage of this complementary statistical measure for analysis and policy debate at various levels, e.g.: international and national organisations, NGOs, experts, businesses, managers, educators, students, interest groups, the general public and the media. They can calculate the lead or lag in time for tracking implementation of targets at the global, regional, national, sub-national or business levels, e.g. Lisbon, NRP and sustainable development targets in the case of the EU, UN Millennium Development Goals, or other planned, budgeted or aid disbursement targets. Besides the application to official data and targets, it can be used as a do-it-yourself tool to track implementation by using your own choice of data and assumptions.

What are some benefits of using the S-time-distance tool for monitoring?

1. The time distance information is at least as helpful for proper perception of the progress in implementation or the lack of it as the percentage difference is.
2. It complements rather than replaces other methods.
3. It is comparable across variables, fields of concern and units of comparison.
4. This innovation provides simultaneous two-dimensional comparisons of time series data: vertically (standard measures of static difference) and horizontally (Sicherl time distance).
5. Empirically, the perceptions of the degree of disparity may be very different in static terms and in time distance.
6. Thus, the broader conceptual and analytical framework leads to new conclusions and richer semantics important for policy considerations.

The free Web tool for monitoring with the S-time-distance measure is available at http://www.gaptimer.eu/s-t-d_monitoring_tool.html. The instructions for preparing input files are on the website. Some input files for EU structural indicators and the results are also available there for easier initial browsing.

The Web tool was prepared first for the application for monitoring implementation of Lisbon and NRP targets. SICENTER would like to express its thanks for the donations that helped our own efforts for the preparation of the Web tool: Government Office for Growth, Republic of Slovenia; the Slovenian Science Foundation; and EUROCHAMBRES (Brussels).

Another application is under discussion with the United Nations Statistical Division for Application for monitoring implementation of the UN Millennium Development Goals. As mentioned above, this could be used for tracking implementation of targets at the global, regional, national, sub-national or business levels.

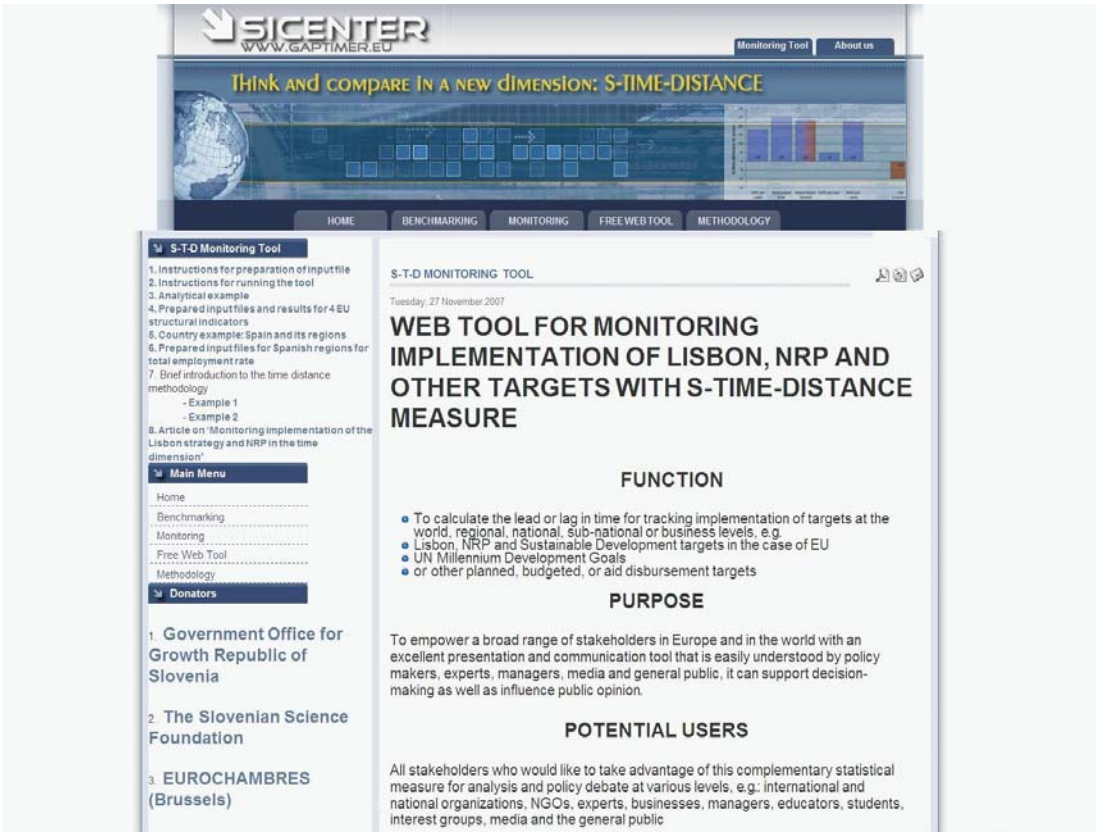
Below are two pictures showing the Web tool entry page and an example of a portion of the results for a given country with two accompanying graphs. This example refers to the total employment rate for Germany. In the country table, the first line shows the line to target from 2000 to 2010, with an assumed exponential line to the target 70. The second line contains the actual values of the total employment rate. In the third line are calculated values of S-time-distance between actual values and the line to target, accompanied in the fourth line by the time on the line to target which corresponds to the actual value in a given year. The fifth line shows the deviation between the actual values and the line to target in percentage terms.

respective times on the line to target. Annex 1 shows examples of sorted S-time-distance tables for 30 units for the four selected indicators for country results against the Lisbon 1 EU targets (e.g. Table 3 shows the S-time-distance deviations from the respective NRP targets).

7. Conclusions

If the relevant EU and national bodies would care to assess the S-time-distance measure by the same eight criteria applied to the selection of structural indicators like 1. Easy to understand, 2. Policy-relevant, 3. Mutually consistent, ... 6. Comparable between

Figure 4:



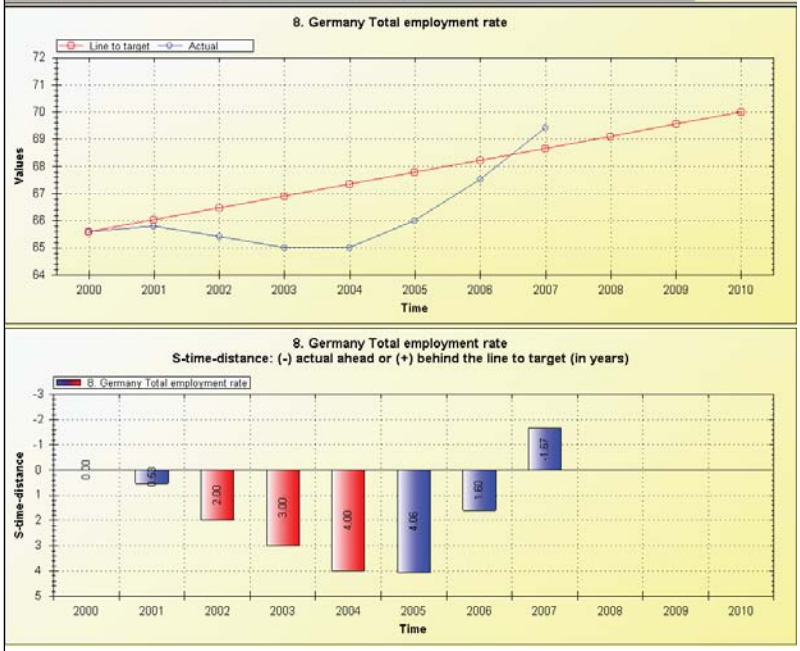
The two graphs for each country or group provide a visualisation of the monitoring results. As indicated, the output files provide the S-time-distance and percentage deviations from the line to target and two graphs for each of the countries and groups. The example for Germany presents deviations in both dimensions: S-time-distance and percentage deviations from the line to target. Users can download this information and use it for further calculations and graphing. Equally, it is possible to download results into tables for all countries from each input file for S-time-distance, percentage deviation and the countries, etc. (Munoz 2004), **then for this application for monitoring implementation** of the Lisbon EU and NRP strategies by structural and sustainable development indicators, **the S-time-distance measure would pass the test with flying colours.**

This paper offers an enhanced extension of the monitoring system that could be used across indicators, as well as across and within countries. S-time-distance is simple, easy to understand by everybody and well placed to complement rather than replace existing methods for tracking implementation.

Figure 5:

8. Germany Total employment rate

8. Germany Total employment rate	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Line to target	65.6	66.03	66.46	66.89	67.33	67.76	68.21	68.65	69.10	69.55	70
Actual value	65.6	65.8	65.4	65	65	66	67.5	69.4			
S-time-distance	0	0.53	2	3	4	4.06	1.60	-1.67			
Time on LT	2000	2000.47				2000.94	2004.40	2008.67			
Deviation in [%]	0	-0.34	-1.59	-2.83	-3.45	-2.60	-1.03	1.09			



The free web tool provides estimates of the S-time-distance and percentage deviations from the line to target and two graphs for each of the 27 EU countries and for EU-27, EU-25 and EU-15 aggregates.

These results present the situation in transparent terms with clear interpretability also to the general public, which can facilitate understanding, commitment and broader participation in the Lisbon process. This means that the more relevant comparison in the monitoring process for countries is between the degree of implementation and their particular NRP targets, rather than comparing it in graphs with the EU-27 average, as was done in the statistical annex to the Commission report.

The degree of implementation for the two EU targets specified in the Commission report showed that the total employment rate for the EU-27 was in 2007 about 2.8 years behind the line to target; for the share of R&D expenditures in GDP, S-time-distance indicates that the time delay was more than 6 years in a 6-year period, as the value in 2006 was even lower than the starting value in 2000. Annex 1 brings additional information on how individual countries are faring against the EU targets. The situation with R&D expenditures is a complete disappointment; the total employment rate is not close to the line to target. However, the targets for female employment rate and employment rate for elderly workers are for the EU overall very close to the line to target; for about half of the countries, the 2010 targets were already reached by 2007.

In the re-launched Lisbon Strategy, Member States in their National Reform Programmes (NRP) specify their own national targets in line with their circumstances. The analysis of implementation is much more interesting also in political terms when it is made against the national targets. These are in most cases lower than the EU targets. For the share of R&D in GDP, the summary of national targets would imply the EU target of 2.6% in 2010. For the total employment rate as one cornerstone of the Growth and Jobs Strategy, it is unfortunate that for 11 countries their NRP targets for employment rate were not provided in the Commission report. This is not a good sign for the overall political commitment to the process.

The application of national targets for the share of R&D in GDP unfortunately did not change the conclusion that its implementation is equally disappointing, as all countries (except Malta, with a low target) are much behind the line to target. For countries totalling about 95% of the EU-27 population, the time delay was more than three years, and for about 55% more than five years; for seven countries with nearly 40% of the population, the value in 2006 was lower than in 2000. This is not a good indicator for the long-term position of the EU in the world.

Next we tested the S-time-distance methodology for the analysis of implementation on 12 selected structural and sustainable development indicators

for the EU-15 across 7 SD themes. This is a good example to show that the S-time-distance measure is easy to understand and comparable across variables, fields of concern and units of comparison.

The four indicators with the greatest delays in time are related to **long-term issues**: sustainable transport (theme 7), share of R&D in GDP (theme 1), total greenhouse emissions and share of electricity from renewable resources (theme 6, climate change and energy); for all of them, the indicators were worse at the end of the period than in the starting year. This brief analysis indicates that the implementation of SD targets is very disappointing in several cases, with long-term consequences. This type of analysis can be repeated in the EU case for all 27 countries across a greater selected number of available indicators with established targets.

SICENTER has developed a free Web tool that allows a variety of interested users to monitor the implementation of Lisbon, NRP and other targets with S-time-distance. The purpose of developing the free Web tool is to empower a broad range of stakeholders in Europe and the rest of the world with an excellent presentation and communication tool that is easily understood by policymakers, experts, managers, media and the general public; it can support decision-making as well as influence public opinion.

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Annex 1: S-time-distances for four indicators for EU targets

Based on the free Web tool for monitoring implementation of Lisbon, NRP and other targets with the S-time-distance measure available at http://www.gaptimer.eu/content/view/25/33/, Statistical data and targets from the Commission of the European Communities (2007), Communication of the Commission to the European Council, COM(2007) XXX final – PART I and annex, Brussels, December 11.

Table 1: Implementation of Lisbon target for total employment rate (70%)

	S-time-distance (in years)							
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
EU-27	0	0,6	1.9	2.5	3.1	3.3	2.9	2.8
EU-25	0	0.5	1.5	2.2	2.8	2.8	2.7	2.4
EU-15	0	0.1	0.7	1.4	1.8	1.9	1.6	1.6
Denmark	TA	TA	TA	TA	TA	TA	TA	TA
Netherlands	TA	TA	TA	TA	TA	TA	TA	TA
Sweden	TA	TA	TA	TA	TA	TA	TA	TA
United Kingdom	TA	TA	TA	TA	TA	TA	TA	TA
Austria	0	1.0	0.7	0.3	> 4	4.3	TA	TA
Cyprus	0	-4.0	-4.8	-5.2	-3.5	-1.6	-3.1	TA
Finland	0	-2.3	-1.3	1.2	2.6	0.7	-1.5	TA
Estonia	0	0.3	0.2	0.3	1.1	0.7	-2.1	-2.4
Latvia	0	0.0	-0.5	-0.7	-0.1	0.1	-1.2	-1.8
Germany	0	0.5	> 2	> 3	> 4	4.1	1.6	-1.7
Ireland	0	-0.3	1.4	2.4	1.7	-0.1	-1.2	-1.2
Slovenia	0	-0.5	1.1	> 3	0.4	0.4	0.6	-0.1
Spain	0	-0.2	0.2	0.2	0.3	-0.4	-0.5	0.0
Bulgaria	0	> 1	1.9	1.8	1.8	1.9	1.4	0.8
Lithuania	0	> 1	1.2	1.0	1.9	1.6	1.7	1.5
Greece	0	> 1	1.2	1.2	1.7	2.1	2.4	3.1
Italy	0	0.2	0.8	1.4	1.4	2.4	2.8	3.6
France	0	0.1	0.8	0.5	1.9	2.6	3.8	3.7
Slovakia	0	1.0	2.0	2.3	3.8	4.3	3.9	3.8
Czech Republic	0	1.0	1.2	> 3	> 4	> 5	5.4	4.7
Luxembourg	0	0.4	1.0	> 3	> 4	3.7	4.7	4.9
Belgium	0	> 1	> 2	> 3	> 4	4.3	5.4	5.3
Poland	0	> 1	> 2	> 3	> 4	> 5	> 6	5.5
Malta	0	0.9	1.9	3.0	> 4	> 5	5.6	5.9
Hungary	0	> 1	> 2	2.4	3.6	4.5	5.2	6.2
Portugal	0	-2.8	-0.5	> 3	> 4	> 5	> 6	> 7
Romania	0	> 1	> 2	> 3	> 4	> 5	> 6	> 7

S-time-distance: (-) actual ahead or (+) behind the line to target (years)

TA - Target already achieved

> x - Actual value is worse than the starting value, S-time-distance is more than x years

Source: Own calculations based on data from the Commission of the European Communities (2007) and Eurostat.

Table 2: Implementation of target for female employment rate (60%)

	S-time-distance (in years)							
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
EU-27	0	0.0	0.8	1.0	1.0	0.7	0.2	-0.4
EU-25	0	-0.2	0.2	0.4	0.4	0.2	-0.4	-0.9
EU-15	0	-0.6	-0.6	-0.7	-0.9	-1.4	-1.9	-2.5
Denmark	TA	TA	TA	TA	TA	TA	TA	TA
Sweden	TA	TA	TA	TA	TA	TA	TA	TA
Netherlands	TA	TA	TA	TA	TA	TA	TA	TA
Finland	TA	TA	TA	TA	TA	TA	TA	TA
United Kingdom	TA	TA	TA	TA	TA	TA	TA	TA
Portugal	TA	TA	TA	TA	TA	TA	TA	TA
Austria	0	TA	TA	TA	TA	TA	TA	TA
Slovenia	0	-1.5	0.7	> 3	TA	TA	TA	TA
Estonia	0	-0.7	-1.3	-3.8	TA	TA	TA	TA
Germany	0	-2.2	-2.3	-1.3	-1.8	TA	TA	TA
Cyprus	0	-4.8	-6.7	TA	-4.1	-2.6	TA	TA
Latvia	0	-2.2	-3.0	-3.7	-3.7	-3.9	TA	TA
Lithuania	0	> 1	> 2	-0.1	3.6	-2.4	TA	TA
Ireland	0	-0.7	-0.6	-0.1	-0.4	-2.3	-2.9	TA
France	0	-0.7	-1.2	-3.4	-2.4	-2.0	-1.6	TA
Bulgaria	0	0.6	1.0	0.8	0.6	0.8	-0.4	-1.4
Spain	0	-0.1	0.1	-0.1	-0.2	-0.8	-0.8	-0.5
Luxembourg	0	0.1	0.4	2.1	2.0	1.2	1.2	0.7
Belgium	0	> 1	> 2	2.6	2.6	2.1	2.9	2.3
Italy	0	0.1	0.6	1.2	0.8	1.8	2.2	3.1
Greece	0	> 1	1.2	1.3	1.8	2.3	2.5	3.2
Slovakia	0	0.6	> 2	2.1	> 4	> 5	5.5	5.1
Malta	0	> 1	1.6	2.8	> 4	4.7	5.1	5.2
Poland	0	> 1	> 2	> 3	> 4	> 5	> 6	5.3
Czech Republic	0	1.0	1.7	> 3	> 4	> 5	> 6	5.7
Hungary	0	0.9	1.9	1.7	2.9	3.6	4.5	5.7
Romania	0	> 1	> 2	> 3	> 4	> 5	> 6	> 7

S-time-distance: (-) actual ahead or (+) behind the line to target (years)

TA - Target already achieved

> x - Actual value is worse than the starting value, S-time-distance is more than x years

Source: Own calculations based on data from the Commission of the European Communities (2007) and Eurostat.

Table 3: Target implementation employment rate for older workers (50%)

	S-time-distance (in years)							
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
EU-27	0	0.3	0.6	0.4	0.8	0.4	0.6	0.7
EU-25	0	0.2	0.2	-0.1	0.4	0.1	0.3	0.5
EU-15	0	0.1	-0.2	-0.5	-0.2	-0.6	-0.5	-0.5
Sweden	TA	TA	TA	TA	TA	TA	TA	TA
Denmark	TA	TA	TA	TA	TA	TA	TA	TA
United Kingdom	TA	TA	TA	TA	TA	TA	TA	TA
Portugal	TA	TA	TA	TA	TA	TA	TA	TA
Estonia	0	-5.0	TA	TA	TA	TA	TA	TA
Finland	0	-4.1	-5.6	-6.6	TA	TA	TA	TA
Cyprus	0	> 1	2.0	TA	-4.3	TA	TA	TA
Ireland	0	-2.3	-3.9	-5.0	-5.0	TA	TA	TA
Latvia	0	0.3	-2.5	-3.2	-4.7	-4.7	TA	TA
Lithuania	0	> 1	0.6	-1.7	-3.2	-4.2	-3.6	TA
Germany	0	0.7	0.8	0.9	0.3	-1.6	-2.9	TA
Netherlands	0	-0.3	-1.8	-2.5	-2.3	-2.0	-2.3	TA
Bulgaria	0	-0.6	-1.0	-1.2	-1.1	-0.8	-1.3	-1.2
Czech Republic	0	0.3	-1.7	-1.8	-1.1	-1.4	-0.9	-0.4
Spain	0	-0.9	-0.3	-0.2	0.4	-0.1	0.2	0.8
Slovakia	0	0.4	1.2	1.3	1.3	0.9	0.8	1.0
Austria	0	0.9	1.8	2.1	4.0	3.2	2.2	1.7
Slovenia	0	-0.5	1.0	2.6	0.9	1.2	1.4	2.1
Hungary	0	0.3	0.3	-0.2	-0.2	0.1	0.9	2.1
France	0	-0.3	-0.9	-1.1	-0.5	0.0	1.3	2.2
Belgium	0	> 1	1.8	2.0	2.0	2.1	3.0	2.8
Greece	0	> 1	1.8	0.7	3.6	2.4	2.7	3.6
Italy	0	0.8	1.3	1.5	2.4	2.9	3.3	3.6
Luxembourg	0	> 1	1.2	1.0	1.9	2.3	2.5	4.1
Poland	0	> 1	> 2	> 3	> 4	> 5	> 6	6.2
Romania	0	> 1	> 2	> 3	> 4	> 5	> 6	> 7
Malta	0	0.5	1.0	0.7	2.2	3.6	5.1	> 7

S-time-distance: (-) actual ahead or (+) behind the line to target (years)

TA - Target already achieved

> x - Actual value is worse than the starting value, S-time-distance is more than x years

Source: Own calculations based on data from the Commission of the European Communities (2007) and Eurostat.

Table 4: Implementation of Lisbon 1 targets for the share of R&D in GDP

	S-time-distance (in years)							
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
EU-27	0	0.9	1.8	2.9	> 4	> 5	> 6	
EU-25	0	0.9	1.8	2.9	> 4	> 5	> 6	
EU-15	0	0.9	1.8	2.9	> 4	> 5	> 6	
Finland	TA	TA	TA	TA	TA	TA	TA	TA
Sweden		TA		TA	TA	TA	TA	
Austria	0	-0.5	-0.3	0	0.7	-0.3	0.1	0.6
Malta			0.0	1.0	-0.4	0.7	1.7	
Estonia	0	0.1	1.0	1.6	1.9	2.4	2.1	
Denmark	0	-1.2	-1.9	-1.8	0.5	1.9	3.2	
Czech Republic	0	> 1	> 2	2.7	3.7	3.3	3.4	
Latvia	0	> 1	> 2	> 3	> 4	3.8	3.6	
Spain	0	1.0	1.3	1.8	2.7	3.3	3.7	
Cyprus	0	0.9	1.1	1.5	2.3	3.0	3.8	
Lithuania	0	0.2	1.3	2.2	2.5	3.5	4.1	
Hungary	0	-0.2	0.2	1.7	3.1	3.6	4.2	
Ireland	0	> 1	> 2	2.6	3.0	3.8	4.3	5.1
Germany	0	0.8	1.2	1.6	3.2	4.4	4.4	
Slovenia	0	0.0	1.3	> 3	3.9	4.6	4.4	
Romania	0	0.8	1.9	2.8	3.8	4.5	5.1	
Portugal	0	0.6	2.0	> 3	3.9	4.6	5.4	
Italy	0	0.7	1.3	2	3.6	4.7		
Greece		0		> 2	> 3	4.0	> 5	
United Kingdom	0	> 1	> 2	> 3	> 4	> 5	> 6	
France	0	0.3	0.9	2.7	4.0	> 5	> 6	
Belgium	0	-0.3	> 2	> 3	> 4	> 5	> 6	
Netherlands	0	> 1	> 2	> 3	> 4	> 5	> 6	
Slovakia	0	> 1	> 2	> 3	> 4	> 5	> 6	> 7
Luxembourg	0			2.9	> 4	> 5	> 6	
Poland	0	> 1	> 2	> 3	> 4	> 5	> 6	
Bulgaria	0	> 1	> 2	> 3	> 4	> 5	> 6	

S-time-distance: (-) actual ahead or (+) behind the line to target (years)

TA - Target already achieved

> x - Actual value is worse than the starting value, S-time-distance is more than x years

Source: Own calculations based on data from the Commission of the European Communities (2007) and Eurostat.