Annex: Methodological Notes

The analysis of the *2006 EU Industrial R&D Investment Scoreboard* has been prepared on the basis of information gathered according to the standards set out below.

A. Scope of the EU Industrial R&D Investment *Scoreboard*

The *Scoreboard* has been prepared from companies' **annual reports and accounts** received by an independent data provider up to and including **1 August 2006**. To prepare the *Scoreboard*, a database of 5152 companies' accounts was screened.

In order to maximise completeness and avoid double counting, the **consolidated group accounts of the ultimate parent company** are used. Companies which are subsidiaries of any other company, such as Airbus (France), Ford (UK) or IBM (Germany) are not listed separately. Where consolidated group accounts of the ultimate parent company are not available, subsidiaries are included, e.g. Sorin (Italy) or Cognis Deutschland (Germany).

For some companies whose accounts are expected close to the cut-off date, **preliminary announcements** are used. Examples are Microsoft (USA), Renishaw (UK), Telent (UK) or Misys (UK).

In case of a **demerger**, the full history of the continuing entity is included. The history of the demerged company can only go back as far as the date of the demerger to avoid double counting of figures, e.g. Freescale Semiconductor (USA) or TRW Automotive (USA).

In case of an **acquisition or merger**, pro forma figures for the year of acquisition are used along with pro-forma comparative figures if available, e.g. Sanofi-Aventis.

The **first time adoption of IFRS**[1], for example by many listed European companies, gives rise to an information discontinuity because R&D is treated differently than before. R&D capitalisation criteria under IFRS are stricter and, where the criteria are met, the amounts must be capitalised. In some pre-IFRS jurisdictions either one or both of these conditions did not apply. The following was implemented to minimise the impact of transition to IFRS:

a) The previous year's figures disclosed in the new IFRS accounts have been

[1] Since 2005, the European Union requires all listed companies in the EU to prepare their consolidated financial statements according to IFRS (International Financial Reporting Standards, see: http://www.iasb.org/).

used in place of the previous year's GAAP figures disclosed in the past annual report. The effect is that the discontinuity moves back by one year so that it impacts on the three year growth statistic but not the one year growth statistic.

b) In most cases, comparative figures are not disclosed, so the previous years' GAAP figures disclosed in the past annual report were examined to assess whether or not there appears to be a material component not disclosed. If the non disclosure appeared to be not material it was assumed to be zero and the R&D spend was calculated. If the non disclosure appeared to be material, the R&D spend was treated as unknown and the result is reported as "not available (n/a)". Companies with "n/a" results are excluded from the aggregate growth statistics.

Companies are allocated to the **country of their registered office**. In some cases this is different from the operational or R&D headquarters. This means that the results are independent of the actual location of the R&D activity. Examples are EADS (the Netherlands), AstraZeneca (UK) or Royal Dutch Shell (UK).
The **data** used for the *Scoreboard* are different from data provided by statistical offices, e.g. BERD data. The *Scoreboard* refers to all R&D financed by a particular company from its own funds, regardless of where that R&D activity is performed. BERD refers to all R&D activities performed by businesses within a particular sector and territory, regardless of the location of the business's headquarters, and regardless of the sources of finance. Further, the *Scoreboard* collects data from audited financial accounts and reports. BERD typically takes a stratified sample, covering all large companies and a representative sample of smaller companies. Additional differences concern the definition of R&D intensity (BERD uses the percentage of value added, while the *Scoreboard* measures it as the R&D/Sales ratio) and the sectoral classification they use (BERD follows NACE (the European statistical classification of economic sectors), while the *Scoreboard* classifies companies' economic activities according to the ICB classification).

B. Sources

The database from which the *Scoreboard* is drawn consists of information extracted from the audited annual reports and accounts of companies, using rigourous financial reporting practice verification processes. The companies are those which are identified as having an R&D activity and which either have their accounts publicly available for free (e.g. on the internet or upon request) or at low cost (e.g. at the company registry). The source documents, annual reports & accounts, are public domain documents and so the *Scoreboard* is capable of independent replication.

The data have been gathered by Company Reporting Ltd, an independent corporate financial reporting specialist based in Edinburgh, Scotland. In 2005 Company Reporting has formed a partnership with European organisations to expand the monitoring process in all EU economies that reflects the increase of the number of companies in the 2006 *Scoreboard*. These external sources are used only to identify potential new entrants.

The database is supplemented by a feed service from Standard & Poor's Compustat Global Vantage database to identify potential new entrants to the ranking. The Amadeus and the Experian databases have been used and recognised stock exchanges are monitored also.

The database contains many times more companies than are listed in the *Scoreboard* to ensure that the top companies by R&D investment can be identified in each case.

C. Limitations

The approach used in preparing the *Scoreboard* has the following limitations:

1. Disclosure

The *Scoreboard* relies on **disclosure of R&D investment** in published annual reports and accounts. Therefore, companies which do not disclose figures for R&D investment or which disclose only figures which are not material enough are not included in the *Scoreboard*. There are few companies which disclose a significant R&D investment only as a percentage figure (often to only one significant figure), e.g. Rhoen-Klinikum, Germany. These companies are not included in the *Scoreboard*.

Due to different national accounting standards and **disclosure practice**, companies of some countries are less likely than others to disclose R&D investment consistently. Further, the facilities and possibility to acquire accounts differ considerably from country to country because the organisation of document registration varies between local and central registries as well as the information that can be obtained and the cost to acquire this data. In some countries, R&D costs are very often integrated with other operational costs and can therefore not be identified separately. For example, companies from many Southern European countries or the new Member States are under-represented in the *Scoreboard*. On the other side, UK companies are over-represented in the *Scoreboard*. For listed companies, country representation

will improve with IFRS adoption.
For **highly diversified companies**, the R&D investment disclosed in their accounts relates only part of their activities, whereas sales, profit before tax and market capitalisation are in respect of all their activities. Unless such groups disclose their R&D investment additional to the other information in segmental analyses, it is not possible to relate the R&D more closely to the results of the individual activities which give rise to it. The impact of this is that some statistics for these groups, e.g. R&D as a percentage of sales, are possibly underestimated and so comparisons with non-diversified groups are be limited.
The R&D investment disclosed in some companies' accounts follows the US practice of including **engineering costs** relating to product improvement. Where these engineering costs have been disclosed separately, they have been excluded from the *Scoreboard*. However, the incidence of non-disclosure is uncertain and the impact of this practice is a possible overstatement of some overseas R&D investment figures in comparison with the EU. Microsoft (USA), for example, is known to include translation expenses in its R&D expenditure. But as these have not been disclosed separately they are part of the R&D investment shown in the *Scoreboard*.
Where R&D income can be clearly identified as a result of **customer contracts** it is deducted from the R&D expense stated in the annual report, so that the R&D investment included in the *Scoreboard* excludes R&D undertaken under contract for customers such as governments or other companies. However, the disclosure practise differs and R&D income from customer contracts cannot always be clearly identified. This means a possible overstatement of some R&D investment figures in the *Scoreboard* for companies with directly R&D related income where this is not disclosed in the annual report.

As a result of these disclosure limitations, the *Scoreboard* **cannot set out to capture systematically all companies with R&D activity**. There is evidence to suggest that the distribution of R&D activity is highly skewed towards larger companies, with a "long tail" of smaller companies.

2. Measurement

In implementing the definition of R&D, companies exhibit **variability** arising from three principal sources:

a) Natural variability arises from differing interpretations of the definition. Some companies view a process as an R&D process while other companies may view the same process as an engineering or other process.

b) Data capture variability arises from differing information systems. Some companies have in place better systems than others for measuring the costs associated with R&D processes. This problem of data capture systems appears challenging for companies in the EU Member States.
c) Fiscal variability arises from fiscal incentives based on the treatment of costs.

Measurement variability therefore has an impact on the extent of R&D investment disclosure.

3. Timing

The accounts of the companies included in the current year set are their **latest published accounts** and are intended to be their fiscal year 2005 accounts. Companies from most countries have discretion in the choice of accounting period end. As a result, the current year set of the 2006 *Scoreboard* can include accounts ending on a range of dates from mid 2005 to early 2006. Furthermore, the accounts of some companies are publicly available more promptly than others. Therefore, the current year set represents a heterogeneous set of timed data.

4. Availability

The accounts of companies which are **not listed** on any recognised stock exchange are significantly more difficult to capture. There is considerable variability between countries in relation to the existence of and, where they exist, the administrative procedures and costs associated with capturing accounts. This results in the smaller private companies from the "long tail" being under represented; and this is the case with a smaller number of significant private enterprises, such as Servier (France).

D. Interpretation

There are some fundamental aspects of the *Scoreboard* which affect their interpretation.

1. Funding vs. activity

The focus of the *Scoreboard* on R&D investment as reported in group accounts means that the results can be independent of the location of the R&D activity. The *Scoreboard* indicates the level of R&D funded by companies, not all of which is carried out in the country in which the company is registered. This enables inputs such as R&D and Capex investment to be related to outputs such as Sales, Profit, productivity ratios and market capitalisation. The information in the *Scoreboard* differs therefore from other information such as the Business Enterprise R&D (BERD) data generated by the OECD, Eurostat and by National Statistics Offices. The BERD data focus on R&D activity within the countries, independent of the source of funding and, at the national level, exclude R&D carried out by companies in other countries. In brief, the distinction can be seen as "funding vs activity".

2. Growth

At the aggregate level, the growth statistics reflect the growth of the set of companies in the current year set. Companies which may have existed in the base year but which are not represented in the current year set are not part of the *Scoreboard* (a company may continue to be represented in the current year set if it has been acquired by or merged with another). These are therefore "successful efforts" aggregates rather than economic estimates of market aggregates.

3. Currency effects

All foreign currency amounts have been translated at the **Euro exchange rates ruling at 31 December 2005** as shown in the following table:

Country	Euro exchange rate as of 31 Dec 2006
Australia	$ 1.61
Canada	$ 1.38
China	9.52 Renminbi
Czech Republic	29.05 Koruna
Denmark	7.46 Danish Kronor
Hungary	252.45 Forint
India	53.09 Indian Rupee
Israel	5.43 Shekel
Norway	7.99 Norwegian Kronor
Russia	33.90 Rouble
South Korea	1192.37 Won
Sweden	9.39 Swedish Kronor
Switzerland	1.55 Swiss Franc
UK	£ 0.69
USA	$ 1.18
Taiwan	$ 38.74
Japan	139.22 Yen

The exchange rate conversion also applies to the historical data. The result is that over time the *Scoreboard* reflects the domestic currency results of the companies rather than economic estimates of current purchasing parity results. The original domestic currency data can be derived simply by reversing the translations at the rates above. Users can then apply their own preferred current purchasing parity transformation models.

E. Glossary of definitions

1. **Research and Development (R&D) investment** in the *Scoreboard* is the cash investment funded by the companies themselves. It excludes R&D undertaken under contract for customers such as governments or other companies. It also excludes the companies' share of any associated company or joint venture R&D investment. Being that disclosed in the annual report and accounts, it is subject to the accounting definitions of R&D. For example, a definition is set out in International Accounting Standard (IAS) 38 "Intangible assets" and is based on the OECD "Frascati" manual. **Research** is defined as original and planned investigation undertaken with the prospect of gaining new scientific or technical knowledge and understanding. Expenditure on research is recognised as an expense when it is incurred. **Development** is the application of research findings or other knowledge to a plan or design for the production of new or substantially improved materials, devices, products, processes, systems or services before the start of commercial production or use. Development costs are capitalised when they meet certain criteria and when it can be demonstrated that the asset will generate probable future economic benefits. Where part or all of R&D costs have been capitalised, the additions to the appropriate intangible assets are included to calculate the cash investment and any amortisation eliminated.

2. **Sales** follow the usual accounting definition of sales, excluding sales taxes and shares of sales of joint ventures & associates. For banks, sales are defined as the "Total (operating) income" plus any insurance income. For insurance companies, sales are defined as "Gross premiums written" plus any banking income.

3. **R&D intensity** is the ratio between R&D investment and net sales of a given company or group of companies. At the aggregate level, R&D intensity is calculated only by those companies for which data exist for both R&D and net sales in the specified year. The calculation of R&D intensity in the *Scoreboard* is different from than in official statistics, e.g. BERD, where R&D intensity is based on value added instead of net sales.

4. **Operating profit** is calculated as profit (or loss) before taxation, plus net interest cost (or minus net interest income) and government grants, less gains (or plus losses) arising from the sale/disposal of businesses or fixed assets.

5. **One-year growth** is simple growth over the previous year, expressed as a percentage: 1 yr growth = 100*((C/B)-1); where C = current year amount, and B = previous year amount. 1yr growth is calculated only if data exist for both the current and previous year. At the aggregate level, 1yr growth is calculated only by aggregating those companies for which data exist for both the current and previous year.

6. **Three-year growth** is the compound annual growth over the previous three years, expressed as a percentage: 3 yr growth = 100*(((C/B)^(1/t))-1); where C = current year amount, B = base year amount (where base year = current year - 3), and t = number of time periods (= 3). 3yr growth is calculated only if data exist for the current and base years. At the aggregate level, 3yr growth is calculated only by aggregating those companies for which data exist for the current and base years.

7. **Capital expenditure (Capex)** is expenditure used by a company to acquire or upgrade physical assets such as equipment, property, industrial buildings. In accounts capital expenditure is added to an asset account (i.e. capitalised), thus increasing the asset's base. It is disclosed in accounts as additions to tangible fixed assets

8. Number of **employees** is the total consolidated average employees or year end employees if average not stated.

9. **R&D per employee** is the simple ratio of R&D investment over employees. At the aggregate level, R&D per employee and the other non-growth statistics are calculated only by aggregating those companies for which data exist for both the numerator and the denominator.

10. **R&D employees** is the number of employees engaged in R&D activities as stated in the annual report.

11. **Market capitalisation** is the share price multiplied by the number of shares issued at a given date. Market capitalisation data have been extracted from both the Financial Times London Share Service and Reuters. These reflect the market capitalisation of each company at the close of trading on 4 August 2006. The gross market capitalisation amount is used to take account of those companies for which not all the equity is available on the market. Companies not listed on a recognised stock exchange have been distinguished separately by the use of italics.

12. **Market Spread** details sales by destination, distinguishing between Europe, North America (USA and Canada) and the Rest of the World. The definition of Europe is subject to the definitions adopted by the individual companies. In cases in which companies have defined a market spread area as EMEA (Europe, Middle East, Africa), this has been allocated to Europe. When a company has not clearly disclosed the turnover region North America but Americas, this has been allocated to North America.

13. **Industry sectors** in are based on the ICB Industry Classification System. The level of dis-aggregation is generally the three-digit level unless indicated otherwise.