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Indicators for evaluating international performance in service sectors

1: Scientific and/or technical quality, relevant to the topics addressed by the call

1.1 Concept and objectives

Concept

Few would dispute that having a dynamic well functioning service sector is key to achieving the goals of the Lisbon agenda. Recent academic literature has highlighted the importance of productivity growth in services as a driver of aggregate economic performance in the US, (Triplett and Bosworth, 2006) and that the EU lags behind the US in achieving productivity increases in services (O'Mahony and van Ark, 2003). Much of the increased attention on services sectors was driven by the observation that benefits from the use of information and communications technology (ICT) has been concentrated in these sectors (Van Ark, O'Mahony and Timmer, 2008; Inklaar, Timmer and Van Ark, 2008). The current financial crisis has led to a renewed focus on the increased size, scope and globalisation of services and the need for a coherent regulatory framework.

Given these observations it is surprising that to date there still remains a lack of solid empirical evidence on the main channels through which services affect growth and their quantitative importance. The main constraint in achieving the necessary empirical evidence is the lack of internationally comparable data on service sector activities and environments. In some respects data is becoming increasingly available, due to the efforts of national statistical offices, international bodies such as EUROSTAT and OECD and research efforts such as EU KLEMS. However easily accessible data sets for service sectors that cover the variables necessary for robust empirical analysis of the kind undertaken for many years for manufacturing is still a thing of the future. Many of the data series are in early stages of development and so are crude measures of the variables about which the research and policy community would like to have information. Progress need to be made both at the conceptual level (how can outputs measured? What are the determinants of growth?) and empirical application (what data are needed?). This differs widely across the services industries. For some services industries such as transport and business services, problems in both areas are relatively minor and much progress is being made. In other services like finance, health and education new concepts have been developed but await empirical application. In other areas such as collective services there are a range of conceptual issues still to be solved. The INDICSER project is designed to fill this gap through a comprehensive study of service sector indicators. This will involve both an EU-wide application of existing concepts and will develop and experiment with new concepts. This will be carried out within an overall coherent structural framework designed to reflect key concepts of productivity and value for money.

Objectives

The INDICSER project will identify and develop the indicators of service sectors required by the academic and policy community in attempting to understand economic developments in these sectors and their impact on aggregate growth. Therefore, the main objective of the INDICSER project is **to develop indicators which are able to provide information on the determinants of growth in service sectors in the European Union.**

To this end, the indicators need to fulfil the following criteria.

- **The indicators need to cover measures of industry-level output, input and productivity growth**
- **The indicators need to cover determinants of productivity, such as innovation, technology and market environments**
- **The indicators need to be feasible and internationally comparable**
- **The indicators need to be relevant and useful for economic and social policy analysis**

These requirements put constraints on the possible sets of indicators to be developed but at the same time ensure that they are collected in a coherent framework, maximizing their usefulness for the users. The INDICSER project will explore indicators in two broad groups, indicators for market services and indicators for non-market services, reflecting the very different measurement issues and states of development in the two.

Much of the work for *market services* will be on developing indicators of the determinants of output, such as skills, ICT and intangible capital, competitive environment and foreign presence. The output and input indicators will be developed within a national accounts framework, but going beyond data collected within the current national accounts. Indicators on market environments will be based mainly on economic theory. The use of these indicators for policy analysis will be validated through descriptive and some econometric analysis of their impacts on service sector performance, within this project and through monitoring their use in the SERVICEGAP project..

The main areas covered for *non-market services* are similar but reflect the existing lack of knowledge for these sectors. Hence a first objective must be to consider what indicators should we be measuring and how these relate to measures in use for market services. This will be followed by analyses of data issues and practical importance. For non-market services such as health and education, the main emphasis will be on measuring output and applying novel concepts of output measurement to a wide range of EU countries. Many ideas have been put forward in recent years (e.g. Atkinson Report, 2005), but so far internationally comparable implementation has not progressed.

To achieve our goal, the INDICSER project aims to maximise the interaction with the academic and policy communities in various ways, in particular at the beginning and the end phase. First, it will provide an overview of developments in measuring indicators for various service sectors in Europe; this will be undertaken in several work packages. The results of this investigation will be disseminated early in the project to allow stakeholders to discuss and influence the subsequent research programme. The objective of the final research work package is **to synthesise the results so as to arrive at a set of recommendations on indicators that are feasible to measure and useful to the policy community**. It will also indicate where future efforts in terms of data collection might be most fruitful. The results will be presented at a large conference at the end of the project.

Thus the overall objective is to produce a comprehensive summary on indicators that might be measured, the feasibility of estimating these indicators given current data constraints and a series of recommendations that will inform the using community of national and international statistical offices

and policy makers. The combined objectives of the INDICSER project are designed to add significantly to knowledge on the appropriate indicators for policy relating to ensuring dynamic well functioning service sectors in Europe. At the heart of the project are concerns that such indicators should be **valid** in terms of concepts and measurement methods and feasibility of data collection but should also have **value** in terms of their usefulness for policy and international comparability.

1.2 Progress beyond the state-of-the-art

General overview

The INDICSER project will build on previous work to provide a comprehensive summary of the indicators for service sectors that are most likely to be useful in informing policy regarding growth and productivity in those sectors. There are many indicators for service sectors available from the statistical and research communities that could potentially inform policy. Some are poor quality or have limited international coverage but many exercises are useful for the purposes for which they were devised. However there is no study that attempts to bring together the various strands of this research into a unified whole. In particular the work on non-market services has largely followed its own distinctive path. This project will consider how to measure the indicators, data availability and the end uses of these indicators in the context of understanding growth in service sectors. To this end we will consolidate and build upon existing international initiatives such as work undertaken at Eurostat and at the OECD, and past and current EC framework research projects like EU KLEMS, AHEAD, INNODRIVE, COINVEST and WIOD.

Our starting point in this project is to revise and expand the data collected in the EU KLEMS project (**WP1**). In terms of the main outputs and inputs that yield productivity measures the EU KLEMS growth and productivity accounts (see O'Mahony and Timmer, 2009) incorporate the international consistency and wide coverage by industry and country to be a useful policy tool for understanding the proximate sources of growth in Europe. The variables in the EU KLEMS database form the core set of data in this project but will be extended in a number of directions.

The first extension is to develop new indicators on innovation, technology and intangible investment in market services (**WP2**). This will be based on existing surveys such as the Community Innovation Survey (CIS), OECD R&D statistics and the Eurostat ICT survey for innovation and the EU LFS and EU earnings survey for intangibles. In addition there are many microdata sets available that are useful, including matched employer-employee datasets as used in the FP7 funded projects INNODRIVE and COINVEST. The second extension is to develop various indicators of competition and internationalisation for market services (**WP3**). These indicators will be built up from international databases such as AMADEUS. These market environment indicators will play an important role in an analysis of the drivers of services productivity differences across countries.

Financial services will be covered in a separate work package (**WP 4**) as, in contrast to most other market services, output concepts in this industry are still not well defined and measures are difficult to compare across countries. In this work package proposals for new output measures for finance will be

developed and applied to a large set of EU countries. Also new quality indicators of financial services will be defined and developed, an issue which has increased importance in view of the global financial crisis.

WP 5 and **WP 6** are devoted to non-market services. Recent literature has brought forward the issue of how to measure productivity in non-market services (Atkinson Review, 2005) and value for money indicators (Cutler, Rosen and Vijan, 2006; Murphy and Topel, 2006). Nevertheless many conceptual and practical issues remain in attempting to apply the concepts in international comparisons. In these work packages we will build upon the work by Dawson *et al.* (2005) for the UK health sector or O'Mahony and Stevens (2009) for education to develop indicators of volumes of output, quality adjusted output and productivity for health (**WP5**) and education (**WP6**). In addition value for money indicators will be constructed for health. In **WP 7** various suggestions will be made for the development of new indicators which can not yet be rolled out on a large scale but might be in the future. In particular, we will make new proposals for output measurement in insurance, collective services and distributive trades and a combined research sector. The final work package (**WP 8**) will synthesise the results so as to arrive at a set of recommendations on indicators that are feasible to measure, practical for policy makers and useful for analysts. In the Table below we provide an overview of the proposed sets of indicators for each service industry, some examples and the main sources used.

SECTOR	MAIN INDICATOR	DETAILED EXAMPLES	Main sources	WP
All services	Intermediate inputs	Energy, Material, Services	Update of EU KLEMS database; based on	1
	Labour inputs	Cross classified by Age, Gender, Educational attainment and Occupation	Eurostat; individual country National	1
	Tangible capital inputs	Various asset types including ICT	Accounts, Labour force surveys (LFS) and	1
	Output measures	Value added and gross output	Investment surveys	1
	Productivity measures	Labour and multifactor productivity measures		1
Market services, excluding finance	Innovation indicators	Innovation output measures	Community Innovation Survey (CIS)	2
	Intangible capital inputs	R&D, Software, On-the-job training, Management input	OECD; Labour Force surveys; National	2
	ICT use indicators	Various indicators such as e-business; broadband access etc.	Eurostat ICT survey	2
	Market environment indicators	Various indicators of competition and internationalisation	Amadeus and FAME	3
Financial services	Output measures	New value and volume measures	Data at European Central Bank; Bankscope	4
	Productivity and efficiency measures	Productivity and efficiency changes of banks relative to national and international frontiers		
	Market environment	Various indicators of competition and internationalisation		4
Health services	Input measures	Breakdown of input costs such as medical equipment, drugs etc.	National Accounts; Government Accounts;	5
	Output measures	Activities, quality adjustments based on survival and quality of life	national sources; ECHIM-2	5
	Productivity measures	Based on various alternative input and output measures		5
	Value for money indicators	The value of lives saved/QALYS gained relative to expenditures		
Education services	Output measures	Volume indicators based on pupils; various quality adjustments based on test-scores and other alternatives	OECD; Labour Force Surveys; Pisa survey	6
Other services	Output measures	New value and volume measures for insurance, distributive trade and collective services	Trade census; UK ONS; proprietary firm data	7

The remainder of this section gives a more elaborate description of the proposed research in each work package, its relation to the existing literature and its unique contribution.

WP1 Input, output and productivity trends in service sectors

The first work package will provide the key data framework that the other work packages will build upon. This work package will provide the basic data on service industry outputs, inputs and productivity, by updating and extending the EU KLEMS database developed in a previous FP6 project (see www.euklems.com). This database includes measures of output and input growth, and derived variables such as multi-factor productivity at the industry level. The input measures include various categories of capital (K), labour (L), energy (E), material (M) and service inputs (S). The measures are developed for twenty-five individual European Union member states, the United States and Japan and cover the period from 1970 to 2005. Labour input measures have been cross-classified by age, gender and educational attainment. Capital is subdivided into eight asset types, including ICT-assets. Although the primary aim of the EU KLEMS database is to generate comparative productivity trends, the data collected have been useful in a large number of other contexts, as the EU KLEMS database provides many basic input data-series. These input series are derived independently from the assumptions underlying the growth-accounting method. Output and labour input series are available at a detailed 72 industry basis, while capital and labour types are available for 30 industries (see www.euklems.com for more information). Due to its wide country and industry coverage, the database is widely used in academic and policy circles in recent years. Hence it will provide a valuable starting point for the project.

In **WP1** we will add additional variables to EU KLEMS and deal with various upcoming revisions to the underlying data. Various National Statistical Institutes (NSIs) in Europe, coordinated by Eurostat, are moving slowly towards production of the data needed for a KLEMS database. But while this process is progressing steadily, it will take some years to complete. Even though National Accounts based data on output and employment is available from the OECD on a regular basis, this is not true for detailed labour and capital type data which have to be derived on the basis of additional survey data. It is in this area that EU KLEMS has proven to be a worthwhile research effort alongside data produced by official statistical bodies and the OECD. In this project we will continue this effort, building upon and complementing ongoing work in NSIs, Eurostat, and the OECD with whom already good contacts have been established in the past.

In the context of the INDICSER project, the following challenges need to be dealt with:

- 1. Critical evaluation of series in National Accounts, in particular output in market services and measures of labour force skills**
- 2. Extending the country coverage**
- 3. Incorporating forthcoming revisions and changes in industrial classifications**

1. This will include an overview of state-of-the-art insights in methodologies currently used to measure the output of services such as trade, transport, finance and business services and comparing the state of measurement across Europe based on existing surveys by Eurostat and the OECD which are currently

being undertaken (see e.g. Eurostat 2001). The emphasis is on cataloguing differences in order to flag up potential comparability problems in existing National Accounts measures of output in non-financial market services. Overviews of measurement practice in finance and non-market services are made as part of the other dedicated work packages (WP 4, 6 and 7). Also, we will critically evaluate the comparability of skill categories across countries and make improvements (see O'Mahony and Timmer 2009) based on extending the number of skill categories and comparisons based on occupational structures.

2. With the accession of Bulgaria and Romania, country coverage will have to be expanded to cover the entire EU-27, depending on the availability of data.

3. This work package will also be devoted to incorporating major revisions to country National Accounts. In some cases, these revisions will be due to international initiatives such as the new System of National Accounts (SNA08) or the new International System of Industrial Classification (ISIC rev.4). An important revision is the capitalisation of R&D expenditures in the SNA08 which will gradually be included in future revisions of SNA statistics. This revision will also have implications for historical series and needs to be addressed. The change in industrial classification will also have far-reaching implications as activities will be shifted from manufacturing to services industries and also between services sectors. Depending on the speed of the revisions in national statistics this has to be taken up in order to maintain comparability across countries and over time. In addition some country-specific factors will be important. For example, while most European countries have modified their national accounts to account for the new regulation on Financial Intermediation Services Indirectly Measured (FISIM), the United Kingdom is still in the process of implementing this revision. Likewise, the Greek statistical agency is incorporating new estimates of the importance of the informal economy. As such country-specific revisions are incorporated in their national accounts, we must take care to ensure consistency over time and across variables. For example, if estimates of the informal economy are only incorporated in output but not employment data, the level of labour productivity will be affected. This task will modify output and employment data for detailed services industries. The Table below provides the set of industries for which the data will be revisited. For the industry groups highlighted in bold, capital data may also be subject to revisions.

Overview of services industries included in EU KLEMS database

Description of industry	Nace rev 1 code
WHOLESALE AND RETAIL TRADE	G
Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel	50
Wholesale trade and commission trade, except of motor vehicles and motorcycles	51
Retail trade, except of motor vehicles and motorcycles; repair of household goods	52
HOTELS AND RESTAURANTS	H
TRANSPORT AND STORAGE	60t63
Other Inland transport	60
Other Water transport	61
Other Air transport	62
Other Supporting and auxiliary transport activities; activities of travel agencies	63
POST AND TELECOMMUNICATIONS	64
FINANCIAL INTERMEDIATION	J
Financial intermediation, except insurance and pension funding	65
Insurance and pension funding, except compulsory social security	66
Activities related to financial intermediation	67
REAL ESTATE, RENTING AND BUSINESS ACTIVITIES	K
Real estate activities	70
Renting of machinery and equipment	71
Computer and related activities	72
Research and development	73
Legal, technical and advertising	741t4
Other business activities, nec	745t8
PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY	L
EDUCATION	M
HEALTH AND SOCIAL WORK	N
OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES	O
Sewage and refuse disposal, sanitation and similar activities	90
Activities of membership organizations nec	91
Media activities	921t2
Other recreational activities	923t7
Other service activities	93

In the final stage of this work package, the extended database will be used for analyses of the changing structure of the services sector. This will result in a papers describing and analysing changes in the sources of growth in each industry, the relative importance of the different services industries and the linkages between services industries and the rest of the economy. The analysis will be undertaken across Europe, Japan and the US.

WP2 Technology, Innovation and Intangibles Indicators

Following this overview, the next two work packages are designed to derive indicators for non-financial market services which are consistently measured across countries and can be used in conjunction with the EU KLEMS database. The first extension is to develop new indicators on innovation, technology and intangible investment in market services (**WP2**).

The first part of WP2 is dedicated to indicator construction. When identifying determinants of productivity differences in service sectors in Europe, innovation in ways of delivering services and development of new services are central. This includes both the adoption and use of new technology such as ICT, investments in complementary assets that facilitate this process and the use of these technologies to devise new products that widen consumer opportunities. Here we will draw upon existing indicators available from CIS, OECD R&D statistics and the Eurostat ICT survey. These will be put on a comparable basis with the EU KLEMS database. In addition we will make use of microdata sets, including the EU LFS and Earnings surveys and matched employer-employee datasets as used in the FP7 funded projects INNODRIVE and COINVEST to construct indicators on intangible investment such as on-the-job training.

WP2 will begin with a review on indicators that have been employed in the existing literature to measure innovation in service sectors. This will focus on investment in innovation activities as a strategy of knowledge creation for productivity and growth. Existing empirical evidence on what drives innovation and its effects on productivity and growth has mainly focused on manufacturing, largely due to more readily available data and the fact that most scientific R&D is concentrated in that sector. There is less understanding on how innovation in services differs from innovation in manufacturing and less by way of quantitative information that has broad country coverage. The literature review will consider innovation indicators employed in the conventional economics literature but will also be informed by the literature on systems of innovation (Malerba, 2004).

The research in INDICSER will exploit the **innovation indicators** provided by the EU's *Community Innovation Survey*. The CIS applies the standard concepts to measure innovation in the business sector (product, process, organisational, marketing innovation) as documented in the Oslo Manual. Data from CIS can be linked on a 2-digit level of NACE rev. 1.2 to other data bases such as EU-KLEMS with harmonised data available for 2002 and 2004 and 2006 data pending. Some countries provide information on additional sectors and comprise a number of questions going beyond the harmonised CIS, which will be reviewed in the project. In INDICSER we will also review whether there exist country specific surveys that might provide additional information and attempt to gauge their usefulness, e.g. the survey of innovation services carried out by the *UK Dept. for Business Enterprise and Regulatory Reform* (BERR, 2008) or the survey among firms from IT and knowledge intensive services carried out by the ZEW on a quarterly basis.

In addition to general innovations this work package will consider ICT as a specific new technology which is likely to have had a major impact on many aspects of service sector growth and productivity. Several empirical studies at the country, industry and firm levels have shown that ICT has positive

impacts on labour productivity and that as an enabling technology it may improve efficiency of other input factors (see for instance Draca et al. 2007 for a recent review of the literature on ICT and productivity, and Hempell (2005), Hempell et al. (2004) for firm level analyses for business services based on CIS. In this project we will develop **indicators which describe the use and application of ICT** to get a more detailed picture not only of how much ICT is invested, but also how it is used.

This will use sector level data from the *EUROSTAT survey on ICT in enterprises for service sectors*, linked to EU KLEMS, allowing for a comparison of different uses of ICT such as internet use for transactions with customers and suppliers. Since EU KLEMS contains information on investment in ICT the combination with EUROSTAT ICT allows us to study both the magnitude of these investments and types of uses together. An additional source of information on the use of ICT is to consider employment in ICT specific occupations (such as programmers and web managers), especially those with university degrees and compare with employment of university educated workers with more generic skills. These variables were employed by O'Mahony, Robinson and Vecchi (2008) to characterise different stages in the adoption of ICT across countries and industries. These labour-specific indicators on ICT will be available for most EU countries from the *EU LFS*. In addition, we will use more detailed firm level data for Germany and the UK. ZEW carries out a firm survey which is representative for the manufacturing sector and for business services (the stratification criteria are the same as for the German CIS) and which is focused on the use of ICT. The data contain a number of ICT variables, to some extent comparable to the EUROSTAT ICT data, to get a comprehensive picture of the ICT intensity of firms and of the heterogeneity of ICT applications. Likewise we will use the UK ICT survey microdata to examine similar issues for that country.

Parallel to the review on innovation measures will be a review of the available **measures for intangible investments in market services sectors**. Recent research has highlighted that organisational changes and other forms of intangible investment such as workforce training are necessary to gain significant productivity benefits from using ICT (Bertschek and Kaiser, 2004; Bresnahan, Brynjolfsson and Hitt 2002; Brynjolfsson, Hitt and Yang, 2002). These investments were frequently referred to as the 'missing input' in the literature - as intangibles are difficult to observe and measure by definition, their impact was mainly captured by the MFP component in analyses of sources of growth. The pioneering work by Corrado, Hulten and Sichel (2005, 2006) attempted to measure intangibles for the US, defining a number of categories including software, scientific and non-scientific R&D, brand equity and firm specific expenditures such as on the job training and managing organisational changes. Estimates by the above authors suggest that these investments combined account for about 11% of US GDP and have been growing rapidly. Similar studies for the UK (Giorgio Marrano and Haskel, 2006, Giorgio Marrano, Haskel and Wallis, 2007), Finland (Javala, Aulin-Amhavarra and Alanen, 2007), Canada (Baldwin et al. 2008), the Netherlands (van Rooijen-Horsten et al. 2008) and Japan (Fukao et al. 2007) suggest also that intangibles are sizeable, although most account for lower proportions of GDP than in the US. The Canadian study also includes estimates by broad sector and shows that the types of intangibles that are most important in service sectors (brand equity, software, non-scientific R&D) differ from those in manufacturing (mainly scientific R&D) with both services and manufacturing investing heavily in firm specific intangibles.

The definition of intangibles will be guided firstly by the existing studies mentioned above and secondly by a thorough literature review as there might be the necessity to extend the range of indicators used by Corrado et al. (2005). Furthermore, it will draw on research carried out in the FP7 projects COINVEST and INNODRIVE. To be able to classify the intangible capital indicators as investment the indicators should be tested against a classification scheme which has been developed in the INNODRIVE project by Jona, Iommi and Roth (2008) in order to evaluate whether expenditure in intangible capital should account for Gross Fixed Capital Formation. At the same time, while many of the conceptual issues regarding inputs such as labour and fixed capital have been discussed in depth in earlier projects such as EU KLEMS, the growing interest in intangible capital, such as brand equity or organizational capital, throws up a whole new range of conceptual challenges. As Nakamura (2008) argues, many types of intangible capital are non-rival, which leads to spillovers, both positive (R&D, knowledge) and negative (market stealing). Furthermore, intangible investments often lead to new products, the effect of which current price measurement methodologies are ill-equipped to take into account. Therefore, to gauge the effect of intangible capital investment on output growth not only requires new efforts at data collection and construction but also conceptual discussions and arguments about how to use them.

Following this literature review the project will consider the feasibility of developing industry estimates of intangibles that can be linked to EU KLEMS. Some measures will be available for all EU countries using existing sources, e.g. scientific R&D and software from EU KLEMS. Other indicators that cover most EU countries could be relatively easily constructed. For example the project will investigate employing data for on-the-job training from the *EU LFS* micro data which will be combined with estimates of the costs of training. The latter will be derived from a review of the literature on firm specific training. Likewise the occupation data from EU LFS will yield information on management input whereas the EU Earnings surveys can be employed to translate this to expenditures. Data from CIS described above can be used to derive estimates for non-scientific R&D with occupation data on use of scientists and engineers from EU LFS also useful in this respect. These sources combined should enable the project to derive some indicators of intangibles for most EU countries. Nevertheless the project will also study a few countries in more detail to derive more complete and robust indicators – likely candidates include Finland, Germany and the UK, linked to US data. This will draw on these countries participation in COINVEST and INNODRIVE. For these countries the project will undertake a full growth accounting exercise to measure the impact of intangibles on growth in service sectors.

The second part of WP2 is dedicated to indicator validation. Analysing and quantifying the effects of innovation and ICT activities on productivity and employment has a long tradition in empirical research relating to industrial organisation. Surveys by Mairesse and Sassenou (1991), Griliches (1995) and Bartelsman and Doms (2000) provide a useful overview of empirical evidence of productivity effects. Much of the past research has focussed on input-oriented innovation indicators such as R&D expenditures, mostly covering manufacturing. In this project we will build upon the methodology developed in recent years for measuring productivity and employment effects of innovation based on innovation survey data (see Crepon et al., 1998; Griffith et al., 2006; Hall et al., 2006; Harrison et al., 2008; Jaumandreu, 2003; Janz et al., 2004; Peters, 2004; 2008). Having constructed a number of indicators on innovation activity and ICT use, the project will use descriptive techniques to consider

correlations between innovation and ICT on productivity and growth in service sectors. The purpose of this exercise is to explore how useful the various indicators are likely to be in explaining differences in productivity and growth across countries for individual service sectors and across these service sectors. Further research using the indicators will be carried out in the SERVICEGAP projects – the results of this will be monitored and will feed into recommendations for future work in this area.

WP3 Market Environment Indicators

Work Package 3 investigates indicators for the market environment interpreted in a general sense to cover the markets in which service sector firms deliver their outputs and purchase inputs and so includes measures of competition, regulation and international markets. The first task will be to review critically the existing literature on measures of market environment, both what is measured and how the various estimates compare with each other. This will explore both international (e.g. European Commission, 2008) and national country studies. The result will be a first attempt to characterise service sector industries according to their degrees of competition, regulation and international presence.

Following on from this review, the project will attempt to construct indicators for all three areas. In the case of **competition and internationalisation** the main data source will be company accounts data for measures of industry concentration (Herfindahl indices, share of top firms etc.), average age of firms and shares of younger firms and measures of foreign presence, either EU service sector firms with affiliates abroad or foreign direct investment in the EU. It will investigate the extent to which service industries are dominated by foreign firms in each country using the share of sales by foreign firms and the extent to which services firms in EU countries have foreign affiliates abroad. In particular, attention will be given to addressing the problem of indirect ownership (A holding B, and B holding C). It will also measure the extent of outsourcing by service sector firms using the imports matrices from the WIOD project. A well known problem with these data is the absence of small firms which is an issue for many service sectors. The project will examine coverage in a number of different databases and its impact on the proposed indicators. For example data for the UK and Ireland are available at the University of Birmingham for both the large company section of *AMADEUS* (about 540,000 companies) and *FAME* (3.6 million companies) so this will be used to gauge the reliability of measures that restrict attention to larger companies. Additional country specific sources such as *Business Statistics* will be used to supplement the company accounts where accessible. A variety of well-established indicators will be used such as concentration ratios, Hirschman-Herfindahl indices, Olley-Pakes allocative efficiency measures and frontier efficiency measures. In addition, the project will also consider whether it is feasible to construct indicators of margins and mark-ups such as the Lerner index, bearing in mind that prices are often not well defined in service sectors. Finally, it will attempt to measure the novel Boone indicator of competition which has not been used widely so far, but as a number of unique and interesting properties (Boone, 2008).

The starting point for **indicators of the degree of regulation** will be those published indicators by the OECD/CEP/World Bank/Fraser Institute on product and labour markets referred above. It is beyond the scope of this project to attempt to calculate European wide alternative measures. Instead we propose

to examine how it might be useful to use microeconomic sources to construct indicators in services sectors. *For example*, given the costs associated with hiring and firing labour are seen as a significant burden to firms we will explore the strictness of Employment Protection legislation (EPL), building on the survey of EPL in Europe and the US as in Siebert (2007). We will then consider how it might be possible to devise an economic means of assessing the costs and benefits of different forms and levels of protection based on a dynamic programming analysis of the behaviour of firms in a situation where there are costs to both hiring and firing and where wages are not completely flexible. We will also consider how other available regulation measures could be combined with input output data from WIOD to measure similar “knock on” indicators as derived by the OECD. An example might be the indicators for professional services measured by Paterson et al. (2003).

The second part of this work package will be devoted to **analysis and validation**. This will consider the impact of these various measures of market environment on growth and productivity in service sectors and will link this to the EU KLEMS data in work package 1 and the measures of innovation, ICT use and intangibles in work package 2. In considering international presence this will build on the large empirical literature showing that multi-national enterprises are more productive than domestic firms (Doms and Jensen, 1998; Girma and Görg, 2007) and on studies that have looked at the effects of foreign ownership on firm performance in manufacturing (Harris and Robinson, 2003; Conyon et al, 2002). However, there is little understanding of the effects of foreign ownership on firm performance in services and it is difficult to determine causality as foreign enterprises might be acquiring or merging with the best domestic firms. Work Package 3 will synthesise the diverse measures of market environment already available in the existing literature, add some new indicators especially of foreign presence that emerge from the analysis in the SERVICEGAP project and evaluate the usefulness of these indicators in explaining growth.

WP4 Financial Services

Work Package 4 will focus on the financial services sector. With the banking sector prominently featuring in policy circles, it is more important than ever to understand developments within the industry as well as the industry’s importance for economic growth. As the survey by Levine (2005) makes clear, the financial system in general performs many useful functions like reducing information asymmetry and facilitating transactions. Bank output as currently measured in the national accounts is not well-suited for understanding how well the industry performs these functions. Work Package 4 will propose a number of indicators that are better geared towards this task. Using these indicators we aim to show which aspects of the financial system are particularly important for productivity growth across Europe.

It will begin with a critical evaluation of current bank **output measurement** practices; alternative estimates of output at current prices (FISIM) that account for the risky nature of bank assets and liabilities; and improved volume indicators that better account for the nature of bank services. It will then compile and compare a range of **financial system performance indicators**, including bank efficiency estimates, indicators of the linkages between the financial sector and non-financial industries, such as reliance on external finance, indicators of competition in banking and bank risk measures based on both balance sheets and market valuations. The main sources for all EU countries will be the

Bankscope database and interest rate and balance sheet data from statistical sources. The workpackage will also include analytical studies using these indicators on the impact of the financial system on output and productivity growth in non-financial industries, the role of competition and risk-taking in both financial and non-financial industries and the role of allocative efficiency across firms within industries as a channel for this impact.

The main difficulty in **measuring bank output** is that much of bank activities are implicitly charged through interest margins: borrowers pay a higher interest rate on loans than the cost of capital for the bank, while depositors receive a lower rate than they could receive on other risk-free investments.¹ This poses problems for determining both bank output at current prices and the trend in the volume of bank services. To impute the value of bank output, the current System of National Accounts (SNA93) recommends using a *risk-free* reference rate to determine to what extent an interest payment or receipt is a payment for services or a transfer of income.² However, Wang, Basu and Fernald (2004) argue that if a loan (or deposit) is risky, the cost of capital to the bank is higher than the risk-free reference rate. Using a risk-adjusted reference leads to substantially lower output at current prices as shown by Basu, Inklaar and Wang (2008) for the United States and Colangelo and Inklaar (2008) for the euro area. As part of these bank services are sold to households, this adjustment has a non-negligible impact on GDP as well. In this work package, we aim to extend the new estimates for European countries to a longer period of time and a larger range of countries and to document how this affects the importance of the banking sector in the economy as a whole.

In addition, the implicit payment for many bank services also makes it difficult to define bank services and measure their **prices** (see e.g. Eurostat, 2001). Almost inevitably one has to rely on proxies for the trend in services output, such as the (deflated) volume of outstanding loans and deposit balances. This makes the strong assumption that every euro worth of loans or deposits represents the same amount of services over time, an assumption that may well fail to take technological advances into account.³ For the US, Inklaar and Wang (2007) show that it matters a great deal whether deflated balances are used as a quantity indicator or the number of loans and deposit transactions. In this work package, we aim to develop new indicators of bank output based (to the extent possible) on quantity indicators. In particular in the area of deposit transactions, this should be feasible using data from payments processors.⁴

More broadly, we would argue that the financial quantity indicators, such as the credit to GDP ratio, that are often used to analyze the effect of finance on growth may be misleading. The financial crisis has shown that in the US many loans were made without sufficient screening and monitoring. We therefore propose a range of indicators to measure the **quality of the financial system**. These will partly consist of

¹ Assuming that deposit insurance makes a bank deposit a risk-free investment.

² See e.g. Begg et al. (1996) for a discussion of FISIM under the current System of National Accounts (SNA93). In the European FISIM (financial intermediation services indirectly measured) regulation, this reference rate is defined as the average inter-bank rate.

³ This is shown theoretically in Wang et al. (2004) and Basu and Wang (2006).

⁴ See Beijnen and Bolt (2008); data coverage is not extensive in terms of years or countries covered, but the data seem feasible for a sensitivity analysis.

our improved output indicators since these focus on the amount of screening and monitoring services provided but also profit efficiency scores to account for aspects of financial services that are hard to measure but that are valued by customers. These efficiency scores will be based on estimated profit functions using individual bank data from Bankscope. Additionally, screening and monitoring services may be higher due to a lack of competition or because of larger risks. We therefore need to adjust our output measures to take these factors into account. For measures of competition we will consider the traditional Lerner indices and the more novel Boone indicator. For measures of risk, we will consider balance sheet measures such as the amount of non-performing loans and market-based measures such as bond spreads or CDS premia.⁵ Also, we will need to consider interactions between, for example, the degree of risk-taking and competition to account for non-linear effects of these indicators on the output and efficiency measures.⁶

Finally, we will consider new indicators of the **integration** of banking within Europe, such as the extent of interest rate convergence and cross-border lending. The former will be determined using official retail interest rate data and the latter using BIS data. Here we can also consider cross-border ownership ties.

While banking is an important industry in itself, its importance is mostly gauged by its impact on the rest of the economy: a well-functioning financial system channels savings to the most productive projects, stimulating economic growth. Inklaar and Koetter (2008) show that this is the case in particular in the new EU member states and this is but one example of a broad literature on this topic (again, see Levine, 2005). To determine the importance of the financial sector for growth in a particular industry, we will develop indicators of dependence on external finance, the extent of collateralizable assets and growth opportunities.⁷ Furthermore, we will examine the channels through which productivity growth is positively affected. The hypothesis would be that if a country has a higher quality financial system, banks are better at selecting the most productive firms to lend to which will be tested using indicators of allocative efficiency from work package 3.

There are only a few studies available that examine the direct effect of competition and bank efficiency on growth, indicating that further empirical evidence is needed in this area. There are a number of papers that study banking efficiency which refer to the case of European banking sectors.⁸ Nevertheless, it is essential to explore in depth the relation between financial development, competition and efficiency, along with how efficiency in banking management affects economic growth and how this attenuates or aggravates the impacts of financial crises. In the case of banking competition, the evidence is limited and somewhat inconclusive, once again because of the difficulties in its measurement. For this reason, the latest research (see a survey in Carbó, Humphrey, Maudos and Molyneux, 2008) emphasizes constructing measures of competition for the banking sector, based on

⁵ See e.g. Gropp et al. (2006).

⁶ See e.g. Allen and Gale (2004) and Boyd and De Nicolo (2005).

⁷ See Rajan and Zingales (1998) on dependence on external finance, Almeida and Campello (2007) on collateralizable assets and Fisman and Love (2007) on growth opportunities.

⁸ See e.g. Altunbas et al (2001); Maudos, et al. (2002); Carbó, Gardener and Williams (2002); Carbó et al. (2007).

various methodological approaches (among others, the Panzar and Rosse test and the Lerner Index). In this context, Maudos and Fernández de Guevara (2008) show the importance of banking competition on economic growth at international (cross-country study) and also regional level (for the Spanish case). The number of studies analyzing the relationship between market power and efficiency in banking management is likewise limited. In the international context (particularly in the case of the United States), there are significant works which have analyzed how market power affects the efficiency of financial institutions (Berger and Hannan, 1998). However, there are not a great many studies applied to the European case (with the exception of Maudos and Fernández de Guevara, 2007). Therefore the research in WP4 will add significantly to the limited existing evidence. Also based on the indicators of financial integration, we can analyze the effect of financial firms and markets integration on growth in particular in the new Member States - in this respect the research will include a specific study of the financial services sector in Hungary.

Given the developments of the past year, it would be remiss to leave out research on the financial crisis in WP4. Much of the current focus is on explaining how this crisis came about (e.g. Barrell and Davies, 2008; Eichengreen, 2008) but perhaps more important will be how it will affect future performance of the financial sector and the rest of the economy. The crisis is particularly relevant for Task 3 of WP4, which focuses on the link between the financial system and economic growth. For one, the crisis might lead to either consolidation of the banking industry as weaker banks are taken over or efforts to break up banks that are 'too big to fail'. In both cases, the effects of changing market structure will influence the degree of competitiveness in the industry, making it more important to evaluate the effects of competition in financial services on broader economic performance as well as on financial stability.

The financial crisis may also directly affect long run economic growth, by for example diminishing the risk appetite of banks, which could make them more hesitant to finance risky projects. Kroszner, Laeven and Klingebiel (2007) on the consequences of banking crises for economic growth provides a useful starting point for further research. In particular we would focus on whether banking crises have an effect by hampering the growth opportunities of specific sectors and on the aspects of the financial system that are most closely correlated with the negative consequences of banking crises (i.e. the amount of credit, the efficiency of banks, etc.). In particular this last feature should be useful to inform regulatory reform in the financial sector.

WP5 Health services

Work Packages 5 and 6 together comprise the main work in INDICSER on deriving indicators for non-market services. The work will include reviews of data availability and then move to practical implementation. The conceptual issues that will be addressed include the use of activities as output measures and what weights to employ to aggregate across activities; how outcomes might be combined with activities or other volume indicators to yield a quality adjusted output measure; how to account for innovations in service provision and to compare the use of productivity and value for money as performance indicators. Many of these conceptual issues have been addressed in the existing literature, notably in Eurostat (2001), The Atkinson Review (2005), and the work at the Centre for the

Measurement of Government Activity at the UK Office for National Statistics and at the OECD. These will be the point of departure for the research team. However there remain unresolved issues, in particular in international comparisons.

Work Package 5 concerns indicators for the health sector and will first consider the feasibility of gathering the data necessary to construct performance indicators, both outputs and input use, in Europe and the US. This will build on the Ageing, Health Status and Determinants of Health Expenditure AHEAD project (FP6) which provides a collection of data describing the demand and supply side of the health sector as well as the health system and the health care expenditure (Schulz 2005). Data stem mainly from Eurostat, OECD Health Data, WHO Health for All database and the country specific Health Care Systems in Transition reports, but also data and information from the individual web pages. The data set includes outcome variables, such as life expectancy, crude death rates, input variables, such as employed health care staff, number of hospital beds, indicators for the use of new technologies (for example MRI per million population), waiting times for elective surgeries, but also indicators describing the health care system, for example free choice of GP, specialists, hospitals, co-payments or the reimbursement mechanism of hospitals or doctors. The OECD also produces a large number of indicators that could be employed in analysis of value for money as does the European Community Health Indicators projects (ECHI-1 and ECHI-2). Useful input indicators can also be gathered from sources such as the EU LFS and Earnings surveys occupation data.

However the data requirements to undertake an extensive study of productivity such as that in Dawson *et al.* (2005) for the UK health sector are less well known. In this project we will use more detailed data in an attempt to measure **cost weighted activity indices for selected countries and compare with input use**. Countries which have the required detailed activity data and on which the research team has the expertise required to evaluate these data include the UK, Germany and Hungary and Spain. Additional countries where much of the required data appears to be publicly available include Ireland, Denmark and the Netherlands.

The second important contribution of this work package is to show how to use **outcome data to quality adjust the activity-based output estimates**. Most papers that attempt to take account of outcome data for health confine attention to readily available measures of survival rates and reductions in waiting times (e.g. work by UK CeGMA and Dawson *et al.* 2005). However in order to properly estimate the effect of treatment on the health of individuals one should go beyond these traditional measures and somehow include quality of life or disability-free metrics. This raises a number of issues, first of which is the choice of metrics. On the one hand is the WHO idea of DALYs (Disability adjusted life years) presented in Murray *et al.* (2002) while on the other is the idea of using as a numeraire years in perfect health which gave rise to the idea of QALYs (quality adjusted life years) (see Fanshel & Bush, 1970; Patrick, Bush & Chen, 1973; Rosser & Watts (1972); Culyer, Lavers & Williams,1972). If quality of life oriented measures are chosen, then we need to select among the available metrics devoted to quality of life evaluation. This could be solved by relying on some of the most popular ones, e.g. EQ-5D or the SF-36., in which some characteristics together with different levels are used to construct health states whose tariffs would be evaluated later on (Brooks, 1996; Brazier *et al.* 2002). This leads to a further

difficulty, namely, the fact that tariffs are sensitive to the elicitation procedure. That is, when using Standard Gamble, in which agents are confronted with the selection of some years in a particular health state with certainty and a lottery with a probability of some years in full health or a probability of immediate death, we obtain different weights than when the elicitation procedure is Time Trade Off, where the individual reports the number of years in his actual state he is ready to sacrifice to recover full health (see Dolan et al, 1996; Lamers et al, 2006). Given these difficulties, an intermediate approach could be to treat as an output measure the so called “Disability-free Life expectancy”, in which instead of computing broad life expectancies what is computed is the number of years without disabilities individuals can expect to live. Therefore a first step is to review the literature on health metrics and ascertain to what extent available measures can be employed to adjust for quality of life.

The **introduction of new services** raises similar issues to those for quality adjustments. The theoretical methods for handling these issues are well understood. New services or extra quality should be valued at their reservation prices, as indicated by their impact on welfare. Törnqvist price indices are then calculated using this as the initial price in order to derive relevant volume indices. Griliches (1994) shows that the outcome of the calculation depends very much on the rate at which an innovation is assumed to diffuse throughout the economy. This work-package will explore the functionality and implications of this approach, addressing the question of how to implement it in a coherent system of constant and current price national accounts. In parallel the question whether there are any other circumstances (such as permanent rationing) when non-market outputs should be valued on the basis of the (average) consumer welfare associated with them.

An important issue that needs to be addressed is what performance measure should be used for non-market services. In market services it is usual to use productivity measures defined as real (quality adjusted) output per unit of input. Given perfectly functioning output and input markets and prices that capture consumer valuations this measure is consistent with ‘value for money’ measures which calculate service valuations minus expenditures, both adjusted for inflation. In non-market services both output and input markets are rife with imperfections due to information asymmetries where knowledge is in the hands of professionals, the importance of public funding and or/provision and the fact that in many countries payment is carried out through insurance markets which creates a wedge between the consumer and the service provider (O’Mahony, Stevens and Stokes, 2008). These market imperfections mean that productivity measures might give very different answers from value for money measures. On the output side there may be high cost activities that do not yield benefits to consumers that reflect their relative costs. On the input side restrictions on entry to professions or market power in the hands of input providers (e.g. drugs) may lead to higher costs than would emerge in competitive markets. This work programme will **compare the relative merits of productivity and value for money measures**, focusing on the healthcare sector. On the output side this will use the methods outlined in Cutler, Rosen and Vijan (2006) and Murphy and Topel (2006) which used data on health expenditures and mortality rates by age groups and gender along with various assumptions on valuing lives. Since many health treatments are for conditions that are not life threatening, a major innovation in this project will be to try to also account for quality of life valuations in these calculations. The use of the idea of disability-free life expectancies in this setting could represent a significant improvement on the actual state of the

art. It is also interesting to explore some alternative methods as those outlined in Becker, Philipson and Soares (2005) or Nordhaus (2002). On the input side the work will draw on the analysis undertaken by UKCeMGA (2008).

It is expected that more detailed studies that attempt to link activities, outputs and outcomes and calculate productivity versus value for money indicators will be confined to a few selected countries. These will include the UK, Germany, Hungary and Spain and based on a preliminary trawl through web-sites, it should also be possible to widen the scope to include The Netherlands, Denmark, Ireland, Slovakia and Romania for some measures. For example plentiful data exist for the UK on activities including a division by age and gender as detailed in Dawson et al (2005). For Germany detailed data on hospital cases by gender, age-groups and by Diagnosis Related Group (DRG) groups is available as well as DRG-specific treatment costs. Concerning input variables there is wide coverage of labour, intermediate inputs and some measures of capital expenditure for the UK whereas in Germany data are available on health care personnel, earnings as well as training in health professions. In Hungary and Spain governmental health institutions and national statistical offices also collect data that will be useful for this study about which the consortium partners are familiar.

WP6 Educational services

Work Package 6 will be concerned with outputs of educational services. It will consider **alternative measures of output** of the educational system. The first is the conventional measure of number of pupils and students educated at different levels (cost weighted). A second indicator might be the average duration of education applying the method of calculating “life expectancy” conventionally used in demographic analysis. In practice this involves calculating for each age group the probability of survival till next year within the system of education and then compiling the total expected duration of education as the sum of the probabilities of surviving at every age in education. A third measure is an indicator for inequalities in educational attainment through the calculation of an “education GINI coefficient” already developed by Thomas, Wang and Fan (2001). This is designed as an indicator which is independent of the current definitions of primary, secondary and tertiary education where some problems of international comparability prevail even today. The education GINI will provide an indicator for the degree of inequality of the overall educational attainment of the population and its development through time. A fourth measure will follow the methods employed by O’Mahony and Stevens (2008) to compare output of the education sector in the UK and US and Serrano and Pastor (2002) for Spain. The basic idea is that firms pay a wage according to the productivity of each worker and this depends on human capital. Output measures of human capital take into account the effects of the educational training of a worker as reflected in his wage rate. To implement this approach a numeraire has to be chosen, for example by dividing each worker’s wage by the wage rate of the unskilled worker as used by e.g. Mulligan and Sala-i-Martin (1997). These measures have typically been employed in research on measuring human capital in the workforce as a whole, but can also be applied to graduates from the educational system or even to pupils who remain enrolled in the system (see O’Mahony and Stevens, 2008). The data for this analysis will be country specific labour force survey microdata and so the analysis will be carried out comparing the UK and Spain where the researchers have access to these data.

The second task in measuring indicators for education is to examine the **use of outcomes both to quality adjust output measures and in their own right as measures of performance**. This will investigate how to incorporate standard outcome measures but will also consider the feasibility of including experimental measures. Arguably the best available evidence on quality in schools comes from standardised academic achievement tests, which are designed to be as comparable as possible across different schools, regions and, more recently, across countries in the OECD PISA study. There is some concern about whether tests provide sufficiently comparable indicators of academic performance, especially when used to assess students from different educational systems. Some argue, for instance, that students who are used to taking similar tests as part of the national education system may be at an advantage compared with those from other countries. Nevertheless the evidence suggests that an improvement in quality, as measured by performance in tests, might have a considerably larger impact on economic growth than a proportionate increase in average years of schooling (Hanushek and Kimko, 2000). Therefore this task will explore the feasibility of employing test score measures to adjust outcomes. It will consider in particular the use of internationally comparable measures such as PISA and how the use of these alters the relative output and productivity position of countries.

Two additional methods for quality adjustment in education will also be reviewed. NIESR are currently exploring the possibility of adjusting pre-school education outcomes in England using quality measures from ratings scales such as ECERS (Early Childhood Environment Rating Scale) and from provider inspection data collected by Ofsted (the Office for Standards in Education). This strand of work will extend this approach to outcome measures for older children. It will assess how well school quality indicators as measured by Ofsted and other rating scales can predict a range of outcomes for children at different stages of compulsory schooling. This will help to improve a limitation of the current approaches to quality adjustment of educational outputs, which focus exclusively on attainment at the end of compulsory schooling, by considering outcomes at different stages of compulsory schooling using outcome data which reflect not only academic attainment but other broader goals of education including health, safety, enjoyment and social contribution.

A second potentially useful approach is to use earnings of age cohorts as a quality adjuster as employed in O'Mahony and Stevens (2008). This captures the idea that the relative earnings of younger workers to the population as a whole today are different to the relative earnings of younger workers say a decade ago. This idea is pursued by Card and Lemieux (2001), who note that the rise in the college wage premium observed in the US, UK and Canada is almost entirely due to the rise in younger college-educated earnings. This they explain in terms of a reduction in the supply of younger college-educated labour allied to the imperfect substitutability between younger and older college graduates. Young workers offer something to employers that older workers of a similar level of education cannot. It could be argued that modern graduates learn something more than older graduates, due to changes in the skills being taught or the quantity or quality of the teaching or other inputs used to provide the education. In this work we will evaluate the usefulness of an approach that assumes that differences between younger and older workers stem from the skills taught in the education sector, i.e. the assumption that the relative effectiveness of workers who leave education in one cohort relative to

earlier cohorts of school leavers can be measured by the proportionate increase in their relative returns from education.

WP7 Experimental output indicators

Work Package 7 is devoted to more experimental research. Various suggestions will be made for development of new indicators which can yet not be rolled out on a large scale but might be in the future. In particular, we will make new proposals for output measurement in insurance, collective services and distributive trades. We will explore the creation of alternative measures of **non-life insurance output** based on quantum of risk. The EUROSTAT *Handbook on Price and Volume Measures in the National Accounts* states (p. 99) that “If the output of insurance and pension funding can be considered as the pooling or transfer of risk then indicators which proxy that risk could be considered suitable for the measurement of price and volumes”. This task will develop this suggestion, exploring the creation of alternative measures of non-life insurance output based on quantum of risk. We will identify, using insurance company data, the insured values of different types of asset (buildings, plant and machinery, vehicles and consumer durables). With constant risk the volume of insurance provided for each asset category is proportional to the volume of assets (i.e. the insured value deflated by the appropriate asset price index). Risk as measured in the market is provided by the premium rate on each class of asset adjusted for interest earned on the technical reserves of insurance companies. For each category of asset we can then produce a volume of insurance index whose change is defined as:

$$\frac{\text{Volume of insured goods in current period} \times \text{Current period adjusted premium rate}}{\text{Volume of insured goods in base period} \times \text{Base period adjusted premium rate}}$$

$$\text{Volume of insured goods in base period} \times \text{Base period adjusted premium rate}$$

If insurance provided is proportional to premia, this is a measure of the change in the insurance services purchased. Thus the appropriate weights are insurance purchases in each of the categories - premia paid net of claims with appropriate adjustment for income on technical reserves. These equal wages plus profits plus other inputs of the industry, and the treatment is therefore consistent with other aspects of the national accounts. This concept will be developed in the United Kingdom in discussion with the Association of British Insurers and structured interviews with key insurance companies in the United Kingdom.⁹ We will then develop the concept for application to **life insurance and pensions**. With life insurance the mortality risk associated with particular types of policy is known from data published by life insurers and pension companies; it differs from that of the population as a whole because of selection bias. The underlying idea can also be applied to pensions; there is already a substantial literature on the pricing of annuities (e.g. Cannon and Tonks, 2006); however, some further development of the concept will be needed to allow for the fact that, when people buy annuities they are insuring against the risk of longevity rather than the risk of death.

A second task will be proposals for improving **output measurement in distributive trade**. This will include a review of methodologies currently in use to measure the output of distributive trade services

⁹ It should be noted that there can be difficulties with joint sales of insurance products- such as house and car insurance sold together- but it is not clear that this is any more problematic than, for example, joint sales of gas and electricity.

which will inform the analysis of the main shortcomings of current methodologies and how to improve these methodologies. New measures will be proposed and applied to a selected set of countries. As yet current National Accounts data are becoming more and more obsolete, and suffer increasingly from international comparability problems, due to statistical measurement innovations. The key problem is that in current National Accounts methodology, changes in prices of the most important input in retail trade, namely the purchases of goods for resale, are not accounted for. The failure to account for changes in purchases prices has always been problematic, but it is becoming more pressing for two reasons, namely changes in retailer's business models and rapid sales price declines of high-tech goods. We will outline a consistent an accounting framework for measuring distribution sector productivity and illustrate this with alternative measures applied to the U.S. and a number of major European countries. This is based on a comparison of retail input and output prices and application of the so-called double-deflation method (Inklaar and Timmer, 2007)

Work Package 7 will also develop ways in which activity indicators can be produced for **collective services**. Essentially they involve distinguishing labour and capital which is employed in the front line delivery of the service from that which is employed in providing support to make the delivery of the service possible. Thus, in looking at the defence industry we would distinguish front-line personnel from those who are not seen as playing potential combat roles. With services such as the police we will distinguish those involve in policing roles from those providing support activity and will also investigate whether it is possible to allocate the time use of personnel involved in delivering policing services between front line and support activities. The Atkinson Review (2005) implied that, other things being equal, the volume of protective services should increase in line with the quantity protected. Applying this principle, which is coherent with the treatment of insurance discussed above, to protective services (police, fire service, defence services) faces a number of problems. First of all, both people and property are protected. The volume of the former is probably best measured by a head-count, while the latter is measured by an index of the capital stock. But the relative degree of protection offered by the different services to people and property may differ. For policing we can make the assumption that protection is proportional to reported damage so that injuries to people can be valued on the basis of official compensation rates while information on damage to property can be collected from insurance statistics. Similar principles can probably be applied to fire services. For defence, however, a balanced view needs to be formed of what the armed services actually provide defence from; is it threats to external activities or protection at home. If the latter one can assume that property and human life are equally defended. The latter then needs to be valued to produce a combined index; the approach suggested by Murphy and Topel (2006) appears to be the most helpful way of doing this. The volume changes identified by this approach are multiplicatively applied to conventional output indices. The data for this work will in general be drawn from administrative sources.

Finally Work Package 7 will explore how to take account of outputs across a range of sectors so as to define a 'Research Sector'. This will combine the outputs of university research activities with output measures for the R&D sector (NACE 73) and examine the feasibility of adding outputs from other key R&D producing industries such as pharmaceuticals and the health sector. It will consider the conceptual and practical data requirements to measures these additional outputs. This strand of work will

investigate how to construct an indicator that could be used to measure the impact of technological capital generated by universities and other sectors through R+D expenditures. This will use the perpetual inventory method to calculate stocks of university generated R&D using the method employed for Spain in Pastor and Pérez (2008).

1.3 European coverage and comparative perspective

For some indicators an attempt will be made to cover a wide range of EU countries, while for others we will produce indicators for only a small subset of countries, illustrate their usefulness and develop a set of recommendations on the feasibility and usefulness of extending to other countries. For example it is likely that some output and productivity indicators measures can be calculated for education for all countries but those that involve returns to education may be confined to a few case studies. Likewise it should be feasible to calculate basic value for money indicators for healthcare in a large number of EU countries since this just requires data on mortality rates and expenditures by age and gender. More sophisticated value for money calculations that take account of quality of life or productivity measures that distinguish detailed treatments and inputs will be confined to a few countries. The following table summarises the EU country coverage.

EU Country coverage in INDICSER*

INDICATORS	Coverage using broad indicators and sources	Countries included in detailed analysis
Outputs and inputs by industry	EU-27, US and selected OECD countries	
Technology and ICT	All EU countries included in CIS and EUROSTAT ICT in enterprises	Germany, UK
Intangible Investments	All countries included in EU LFS	Belgium, Finland, UK
Market environment	All EU countries included in AMADEUS	
Financial services	All EU countries included in Bankscope	UK, Hungary
Health	All EU countries included in AHEAD	UK, Germany, Hungary, Spain,
Education	EU-27 for volume indicators	Spain, UK

*In practice coverage will depend on sample sizes in the relevant data

1.4 S/T methodology and associated work plan

The project will have a common structure to the research, with each body of work involving activities that fall within three broad groups:

- Measurement issues: Discussion of concepts and the feasibility of collecting data on indicators for EU countries
- Indicators: Development of statistical data for a narrow or broad set of countries and industries, depending on data availability
- Analytical studies: Studies that demonstrate the relevance of various indicators for tracking the structure, performance and impact of the services sector.

Work package deliverables will comprise four areas

- 1. Survey papers on measurement issues, including data availability and conceptual discussion.**
- 2. Indicators for use in analytical studies and disseminated to other users – coverage may be all EU countries, or selected countries, broad sectors or detailed industries, depending on data availability.**
- 3. Analytical research papers**
- 4. Recommendations on feasibility and usefulness of indicators based on 1-3.**

Work Package 1 will contain an overview of trends and developments in EU service sectors to inform the subsequent development of the programme. Each of work packages 2 to 6 will begin with survey papers, the findings of which will be discussed at a meeting in Month 12 to which representatives of the statistical, policy and academic communities will be invited. The discussion arising from this will inform the subsequent work programme. The research findings from work packages 1 to 7 will feed into the synthesis work package 8. The main linkages across WPs are illustrated in chart 1.3.1 below. The timing of the work packages will depend on these linkages. The Gantt chart 1.3.2 shows the timing of WPs and their tasks.

Figure 1.3.1: Linkages between workpackages

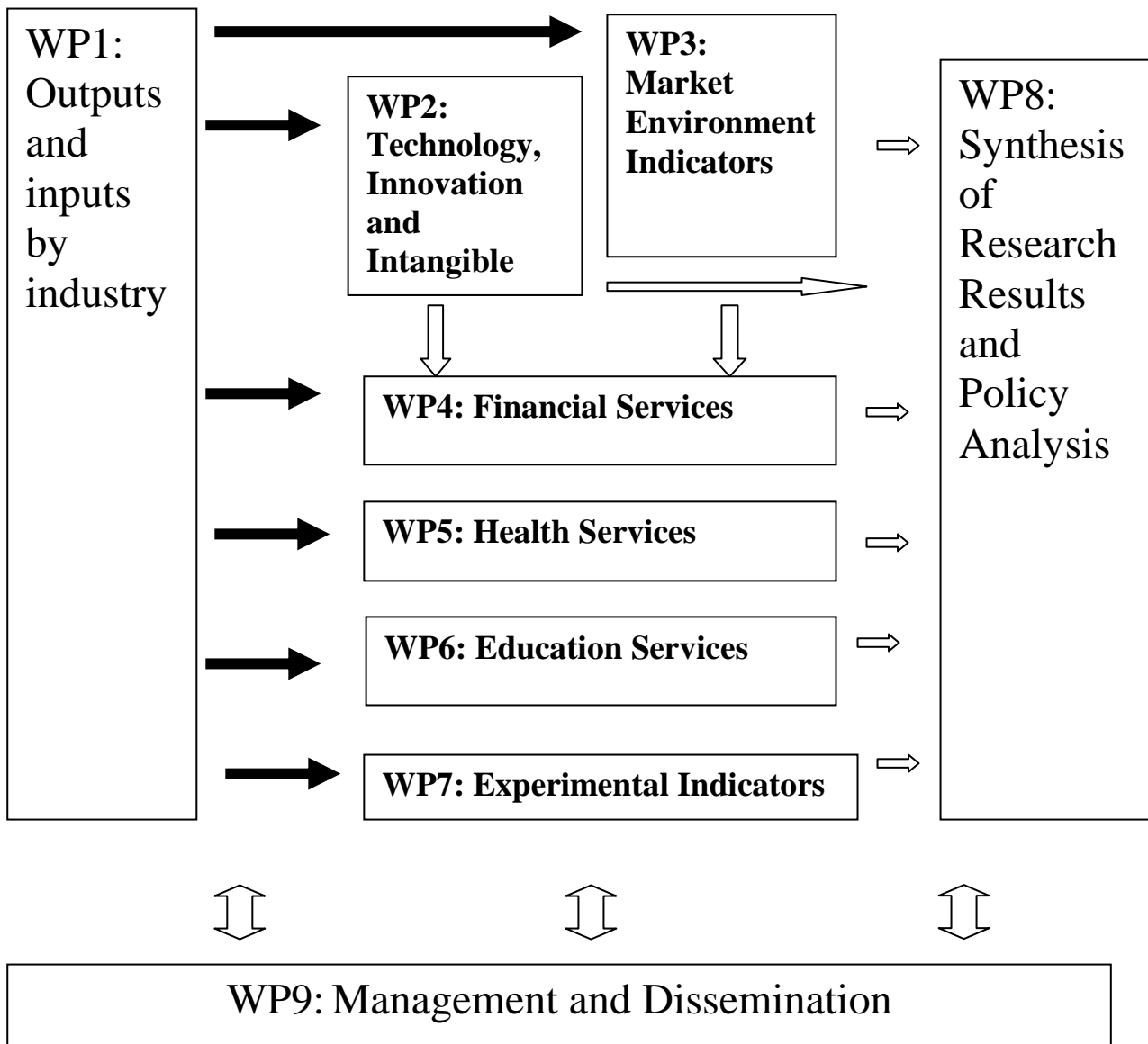


Figure 1.3.2: Gantt Chart showing timing of work packages and their tasks

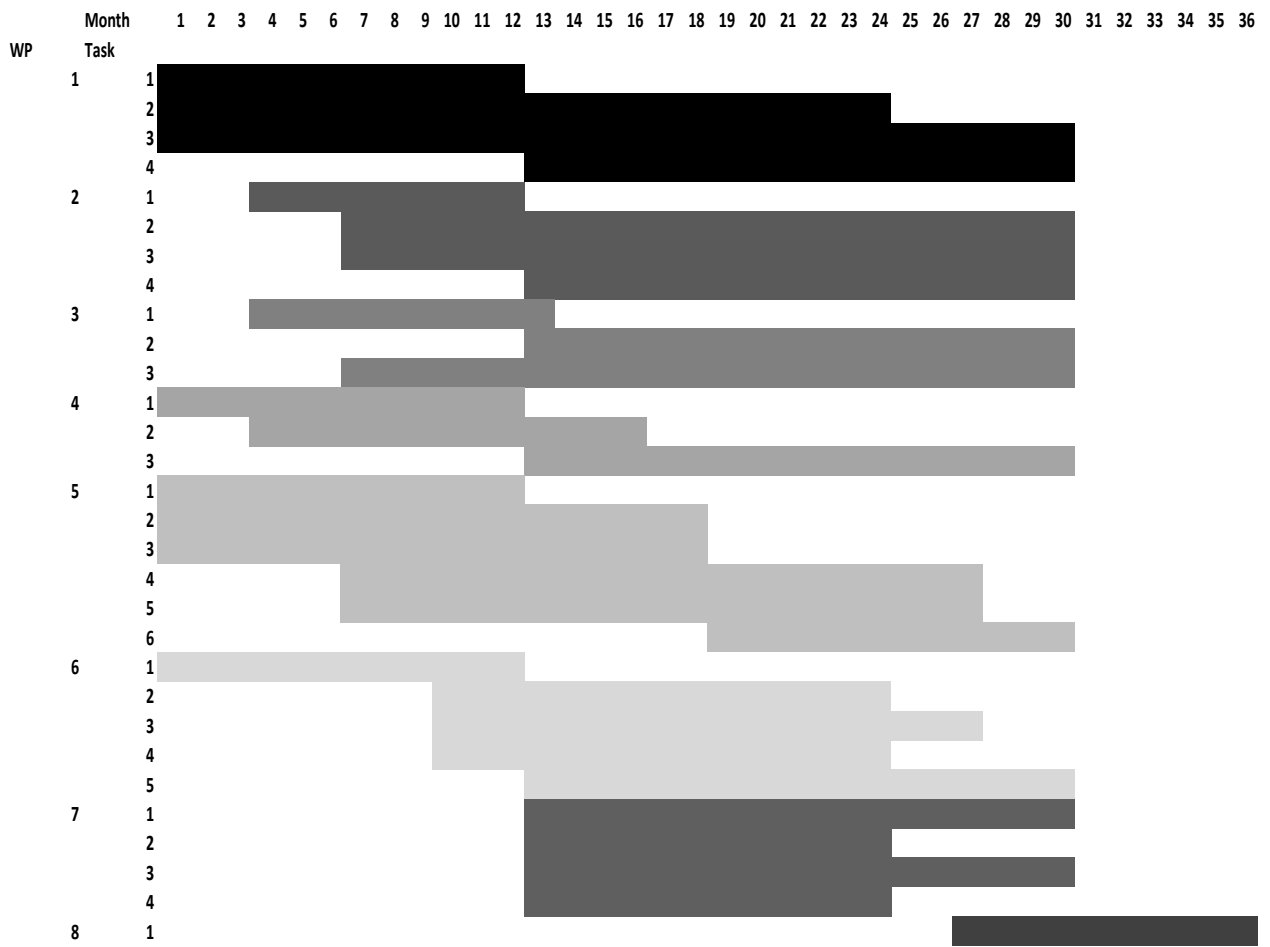


Table 1.3a: Work package list

Work package No	Work package title	Type of activity	Lead participant No	Lead participant short name	Person-months	Start month	End month
1	Input, output and productivity trends in service sectors	RTD	2	RUG	43	1	36
2	Technology, Innovation and Intangible Indicators	RTD	4	ZEW	49	4	32
3	Market Environment Indicators	RTD	1	BHAM	30	4	32
4	Financial Services	RTD	2	RUG	42	1	32
5	Health Services	RTD	7	IVIE	60	1	32
6	Educational services	RTD	5	CEPS	36	1	32
7	Experimental output indicators	RTD	3	NIESR	28	13	36
8	Synthesis	RTD	2	BHAM	22	27	36
9	Management and Dissemination	MGT	1	BHAM	20	1	36
				TOTAL	331		

Table 1.3b: Deliverables List

Del. no.	Deliverable name	WP no.	Nature	Dissemination level	Delivery date
D9.1	Project website	All	R&O	PU	1-
D1.1	Papers on output measurement in market services and trends in output, input and productivity growth	1	R	PU	12, 30
D1.2	Extending EU KLEMS	1	O	RE, PU	15, 30-34
D2.1	Review of existing measures of innovation, ICT and intangibles	2	R	PU	12
D3.1	Review of existing measures of market environment	3	R	PU	12
D4.1	Review of existing financial services indicators	4	R	PU	12
D5.1	Reviews of measures and data for indicators of the health sector and quality of life indicators	5	R	PU	12
D6.1	Review of existing indicators of the education sector and gathering comparable data at the European level	6	R	PU	12
D4.2	Construction of indicators for financial services	4	O	RE, PU	18, 30-34
D5.2	Review of indicators of effectiveness of treatment for some specific diseases	5	R	PU	18
D2.2	Construction of indicators for innovation, ICT use and intangibles	2	O	RE, PU	18, 30-34
D3.2	Construction of indicators for market structure, competition, entry and exit	3	O	RE, PU	18, 30-34
D5.3.	Analysis of disability-free life expectancies as a measure for output in the health care sector	5	R	PU	18
D6.2	Construction of indicators for output and human capital for the education sector	6	O	RE	24

Del. no.	Deliverable name	WP no.	Nature	Dissemination level	Delivery date
D2.3	Paper on growth accounting analysis of the impact of intangibles in service sectors and on the concept of intangibles as an input	2	R	PU	24
D3.3	Paper on alternative measures of product and labour market regulations	3	R	PU	24
D5.4	Paper on activities, outputs, outcomes, inputs and productivity for the health sector, innovation in health sectors and comparisons of productivity and value for money indicators for selected countries	5	R	PU	24, 27
D6.3	Papers on quality adjustments to education output using outcome data	6	R	PU	24, 30
D2.4	Paper on links between productivity, innovation and ICT use	2	R	PU	27
D3.4	Paper on internationalisation indicators	3	R	PU	30
D4.3	Paper on bank competition, financial development and cross-border integration of financial firms and economic growth and financial services in new member states	4	R	PU	30
D5.5	Construction of indicators of output, input use, productivity and value for money for health sectors in selected countries	5	O	PU	34
D6.4	Construction of indicators for productivity of the education sector	6	O	PU	34
D7.1	Paper on Output measurement in insurance	7	R	PU	30

Del. no.	Deliverable name	WP no.	Nature	Dissemination level	Delivery date
D7.2	Paper on output measurement in distributive trades	7	R	PU	30
D7.3	Paper on Collective services	7	R	PU	30
D7.4	Papers on technological capital generated by universities through R+D expenditures and on outputs and inputs of the 'Research Sector'	6	R	PU	30
D8.1	Summary papers of research results for market services and results for non-market services	8	R	PU	32
D8.2	Research report on final results	8	R	PU	36
D9.2	Policy brief	9	R	PU	12,18.24,30, 36 and in case of a concrete policy request

Table 1.3c: List of milestones

Milestone number	Milestone name	Work package(s) involved	Expected date	Means of verification
M1	Launch of the project web-site and consortium Kick-off meeting with representation from the European Commission	9	Month 1	Minutes
M2	Workshop to disseminate results of reviews of concepts and measurement	1,2,3,4,5,6	Month 12	Minutes and Papers
M3	First set of indicators published – extensions of EU KLEMS	1	Month 15	Published on restricted web-site
M4	Construction of first set of indicators for financial services, innovation and intangibles and market environment	2,3,4	Month 18	Published on restricted web-site and paper
M5	Mid term conference and consortium research coordination meeting with representation from the European Commission	All WPs	Month 18	Mid term report
M6	Workshop to disseminate research results from WP2-4	1,2,3,4,5,6	Month 24	Minutes and Papers
M7	First Working Papers series published	All WPs	Month 24	Papers
M8	Second Working Papers series published	All WPs	Month 30	Papers
M9	Second set of indicators extending EU KLEMS, innovation and intangibles and market environment, indicators for health and education	1, 2, 3, 5, 6	Months 30-34	Published on web-site
M10	Workshop and consortium research co-ordination meeting	8	Month 32	Reports for market and non-marker services
M11	Consortium Final Conference with representation from the European Commission	9	Month 36	Final Report

Table 1.3d: Workpackage descriptions

Work package number	1	Start date or starting event:			Month 1		
Work package title	Input, output and productivity trends in service sectors						
Activity Type	RTD						
Participant number	1	2	6	7			
Participant short name	BHAM	RUG	DIW	IVIE			
Person-months per participant:	6	28	3	6			

Objectives

To present an overview of trends in output, inputs and productivity in European service sectors by extending the EU KLEMS database.

Description of work (possibly broken down into tasks), and role of participants

Task 1 Output measurement in market services (RUG, BHAM, DIW, IVIE)

This will include a review of methodologies in currently use to measure the output of services such as trade, transport, finance and business services and comparing the state of measurement across Europe based on surveys by Eurostat and the OECD. The emphasis is on cataloguing differences in order to flag up potential comparability problems in existing National Accounts measures of output in market services.

Task 2 National accounts developments (RUG)

In the upcoming years a new system of national accounts (SNA08) and a new industrial classification system will be implemented (ISIC rev.4). This will create major breaks in the industry series which need to be dealt with. Also, the inclusion of R&D as investment instead of intermediate consumption needs to be addressed. In addition, individual countries will sometimes make major revisions to their national accounts such as the planned change in the computation of FISIM in the UK, the continuing changes to reflect the informal economy in Greece. We will track these developments and outline methodologies to ensure that our data series are consistent to the extent possible, both across countries and over time.

Task 3 Extending EU KLEMS (RUG, BHAM, DIW, IVIE)

As part of the WIOD FP7 project, the EU KLEMS database will be extended, but at a relatively high level of industry aggregation (31 industries). To chart developments in services industries with a useful degree of detail, data at the level of 72 industries will be necessary. In addition, with the Accession of Bulgaria and Romania, country coverage will have to be expanded to cover the entire EU-27.

Task 4. Trends in output, input and productivity growth (RUG, BHAM, IVIE)

Based on the extended EU KLEMS database, we will document and analyze the changing structure of the services sector. This will consist of broad overview of changes in the sources of growth in each industry, the relative importance of the different services industries and the linkages between services industries and with the rest of the economy.

Deliverables (brief description and month of delivery)

D1.1 Papers on Output measurement in market services, trends in output, input and productivity growth and national accounts developments (Month 12, 30)

D1.2 Revising and extending EU KLEMS (Month 12, 34)

Work package number	2	Start date or starting event:				Month 4	
Work package title	Technology, Innovation and Intangible Indicators						
Activity Type	RTD						
Participant number	1	2	3	4	5	6	
Participant short name	BHAM	RUG	NIESR	ZEW	CEPS	DIW	
Person-months per participant:	9	3	5	24	6	2	

Objectives

To review indicators of technology, innovation and intangible investments

To construct indicators of innovation and use of ICT

To construct indicators of intangible investments

To consider the impact of ICT use, innovation and intangible investments on international productivity performance

Description of work (possibly broken down into tasks), and role of participants

Task 1. Review of measurement of indicators on innovation, ICT and intangibles (ZEW, BHAM, NIESR, RUG)

This will draw on existing studies and projects and will contain an overview of the variables included, country coverage, industry coverage and time periods. The main pan-European surveys (CIS, ICT use Survey, EU LFS) as well as country specific studies (ZEW surveys, matched employer-employee surveys) will be used.

Task 2. Construction of Indicators from Survey data

- Innovation indicators based on CIS (**ZEW**)
- ICT use from EUROSTAT ICT in enterprises and from firm level data for Germany and the UK (**ZEW, NIESR**)
- ICT occupations (**BHAM**)
- Other (**ZEW, BHAM**)
- Occupations vs. skills (**BHAM, NIESR**)

Task 3. Intangible investments. (BHAM, , CEPS, NIESR, ZEW, RUG,DIW)

3a. This will first be concerned with defining intangible investments, drawing on existing literature and the analysis in work package 1.

3b. Construction of Indicators of Intangible Investments for broad (NACE 1 digit) service sectors EU-wide: Software, R&D (scientific and non-scientific), firm specific investments (on the job training)

Selected countries: above plus Brand Equity and Management and organisational structure.

An attempt will be made to measure some indicators for all EU countries using sources such as EU KLEMS, EU LFS, EU Earnings survey and ANBERD. More sophisticated measures will be confined to selected countries such as the UK, Germany and Finland.

3c. With the growing amount of data on intangible capital investment available, efforts to identify the main theoretical and empirical bottlenecks to understanding the impact of intangible capital on growth are essential. The non-rival nature of many such investments and the spillovers, both positive and negative, this entails are areas where the measurement implications are still

insufficiently understood.

Task 4. Analytical Research (BHAM, CEPS, NIESR, ZEW,DIW)

4b. Model indicating impact of intangible investments on productivity in market service sectors. **(BHAM, CEPS)**. The research will use the above data, linked to EU KLEMS data in a growth accounting analysis of sources of growth. This necessitates assumptions regarding deflators and depreciation rates for intangibles, which again will be based on the existing literature, but will be subjected to sensitivity tests. A full growth accounting exercise will only be possible for the countries named above. A partial growth accounting analysis will be undertaken using indicators available for all EU countries, such as proportion of workers in various occupations, receiving on the job training etc.

4.c.

Deliverables (brief description and month of delivery)

D2.1 Review of existing measures of innovation, ICT and intangibles and of the corresponding coverage with respect to countries, industries and time periods. (Month 12)

D2.2 Construction of indicators for innovation, ICT use and (Month 18, Month 34)

D2.3 Papers on growth accounting analysis of the impact of intangibles in service sectors and on the concept of intangibles as an input (Month 24)

D2.6 Paper on analysis of links between productivity, innovation and ICT use (Months27)

Work package number	3	Start date or starting event:			Month 4		
Work package title	Market Environment Indicators						
Activity Type	RTD						
Participant number	1	3	7	8			
Participant short name	BHAM	NIESR	IVIE	TARKI			
Person-months per participant:	14	7	6	3			

Objectives

The market environment of industries is a crucial factor in the growth performance of industries across countries. Much research though has focused on data for single countries due to the lack of reliable cross-country micro-data. In this work package we aim to construct a range of indicators for industry structure, productivity, competition, dynamics and international exposure and presence. We will mostly rely on cross-country databases such as Amadeus, but inform the decision on which indicators to use and publish for which countries and years using industry and country-level micro-data. We then use these market environment indicators to show their role in industry growth.

Description of work (possibly broken down into tasks), and role of participants

Task 1 Measurement of market environment indicators (BHAM, NIESR)

Indicators based on firm-level data are becoming more important in economic research, but current efforts are still hampered by the scarce availability of cross-country micro-data. Private databases such as Amadeus from Bureau van Dijk can be a useful complement if the coverage and concepts are comparable enough. This may be the case for some indicators, but not for others so a confrontation is needed with indicators based on EU KLEMS industry data and Eurostat and NSI micro-data. This will also help determine for which countries and time periods such Amadeus-based indicators can be useful.

Task 2 Indicators (BHAM, NIESR, IVIE, TARKI)

We aim to construct at a range of different indicators: Industry structure: firm size, concentration ratios, Hirschman-Herfindahl index

- Industry productivity: labour productivity, total factor productivity, Olley-Pakes allocative efficiency measure, frontier efficiency measures
- Competition indicators: Lerner indices, Boone indicator of competition, measures of product market regulation, measures of labour market regulation
- Industry dynamics: entry, exit and continuing firms
- International presence/exposure: share of foreign ownership (total and by country), share of foreign affiliate sales (total and by country) – all from SERVICEGAP, imports of services (from WIOD)

Which of these proves feasible will be informed by the analysis in Task 1 of what data is reliable enough for the indicator at hand.

Task 3 Analytical research (BHAM, RUG, NIESR, IVIE, TARKI)

This will be a descriptive analysis of trends and correlations that aid in improving our understanding of productivity growth in services, answering questions such whether a greater presence of foreign multinationals stimulates productivity; and whether technology transfer from more productive countries is mediated by the distribution of productivity within industries.

Deliverables (brief description and month of delivery)

D3.1 Review of existing measures of market environment including coverage with respect to countries, industries and time periods. (Month 12)

D3.2 Construction of indicators for market structure, competition, entry and exit and foreign presence (Month 18, Month 34)

D3.3 Paper outlining the feasibility of constructing alternative measures of product and labour market regulations above those in the existing literature (Month 24)

D3.4 Paper on internationalisation (Month 30)

Work package number	4	Start date or starting event:			Month 1		
Work package title	Financial Services						
Activity Type	RTD						
Participant number	2	3	7	8			
Participant short name	RUG	NIESR	IVIE	TARKI			
Person-months per participant:	25	5	9	3			

Objectives

The key aim of this work package is to develop a range of indicators that measure the performance of the financial services sector; their linkages to the rest of the economy; competition in the financial sector; and the cross-border integration of financial services. These indicators will be used to gain a better understanding of the role of the financial sector in the economy. We will analyze questions such as whether a more developed financial system improves economic growth; which dimensions of the financial system are important; the channels through which growth is influenced; the role of competition in the banking sector on growth effects; whether competition in banking stimulates competition in the rest of the economy; and whether more thorough financial integration has growth benefits.

Description of work (possibly broken down into tasks), and role of participants

Task 1. Review of measurement and indicators for financial services (RUG, IVIE)

The first task consists of a review of the literature outlining the various measurement alternatives available for indicators of financial development, integration and cross-border integration. Here we will discuss choices amongst different concepts, data sets and econometric methods used in estimation; leading to either clear choices in favour of a certain alternative or sensitivity analysis of different alternatives.

Task 2. Indicators for financial services (RUG, IVIE)

Constructing the indicators for financial services will depend on a range of publicly available data sources, including interest rate and balance sheet surveys and databases such as Bankscope and Amadeus. This will lead to the following indicators:

- improved output measures for banking both in current and constant prices;
- measures of the dependence on external finance;
- cost and profit efficiency scores for banks;
- other measures of financial development;
- indicators of competition in banking such as Lerner or Boone indicators;
- and new indicators of financial integration/internationalization/openness

In many cases, substantial coverage of the EU will be achieved, dependent on the availability and quality of the source data. For instance, if there is data on too few banks, certain competition indicators cannot be estimated.

Task 3. Analytical studies (RUG, IVIE, TARKI, NIESR)

The interaction between characteristics of the financial system and growth in the rest of the economy is central to the analytical studies. We will examine which aspects and characteristics of the financial system are particularly important in fostering economic growth. We will examine the channels through which the financial system influences economic growth, such as investment in new capital, improvements in allocative efficiency of resources across firms in an industry and the pace of innovation. The work will also focus on the consequences of the financial crisis - on the potential aspects of the financial system which are likely to have negative consequences on growth such as the amount of credit and the efficiency of banks and structural factors that link financial innovation and regulation with the sustainable level of output. It will examine whether banking crises have an effect by hampering the growth opportunities of specific sectors. (RUG,IVIE,NIESR). Finally, we will analyze the effect of financial firms and markets integration on growth, a particularly relevant topic for new Member States. In this respect the task will include a specific study of the financial services sector in Hungary. (TARKI)

Deliverables (brief description and month of delivery)

D4.1 Review of existing financial services indicators (month 12).

D 4.2 Construction of indicators of financial development, banking efficiency, competition and integration (month 18, 34).

D 4.3 Papers on bank competition, financial developments and cross-border integration of financial firms and economic growth and financial services in new member states (month 30)

Work package number	5	Start date or starting event:					Month 1
Work package title	Health services						
Activity Type	RTD						
Participant number	1	2	3	5	6	7	8
Participant short name	BHAM	RUG	NIESR	CEPS	DIW	IVIE	TARKI
Person-months per participant:	12	3	8	5	16	9	7

Objectives

To develop indicators for Health, including on output, inputs and productivity and quality adjustments using outcomes. To consider how evidence of new procedures and changes to procedures in health can be incorporated so as to establish how these have diffused and the implications of this for output indicators; to measure value for money indicators for a few countries and compare with productivity estimates and to undertake an analysis of the comparative performance of health sectors in selected countries.

Description of work (possibly broken down into tasks), and role of participants

Task 1 Measurement for the aggregate health sector (BHAM, CEPS, DIW, TARKI, IVIE, RUG)

This task will examine the feasibility of gathering the data necessary to construct performance indicators for the health sector in Europe and the US. It will first examine data availability on activities, unit costs of these activities, mortality rates, QALYS and other outcome measures, labour input (occupation – doctors, nurses, admin, other), capital input (asset types – medical equipment), intermediate input (drugs, clinical supplies, other). The starting point will be data collected by Eurostat, OECD and the World Health Organisation, e.g. data on hospital discharges by disease group, number of physicians from Eurostat and expenditures on health by age group produced by OECD. It will examine the extent to which these indicators can be supplemented by data from national sources. It will consider if evaluating performance is possible for aggregate health sectors by country and for which time periods or if a disease based approach would be a feasible alternative. It will survey the systems of provision of healthcare (public or private funding, public or private production, primary care provision, extent of co-payments etc.) to ascertain the feasibility of comparing performance across EU countries, either the aggregate sector or parts of the sector (e.g. hospitals).

Task 2. Activities and inputs (BHAM, RUG, DIW, IVIE, TARKI)

This task will attempt to measure cost weighted activity indices for selected countries and compare with input use. Countries which have the required detailed activity data and the research team have the expertise required to evaluate these data include the UK, Germany and Hungary and Spain. Additional countries where much of the required data appears to be publicly available include Ireland, Denmark and the Netherlands. We will construct an index of labour input in the health sector by combining data from all available sources to calculate a volume measure of total hours worked. We will also use data from labour force surveys and other health sector workforce surveys available to include an adjustment to take account of increases in the skills of the workforce or changes in the utilization of different types of workers. We will then produce labour productivity indexes for these countries. Where feasible we will also attempt to include measures of capital inputs and intermediate inputs such as drugs.

Task 3. Quality adjustments using outcome data. (IVIE, BHAM, NIESR)

This will draw on the research in WP5 and Task 1 of this work package to examine the extent to which activity data could be combined with outcome measures to estimate quality adjusted output measures for the countries included in task 2. Outcome measures will include post discharge survival rates, longer term survival rates from major diseases, before and after measures of the effectiveness of treatments and waiting times. This will show how to go from measures of mortality (or survival) rates to measures including quality of life. A very interesting (unsolved) problem is the possibility of comparison across countries when using these output measures. For example, taking into account disparities between EQ-5D tariffs across countries. We will present estimates of these indices which examine their sensitivity to different ways of adjusting for the above quality dimensions.

Task 4. Innovation in health procedures (DIW, IVIE, NIESR)

In this task data will be examined for evidence of new procedures and changes to procedures so as to establish how these have diffused and the implications of this for output indicators will be assessed.

Task 5. Value for money indicators (BHAM, CEPS, IVIE, NIESR)

This task will develop measures of value for money using nominal valuations for both outputs and inputs. On the output side it will employ the methods used to value life and health suggested by Cutler, Rosen and Vijan (2006) and Murphy and Topel (2006). This task will compare the UK and the US and possibly selected other countries depending on data availability. It will attempt to extend this using activity data, information on before and after treatments for selected procedures reported in Castelli et al. (2007) and valuations of QALYs to attempt to also take account of changes in the quality of life of non-life threatening illness such as hip replacements. On the input side it will consider the nominal wage payments and expenditures on other inputs.

Task 6. The performance of Health Sectors (BHAM, CEPS, DIW, IVIE)

This will combine the results in Tasks 1-5 to examine how the comparative performance of health sectors in a few countries varies according the indicators employed. We will also consider the extent to which performance differences across countries are influenced by demographic factors, in particular the age structure of populations.

Deliverables (brief description and month of delivery)

D5.1. Reviews of measures and data for indicators of the health sector, and quality of life indicators. (Month 12)

D5.2. Review of indicators of effectiveness of treatment for some specific diseases (as cancer treatments, diabetes, etc) (Month 18)

D5.3. Analysis of disability-free life expectancies as a measure for output in the health care sector (Month 18)

D5.4 Papers on activities, outputs and outcomes as quality adjusters, inputs and productivity for the health sector, innovation in health sectors and comparisons of productivity and value for money indicators for selected countries (Month 24, 27)

D5.5 Construction of indicators of output, input use, productivity and value for money for health sectors in selected countries (Month 34)

Work package number	6	Start date or starting event:				Month 1
Work package title	Educational services					
Activity Type	RTD					
Participant number	1	3	5	7	8	
Participant short name	BHAM	NIESR	CEPS	IVIE	TARKI	
Person-months per participant:	9	8	9	6	4	

Objectives

To develop indicators for Education, including on output, inputs and productivity and quality adjustments using outcomes.

Description of work (possibly broken down into tasks), and role of participants

Task 1 (CEPS)

The research will first produce conventional measures of number of pupils and students educated at different levels (cost weighted). The research will involve calculation of average years of schooling and higher education using the methodology of the calculation of life expectancy in demographic analysis. In practice this involves calculating for each age group the probability of survival till next year within the system of education and then compiling the total expected duration of education as the sum of the probabilities of surviving at every age in education. A third task is to estimate education Gini Coefficients. The calculations will be done for selected years and for all EU Member States and selected non-EU countries (United States, Japan and Korea).

Task 2 (BHAM, IVIE).

Experimental measures of education output that incorporate returns to schooling and higher education. This will be carried out for the UK, the US and Spain using detailed microdata on earnings and econometric analysis of returns to education. The measures might be extended to other countries where the existing literature provides current reliable estimates of these returns,

Task 3 Experimental quality adjustments to outputs using information on outcomes (BHAM, CEPS, NIESR, IVIE).

This will draw on the research in WP5 and Task 1a of this work package to examine the extent to which activity data could be combined with outcome measures to estimate quality adjusted output. This will consider three alternatives.

Adjustments using PISA, applied to international estimates, Earnings by age cohorts which will be experimental indicators for the UK and Spain and a UK case study using Quality from ratings scales as measured by Ofsted and other rating scales.

Task 4 Growth accounting (BHAM, CEPS, IVIE)

Using the data above we will produce provisional estimates of labour productivity and total factor productivity growth and the sensitivity to various adjustments for quality.

Deliverables (brief description and month of delivery)

D6.1. Review of existing indicators of the education sector. Possibilities of gathering comparable data at the European level (Month12)

D 6.2 Construction of indicators for output of the education sector, and indicators for human capital (Month 20, 24)

D6.3 Papers on quality adjustments to education output using outcome data (Month 24, 30)

D6.4 Construction of indicators for productivity of the education sector (Month 30)

Work package number	7	Start date or starting event:			Month 13		
Work package title	Experimental output indicators						
Activity Type	RTD						
Participant number	1	2	3	7			
Participant short name	BHAM	RUG	NIESR	IVIE			
Person-months per participant:	6	12	6	4			

Objectives

Various suggestions will be made for development of new indicators which can yet not be rolled out on a large scale but might be in the future. In particular, we will make new proposals for output measurement in insurance, collective services, distributive trades and the research sector.

Description of work (possibly broken down into tasks), and role of participants

Task 1: Output measurement in insurance (NIESR)

We will explore the creation of alternative measures of non-life insurance output based on quantum of risk. The measures will be applied in the UK discussion with the Association of British Insurers and structured interviews with major insurance companies in the United Kingdom. The task will then develop the concept for application to life insurance and pensions.

Task 2: Output measurement in distributive trade (RUG)

This will include a review of methodologies in currently use to measure the output of distributive trade services. A literature review will inform the analysis of the main shortcomings of current methodologies and how to improve these methodologies. New measures will be proposed and applied to a selected set of countries.

Task 3. Collective services (NIESR).

This task will attempt to measure performance in collective services, concentrating on protective services (police, fire service, defence services). The data for this work will in general be drawn from administrative sources and will most likely be carried out only for the UK. Other countries may be added depending on the data availability.

Task 4. Output measurement in the Research Sector (BHAM, IVIE)

This will consider how to combine outputs of university research activities, and the 'Research and Development industry (NACE 73) plus other sectors where R&D is significant (e.g. the pharmaceuticals industry, the health sector) to see if it is valuable to measure outputs and inputs in a combined Research sector.

Deliverables (brief description and month of delivery)

D 7.1: Paper on Output measurement in insurance (month 30)

D 7.2: Paper on Output measurement in distributive trade (month 30)

D 7.3: Paper on Collective services (month 30)

D 7.4: Papers on technological capital generated by universities through R+D expenditures and on

outputs and inputs of the 'Research Sector' (month 30)

Work package number	8	Start date or starting event:					Month 27
Work package title	Prospective Analysis and Synthesis of Research Results						
Activity Type	RTD						
Participant number	1	2	3	4	5	6	7
Participant short name	BHAM	RUG	NIESR	ZEW	CEPS	DIW	IVIE
Person-months per participant:	6	4	2	2	2	2	2
Participant number	8						
Participant short name	TARKI						
Person-months per participant:	2						

Objectives

1. To bring together the research results to provide a prospective analysis indicating the constraints and opportunities relating to service sector performance and its impacts on economic growth
2. To check robustness of derived indicators and summarise their uses
3. To arrive at a set of recommendations on feasibility and usefulness of indicators for the European service sectors.

Description of work (possibly broken down into tasks), and role of participants

In order to achieve these objectives the project will devote effort to synthesising the results from the work on market and non-market services. This will be carried out by the group leaders in collaboration with work package leaders.

Task 1: Summary of research results for market services (RUG lead)

Task 2: Summary of research results for non-market services (NIESR lead)

The results from Tasks 1 and 2 will be reported at a full consortium meeting in Month 32 which will be devoted to discussions on how the results in one theme relate to others. Researchers who have contributed to a particular area will be asked to scrutinise the results from the other areas and explore common methods, data sources and resulting indicators. This will lead to

Task 3: Combined research report which will be drafted by all members and publicly available to coincide with the final conference

Deliverables (brief description and month of delivery)

D 8.1: Summary papers of research results for market services and research results for non-market services (month 32)

D 8.2: Research report on final results (month 36)

Work package number	9	Start date or starting event:	Month 1
Work package title	Management and Dissemination		
Activity Type	MGT		
Participant number	1		
Participant short name	BHAM		
Person-months per participant:	20		

Objectives

To provide effective scientific management of the project

To disseminate the results of the project

Description of work (possibly broken down into tasks), and role of participants

The management of the project will be handled by the coordinator and area by area by the work package leaders. The administrative assistant at Birmingham will be responsible for overseeing dissemination, helping consortium members to prepare their work for publication, promoting the findings of the project to journalists and ensuring that policy-makers are fully aware of them. All consortium members will at some time contribute to policy briefs and reports.

Deliverables (brief description and month of delivery)

D9.1 Project website (Month 1) D9.2 Policy briefs in months 12, 18, 24, 30 and 36 and in case of a concrete policy request

Table 1.3e: Summary of staff effort

Participant no./short name	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	Total person months
1 BHAM	6	9	14		12	9	6	6	20	82
2 RUG	28	3		25	3		12	4		75
3 NIESR		5	7	5	8	8	6	2		41
4 ZEW		24						2		26
5 CEPS		6			5	9		2		22
6 DIW	3	2			16			2		23
7 IVIE	6		6	9	9	6	4	2		42
8 TARKI			3	3	7	4		2		19
Total	43	49	30	42	60	36	28	22	20	331

Risks

The researchers involved in the project are all experienced and work at institutions used to cross-border co-operation, giving confidence that the programme of work proposed here can be delivered to time and to budget. The outcomes of the project depend in some way on data availability from other EU projects, in particular COINVEST and INNODRIVE. There is an ongoing communication between the INDICSER research consortium and these projects through personal and institutional contacts, so that there should be no delay in accessing the data once they are available. As with all measurement exercises unanticipated problems may arise due to say poor data availability for some sectors/countries. In this case the problems will be noted in detail in the series of recommendations that are part of the project deliverables, and the researchers will indicate possible solutions.

2. Implementation

2.1 Management structure and procedures

Management Arrangements

A project of this size and complexity, with a large number of participating institutions, requires a clear management structure. The coordination of INDICSER will be the responsibility of the lead organization, the University of Birmingham. The University has been involved over 100 projects and has already participated in 22 FP7 projects including three Collaborative Projects (one large & two small) and one European Research Council Starting Grant, which will be managed by the University. As a result, it has intensive experience of EU Collaborative Projects and partnerships and in-depth expertise on Framework Programme matters, including financial management, reporting and auditing. The Project Coordinator, Professor Mary O'Mahony will be supported at all stages of the project (including when liaising with European Commission and the participants) by a team of University administrators dedicated to the Framework Programme, which include a European Officer, a European Contracts Officer, three accountants and a post-award project delivery officer.

A project coordination team will consist of the overall coordinator (Mary O'Mahony), the coordinators for market services (Marcel Timmer) and the coordinator for non-market services (Martin Weale), assisted by a part-time Project Manager employed by the University of Birmingham. This team will be the main point of contact with the European Commission and will be responsible for:

- Overall responsibility for ensuring the project is carried out according to the work plan;
- Communication with internal consortium members, through periodic newsletters;
- Maintenance of the web site including posting working papers;
- External relations;

The academic representatives will be responsible for organising and managing the different activities in which his/her institution is involved and be responsible for the reporting, administrative and financial matters relating to the participation of the institution in the project.

Steering Group

A steering group will be formed consisting of a project coordination team, an academic representative from each of the participating research institutes and members of the external advisory board. Mary O'Mahony will chair the steering group but operational decisions will be taken on a consensual basis. Each work package leader will undertake to ensure that the programme of work is adhered to both in terms of timing and the quality of the academic output. They will do so through frequent contact with work package contributors, by e-mail or at face to face meetings and through contact with individual consortium members by means of periodic consortium meetings. They will be responsible for the coordination between the different parties involved in a given work package and for monitoring the achievements originating from the different tasks of the work package and that the results of their work package are suitably integrated with the results coming from the other work packages. The project coordination team will meet six monthly with more frequent exchanges through telephone conferences.

The steering group will meet face to face at the consortium meetings and will also communicate through telephone conferences when necessary.

The entire consortium will meet at the inception of the project to plan activities, and consortium meetings will also occur at months 4, 18 and 34. These meetings will coincide with dissemination events to maximise the attendance. Substantive decisions concerning content and direction of the project will be discussed at these meetings. The administrative co-ordinator, the University of Birmingham, will take responsibility for recording minutes of consortium meetings and circulating them within two working days of each meeting so that discussions are properly recorded. The consortium meeting in month 32 will discuss the results of the summary reports for the integrating work package WP 8 and plan the final report. In addition to the meetings above, theme meetings and some on individual work packages will be held as required.

Advisory board and observers

The consortium will organise for external scientific and management experts to participate in the annual consortium meetings which will coincide with project review meetings. The external advisory board will consist of academics involved in previous or current FP7 projects, including Jonathan Haskel, coordinator of COINVEST, Eric Bartlesman from the Free University of Amsterdam, Nick Oulton from the LSE, Jack Triplett from the Brookings Institution and Cecilia Jona-Lasinio at LUISS. The academic advisors will be joined by advisors from NSIs and other bodies with an interest in the project. These include Peter van der Ven, Head of the National Accounts Division of Statistics Netherlands, Steve Drew from the UK CeGMA at ONS, Antonio Colangelo from the Monetary and Financial Statistics Division of the European Central Bank and Colin Webb from OECD. In addition to attending meetings, advisors may be asked to provide comments on specific pieces of work. There will also be collaboration with other NSIs, especially ISTAT through the BLUE-ETS (Blue European Enterprise and Trade Statistics project on the modernization, quality, integration and availability of business statistics. Here the project coordinators (Paolo Roberti for BLUE-ETS and Mary O'Mahony for INDICSER) and, where appropriate, consortium members will comment on each other's research from the standpoint of usefulness to both NSIs and the scientific community.

Performance indicators

The University of Birmingham coordinator and the management board will monitor performance using the following indicators (1) Delivering on a timely basis (2) the generation of high quality output through submissions to top ranked journals (3) interest shown by external bodies through web-site hits, number of downloads, number of invitations to consortium members to speak at academic and user events.

2.2 Individual participants

Participant No. 1

Main Information	Full name of the organisation: <i>University of Birmingham</i>
	Short name: BHAM Country: United Kingdom
Main Activities	Birmingham Business School (BBS) is a research-led institution and part of the University of Birmingham. It is a thriving and active community of around 100 academic staff who teach and engage in scholarship and research in a wide range of areas including industrial and labour economics and international management.
Main tasks attributed	Project Coordinator: It will be the project coordinator and so be responsible for overall direction of the research programme, management and dissemination. The project will be based in the recently created Centre for Productivity, Management and the Workplace which Prof Mary O'Mahony co-directs with Prof Helen Rainbird. The University of Birmingham will coordinate the project. Much of the research will be carried out by a Research Fellow and a Ph.D. student who will work closely with Prof Mary O'Mahony. She will be assisted as coordinator by a project administrator.
Previous experience relevant to tasks	EUKLEMS - No. 502049 (SCS8). This project uses a comparative industry approach to study productivity in the European Union; EPKE – No. HPSE-CT-2001-00055: "Employment projects in the knowledge economy".
Short profile of the key staff members who will be undertaking the work	Mary O'Mahony: Professor of International Industrial Economics. Research interests include international comparisons of productivity including the public sector, the impact of ICT on growth and the demand for skilled labour, and links between market structure and growth. Publications include articles in the <i>Journal of Economic Perspectives</i> <i>The Economic Journal</i> ,(forthcoming), <i>Research Policy</i> , <i>Labour Economics</i> , <i>Economica</i> , <i>The Journal of Productivity Analysis</i> (forthcoming) and <i>The Review of Income and Wealth</i> . She is also a Public Services Fellow of the Advanced Institute of Management Research, funded by the UK Economic and Social Research Council. She will coordinate the overall project and will contribute to research in most WPs.
	Matthew Cole: Reader, Department of Economics. Research interests include globalisation and growth with particular interest in the impact of trade, economic growth and investment flows on the natural environment. His journal publications include <i>China Economic Review</i> , <i>Environmental and Resource Economics</i> , <i>Scandinavian Journal of Economics</i> and <i>The World Economy</i> . He will contribute to the research on internationalisation of services in WP3.
	Robert Elliott: Reader, Department of Economics. Research interest include empirical international trade, environmental, development and labour economics. His journal publications include <i>Journal of Environmental Economics and Management</i> , <i>Journal of the Royal Statistical Society Series A</i> , <i>International Economic Journal</i> and <i>The World Economy</i> . He will contribute to the research on internationalisation of services in WP3.
	Stanley Siebert: Professor of Labour economics. His main research interests are on regulation in labour markets, management input in explaining productivity across firms, job quality and work life balance. His journal publications include the <i>Academy of Management Journal</i> , <i>Oxford Economic Papers</i> , <i>Industrial and Labor Relations Review</i> , <i>British Journal of Industrial Relations</i> to name but a few and has produced a number of widely cited books. He will contribute to the work on labour market regulation.

Participant No. 2

Main Information	Full name of the organisation: <i>Rijksuniversiteit Groningen</i>
Main Activities	<p>Short name: RUG Country: The Netherlands</p> <p>The University of Groningen is one of the oldest universities in Europe. It has a high reputation for academic teaching and research, and a large international network. It employs 6,000 people and has an annual budget of EUR 445 M. The Faculty of Economics and Business is internationally known for its complete and balanced educational program in Economics and Business. Its research programs are combined in top institutes, where knowledge and functional areas are being used in finding answers for social and organizational questions. The Faculty has a strong binding with technology, innovation and entrepreneurship through various centres for research and education.</p>
Main tasks attributed	RUG will lead on work package 1 and 4 and coordinate the work in work packages 1 to 4. It will contribute also to work packages 3 and 5.
Previous experience relevant to tasks	The RUG coordinated the FP 6 <i>EUKLEMS project</i> - No. 502049 (SCS8). This project uses a comparative industry approach to study productivity in the European Union. It also leads the FP7 project <i>WIOD: World Input Output Database</i> in which international input-output tables are combined with socio-economic and environmental accounts to study the dependencies between processes of trade, economic growth, inequality and environmental pressures.
Short profile of the key staff members who will be undertaking the work	<p>Marcel Timmer. Professor of Economic Growth and director of the Groningen Growth and Development Centre (GGDC). He has been co-leading the EU KLEMS project and also be part of the management team of the forthcoming WIOD project. Editor of the <i>Review of Income and Wealth</i>. He is very experienced in constructing large databases and published extensively in the field of international comparisons of productivity, among other things. Key publications include articles in <i>Journal of Economic Perspectives</i>, <i>The Economic Journal</i> (forthcoming), <i>Review of Economics and Statistics</i> (forthcoming), <i>Journal of Economic History</i>, <i>Journal of Development Economics</i>, <i>Economic Policy</i> and <i>Oxford Economic Papers</i>. He will coordinate the work on market services in work packages 1 to 4 and in particular work on the EU KLEMS database in WP1.</p> <p>Robert Inklaar: Assistant Professor in the department of International Economics & Business at the University of Groningen. His research has focused on international comparisons of productivity growth and levels and their determinants and synchronization of business cycles. Publications include articles in the <i>European Economic Review</i>, <i>Economic Policy</i>, <i>Oxford Economic Papers</i>, <i>Economica</i>, <i>Review of Income and Wealth</i> and <i>Journal of Productivity Analysis</i>. He will contribute to work package 1 on service productivity trends and lead work package 4 on financial services.</p>

Participant No. 3

<p>Main Information</p>	<p>Full name of the organisation: <i>National Institute of Economic and Social Research</i></p>
<p>Main Activities</p>	<p>Short name: NIESR Country: United Kingdom</p> <p>The National Institute was set up in 1938 as an independent research institute to carry out applied work of high academic quality. It has nearly thirty researchers with the majority working on issues surrounding labour markets, productivity and economic growth.</p>
<p>Main tasks attributed</p>	<p>NIESR will lead on work package 7 on experimental output measures, will contribute to work packages 2, 3, 4, 5 and 6 and will lead the synthesis of results for non-market services.</p>
<p>Previous experience relevant to tasks</p>	<p>EUKLEMS - No. 502049 (SCS8): This project uses a comparative industry approach to study productivity in the European Union. EPKE – No. HPSE-CT-2001-00055: “Employment projects in the knowledge economy”; SSH7; INNODRIVE, FP7: Intangible Capital and Innovations: Drivers of Growth and Locations in the EU. FINPROP: FP6, Financial Integration in Europe and the Propagation of Shocks</p>
<p>Short profile of the key staff members who will be undertaking the work</p>	<p>Martin Weale Director of NIESR since 1995. MA Cantab 1977, ScD 2006, CBE. He has a wide body of experience in working on economic and statistical issues. He has published on national accounting in journals such as <i>Review of Economic Studies</i>, <i>Review of Economics and Statistics</i> and <i>Journal of the Royal Statistical Society</i>. He has worked on FISIM and the health sector and is current chairman of the Advisory Board for the Centre for the Measurement of Government Activity at ONS. He will work on WP5, WP6, WP7 and WP8.</p> <p>David Wilkinson is a Senior Research Fellow at the National Institute of Economic and Social Research. His work has focussed on a range of topics in applied labour economics. His recent research has covered evaluation methodology with applications to welfare-to-work programmes; the impact of recent changes in student funding, and he is currently working on a quality measurement framework that considers the quality of pre-school education. He has published in the <i>Industrial and Labour Relations Review</i> and the <i>Oxford Bulletin of Economics and Statistics</i>.</p> <p>Justin Van de Ven Research Fellow at NIESR since 2002. DPhil Oxon 2002 Developed dynamic programming models for policy analysis. Published in journals such as <i>Economic Journal</i> and <i>Oxford Bulletin of Economics and Statistics</i>. He will work on labour market regulation in WP4</p> <p>Ray Barrell: BSc MSc. Senior Research Fellow since 1990. He leads the National Institute’s programme of macro-economic research. He has worked on a wide range of applied econometrics and policy design issues, including consumption, determinants of growth, labour markets, fiscal and monetary policy, the impact of European integration, accession and expansion, and on macro economic modelling. Publications include articles in <i>Economic Journal</i>, <i>European Economic Review</i>, <i>Review of Economics and Statistics</i>, <i>Economics Letters</i>, <i>Bank of France Bulletin</i> and <i>German Economic Review</i>. He will contribute to macro-economic analysis of the financial markets (WP 4) Rebecca Riley: BA, MSc Research Fellow. Principal Investigator for NIESR on the FP7 project, INNODRIVE. Her Research interests include the economics of the labour market, skills, technical progress and policy evaluation of the labour market. Recent publications include papers in <i>Labour Economics</i> and <i>Oxford Economic Papers</i>. She will coordinate NIESR research in WP2 and WP3. Ana Rincon-Aznar: BSc, MSc. Research Officer. Her current research includes analysis of the relationship between R&D and productivity. She will contribute to work packages 3, 4 and 6.</p> <p>Lucy Stokes: BA, Research Officer. Her research interests include evaluating performance in the health sector and in hospitals and the quality of pre-school education. She will contribute mainly to work packages 6 and 7 on non-market services.</p>

Participant Number 4

Main Information	Full name of the organisation: <i>Zentrum fuer Europaeische Wirtschaftsforschung</i>
	Short name: ZEW Country: Germany
Main Activities	The ZEW is a non-profit economic research institute funded in 1990 carrying out economic research, economic counselling and knowledge transfer. Around 100 researchers are working in 7 research units. It takes a predominantly microeconomic and microeconomic research approach and has distinguished itself in particular in the creation of micro-level databases and comparative analysis at the European level.
Main tasks attributed	Its main contribution will be to lead on WP 2: Technology indicators.
Previous experience relevant to tasks	ZEW also participates in COINVEST (grant SSH-CT-2008-217512) which investigates the contribution of intangible investments to innovation, competitiveness, growth and productivity in Europe. Moreover it participated in EPKE (grant HPSE-CT-2001-00055), a study into the "Employment projects in the knowledge economy".
Short profile of the key staff members who will be undertaking the work	<p>Irene Bertschek: Dr. Irene Bertschek is Head of the ICT Research Group at ZEW. Research interests include microeconometrics, the effect of ICT use on firm and labor productivity on firm organisation and the age structure of workers. Publications i.a. in <i>Management Science</i>, <i>Journal of Industrial Economics</i> and <i>Empirical Economics</i>. Organisation of several international conferences and interdisciplinary research projects. She will lead work package 2 of the project and the work carried out by ZEW. Her specific research contribution will be on ICT use in services.</p> <p>Jenny Meyer: Jenny Meyer is a researcher at the ICT Research Group and a Ph.D. student at the University of Zurich. She is responsible of the ZEW quarterly business survey among service providers of the information society. Her specific research contributions will be on knowledge-intensive services</p> <p>Bettina Peters: Dr. Bettina Peters is senior researcher at the Department of Industrial Economics and International Management at the ZEW. She is particularly engaged in the conceptual development and econometric analysis of the Mannheim Innovation Panel and the Community Innovation Surveys (CIS).</p> <p>Christian Rammer: Dr. Christian Rammer is Deputy Head of the Department of Industrial Economics and International Management at the ZEW. He is mainly concerned with research on innovation in firms, technology transfer and technology policy. He is project manager of the ZEW innovation survey (Mannheim Innovation Panel) which is the German contribution to CIS. Jointly with Bettina Peters, he will contribute to the work based on CIS in the project.</p> <p>Marianne Saam: Dr. Marianne Saam is Deputy Head of the Department of the ICT Research Group. Research interests include macroeconomic productivity, in particular productivity aspects of ICT. Publications include papers in the <i>Scandinavian Journal of Economics</i> and <i>Journal of Macroeconomics</i>. Her specific research contributions will be on ICT use and productivity in the service sector.</p>

Participant No. 5

<p>Main Information</p>	<p>Full name of the organisation: <i>Centre for European Policy Studies</i></p> <hr/> <p>Short name: CEPS Country: Belgium</p>
<p>Main Activities</p>	<p>CEPS is an independent membership-driven organisation with more than 100 corporate members and a large number of central banks, diplomatic missions and international business organisations in its constituency. CEPS' core business is the conduct of policy research on European affairs and the broad dissemination of its findings through a regular flow of publications, public events and electronic commentary. It strives to bring new knowledge to the attention of decision-makers and to offer fresh insights into important public policy issues of the day.</p>
<p>Main tasks attributed</p>	<p>CEPS will lead on work package 6 on education with contributions to work package 2 on measuring intangibles and work package 5 on health services.</p>
<p>Previous experience relevant to tasks</p>	<p>Since 1999, CEPS has coordinated the European Network of Economic Policy Research Institutes (ENEPRI, www.enepri.eu) now comprising 25 institutes throughout the EU. Related projects it has implemented include: The contribution of health to economic performance. <u>Funded by:</u> EC, DG Health and Consumer Protection; October 2004–March 2005; Ageing, Health Status and Determinants of Health Expenditure (AHEAD), FP6; Research Training Network on Health, Ageing and Retirement (REVISER), <u>Funded by:</u> EC, DG Research Fifth FP, August 2003–July 2007 and is participating in INNODRIVE, FP7: Intangible Capital and Innovations.</p>
<p>Short profile of the key staff members who will be undertaking the work</p>	<p>Jørgen Mortensen, is Associate Senior Research Fellow at CEPS. He graduated in economics and statistics from the University in Copenhagen in 1963 and served as official in the OECD and DG ECFIN. Since 1989 he has been associated with CEPS. Through his involvement in the research projects and studies he has acquired a broad insight into the different aspects of employment and welfare issues in Europe. Aside from his academic skills, Jørgen Mortensen has long experience as team and project leader thanks to which he developed a unique capacity to spot colleagues' abilities and distribute tasks according to it.</p> <p>Güldem Ökem is a Research Fellow in CEPS. She graduated in economics in 1989, Middle East Technical University, Turkey, has M.Sc. in Health Services Management from Hacettepe University, Turkey in 1993 and MS.C. from the London School of Hygiene and Tropical Medicine in 1994. In 2007 she obtained a PhD in Economics from University of Marmara, Turkey. Her background includes posts as a Consultant in Health Economics and Finance in the Ministry of Health and Social Security Institution, national expert on Turkey for the WHO She is responsible for research in health economics and health sector projects in CEPS. She is the Project Director of FP7 research project on Assessing Needs of Care in European Nations-ANCIEN.</p> <p>Felix Roth holds a doctorate in economics from the University of Göttingen. Research fellow at the Postgraduate Program 'The Future of the European Social Model' at the University of Göttingen and Visiting Researcher at the London School of Economics, he analysed the relationship between social capital, trust and economic growth.</p> <p>Ilaria Maselli is a Research Assistant at CEPS. In July 2008 she graduated in European Affairs with a thesis on the exportability of flexicurity to big countries. Through this work, she has acquired familiarity with data collection and analysis and labour issues from both the institutional and political economy point of view.</p>

Participant No. 6

<p>Main Information</p>	<p>Full name of the organisation: <i>German Institute for Economic Research</i></p>
<p>Main Activities</p>	<p>Short name: DIW Country: Germany</p> <p>The German Institute for Economic Research (a registered association) in Berlin was originally founded in 1925 as the “Institute for Business Cycle Research”. It is now one of the leading economic think-tanks in Germany. As an independent non-profit organization, the DIW is exclusively committed to academic pursuits in the public interest. The DIW’s main task is to investigate economic processes in Germany and abroad and to support decision-making in politics, economy and administration. The wide range of research covers short-term analysis of economic developments, searching for answers to current economic and fiscal affairs, and the long-term projection and evaluation of developments in the global economy and individual sectors alike. The unifying research theme of the Public Economics Department is how the various policy instruments of the welfare state, such as taxes, transfers, the provision of public services, and government regulations, affect the allocation of resources and the distribution of incomes. Our trademark of research is the strong empirical microeconomic foundation based on new methodological developments, in particular micro-econometrics and micro-simulation models. One focus lies on health and long-term care provision and demand.</p>
<p>Main tasks attributed</p>	<p>Contributor to work packages 1 on productivity trends in service sectors and work package 5 on health services.</p>
<p>Previous experience relevant to tasks</p>	<p>ANCIEN: 7th Research Framework Programme Assessing Needs of Care in European Countries (Project-no. 223483) INNODRIVE - FP7: Intangible Capital and Innovations: Drivers of Growth and Locations in the EU. AHEAD: 6th Research Framework Programme Ageing, Health Status and Determinants of Health Expenditure (SP21-ct-2003-502641) EUKLEMS project, FP 6 - No. 502049 (SCS8) FINPROP: FP6, Financial Integration in Europe and the Propagation of Shocks AGIR – Ageing, health and retirement in Europe , FP5 (QLK6-CT-2001-00517)</p>
<p>Short profile of the key staff members who will be undertaking the work</p>	<p>Erika Schulz, Senior Researcher is a specialist in population studies, migration and labour market behaviour, health care, long-term care and consumption behaviour. She is economist, but with a large experience in demographic and health research. She participated in particular in the AGIR and AHEAD projects, financed by the EC. She was involved in preparing the Social Situation Observatory report, Lot1 Demography, with the special focus on the development at the labour and housing market. She is a member of the German Association for Demography (and was more than 10 years member of the board) and the leader of the working group “Population Economics”. She will contribute to work package 5 on health services.</p> <p>Martin Görnig, Deputy Head of the Department of Innovation, Manufacturing, Services at DIW Berlin. He is Honorary Professor at the Technical University of Berlin and member of the Centre for Metropolitan Studies at Humboldt University, Berlin. His main research fields are productivity and earning analyses on the industry, the regional and the firm level and observations of service and construction industries. He has been engaged in a number of research projects for the German Government ,e.g. to the impacts of the EU service directive or the perspectives of service</p>

	<p>industries in the New German Countries. He was involved in the team of the EUKLEMS project (6. framework program) and is currently participating in the INNODRIVE project (7. framework program). Publications include articles in <i>Regional Studies</i> and <i>The Economics of Transition</i> and various contributions to books. He will contribute to work package 1.</p>
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Participant No. 7

Main Information	Full name of the organisation: <i>Instituto Valenciano de Investigaciones Económicas</i>
	Short name: IVIE Country: Spain
Main Activities	Ivie is dedicated to the development and fostering of economic research with aims in the general public interest. It undertakes studies and research, creates databases to improve economic information, and furthers the increase in human research potential through the training of specialised personnel and the support of existing research groups. IVIE endeavours to establish the necessary links between research work and the decisions taken by economic agents, by offering information and technical assistance on economic issues to the institutions and public or private companies that request it.
Main tasks attributed	IVIE will lead work package 5 (health services) and will contribute to work packages 1 (productivity trends in service sectors), 3 (market environment indicators), 4 (financial services) and 6 (Education Services)
Previous experience relevant to tasks	EUKLEMS - No. 502049 (SCS8). Within the framework of the Human Capital Project financed by Bancaja it has elaborated a number of studies dealing with different issues related to human capital the estimation human capital series, the returns to education, the measurement of the output of the Spanish education sector, as well as the economic impact of some Spanish universities. It has developed several project for international (European Commission, Wold Bank, etc.) and national institutions (the BBVA Foundation, The Spanish Savings Banks Foundation, the Financial Studies Foundation, AFI, etc., and financial institutions as Bancaja and CAM). It was the leader of the competitive research project for the European Commission “The monitoring and structural changes and trends in the internal markets for financial services”.
Short profile of the key staff members who will be undertaking the work	<p>Matilde Mas: PhD in Economics from the Universitat de València and Professor in Economic Analysis at the same University. Her specialized fields are Growth, Regional Economics, and Public Capital. She is co-author of over 40 books and book chapters. She has published more than fifty articles in Spanish and international journals. She is member of the Editorial Board of <i>Investigaciones Regionales (Spain)</i>.</p> <p>Carmen Herrero, Full Professor at the University of Alicante and Senior Researcher at the Ivie. Her research interests include health economics, fairness and game theory. Her publications in the health economics field include articles in <i>Journal of Health Economics, Health Economics, Social Sciences and Medicine, and Mathematical Journal of Operations Research</i>.</p> <p>Joaquín Maudos is Lecturer in Economic Analysis in the University of Valencia and research professor of the IVIE. His specialty fields are Banking and Regional Economics. Visiting researcher at the Florida State University and Consultant of the European Commission. He has published 8 books and over 50 articles in specialized journals (<i>Journal of Banking and Finance, Regional Studies, Review of Income and Wealth, Journal of International Money and Finance, etc.</i>). Principal researcher of several competitive projects as well as projects for enterprises and public institutions</p> <p>Lorenzo Serrano: Researcher at the IVIE and lecturer at the Universitat de València. He received his Ph.D. in Economics in 1998. His work covers topics such as Human Capital, Growth and Regional Economics. He has published numerous books and articles in Spanish as well as in international journals (<i>Review of Income and Wealth, Applied Economics, Economics Letters, International Journal of Transportation and Statistics, Regional Studies, Transportation</i> among others.</p>

	<p>José Manuel Pastor. Lecturer at the Universitat de València. He has been a visiting scholar at Florida State University (1996-1997) and an external consultant of the World Bank. His research interests include Human Capital, Banking and Regional Economics. Co-author of several books and has published articles in international academic journals.</p>
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Participant No. 8

Main Information	Full name of the organisation: Kopint-Tárki Konjunktúrakutató Intézet Zrt. (Kopint-Tárki Economic Research Institute Ltd.) Short name: KOPINT Country: Hungary
Main Activities	<i>The Kopint-Tárki</i> staff of 15 highly qualified researchers publishes analyses concerning economic policy issues of Hungary, Central and Eastern Europe. Major research areas also cover fiscal and monetary developments, labour markets, factors of competitiveness, regional economic issues and foreign trade. Over the past years the staff prepared several empirical and analytical studies on the service sector, focusing on specific aspects, e.g. reasons for, and consequences of, contracting out of service activities, SMEs in the service sector, trade and FDI in services etc. International comparisons of the Hungarian service sector with neighbouring countries were conducted. Major clients are government agencies, private sector and bodies of the EU.
Main tasks attributed	The main contribution will be to the research on non-market services (work packages 5, 6 and 7). Contributions relating to the experience of East European countries will also feature in work package 3 on the market environment and work package 4 on financial services.
Previous experience relevant to tasks	Project completed for the Hungarian Prime Minister's Office: Performance management in the public sector: review of international experiences, survey of the present Hungarian practice, recommendations for developing a data base of performance indicators in the Hungarian public sector (2004-2005)
Short profile of the key staff members who will be undertaking the work	<p>Antonia Hüttl (Huettl): Senior adviser at Kopint-Tarki, Professor at the Budapest Corvinus University, formerly she was the head of the national accounts in the Hungarian Central Statistical Office and deputy president of HCSO responsible for economic statistics. Research interest includes statistical methodology and macroeconomic analysis. She is also advising the Ministry of Finance in government Finance Statistics. She will lead the Hungarian pilot study in measuring the performance of non-market services.</p> <p>Ágnes Nagy: Senior research fellow at Kopint-Tárki. She has experience in analysing the measurement of non-market services as well as the performance of business sector enterprises using large datasets. In recent years she has also been involved in adapting methodology and developing data collection for foreign trade in services and services producer price statistics. She will be responsible for the Hungarian country studies for non-market services other than health.</p> <p>Erzsébet Gém: senior researcher at Kopint-Tárki. Her main research interests include the financial markets, financial and banking systems in Europe and Hungary, competition and regulation in the Hungarian banking sector. In 2006-2008 she took part in two research programs on these topics. In 2005 she participated in a work on measurement of the non-market services, and she dealt with the performance of the Hungarian health services. Her publications include articles in Hungarian journals and periodicals (for example <i>Külgazdaság</i>). She will work on measurement of the Hungarian health services' performance in work package.</p>

2.3 Consortium as a whole

The consortium is a group of leading universities and research institutes selected for their expertise in one or more of the areas covered in the project. The consortium therefore combines institutes which have worked on issues of productivity, technology and market environments and those who have also worked on specific issues relating to non-market services. All institutes contribute established expertise on the service economy and have many methodological competences, in particular in measurement, but also in econometric methodologies. Individual researchers have a proven track record on areas such as economic growth, intangibles, ICT, innovation, financial services, health, education and other non-market services.

The consortium has benefited from considerable collaboration in the past. Probably the most significant collaboration has been the EU KLEMS: Growth and productivity accounts for the EU (FP6) which involved partners BHAM, RUG, NIESR, DIW and IVIE. Mary O'Mahony and Marcel Timmer were two of the three managers in this project, and co-led the consortium of 15 research organisations, not only in Europe but also in the US and Japan. This project has generated significant interest among both academic and using communities and forms the starting point for the work in INDICSER. Other past or current project collaborations include WIOD (RUG, ZEW) - World Input Output Database (FP7); INNODRIVE (NIESR, CEPS) - Measuring intangible investments (FP7); AHEAD (CEPS, DIW) - Ageing, Health Status and Determinants of Health Expenditure (FP6); and EPKE (RUG, NIESR) - Employment prospects in the knowledge economy (FP5). ZEW is involved in the COINVEST FP7 project on measuring intangibles and is the convenor of an annual international conference on Economics of ICT in which researchers from several team members have taken part. BHAM and NIESR are members of a consortium tasked with contributing to the European Commission DG Enterprise Annual Competitiveness Reports. CEPS, DIW and NIESR are members of the European Network of Economic Policy Research Institutes (ENEPRI) which brings together twenty-four leading national economic policy research institutes from most of the EU-27 countries. The researchers and their institutes have track records in producing research that is both innovative and of use to policy makers and the past research collaborations listed above demonstrate a commitment to collaborative research on Europe's economies.

2.4 Resources to be committed

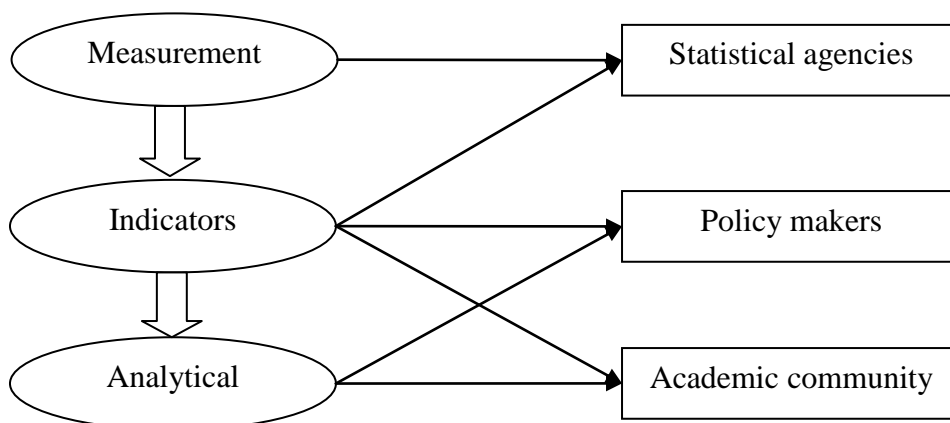
The total budget is 3,041,082 euro and the requested EC contribution is 2,349,725 euro.

3. Impact

3.1 Expected impacts listed in the work programme

Expected impacts

This project will deliver a range of new indicators to describe service sector output and explain service sector growth. The key aim is to improve the policy-making capacity of national governments and the European Commission, but in general at each step this project is expected to impact on any or all of three key constituents, namely policy makers, statistical agencies and academic researchers. Schematically, this can be shown as follows:



‘Measurement’ entails a discussion of what indicators to construct and what data source can be used for this; ‘Indicators’ covers the actual data that is delivered and ‘Analytical’ describes how the indicators are related; in particular to what degree we can explain developments in service sector economic performance. In detail, we expect the following impact for each of the three groups:

Policy makers

In terms of economic policy options, the cupboard is surprisingly bare for policymakers wanting to keep track of service sector performance given the importance of this sector for the economy. The EU KLEMS database has provided the first standardized database covering measures of industry output, inputs and productivity across Europe and extending and updating this database will ensure this database remains valuable for current decision-making. However, the indicators to explain differences in performance across countries or over time are few and far between. Furthermore, there are many concerns about the quality of many available series, especially output series in services. By constructing a wide range of new indicators and improving existing indicators, we aim to address this situation. To make these indicators as useful as possible, we will also survey the existing literature and provide fresh analytical research to show the interdependencies amongst the different indicators and show how they are important in explaining differences in service sector performance across countries. The end-result is improved policy-making capacity: greater knowledge about trends in output of service industries and a better understanding of the drivers of these trends so better opportunities to influence output trends.

Statistical agencies

The interaction between academic researchers and statistical agencies has long been a crucial one, going back at least to the development of the System of National Accounts in the days of Kuznets and Stone. On the one hand academics can provide useful input for statistical agencies by examining alternative methodologies, concepts and data sources. On the other hand academics rely on the output of statistical agencies for high-quality statistics on an ongoing basis. In this project, we aim to both work within and move beyond the framework of the System of National Accounts to construct indicators relevant for understanding the performance of the service sector. By examining and improving indicators of industry output for a number of service industries, we hope to stimulate statistical agencies to implement such measures in their national accounts. By constructing indicators that better describe the production process of services firms, their market environment and the linkages between financial services and the rest of the economy, we hope to expand the range of indicators maintained by statistical agencies. We will provide thorough documentation on the construction of these indicators and maintain an ongoing discussion with Eurostat, national statistical institutes and central banks to make it as straightforward as possible to move the construction of these indicators from academic exercises to statistical products.

Academic community

In the academic community, research into service sector performance has been a poor second cousin to research into manufacturing performance. Like policy makers, academics have been hampered by a lack of indicators and a lack of trust in those that are available. By constructing indicators that are readily usable in research and by pointing the way to important relationships between the indicators through our own analytical work, we aim to demonstrate that there is considerable academic mileage in studying the service sector and important insights to be gained about the process of economic growth.

An international perspective

Many of the largest differences in service sector growth and productivity are apparent when we look at relative achievements across countries. The strong performance of the US is well documented as is the relatively favourable experience of a handful of EU countries such as Ireland and the UK. At the same time the performance in many European countries has deteriorated. To understand these differences and in particular the role of institutional or environmental factors that change only slowly over time, it is crucial to adopt a cross-country perspective.

Embedded in ongoing research activities

The proposed project is firmly embedded in a range of research activities in which the partners of this project are participating. In addition to EU KLEMS this includes both activities financed through the European Framework Programme and others. Closely related FP7 projects are WIOD, COINVEST and INNODRIVE. WIOD will provide input to this project through their work to collect and compile data on international trade in services. COINVEST and INNODRIVE will provide mostly aggregate series of intangible investment for many countries, with an industry breakdown scheduled as part of this project. Beyond FP7 projects, this project will build on efforts by the European Central Bank to improve measures of current bank output (FISIM). Hence INDICSER builds on a well known and well respected research effort which is likely to enhance its impact among all three groups of users.

Impacts of the specific work packages

The research in WP1 will ensure that up-to-date information is available to policy makers on trends in productivity and growth in service sectors. Work packages 2 and 3 will yield a comprehensive study of technology and market environment indicators for the service sectors, how these should be measured, the feasibility of their measurement for EU countries and the potential value of these indicators in explaining growth in service sectors. The project will also deliver a number of indicators that can be used immediately in research, some covering all EU countries and some for selected countries. This research agenda will complement the analysis in work package 1 and will represent a significant step up in knowledge on the impact of technology, innovation, competition and regulation on growth in service sectors as well as highlighting the opportunities for further work on indicators that national and international statistical agencies might wish to pursue. The research in WP4 will indicate the role of the financial sector in facilitating economic growth and as a factor mitigating or intensifying the sensitivity of different countries to the current economic crisis. Thus it will have a direct bearing on the structural policies governments might undertake both to promote economic growth and to limit economic instability.

Work on the non-market sector will have its impact through providing better indicators of the performance of this largely government-run sector of the economy. At a time when government budgets are strained it is very important that governments can assess properly the importance of such sectors and the contribution they make to the economy. Better indicators of both health (WP5) and education (WP6) will enable governments and tax-payers to assess better how far public spending is effective, contributing to an informed debate about the management of public sector resources. They will also point the way to improved national accounts and thus to improved understanding of overall economic performance.

Work on experimental output indicators will, similarly, lead to better ways of measuring the economic performance of the service sector and the contribution it makes to the economy as a whole. This is important as a contribution to developing our overall understanding of the factors which influence economic activity.

3.2 Dissemination and/or exploitation of project results, and management of intellectual property

The dissemination strategy of the project is aimed to present its results and findings to the main using communities, including national and international statistical offices and policy makers and to academics. A project web site will be set up and maintained by University of Birmingham as part of the Business School web site. All of the project outputs will be available here and the site will be designed to be accessible to all categories of user. Beyond this, different strategies will be needed to reach each of these audiences

Statistical offices and Policy Makers

The two main mechanisms for reaching policy-makers are through the circulation (in paper and electronic form) of policy briefs prepared in each work package and the summary findings which will be prepared in work package 8 and by means of non-technical conferences and workshops. The presence of CEPS in Brussels makes it simple to organise these in a manner convenient to European Commission officials. It is envisaged that three one day workshops will be held in Brussels. Two of these will disseminate both the research outputs of this project and those from the SERVICEGAP project where there are synergies in the research output. These will cover (i) Financial markets and the Crisis, (ii) innovation and intangibles with the third devoted to non-market services, not considered in SERVICEGAP. Podcasts of the presentations at conferences and workshops or summary versions will be made available on the project web site.

Many of the partners have close links with their national policy-makers; this will ensure thorough dissemination of the findings at a national level.

Members of the statistics and policy communities will be invited to the meeting at month 15 designed to discuss the results from work package 1 on the overview of developments in the EU service sectors and the literature reviews in other work packages. Individuals from this group will be asked to act as discussants on the work and form an evaluation committee that informs the subsequent research programme. The project coordinator will compile from the databases of the participating institutions, an overall database of policy-makers classified according to their particular interest and supplemented as necessary, who will be invited to this event. This will be expanded following recommendations of those attending the meeting to ensure as wide an audience as possible among policy makers. We will produce a newsletter with key findings to be circulated every six months, including invitations to project events and policy summaries.

The mid-term and final conferences, at which the policy findings will be presented and the implications of the work for the future of the knowledge society assessed, will be designed specifically to be accessible to policy-makers. In addition we will hold a mid-term policy briefing in Brussels coinciding with the mid-term consortium meeting. In addition each participant will be expected to hold workshops for policy makers, national statistical institutes and academics in their country and each work package will hold a workshop to disseminate its findings. These will take the form of a 'mini-commission'

bringing the academic researchers, government and other organisations together for a one day workshop to examine the research findings and develop policy implications

Academics

The project participants are all experienced at working on policy-relevant research and in presenting the results to public officials. However, at the same time they are all academic institutions or public bodies which give great importance to publication in academic media. The core outputs of the project will be written up in a manner intended to be suitable for academic publication in appropriate journals. These will be available initially as discussion papers, both from the project web site and in the discussion paper series of the individual participants. The participants will submit them for presentation at suitable conferences such as the annual meeting of the European Economic Association and the European Meeting of the Econometric Society so as to obtain feedback on them and then submit them for journal publication. The time lags in journal processing mean that most of the research is likely to be published after the end of the project.

In order to promote academic awareness of the research we will send our newsletter to academics on participant institutions' databases, again including invitations to our main conferences.

Effort will also be expended to reach the public at large. The most commonly used method of disseminating the findings is through the printed media. Experience suggests that the best way of ensuring journalists take an interest in the work is through personal contact. For example ZEW has experience in diffusing results on innovation, ICT and knowledge-intensive services to the national media by means of press releases and periodical non-technical publications. Once researchers build up relationships with local journalists it is possible to talk to them about the areas where the project produces results in areas in which they have direct interests. The fragmented nature of the printed media means that this has to be done institution by institution. NIESR will, however, handle the issue of promoting the findings to the English language national and international press based in London; it already has the contacts needed to do this.

In addition the coordinating institution will employ a number of innovative ways to target general audiences, making the most use of information technology, including pod casts and video casts.

As part of the management and dissemination activities, the consortium will aim to make scientific publications generated from the project openly accessible, where possible. In doing so and depending on the most appropriate publishing route both open access publishing and/or self-archiving in an appropriate repository will be considered as well as any necessary embargo periods. The latter is foreseen to range between 6 and 12 months after initial publication, where relevant.

Most of the data generated within the project will first be available on a restricted basis (i.e. for consortium partners and Commission services, and any other party indicated by the Consortium). The preliminary data sets will be used internally by the consortium to undertake other tasks that crucially depend on the availability of data. This restricted use will also provide feedback to improve preliminary data series. After validation by users within the consortium, the database will be made public, mostly in

Month 30. The data series covered by these provisions will be those indicators that arise from the research in Work packages 1-6, i.e. extensions of EUKLEMS, indicators of innovation, intangibles and market environments, indicators for the financial, health and education sectors.

Data series arising from work package 7 will also be made available for research purposes but in a form that clearly states their experimental and hence nature preliminary nature.

Open Access

We will allow public access to any datasets constructed during the project, with accompanying documents on sources and methods and will ensure users have clear links to external websites where intellectual property considerations prevent the consortium from publishing data.

Archiving of information produced by the project

The consortium will carry out the project in such a way that databases, survey results, statistics, indicators, methodologies, questionnaires, classifications, models, etc. resulting from the project and used by the consortium to carry out work under the project can, at the end of the project, be centrally archived by the project (guidelines on how to archive such information is available from CESSDA: Council for European Social Sciences Data Archives – www.cessda.org/sharing/index.html). The objective of this archiving is that other research teams and policy makers can have access to the information produced by the project in full compliance with data protection regulations and ethical principles governing FP7 implementation. The consortium should wherever possible use existing international classifications and standards when undertaking the research under this project.

4. Ethical Issues

The research relies either on analysis of publicly available data or on surveys with businesses. No questions of a personal nature are being asked and the subjects do not include vulnerable people (such as children, or sick or infirm people). There are therefore no ethical issues associated with the research.

5. Consideration of gender aspects

The INDICSER project has a good gender balance; about 30% of the named researchers are female. The project promotes female scientists in positions of responsibility. Indeed the coordinator is female as are the lead investigators in four additional participating institutions (IVIE, ZEW, DIW and TARKI). The members of the project consortium hereby confirm that they have obliged themselves to respect the principles laid down in the Charter for Researchers and the Code of Conduct for the recruitment of researchers, in particular the working conditions, transparency of recruitment processes and career development of the researchers recruited for the project. The University of Birmingham – as the coordinator – has always been committed to promote equal opportunities between men and women. It will take responsibility for the implementation of the above stated principles and the promotion of female scientists within the project.

In the work programme care will be taken to ensure that where gender issues are important, the indicators will incorporate gender aspects. This is likely to be the case for indicators of some intangible investments such as on the job training, and indicators for education and health.

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