Promoting the Role of R&D in Services:

A report of the CREST OMC Working Group *R&D in Services*

Acknowledgment

The working group was chaired by Paula Nyberg from the Ministry of Finland and had members from 14 countries as follows:

CREST Decision

319th meeting, 18 April 2008

The third cycle CREST OMC 3% Working Group on "*R&D in services"* reports on its fact-finding mission and its assessment on research activities in the service sector. The working group provides suggestions and recommendations on how to develop the service sector with research-related policy measures. The report highlights the importance of the service sector and service activities in the European economy and the essential role R&D can play for the improvement of the European economic performance and its innovative capacity. At the moment the area is attracting increasing policy attention on global scale, as countries are striving to boost their economic development through innovation and growth in services[1]. There is a need to take action at European scale that will move forward research on services and produce knowledge for policy development. As a result, Member States and Associated States will be more able to mobilise the full innovation potential of both services and its technologies.

The CREST working group on "R&D in Services" has produced evidence by a report that support the following conclusions and CREST decides to:

1. To encourage Finland to make a proposal for the continuation of the WG's work, e.g. a proposal for an OMC NET, in order to develop a mutual learning activity between Member States as well as Associated Countries on experiences of research and policy development in services. Active Member States and Associated Countries will present their activities and experiences to other interested countries. In addition new developments outside Europe may be assessed.

2. To encourage CREST Members to explore joint research activities involving Member States and/or Associated Countries in ERANet type initiatives in order to stimulate research and innovation in services highlighting the connection with technological oriented R&D in services industries, service sciences and service engineering.

3. To invite Member States and Associated Countries to encourage their universities and public research institutes to explore the possibilities to promote the subject of service sciences and service engineering.

4. To initiate a regular exchange of views on research and innovation in services bringing together different stakeholders by means of private-public partnerships.

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[1] One of the remaining three candidates for President in the US calls for a service research programme. Taiwan has adopted an essential service research programme and even China is considering one. The WG was invited by Germany to participate in a "Transatlantic workshop Germany-USA: Service Research – Status quo, advance and development, held 2 April 2008 by a video conference in Berlin.

5. To invite the Commission to explore in the context of the mid-term review of the financial perspective an expansion of research activity on services in the context of FP7 as well as a more a comprehensive approach on service research in the forthcoming FP8 on subjects proposed in the report delivered by the Working Group.

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1   Overview

The task of the CREST OMC 3% Working Group R&D in services has been to promote the R&D in service sector by exchanging information, identifying good practices and developing policy recommendations. The participants include: *Belgium, Denmark, Finland (chair), Germany, Greece, Iceland, Ireland, Lithuania, Luxembourg, Norway, Sweden, Switzerland, Turkey and the United Kingdom*. The work programme consisted of the following elements:

- A review of existing literature and data bases
- Survey of policy measures targeting the R&D in services activities in the participating countries
- Case studies highlighting the practices and development needs of R&D in services in multinational and domestic enterprises representing a range of sizes and industries (key findings are included in this report, separate document presents the case studies)
- Synthesis and policy implications for the promotion of R&D in services.

The CREST OMC 3 % Working Group R&D in services started to work actively in January 2007 and its work was completed by the end of 2007.

Chapters two and three of this report provide an introduction to the conceptual issues around R&D and innovation in services, as well as a statistical review of the area. Even if the R&D in services is still relatively unknown issue, the importance of these activities is highlighted in many ways. For instance, the employment statistics indicate that around 80 per cent of science and technology jobs are in services sectors. The concept of service can refer to a number of different things such as industry, sector, occupation, activity, or an organisation. Such a multitude of meanings is a common reason for some confusion and a challenge for any analytical discussion. However, the Working Group took this challenge and addressed also other key concepts such as the definition of the R&D and innovation in services. For the moment, there is not a widely accepted definition that would cover all relevant R&D activities in services, and this causes many kinds of problems. On strategic level, it is holding back the development of reliable statistics and also the status of R&D in services is suffering from the lack of suitable official definition. The statistical coverage of R&D in services is gradually improving but many challenges still lie ahead. These challenges include the heterogeneous nature of service industries, service activities that cut across the industries, as well as the nature of R&D in services. There is a need for statistics that provide more complete picture on R&D in services. This requires indicators that will cover the full spectrum of activities that are contributing R&D in services. However, statistics offices alone cannot improve the quality of the data. Also businesses need to be able to recognise and report more accurately their own activities relevant for R&D in services.

Chapter four presents key findings extracted from the recent research and policy reports addressing R&D in services. This chapter will further highlight the issues and

themes that keep coming up in the research. At the same time the chapter brings together analytical summaries of latest articles on the R&D and innovation in services.

Chapter 5 presents an overview of the policies that have relevance for the R&D in services. Most Member States recognise services sector as an R&D performer. Hence, services can benefit from the available R&D supports but these supports are mainly technology oriented. There are also some measures that are targeting services explicitly. Greece has specific calls for services within the existing R&D programmes. Finland, Germany, Ireland, Norway and Sweden recognise services as a specific development target. These countries have been active in developing strategies and instruments for supporting R&D in services. The rest of the countries are also carrying a varying range of activities that seek to address services related R&D, either directly or indirectly. R&D in services is an issue of interest and that the developments in the area are being monitored. Policy responses reflect the overall approach in the Member States. Those who favour more hands-off approach are adopting this also in the case of service related R&D support. Equally, those who favour more direct interventions tend to use them also in the case of services R&D supports.

Chapter six synthesizes the key results from the case studies that were analysed as part of the project. These case studies are highlighting the real life business practices related to R&D in services in a range of different types of service enterprises. In total nine countries conducted 15 case studies that analysed a wide variety of businesses as presented in the Exhibit 10. The study covers a broad range of different types and different sizes of services businesses ranging from construction, to software and consulting, covering technology based (e.g. software) services as well as traditional services (e.g., retail trade). Full business case reports are presented in a separate report that complements this paper.

Chapter seven presents the key policy implications of the CREST OMC 3% Working Group of R&D in Services. Policy makers have increasingly recognised the socio-economic importance of services and there is a growing interest to develop measures that address services. A number of major EU - level initiatives have already been launched in this area. These include such topics as innovation in services, service markets, and the support for service business development. In addition, at the Member State level there are several programmes aimed in the above areas as well as the renewal of public sector services. So far, there are only few policy measures specifically targeting R&D in services. Still, it is clear that this domain has wide spread needs for further research and development. These needs range from basic research to design and delivery of the policy. Hence, there is a strong indication that the FP 7 could, and should address R&D in services domain. The following policy implications will address those issues that appear to be most relevant from the R&D in services perspective.

- There is a need for policy actions that enable better understanding of the nature of the R&D in services. More accurate statistics and improved conceptual clarity are important enablers of further development in the area.

- R&D in services is a multidimensional, multilayer phenomenon that needs further exploration. The notions of 'service sciences' and 'service engineering' may provide ways to develop deeper understanding of R&D in services[2]. An effective dissemination of this knowledge to a wider audience including policy makers, academic community and business practitioners would be desirable.

- The multidimensional character and variety of R&D in services implies that many policies will bear influence in it. This calls for horizontal policy approach and recognition that many broader policies will influence R&D in services more than specific R&D measures.

- It is important to initiate policy actions that can remove the institutional barriers that inhibit the development of R&D in services. The development and adoption of an up-dated R&D definition can be seen as an important step forward in the development towards more favourable framework conditions for the R&D in services.

- Measures ought to be taken towards the mapping and sharing of good practice policy elements related to R&D in services. Information of policy measures, their impacts and practical R&D case studies ought to be collected, organised and disseminated on the need basis.

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[2] The key to service science and service engineering is their interdisciplinary nature, focusing not merely on one aspect of service but rather on service as a system of interacting parts that include people, technology, and business. As such, service science draws on ideas from a number of existing disciplines – including computer science, cognitive science, economics, organisational behaviour, human resources management, marketing, operations research, and others – and aims to integrate them into a coherent whole. http://en.wikipedia.org/wiki/Service_Science,_Management_and_Engineering

2 Introduction

This document represents a partial contribution to the work carried out by the CREST R&D in services Working Group. The overall aim of the Working Group is to advance the use of R&D in service sector by exchanging information, identifying good practices and developing policy measures and recommendations. In total 14 countries have participated the R&D in services Working Group meetings. The participant countries include: Belgium, Denmark, Finland, Germany, Greece, Iceland, Ireland, Lithuania, Luxembourg, Norway, Sweden, Switzerland, Turkey and the United Kingdom. The programme of the CREST Working Group includes the following elements that are reflected in the chapters of this paper:

1. A review of existing literature and databases
2. Survey of policy measures targeting the R&D in services activities in the participating countries
3. Case studies highlighting the practices and development needs of R&D in services in multinational enterprises
4. Synthesis and policy implications for the promotion of R&D in services.

Tasks 1 and 2 were carried out by mid 2007, while case studies and synthesis have been completed during the second half of the year. As a whole this work brings together latest research findings, brief statistical note, review of services R&D policy developments in participating countries plus a synthesis as the final part of the report. The following sections of this paper will *first* discuss briefly the nature of service from a number of different perspectives, highlighting some of the complexities attached to this concept. In the *second* section some statistical issues and related development needs will be addressed. In the *third* part a number of recent research reports and their key findings will be briefly reviewed. The final *fourth* section of the report part will present a brief synthesis of the results for further discussion.

For some years already, policy and research communities have paid increasing attention to services. As a result, the research-based knowledge in the area has accumulated. At present, it is widely accepted that services represent a key driver of the economic growth. A clear message comes through from the material at hand, R&D and innovation in services are necessary for the growth and prosperity of the European economy. Hence, services clearly represent an area which deserves policy makers attention. However, more detailed analysis reveals a number of challenges that the policy makers will face. A lot more investigation needs to be done in the area, and evidence-based policy will benefit in particular from:

- Improved statistics in services and service related R&D[3]
- Increased business sector awareness and reporting of services R&D
- Acknowledgement of services heterogeneous nature

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[3] Bearing in mind that services process nature will always represent a special challenge for statistical analysis

- Recognition of the intertwined nature of services and manufacturing
- Better understanding of the concepts of R&D and innovation in services

This type of findings are discussed in a number of reviewed reports highlighting how important it is to develop a common language and concepts in the area of service related R&D and innovation. This clearly is one key task of the R&D in services Working Group as it is seeking exchange knowledge and good practices.

3   Characterising services and R&D in services

As a concept service can refer to a number of different things such as industry, sector, occupation, activity, or an organisation. Such a multitude of meanings is a common reason for some confusion as different parties come together and start the discussion on services. All of the above-mentioned perspectives are more or less directly related to R&D in services, another important notion in the context of this paper. The following sections draw on the work by Bryson et al., (2004), who are exploring different perspectives to the concept of service.

3.1   Services are integral part of the economy

To start with is important to recognise the ubiquitous nature of services in the developed economies. Fundamentally all economies represent some form of production that transforms raw materials into something that has value. The products created can be tangible such as airplane, or intangibles like a concert. Over time the production processes have developed into a very complex processes that involve highly elaborate division of labour. As a result, production of services and goods are now highly intertwined. It is almost impossible to draw clear lines between production of tangible goods and services. For instance, car industry uses extensive amount of services when a new automobile is being designed. During the actual production process of a car a wide range of different types of services are being consumed and the production would not function without service inputs. Finally, a completed car is sold to a consumer who will use many types of services over the life-cycle of the automobile, before the final service will recycle most part of the vehicle. *The afore-mentioned implies that R&D in services is not an isolated activity but typically very closely related to technologies and production processes of physical goods.*

3.2   Globalisation of service markets

Many of the traditional services need to be delivered locally so that the supplier and consumer are in the same location. This applies to most traditional services such as health care and elderly care. The recent development is that even the locally delivered services are becoming increasingly global as a result of the increased labour mobility and technological advances. For instance, in many European countries a significant share of the health care services is delivered by immigrants. This means that global dynamics are currently having an impact also on services that used to be traded and delivered on very fragmented local markets. *More dynamic and open markets imply that also traditional, and locally traded services will increasingly be subject to more systematic R&D efforts.*

Typically information and knowledge-based services can be digitalised and delivered globally almost instantly. This opportunity creates a truly global market for services such as financing and insurance. Importantly such services represent very high value added and they tap into competitive knowledge pools across the world. Such services are R&D intensive and highly mobile in nature, as the rapid increase in offshoring of services, such as call centres, illustrates. Digitalisation and opportunities for illegal

copying of high value added services have raised the importance of IP protection in services context. *Without sufficient IP protection, investments in service R&D may not yield sufficient returns. This may be a serious disincentive for R&D in services. There is an urgent need to develop IP protection in the service context.*

3.3   Service industries and business services

Bryson et al., (2004) introduce a range of relevant perspectives to services ranging from service occupations to service economy. *Service industries* consist of enterprises in which the final commodity is in some ways intangible or immaterial. *Occupations within service industries* typically include tasks related the production of physical goods as well as services. *Business services* are those services that are purchased by other businesses in the pursuance of their own activities[4]. They do not therefore include services that are purchased for resale. Examples of business services would be the auditing of accounts by an accountant, the preparation of building plans by an architect, or the cleaning of business premises. Businesses offering these services are, along with many others, classified to NACE section which covers: real estate, renting and business activities[5]. There are other business services which are carried out as part of *in-house service activities*. A business may employ its own computer personnel rather than making use of specialist enterprises or may carry out its own research and development. Changes over the past 30 or so years, particularly in industry, have led to many such in-house activities being contracted out. Such *services outsourcing and offshoring* has taken place because specialised business service suppliers can offer services more cheaply, and often their services quality may be better as well. This allows for increased efficiency in the enterprises that buy the services and allows them more flexibility when changes need to be made in response to changes in the market. This enables them to expand or contract more easily than if they provided their own business services in-house. The increased use of outsourcing has contributed to an apparent decline in the fortunes of industry; it has also contributed to a growth in the business services.

3.4   Service occupations

Service occupations are forms of work that are not directly, but may be indirectly, involved in the production of physical goods. These occupations include highly knowledge intensive jobs as well as more traditional services, some of which require high-level manual skills while other manual services are based on the use of unskilled labour. According to Eurostat 80 per cent of Science and Technology jobs are found in the services sectors.[6] Service industries covered in these statistics include knowledge intensive: financial services, high technology services, market services, other services, and less knowledge intensive services. *It is important to secure the supply of the skilled labour, including manual and knowledge based skills, by keeping the research and education system closely attached to the needs of the service sector.* For more detailed view on knowledge ion service occupations, see also section 1.6.

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[4]   Business services in Europe, Eurostat and European Commission, Luxembourg, 2001, pp. 5-6.
[5]   However, some of the 'business services' are often being purchased by private individuals, and therefore, their output is not exclusively providing services to business.
[6]   Eurostat Statistics on Human Resources in Science and Technology (HRST), 2004.

3.5 Service activities

Service functions/activities are taking place across the industries within individual firms, networks and value chains. They refer to tasks that are being carried out in connection with productive processes and consumption of both goods and services. Typical examples of knowledge intensive service activities (KISA) include research and development (R&D), management consulting, ICT services, human resource management and employment services, legal services (including those related to IPR) accounting, financing, and marketing-related service activities. Most businesses and public sector organisations make use of such KISA in their daily operations, whether they provide them internally and/or outsource them from external suppliers in the private or public sectors[7]. *From the policy perspective, securing the availability of the above type KISA is an important issue. At the same time it is equally important to promote the utilisation of KISA in the public and private sector organisations, especially by the SMEs.*

3.6 Major components of the services sector

Major components of the services sector include the following type main categories listed in the table below in the Exhibit 1. However, all services definitions tend to be somewhat problematic. For instance many manufacturing industries employ a significant number of service employees. Further on, many manufacturing firms and industries make a significant share of their turnover from services. The table also lists some typical R&D activities related to each type of services. Although the list is by no means comprehensive it is obvious that service industries related research is very interdisciplinary in nature including very practice oriented research as well as research close to basic science. All this come on top of the very heterogeneous nature of service sector itself, and further emphasizes the need for sectoral approach to service related R&D.

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[7] OECD (2006) Innovation and Knowledge-Intensive Service Activities, Working Party on Innovation and Technology policy (TIP), Paris, France.

**Exhibit 1   Main elements of the service sector and some typical R&D activities**

Type the service	Typical R&D activities
Finance, insurance and real estate industries Commercial and investment banking, insurance, and commercial and residential real estate industries	Insurance and financial mathematics, IT systems development for the back office and delivery, service scripts development for the front desk personnel
Business services, legal services Legal services, advertising, engineering and architecture, public relations, accounting, R&D and consulting	Creative design, socio-economic research (market research, technical science, consumer behaviour, management research, media research)
Transportation and communications Electronic media, trucking, shipping, railroads, airlines and local transportation such as buses and taxis	ICT research and development, logistics simulation, technical science, systems management, planning and socio-economic research, management research, cabin service development, marketing and communications research
Wholesale and retail trade Intermediaries between producers and consumers, restaurants, personal services, repair and maintenance services	Socio-economic research, economics, consumer behaviour, logistics, shop lay-out, logistics, purchasing management, management research, marketing research, systems management, simulation
Entertainment, hotel and motels Comprise elements of tourism, the world's largest industry	Socio-economic research, economics, environmental research, consumer behaviour, management research, food science
Government services at the transnational, national, and local levels. Public servants, armed forces, education, health care, police, fire departments.	Economics, politics-, and policy research. Socio-economic research, security research and development, planning, medical and health research, gerontology, demographics research, environmental and energy research
Not for profit agencies charities, churches, museums, private not for profit health care agencies	Socio-economic research, nutritional research, demographics research, religion-oriented research, medical research

Adapted from: Bryson, J. Daniels, P. and Warf, B. (2004), Service Worlds –People, Organisations, Technologies, pp. 1-11, Routledge, London.

4   R&D in services – statistical overview

Increased interest in services has motivated improvements in service related R&D statistics. Although services R&D statistics have improved, many open questions still remain. The following section will first present some key statistics followed by discussion on the development needs in services R&D statistics. To start with it has to be recognised that R&D is only one, albeit important, measure of innovation performance. Other measures have been developed using patent data and innovation surveys. Unlike some other innovation indicators, R&D measures an input not an output. Further on, traditional R&D is a measure of technological innovation and does not capture non-technological aspects. For example, UK innovation surveys suggest that R&D accounts for around 40% of all innovation expenditures[8]. In broad terms R&D in services is increasing rapidly, although on average it still remains lower than the average R&D spending in the manufacturing. The following three figures from the Reneser report, (2007), illustrates some key development trends of the R&D in services[9]. Exhibit 2 shows striking differences between the average R&D intensity of services and manufacturing in a number of countries. Manufacturing is typically achieving a R&D intensity of at least 2%, but frequently 4% and above. It is clear that given the economic weight of the service sector in the European economy, if the EU is to achieve its Lisbon agenda target of increasing R&D as a proportion of value added to approach 3% by 2010 then raising the R&D intensity of European service sectors is of fundamental importance.

Exhibit 2   R&D intensity of the services and the manufacturing sectors, 2004

R&D intensity - 2004
Total BERD as a percentage of value added per sector

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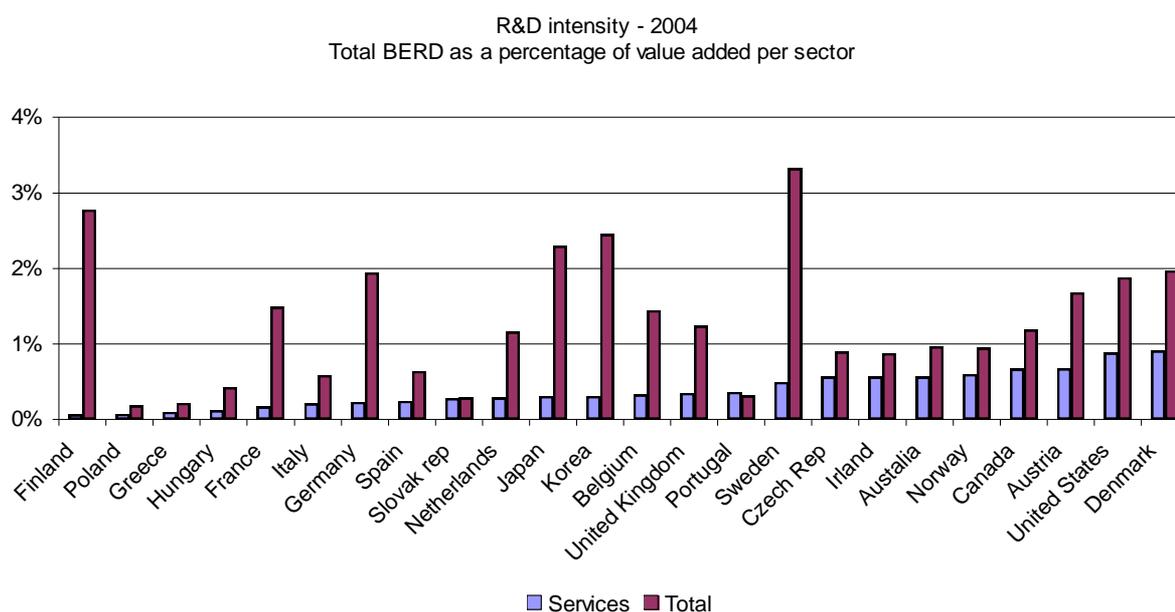
8   Department of Trade and Industry (2005) R&D Intensive businesses in the UK, DTI Economics Paper, 11 / 2005, London, UK.
9   Reneser Report (2007) Research and Development Needs of Business Related Service Firms – Reneser Project, European Commission, DG Internal Market and Services, Brussels, Belgium.

Source: Source: OECD ANBERD except Austria, Greece, Italy, Portugal and United states, Eurostat Newcronos, Rem: Australia, Japan and Sweden 2003, Turkey 2002.

Exhibit 3   Share of manufacturing and Non manufacturing R&D in Total Business 2004, Selected OECD Countries
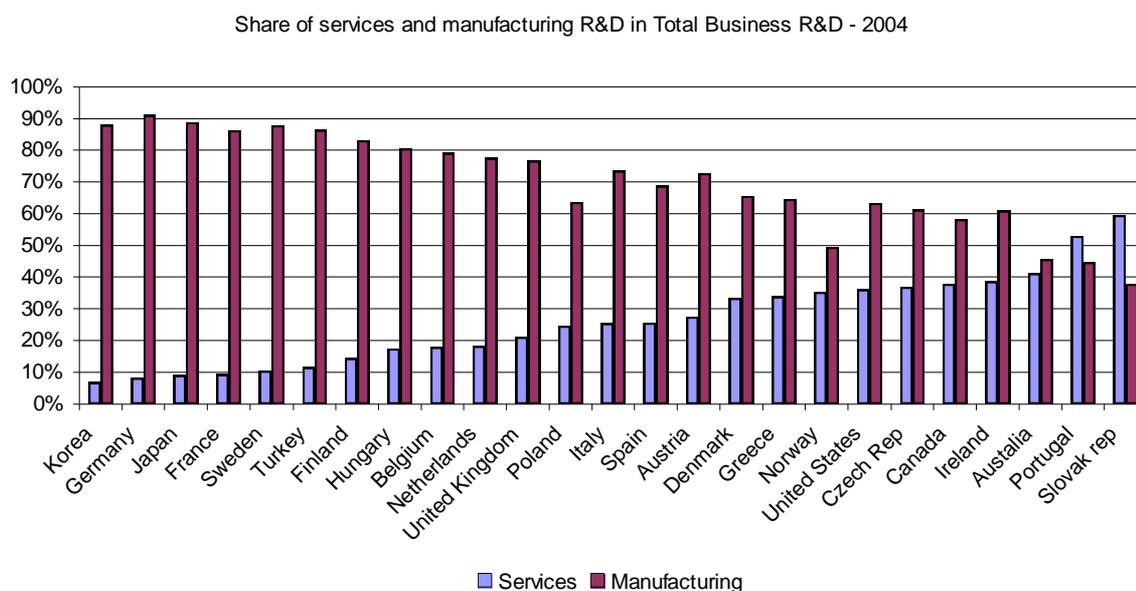
Share of services and manufacturing R&D in Total Business R&D - 2004

Source: Source: OECD ANBERD except Austria, Greece, Italy, Portugal and United states, Eurostat Newcronos, Rem: Australia, Japan and Sweden 2003, Turkey 2002.

Exhibit 3 illustrates the breakdown between manufacturing and non manufacturing related R&D. Interestingly, the leading countries in terms of non manufacturing R&D include Slovak Republic, Portugal and Australia. All countries where the overall level of business related R&D is rather low. At the same time, countries that have high level of manufacturing R&D, like Korea, Germany, and Japan are showing lowest share of non-manufacturing R&D. This may reflect their significant contribution to manufacturing R&D, rather than very low spending on non-manufacturing R&D. Similar type of pattern has been presented in earlier US studies analysing earlier 2001 data[10].

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[10]   Gallagher, M., Link, A., and Petrusa, J. (2005), Measuring Service-Sector Research and Development Final Report, Planning report 05-1, National Science Foundation and National Institute of Standards and Technology, VA, USA.

Exhibit 4 **Real Growth Rates of Business Expenditure in Services and Manufacturing on R&D as a share of GDP, 1987-1999)**

■ Services   ◇ Manufacturing
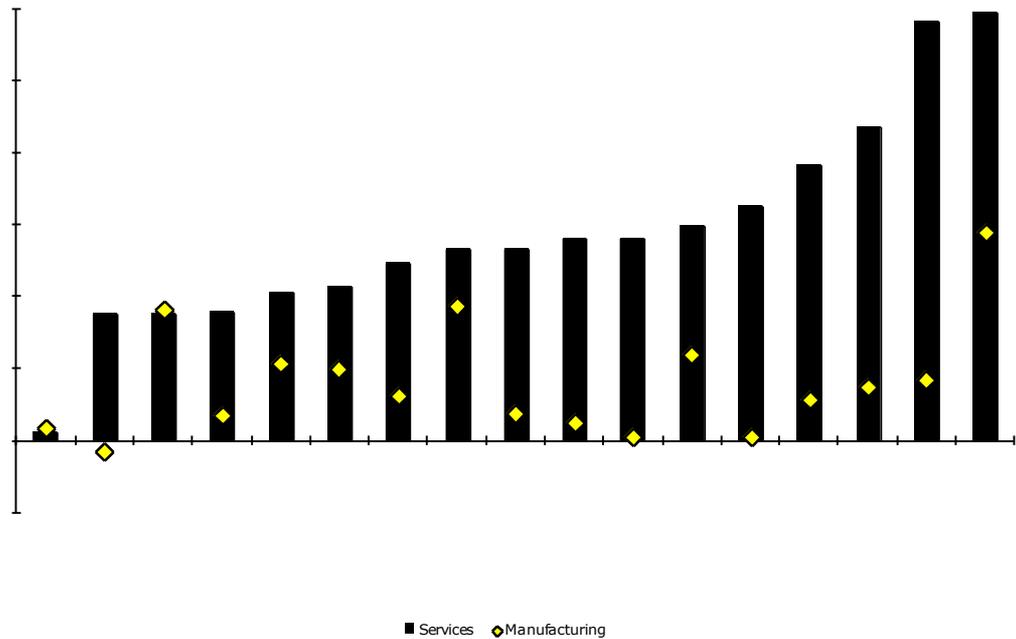
The importance of services R&D for the economic growth is also highlighted by its growth rate. For instance, Ireland and Austria show around 30 per cent real growth rate in the services R&D between 1987-1999. Although the starting level is low, the growth rate of services R&D is higher rate than the R&D growth in manufacturing context. This applies to most countries except the UK and Finland where both service and manufacturing R&D have the same growth rate.

Exhibit 5 provides another interesting view to the discussion by showing the share of business R&D in the services sector. The outcome of the table provides an interesting comparison to the Exhibit 4, in terms of country performances. Also, it is notable that such new member states as Latvia and Slovakia are the two leading countries and Japan the least spending country in this type of services R&D statistics. Overall, the statistics on services R&D are much more patchy than the manufacturing related R&D statistics. The coverage of service R&D statistics is one thing, while another, even more serious problem, is related to the way services related R&D is recorded. The indications are that much of the services related R&D is informal and it goes on without ever being recorded within the business nor in the statistics.

Exhibit 5   Share of Business Expenditure on R&D in the services sector 1997 and 2002
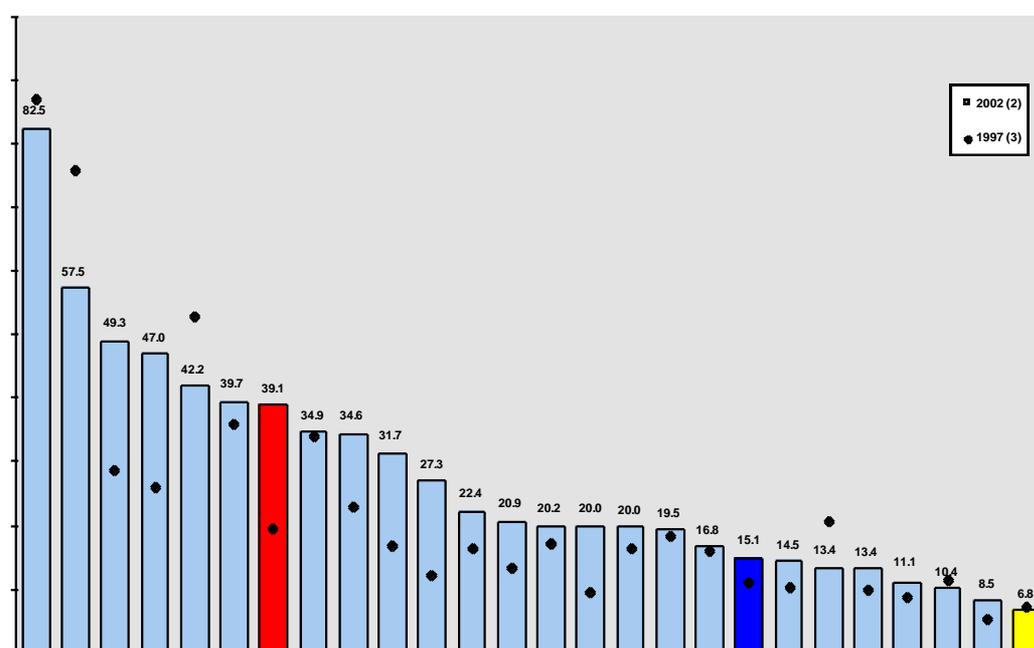
4.1.1   The concept of R&D in services needs further clarification

At present, innovative activity in the service sector is still difficult to define exactly. This is partly related to the heterogeneous nature of services, partly it owes to the existing R&D definitions as well as statistical issues. The recent US report 'Measuring Service-Sector Research and Development', (see section 3.6) brings up a number of concrete developments needs related to definitions and statistics of service related R&D.

It starts by concluding that the traditional definition of R&D makes no distinction between manufacturing and service-sector R&D. Further on, it is not very clear which innovative activities targeted at developing new and improved services qualify as R&D. However, the historical view of R&D and product development (engineering

design, prototype testing, and manufacturing process design leading to mass production) does not fit well when services are built on unique applications that are continually customized, incorporating incremental improvements (as opposed to discrete new product models or software versions). In addition to identifying R&D activities, service-sector R&D is also inherently more difficult to measure. For example, R&D can be carried out in formal R&D departments or in an informal nature carried out in facilities where R&D is not the main activity. Because service innovations are more likely to be customer driven, related R&D activities that are typically integrated into user companies' business units. There is less likely to be a stand-alone R&D facility or division in which R&D activities can be readily quantified by existing accounting systems.

Service innovation is more likely to be carried out in a multidisciplinary business unit that combines IT system integrators, managers, and market researchers. This places more responsibility on the organization to determine what share of its innovation expenditures is to be classified as R&D when completing the survey. In addition to business units composed of teams of multidisciplinary staff, it is also common for individual staff members supporting innovation in the service sector to have multiple responsibilities and functions. For example, IT managers need to maintain and improve their networks and systems[11].

Further on, the distinction between the manufacturing and service sectors is becoming increasingly blurred. For example, in some industries, a significant share of the R&D reported under service-sector statistical codes is product/production-related research outsourced from traditional manufacturing sectors. Also literature highlights the trend where manufacturing firms increasingly providing services and hence they are conducting service-related R&D activities. This industry misclassification issue, driven by the unavoidable need to aggregate R&D to the establishment level, has led to uncertainty in trends for R&D activities targeted at service innovation (i.e., efforts targeted at advancing the provision and content of services). So far the efforts to tackle misclassification issues have had little success at quantifying the impacts on aggregate R&D statistics used for policy analysis. As a result, what is lost is the potentially important distinction between R&D expenditures targeted at enhancing manufacturing vs. service activities across all sectors of the economy.

4.1.2 The definitions of R&D and innovation

As the US report points out current institutional definitions of R&D are not completely applicable for the service sector. This is because the historical definitions and examples have evolved primarily to characterize manufacturing-sector R&D activities. As a result, the definition of which service activities fall under the R&D classification may not accurately or fully capture service-sector R&D. Another problem related to the definitions of innovation and R&D is rooted to their somewhat conflicting nature. While the innovation definition presented in the latest Oslo manual captures the essential elements of service innovation, the existing R&D definitions excludes a number of activities that can be seen as services R&D. The following sections will shortly address these issues.

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[11] Gallagher, M., Link, A., and Petrusa, J. (2005), Measuring Service-Sector Research and Development Final Report, Planning report 05-1, National Science Foundation and National Institute of Standards and Technology, VA, USA.

Many of the existing problems can be rooted to the concepts of R&D and innovation in services that are multidimensional and complex in nature. For instance, the most recent Oslo manual (2005: 53) provides guidelines for distinguishing different types of innovations, service related included.

> With respect to services, however, it may be less clear, as the production, delivery and consumption of many services can occur at the same time. Some distinguishing guidelines are:
> - If the innovation involves new or significantly improved characteristics of the service offered to customers, it is a product innovation.
> - If the innovation involves new or significantly improved methods, equipment and/or skills used to perform the service, it is a process innovation.
> - If the innovation involves significant improvements in both the characteristics of the service offered and in the methods, equipment and/or skills used to perform the service, it is both a product and a process innovation.

While the multidimensional characteristic of service innovation has been recognised in the key documents, service related R&D is a more problematic issue. The Frascati Manual (2002:30) definition of R&D[12] covers three activities: basic research, applied research and experimental development. The manual also lists a range of activities to be excluded from R&D. Interestingly, many of the activities that play important role in the services R&D, are excluded from the official R&D definitions and surveys. Four broad groups of activities are related to R&D but should not be included in the R&D surveys[13].

- Education and training
- Other related scientific and technological activities
- Other industrial activities
- Administration and other supporting activities

Yet, at the same time similar type are activities are listed in OSLO manual as elements of service innovation. For instance, excluded activities include education and training which are important elements of R&D in knowledge intensive service firms. Complete list of activities excluded from the R&D are presented below:

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[12]   *"Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, society, and the use of this stock of knowledge to devise new applications."*
   Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.
   Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.
   Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed. R&D covers both formal R&D in R&D units and informal or occasional R&D in other units. Source: Frascati Manual (2002).

[13]   OECD (2002) Frascati Manual - The Measurement of Scientific and Technological Activities, Proposed Standard Practice for Surveys on Research and Experimental Development, OECD Publishing, Paris, France.

- *Education and training* of personnel in the natural sciences, engineering, medicine, agriculture, the social sciences and the humanities in universities and special institutions of higher and post-secondary education should be excluded.
- *Other innovation activities* defined as all those scientific, technical, commercial and financial steps, other than R&D, necessary for the implementation of new or improved products or services and the commercial use of new or improved processes.
- *Other industrial activities* include acquisition of technology, tooling up and industrial engineering, industrial design and other capital acquisition, production start-up and marketing for new and improved products.
- *Production and related technical activities* including distribution of goods and services and the various allied technical services, together with allied activities using social science disciplines, such as market research[14].

Based on the above discussion it can be said that institutional definitions needs to be further developed. From the business and policy perspectives it would seem appropriate if the R&D and innovation concepts could be harmonised. Hence, they would provide a sounder basis for the development of statistical analysis as well as service related research.

4.2 Concluding comments on statistics and conceptual definitions related R&D in services

The previous sections have illustrated that the statistical coverage of R&D in services is gradually improving but many challenges still lie ahead. These challenges include the heterogeneous nature of service industries, service activities that cut across the industries, as well as the very nature of R&D in services. There is a need for statistics that provide more complete picture on R&D in services and work needs to be done so that indicators will reflect the full spectrum of relevant activities. This development needs to be done across the countries which represent different starting levels in terms of the R&D itself, as well as the quality and coverage of relevant statistics. Even if the R&D in services is still relatively unknown issue, the importance of these activities is highlighted by the employment statistics which indicate that 80 per cent of science and technology jobs are in services sectors.

Statistics offices alone cannot improve the quality of the statistical data. Also businesses need to be better able to both recognise and report their own activities relevant for R&D in services. This requires the development towards a services culture, clearly specified concepts and management principles, just as the R&D in manufacturing already has. Services heterogeneous nature implies that R&D in services will remain an area with variety of different processes. However, this challenge must not prevent further development of statistics and key concepts such as the definition of the R&D in services. The problem of the current situation is, that there is no widely accepted definition that would cover all relevant R&D activities in services.

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[14] OECD (2007) The measurement of scientific and technological activities – Proposed guidelines for collecting and interpreting technological innovation data, Oslo Manual, OECD, European Commission, Eurostat. Paris. France.

5 Recent research reports addressing R&D in Services

The following sections will present key findings extracted from the recent research reports addressing R&D in services. The aim of this chapter is to further highlight the issues and themes that keep coming up in the research. One aim of this R&D in services report is to highlight some underlying processes that are 'behind' these research findings. Such deeper understanding is fundamental element of knowledge sharing and development in the area.

5.1 Towards a European strategy in support of innovation in services: Challenges and key issues for future actions

This Staff Working Document responds to the request of the European Council and it sets out, for the first time, elements of a policy framework aiming at better supporting innovation in services, taking into account the report of an Expert Group (see next section 4.2) that was set up in its preparation. It was initiated by, *A broad-based innovation strategy: strategic priorities for innovation action at EU level*, published on the 4. December 2006[15]. This document invites the Commission 'to prepare by April 2007 an overall assessment on innovation in services, evaluating e.g. the related needs for policy adjustments, where appropriate. The Commission is also invited to take into account the various forms of non-technological innovation'. This paper also recognises the work of CREST Working Group on Services R&D and highlights the importance of the policy implications provided by the group.

Conclusions and policy implications

The future challenges and key issues to be addressed in defining a European strategy in support of innovation in services can be summarised in the following ten points:

- First, building upon the results of the Community Innovation Survey (CIS-4) there is a need to better understand the specific innovation patterns of services and their relevance for innovation policy strategies. Work to improve indicators which better capture the specificities of service innovation needs to continue.
- Second, the internal market for services needs to be further completed. The full implementation of the Services Directive will lower barriers for market entrance and stimulate new forms of service innovations.
- Third, service companies use registered IPRs less than manufacturing companies. This may call for specific support actions and awareness raising, helping service companies to protect their IPR in an optimal manner, including informal forms of protection.
- Fourth, services would particularly benefit from more innovation-friendly public procurement. Further actions need to be taken to promote the use of the Guide on dealing with innovative solutions in public procurement, for both products and services.

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[15] Council of the European Union (2006), 2769th Competitiveness (Internal Market, Industry and Research) Council Meeting Brussels, 4 December 2006, Conclusions point 8.

- Fifth, innovation in services depends critically on the right skills and innovation management capabilities, which need to be better identified and promoted at all levels.
- Sixth, R&D and innovation programmes need to be better aligned with the specific requirements of service innovation. Innovation in services is less driven by technological research projects than by organisational innovation and new business models. This should be better reflected in research priorities, as well as by developing new forms of knowledge transfer from research to the business community, taking into account the recommendations of the <u>CREST Working Group on "R&D in Services"</u>.
- Seventh, it is not enough just to open existing innovation support schemes for services. More emphasis should be given to the specific needs of fast growing innovative firms in the service sector. This requires new forms of support services, bringing together different business support services (knowledge transfer, incubation, finance) in a more consistent and less bureaucratic manner.
- Eighth, the Commission will support under the Competitiveness and Innovation Programme the development and testing of new tools and instruments in support of innovation in services that follow a more integrated approach and are less bureaucratic than existing support mechanisms, with a view that ultimately they will be used and implemented on a large scale by regional, national and European service providers.
- Ninth, in defining and implementing new ways of supporting innovation in services, Member States should work closely together and learn from each other. Scope for trans- national cooperation in this field exists, particularly in sharing information about future trends and developing new tools and instruments in support of innovation in services.
- Tenth, innovation in services is an important pillar of the Lisbon strategy, which aims at supporting all forms of innovation in the best possible manner.

The Commission's services will improve the collection of information on relevant policy initiatives and facilitate the identification and further dissemination of good practice in this field. These orientations will be further elaborated by the Commission's services as a matter of priority and implemented as part of the Lisbon strategy. To be effective, these priorities need to be supported and further strengthened by complementary efforts at regional and national level.

5.2 Fostering Innovation in Services

In 2006 European Commission's DG Enterprise set up an Expert Group on Innovation in Services. The final report, 'Fostering Innovation in Services', was published early 2007[16]. This report is building upon earlier initiatives and communications produced by the Commission. In particular, this report seeks to addresses the need to 'define a strategy to promote innovative services in the EU'. It seeks to present a framework to enable a better understanding of services innovation, and policymaking facilitating innovation and services.

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[16] European Commission (2007) Fostering Innovation in Services, A report submitted by the Expert Group on innovation in Services, DG Enterprise, Brussels, Belgium.

Conclusions

- Services play a major role in European member states in terms of their growth and development. Majority of jobs, GDP and productivity growth are based on service activities.
- Services are becoming more R&D intensive and the significance of innovation to the performance is now recognised. Thus, services other than those in the 'peculiar sectors' of telecommunications and computer services, have been assumed not to engage in R&D.
- There is significant growth in R&D in services but it remain unclear to what extent this reflects real growth, or a growing recognition by statistical agencies (and the responding firms) that services engage in R&D.
- Service innovation is often closely linked to changes in disembodied, non-technological innovative processes, organisational arrangements and markets.
- Service firms closely ally investments in innovation with investments with training and skills based provision.
- Services and service innovation remain difficult to study and conceptualise.
- It is important to develop new indicators that can better articulate and measure what service innovation is about.

Policy implications

The report lists a broad range of policies that can support service innovations.
- *Horizontal framework policies including:*
  - Legal and regulatory frameworks
  - The knowledge base
  - Entrepreneurship and finance
  - Demand-side policies, including public procurement
- *Specific policy actions include proposals for:*
  - European Innovation Platform for Start-Ups in Knowledge Intensive Services
  - European Service Innovation Institute
  - Innovation Service Exchange Network and, support for the market launch of high risk, innovative service products.

Policy recommendations that are most closely related to services R&D issues include:

- *Research needs of services need to be addressed more effectively*
  - Service industries ought to be more actively involved in drawing up research agendas' and R&D and innovation needs should be articulated more clearly
  - More socio-economic research associated with service innovation is needed
  - Launch of 'Service R&D Challenge Call' where R&D and innovation programmes encourage service, 'hybrid' and indeed manufacturing firms to systematically develop new service products and related support services

- Wider range of services needs to be more closely aligned with certain thematic research networks and programmes. For instance biotechnology, nanotechnology, new generations of ICT, converging technologies.
- Further on, developments in, for example, genomics, neurosciences and ambient intelligence and locational technologies will have many applications in services
- Research networks and programmes should also be evaluated in terms of how well services were integrated into them and to what extend service innovations will arise from them.
- *Measures that initiate better innovation networking links for services*
  - For instance, innovation voucher scheme specifically aimed at service businesses is an example of a measure that can link services to knowledge institutes (e.g. in Netherlands; Innovation Vouchers for SMEs).

5.3 Reneser report

In 2005 RENESER project was established by the European Commission´s DG Internal Markets and Services[17]. The study was operationalised via a process that embraced literature review and secondary statistical analysis, and most importantly by the development of 21 detailed case studies in selected segments of the services industries. The RENESER study deals with the Research and development Needs for business-related Services. It focused on two key issues:

- the underinvestment on firms in R&D and
- the degree to what public R&D expenditure is satisfactory addressing the real R&D needs of service firms.

Conclusions:

- Some service firms do perform classic technological R&D and use classic R&D performed by others.
- Services R&D is widely underestimated (large amount of classic R&D is hidden behind labels such as business development, service improvement etc.).
- Leading edge firms show attention to management of services´ R&D and service innovation activities.
- Most service firms are poorly linked to the science base and innovation and R&D programmes. This results in that innovative service firms are less likely to receive public innovation support than are their manufacturing counterparts.
- There is clearly room to go beyond the market failure argumentation that is commonly used to justify policy interventions (eg. designing policies with broader objectives (education and training, environment, IP, public services and procurement etc.).

Policy implications:

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[17] Reneser Report (2007) Research and Development Needs of Business Related Service Firms – Reneser Project, European Commission, DG Internal Market and Services, Brussels, Belgium.

- Creating a more pro-service innovation culture at different levels: enterprises, innovation managers, researchers, policy-makers.
- Promoting studies, debate, research and statistics.
- Assessing the sectoral balance of R&D programmes and innovation policies.
- Identifying and promoting best practice.
- Promoting skills, business models and voluntary standards in R&D ad innovation in services.
- Screening of relevant Commission policies to assess the contribution to service innovation.

5.4 The future of R&D in services: implications for EU research and innovation policy -report

The Science and Technology Foresight Unit of the DG Research commissioned a project: The future of R&D in services: implications for EU research and innovation policy'[18]. The final report was published in 2006. The report examines:

- the prospects for growth in services' R&D and;
- discusses the question of how R&D is being measured in services.

The study first reviews the general literatures on services sectors, innovation and R&D, complemented by discussions and commentary by researchers. Empirical part of the research is based on interviews and workshops with practitioners representing a range of service industries.

The key conclusions of the study include the following ones:

- There are many problems with measuring services' R&D. These means that much the analysis likely to underestimate a good deal of the R&D effort actually undertaken in services. Measuring problems would also lead into the overstating the size of the US-EU gap in terms of service related R&D

- Even so, R&D as conventionally understood appears to be lower in services firms than in comparable manufacturing firms. Similarly, there does seem to be an on-going tendency for the US services' sector to undertake more R&D than EU equivalents

- Services' R&D as conventionally understood is likely to increase both absolutely and relatively, and appears to be a promising target for policy action

- However, there are dangers in putting too much emphasis on conventional R&D. There are other innovative activities that are also important. They may be equally deserving of policy and management attention, and overemphasis on R&D (or one notion of R&D) might skew innovation in suboptimal directions

The main policy issues

The main policy issues arising from this report include:

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[18] European Commission (2006) The Future of R&D in Services: Implications for EU research and innovation policy, DG Research, Foresight Unit, Brussels, Belgium.

- Improved measurement of services R&D has to be seen as a one step towards better understanding of services innovation. Simply expanding the accounting of R&D by improved measurement will do little to enhance the competitiveness and quality of European services.

- 'Sector-neutral' R&D and innovation policies seem to have less relevance for services than could be expected. It may be that networks between policymakers and civil servants, public research institutions, and private firms are better developed for manufacturing (and a few high-tech services) than for other services.

- More general conclusion is that services are often less well-embedded in innovation systems than are firms in other sectors. Efforts to build better innovation networks for services (and to use existing professional and trade networks as vectors for innovation) could be important for fostering innovation and R&D in these sectors.

- There have been few instances of policies aimed specifically at boosting services innovation – Germany is the main exception within the EU, having both service innovation and service R&D programmes. But there is growing attention to such issues, for instance in the Nordic countries. Analysis of the rationales and experiences of such programmes would be a good basis for policy learning elsewhere.

5.5 Innovation and Knowledge-Intensive Service Activities

The OECD Directorate for Science, Technology and Industry commissioned an 11 country research project on the role of service activities – such as R&D – in innovation. The final synthesis report was published in 2006[19]. The project examines the value of KISA in facilitating the growth of innovation capacity within recipient organisations by focusing not on service sector industries per se, but on the role of knowledge-intensive services as carriers and sources of knowledge that influence the performance of individual organisations, value chains and clusters across industries. From this perspective, the impact of services on innovation performance is understood through their specific functional role rather than as a set of distinct industry sectors.

The study reviews the general literatures on services, innovation and service innovation, complemented by discussion within the Group of experts. Empirical part of the research is based on interviews, surveys and statistical analysis in the three types of industries: software industry, health care, tourism and leisure, and resource based industries (related to traditional manufacturing).

Some key findings of the study

KISA such as R&D services are increasingly important in the globalising knowledge economy. The evolving division of labour and the volume of knowledge are strong drivers of KISA. Integrating internal and external capabilities is increasingly important. As KISA becomes more important to the innovation activities of firms and as the number of external suppliers of KISA grows, firms face a growing challenge of

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[19] OECD (2006) Innovation and Knowledge-Intensive Service Activities, Working Party on Innovation and Technology policy (TIP), Paris, France.

integrating internal capabilities with external expertise. This can take place in a numerous ways such as:

- Effective management of human resources, such as employing experts who can build up their knowledge base and absorptive capacity; forming multi-disciplinary research teams that broaden the knowledge base required in selling solutions; and making use of personal connections with industry and other experts.
- Establishment of appropriate organisational structures, such as setting up dedicated business units that scan the environment and develop new expertise and business; acquiring firms that can bring in new knowledge and innovative thinking; and establishing joint ventures that typically (e.g. with industrial service firms) institutionalise co-operation and integration of KISA with other firms.
- Forging effective networks and linkages, such as by participating in networks which offer opportunities for incorporating internal and external knowledge; engaging in close co-operation with suppliers and setting up joint development projects; working closely with customers in new solutions development; and establishing joint projects with research.
- Employing market-based transactions, such as buying integrated product-service bundles that bring external KISA within the firm; using outsourcing as a way to integrate former internal KISA with the external expertise; and purchasing services from service providers businesses and working with them.

Knowledge intensive service activities have several different functions in relation to innovation:

- *Renewal service activities* – such as R&D services and management consulting - are most closely related to innovation
- *Routine services* – such as accounting - contribute the improvement, maintenance and management of various subsystems within organisations
- *Compliance services* – such as auditing and some legal services - help organisations to work within the legal framework and various regulatory regimes
- *Network services* – e.g. informal personal networks and professional networks - facilitate communication, knowledge exchange and flexible resource allocation

Policy implications

Fostering the supply, quality and demand for KISA, to improve innovation performance, will be the challenge for innovation policy. Policies can target KISA actors directly or indirectly through intermediary organisations, or through wider framework conditions including government regulation, education and skills development, and procurement practices. Also, the public sector itself is a significant provider and user of KISA, and hence a target for innovation policies.

- Research-based knowledge and a highly skilled labour force are basic requirements for many kinds of KISA
- Innovation policy frameworks need to respond to the non-technological aspects of KISA and their impact on innovation capability. The KISA study has identified the importance of non-technological contributions to the innovation capability of

firms. This suggests that the traditional R&D-based approach to innovation is too narrow and that innovation policies need to recognise the various types of knowledge-intensive services activities that have different roles in the innovation processes

- A key challenge is improving access to KISA. This challenge is highlighted by intangibility, complexity and difficulties in assessing the quality and suitability of the services offered prior to engaging with them. Financial assistance is only a partial solution. Awareness of KISA needs to be developed first and knowledge asymmetries between KISA suppliers and users need to be addressed

- Policy must adapt to changing needs for KISA. The need for KISA evolves as industries, organisations and innovations mature. The life cycle of the innovating organization and of the innovation process itself can be used to determine which type of KISA best facilitates further development. At different stages of the innovation life cycle, the balance between internal and external KISA may also change, implying a need for different types of policy measures.

5.6   Promoting innovation in services

This project is part of the OECD horizontal project on 'Enhancing the Performance of the Service Sector'. The report was published by the Committee for Scientific and Technological Policy (CSTP) in April 2005[20]. It draws on existing STI statistics, recent innovation surveys, and a policy questionnaire circulated to TIP and CSTP delegates to characterise innovation in service sector industries and identify policy measures being implemented in OECD countries to improve innovation in services.

Research findings

The service sector is of growing importance in OECD economies. Statistical evidence supports the notion that services are increasingly knowledge-based, innovative and drivers of growth. Service-sector firms in general are less likely to innovate than manufacturing firms, but they are becoming more innovative and knowledge-intensive, and services such as financial intermediation and business services show above-average levels of innovation.

- In spite of the fact that the service sector relies less on R&D for innovation, service-sector investments in R&D appear to be rising. Between 1990 and 2001, service-sector R&D increased at an average annual rate of 12% across OECD member countries, compared to approximately 3% in manufacturing.

- Large differences between growth rates in services and manufacturing are most pronounced in countries such as France, Germany, Japan, Netherlands, Spain and the United States.

- While it is clear that a portion of the rapid growth in service-sector R&D is a statistical artefact[21] it also appears to reflect real increases in R&D by service-

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[20]   OECD (2005) 'Enhancing the Performance of the Service Sector', the Committee for Scientific and Technological Policy (CSTP), Paris, France.

[21]   This means that the increase in services R&D is reflecting better measurement of R&D in the service sector and a possible reclassification of some R&D-intensive firms from manufacturing to services (as their service activities have expanded),

sector firms, driven by competitive demands or by increased outsourcing of R&D by manufacturing firms and government.

- Moreover, R&D appears to have grown faster than value added in services, reflecting its increased importance.

- R&D spending as a share of value added (R&D intensity) in services is still considerably below that in manufacturing. However, available statistics indicate that R&D intensity in services has increased quickly in most OECD member countries even in many in which manufacturing R&D intensity has declined.

- Business services and post and telecommunications, and computer and related services in particular, account for most of the growth in R&D intensity over the last decade In Germany, Korea, Netherlands and Portugal. R&D intensity in the computer and related services industry increased more than 25% annually in recent years, and the Korean R&D service sector has seen increases of the order of 75% a year. This highlights the fact that service-sector R&D varies considerably across industries, as is also the case in manufacturing.

Policy implications

Service sector requires attention to a number of policy areas, with different emphases than for manufacturing as listed below:

- Service-sector innovation derives less from investments in formal R&D and draws more extensively on acquisition of knowledge from outside sources that is acquired through purchases of equipment and intellectual property, as well as via collaboration.

- Human resource development is especially important to service firms, given their high reliance on highly skilled and highly educated workers, as well as indications that a lack of highly skilled personnel is a major impediment to service innovation in most OECD economies.

- The role of newly established firms in innovative activity is greater in services than in manufacturing, so that entrepreneurship is also a key driver of service innovation. Nonetheless, small firms tend to be less innovative than larger firms.

- IPR protection has also drawn considerable attention, especially as relates to software and business method patents, which seem to have strong links to innovation in services.

5.7 Measuring Service-Sector Research and Development

The US. National Science Foundation (NSF) and National Institute of Standards & Technology (NIST) commissioned a project to investigate R&D in services. The final report, 'Measuring Service-Sector Research and Development', was published in March 2005 and it first describes services and the trends in service related R&D[22]. The remainder of the report begins with the definition of R&D and current R&D statistics, measurement and classification issues related to service-sector R&D expenditures, taxonomies for service-sector R&D and recommendations for

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[22] Gallagher, M., Link, A., and Petrusa, J. (2005), Measuring Service-Sector Research and Development Final Report, Planning report 05-1, National Science Foundation and National Institute of Standards and Technology, VA, USA.

enhancing the RD-1 survey instrument. Case studies were conducted in four service-sector industries: telecommunications, software-, financial services, and research development and testing (RD&T).

Research results

- The U.S. service sector is the largest sector in the economy and accounts for an increasingly significant share of gross domestic product (GDP). Service-sector revenues in the United States account for about one-third of service-sector revenues worldwide.

- Service-sector industries are characterized by a close interaction between production and consumption, high information content, the intangible nature of their output, and a heavy emphasis on labour capital in the delivery of their output.

- It is widely accepted that a significant share of R&D conducted in the manufacturing sectors supports the provision of products and services provided by the non-manufacturing sectors. Service-sector industries' increased reliance on information technology provides a prime example of this.

- Service sector's share of R&D varies greatly across OECD countries. To some extent, these cross-country differences highlight the difficulties in identifying, measuring, and classifying R&D expenditures in the service sector. These issues are further complicated by the background of individuals completing the surveys and the diversity of business lines within modern evolving corporations.

- In addition to identifying R&D activities, service-sector R&D is also inherently more difficult to measure. R&D can be carried out in formal R&D departments or in an informal nature carried out in facilities where R&D is not the main activity.

- Service innovations are more likely to be customer driven and related R&D activities are typically integrated into user companies' business units. There is less likely to be a stand-alone R&D facility or division in which R&D activities can be readily quantified by existing accounting systems.

- Current institutional definitions of R&D are not completely applicable for the service sector. The definition of which service activities fall under the R&D classification may not accurately or fully capture service-sector R&D.

- The distinction between the manufacturing and service sectors is becoming increasingly blurred. In some industries, a significant share of the R&D reported under service-sector NAICS codes is product/production-related research outsourced from traditional manufacturing sectors.

- Manufacturing firms are increasingly providing services and hence conducting service-related R&D activities.

- Service sector is an extremely diverse set of industries. It includes firms that access and integrate technology with the goal of developing and providing enhanced services to their customers, as well as firms that provide research as their primary service.

Policy implications

The policy implications of this report focus on the development of the R&D survey so that it will provide more accurate results on service related R&D. Recommendations propose rather comprehensive changes in terminology and adjustments that facilitate meaningful comparisons between manufacturing R&D and service-sector R&D investments. Also modifications to the existing survey instrument and to the survey instructions are put forward.

5.8 The competitiveness of business-related services and their contribution to the performance of European enterprises

This Communication contains an economic analysis of the role of services in the European economy[23] and examines their competitiveness, seeks to reflect their importance in the overall EU economy and to signal the Commission's commitment to improve their framework conditions, in line with the 2002 Communication on "Industrial Policy in an Enlarged Europe". This Communication on Business Related Services clearly recognises the importance of R&D for services and this is being highlighted as follows:

Conclusion

'The involvement of services companies in the national and European R&D Programmes should be improved to address their specific problems and needs. The EU target of devoting 3 % of GDP to research and development will be less difficult to achieve, if the business-related services sector plays a larger role, reflecting their overall economic weight.'

5.9 Concluding comments on R&D in service

The objective of this chapter has been to bring together insights into the recent research, statistics and key concepts related to the R&D in services. This has been achieved by reviewing seven recently published papers that discuss relevant from the R&D in services point of view. The following sections present a range of key findings and policy issues in the afore-mentioned areas.

- Services are an integral part of the economy and highly intertwined into manufacturing activities. Hence R&D in services has its specific features but it is not an isolated function. On the contrary, it is closely related to technologies and production processes of physical goods. This implies that R&D policies should be based on thorough understanding of the service concept, related R&D and their linkages to the wider national and international economic contexts.
- Services linkages to the wider socio-economic context means that horizontal policy perspective and policy coordination have important role in the future development. Following the broad based policy approach (see Appendix 2) at least the following type policy measures can be identified: R&D tax incentives for businesses and R&D workers, targeting of university funding, tailored courses for firms, R&D grants, advisory services, cluster policies use of regulations and

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[23] European Commission (2003) The competitiveness of business-related services and their contribution to the performance of European enterprises, COM(2003) 747 final, Brussels Belgium.

standards, public procurement of R&D. In addition there are numerous other policy areas that are more indirectly influencing R&D in services.

- Opening up of markets will increase competition also in traditional, and locally traded services. Such intensifying competition motivates service businesses to invest in R&D. The role of IP management and protection becomes essential as service enterprises seek to protect their R&D investments. This implies a need to develop existing IP regime so that it will cater the needs of service businesses more effectively.

- Service occupations make up a significant proportion of the jobs in the developed economies. Whether the question is about knowledge intensive or traditional jobs, employee skills represent a crucial input to services related R&D. Thus it is important to secure the supply of skilled labour by creating a dynamic research and education system that is closely attached to the needs of the service organisations.

- Knowledge intensive service activity (KISA) perspective draws the attention to service functions and activities instead of the actors. The intertwined nature of services can be highlighted through this perspective since many of the key functions in manufacturing are service activities. The central role of KISA is highlighted by the fact that R&D function itself belongs to this category. Service activity perspective is particularly interesting from policy point of view because it can reveal the flow of knowledge intensive services: within and between the firms, in value chains, within clusters and regions and as part of the global economy.

- The globalisation of services R&D is highly relevant since the effects cut across the economy on many different levels such as: industry-, business-, occupations-, and service activities[24]. It is not only businesses that are increasingly international, the same applies also to service employment where professionals represent a very dynamic and mobile element on the international labour markets. For instance, the international competition often takes place at the level of work tasks rather than sectors[25]. In other words, even if the business keeps its site in one country, it may at the same time offshore many service tasks to overseas locations.

The key conceptual issue that needs attention is the current institutional definition (Frascati manual) for R&D. Seemingly it does not fully fit the reality of service development activities. This finding was highlighted in several of the examined reports. However, very few practical proposals on how to address this issue were brought up. On positive side it can be said that it is policy makers who have the mandate to refine the institutional definitions so that they will better reflect the current services R&D concept.

- There are several options for addressing the issue of R&D definition in services context. One option is to keep the status quo, at least until there is a more clear view of how to solve the issue. Another approach is, that the traditional R&D concept will continue to be based on the narrow definition, and a parallel wider

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[24] Service activities cut across the sectors and clusters, for instance R&D service activities. For detailed discussion see OECD (2006), Innovation and Knowledge-Intensive Service Activities.

[25] Baldwin, R. (2006) Globalisation: the great unbundling(s), contribution to the project; Globalisation Challenges for Europe and Finland organised by the Secretariat of the Economic Council. The project is a part of Finland's EU Presidency Programme.

concept for R&D in services will be introduced. Finally, the institutional R&D definition may be revised so that it includes the features of service related R&D.

- In any case, more knowledge needs to be acquired and disseminated on the R&D in services. Major target audiences include policy makers, business community and researchers. Since the institutional definition for innovation (Oslo Manual) has already been updated to cover service innovations features, it would seem logical to proceed to the same direction with the R&D definition.

Service sector holds within it an enormous variety of activities.[26] This is reflected also in the R&D in services so that it ranges from close to market development projects to basic research. The best way to improve our understanding of the various forms of services related R&D is to carry out empirical investigations across the different types of services. Both qualitative- and statistical analysis is required in this type of explorative research field. Once the knowledge on the R&D in services accumulates it provides a solid basis for better policy design, and targeting of the direct and indirect policy measures.

One very vocal message from the reviewed literature is that more accurate statistics on service R&D would benefit research and policy development. There are a number of reasons why R&D in services is a challenging area for statistics. These include the following ones:

- statistical surveys tend to be biased towards industrial R&D in terms of sampling and questionnaire design
- institutional definition of R&D does not capture all forms of service related R&D
- service businesses themselves do not always realise that they are conducting R&D, and hence they are not reporting their activities
- much of the R&D in services is 'hidden' since it is often: informally organised, carried out partly by suppliers, individuals, or in client firms facilities

There is a good reason to believe that statistical coverage of R&D in services will improve in the near future. Industry classification systems are becoming more sensitive to services and more refined codes for services are being added into them (see Appendix 1). For instance, Statistical Classification of Economic Activities in the European Community, (NACE; 2007[27]), and North American Industry Classification System (NAICS; 2007[28]) have been recently updated and they can now provide a basis for more accurate statistical analysis on services. Keeping the industrial classifications up to date requires constant updates that reflect the changes in the economy. As a result of the above-mentioned updates, service activities are well represented in the most recent industry classifications.

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[26] Such activities include: such as: finance, insurance and real estate industries, business services, legal services, transportation and communications, wholesale and retail trade, entertainment, hotel and motels, government services at the transnational, national, and local levels and, not for profit agencies.

[27] NAICS 2007, see http://www.statcan.ca/english/Subjects/Standard/naics/2007/naics07-index.htm'

[28] NACE 2007, see http://ec.europa.eu/eurostat/ramon/index.cfm?TargetUrl=DSP_PUB_WELC

6 Policy survey mapping the public support measures for the R&D in services

This chapter presents the results from the survey of policy measures addressing R&D in services. The Working Group organised this survey that produces new information on the currently implemented policies relevant for the R&D in Services. The results of the survey complement the literature review and case analysis that will provide further contributions to the final report. The topic, R&D in services is complex and the following issues have been identified as areas that needs to be further analysed:

- Statistics on new service development (R&D) activities are getting better but further improvements are needed since current picture is incomplete
- R&D definition covers only part of the new service development activities
- Businesses may not be reporting all of their service development activities in the R&D surveys
- R&D in services is more informal, or, less organised than industrial R&D. It is not always easy to identify existing service development activities
- Often new service development involves incremental improvements that can easily escape the attention even within the developer organisation

Further on, discussion on new service development should be clarified by making more distinct when the research is concerning services in a more general sense and, when the question is on research and development that is directly targeting new service development. While all research benefits new service development indirectly, the actual new service development is directly targeting the development of new and improved services. Working Group participants have raised a number of other important issues related to services R&D. These include:

- Which other key enabling technologies are there besides ICT?
- SMEs importance in services sector, how is this reflected in services R&D and related policies?
- National and EU level targets for R&D and collaborative R&D in general, and in the case of services R&D in particular
- Services and R&D related definitions need to be further clarified
- How to secure the visibility and R&D policy attention to the service sector?
- How supportive the existing funding instruments are in the case of services – more evaluation is needed
- IP management and protection issues in the services R&D context
- How to combine country, EU level, coordination for increased competitiveness?
- Healthcare services and technology issues need attention
- Human resource issues and skills issues

While some of these issues are addressed in this paper, there are also many areas that fall out of the scope of this paper and need to be dealt in the future. This report focuses on those policy measures that have been specifically designed to support R&D in services. Another debate, the effectiveness of sector neutral measures in

promoting R&D in services, is not within the scope of this paper. More specifically, this survey of R&D in services explores the current state of service related R&D policy in the CREST Working Group member countries. In total 8 countries returned the survey results, these countries are: Belgium, Finland, Germany, Greece, Lithuania, Sweden, Turkey and United Kingdom. The following results represent the inputs from these countries. In addition, five countries submitted somewhat less extensive review of their policies, programmes and instruments. These countries include: Denmark, Iceland, Ireland, Luxembourg and Norway. The following sections will provide a more detailed account of the survey results.

6.1 How R&D in services has been addressed in participant countries?

Majority of the 13 reporting countries recognise services sector as an R&D performer, and typically services can benefit from the available R&D supports that are mainly technology oriented. In terms of measures targeting services in particular, Greece has specific calls for services within the existing programmes. Finland, Germany, Ireland, Norway and Sweden recognise services as a specific development target. These countries have for some time been active in developing strategies and instruments for supporting R&D in services. The rest of the countries are also carrying out a varying range of activities that seek to address services related R&D, either directly or indirectly.

Exhibit 6   Service sectors that are seen as essential in terms of R&D policies

Country	Services most important in terms of private business R&D	Services that are most important recipients of public sector R&D funding	Services that are high on the policy agenda for some other reason
Belgium	Information services Other Business services Transport, storage and communication	No precise information	Transport and logistic ICT Health care services
Denmark*	Knowledge intensive service ICT Financial sector	Knowledge intensive services ICT	Industrial service Creative economy
Finland	ICT services Health Care (?) Industrial Services Software	Health Care Software Industrial Services Knowledge intensive business services	Health Care Knowledge intensive business services
Germany		ICT services and Knowledge intensive services	High value added services: Finance, leasing and business services, public health care, educational services, social services, leisure, sports, waste management, trade, tourism and logistics
Greece	IT-services (software, consulting services, etc) IT-telecommunications Transport	IT services IT-telecommunication Cultural and re-creational activities KIBS	Health care KIBs IT Financial services Cultural and re-creational activities
Iceland*	ICT Health care	ICT Health care	Health care Transport, Tourism

	Financial services	Services within the fisheries Natural hazards monitoring	Cultural activities Financial services Natural hazards monitoring
Ireland*	Financial services Software / Computer related Food, Drink & Tobacco	Computer related services Communications Engineering and technical services Financial services	Healthcare, Financial services, Education, Professional / Business Services, Transport, Utilities, Personal services, wholesale and retail trade, Leisure and recreational, property.
Lithuania	Industrial services, Retail trade, Tourism	Health services, ICT services	Industrial services, ICT services
Luxembourg*	Multimedia Telecom Software Financial Sector (Finance & Insurances)	Software Multimedia Telecom Logistics	Health Care KIBS
Norway*	ICT related services,		Financial and business services, ICT, industrial services, tourism Norway export services within shipping, drilling, engineering, tourism, financial & business services, transport
Sweden	ICT Telecom Logistics Wholesale & retail	Public transport ICT/Telecom (focus on Mobile services) "the New Service Economy" (horizontal program focusing on new service development) Health care and health promotion Innovation research	Public e-services Tourism & travel Healthcare Household services to consumers (e.g. gardening, carpenters, cleaning etc.)
Turkey	ICT services Financial services, Logistics related services, Tourism related services. Insurance and retirement related services.	Information and communication technologies, Financial services	Tourism related services Education related services E-Government
United Kingdom	Computer related services Post and telecommunications Miscellaneous business R&D services Wholesale and retail trade		

*Countries that did not carry out full survey but provided key information for the above table

Exhibit 6 shows that information and communication technologies (ICT) and related services are the key area in many respects. First, it is one of the key target areas of business R&D in most respondent countries. Secondly, ICT and related services represent a key target for policy measures. ICT is seen as important as such but also as an important driver of the service industries development. Typically ICT is seen as an enabler of new services and hence an important for the service sector R&D. Other important areas where substantial business R&D is being carried out include: business

and industrial services, transport and logistics, software services, health care services, retail and wholesale trade, tourism, finance and insurance services.

In addition to ICT, knowledge intensive services such as software, industrial services, financial services and creative industries have been a target for service R&D policy measures. Further on, several participant countries have targeted service R&D support for health care services. Public sector service provision has significant role in the case of health care services in most countries, and hence public sector has an important direct role also in carrying out R&D activities. Overall, participant countries have specified 2-5 areas that are seen as essential in terms of service related R&D. However, some of the specified areas are very wide, such as 'public sector services', some are more focused like tourism or wholesale and retail trade. In the third column respondents have identified services that are important from some other reason than high share of business R&D or policy support for R&D. Most often services that are high on the policy agenda for some other reason include: health care services, knowledge intensive business services and culture-/recreational services. These areas represent services that are seen important because of their future potential, or because of potential bottlenecks, hence there is a need to address R&D in these areas.

As a policy area R&D in services is not always clearly designated to a certain type policy actor, or ministry. Participant countries report a wide range of different types of key actors addressing R&D in services. Typically they include ministries covering such areas as science & education, trade & industry, financing and health. However, there are no policy actors devoted to promotion of R&D in services. In most cases services have more or less pronounced role in the executive agencies work. Notably, regional development agencies and policy actors seem to have a fairly active role in relation to services development.

6.2   Policy measures targeting R&D in services

Reported R&D policies are typically sector neutral and addressing technology development or innovations in a wider sense. In principle, service related R&D can be supported but often programmes seem to portray some technology bias. This can be partly traced down to the long history of technology related R&D in comparison to services one. As a result, support policies, programmes and agencies knowledge and skills tend to be more advanced in the technology related R&D. The following table compiles together information on the most important policy measures that survey respondents have reported.

Exhibit 7   Most important policy measures targeting services (directly / indirectly)

	Equity support	Fiscal measures	Support for public R&D and education	Training and mobility of HR	Grants for industrial R&D	Information brokerage	Networking & collaborative R&D	Dedicated service R&D programmes	Programmes open for service R&D	Use of ICT and existing technology	Promotion of KIBS firms	Facilitating access to KIBS use	Service development in manufacturing	Service concept & business model dev.	Systematic development of new serviced	Promotion of network based services	Support for peer-to-peer networks
	4	6	8	5	6	4	4	3	5	5	4	2	5	5	4	4	1
Belgium		x	x														
Finland	x	x	x	x	x		x	x	x	x	x	x	X	x	x	x	
Germany			x				x	x		x	x	x	X	x	x	x	
Greece	x	x	x	x	x	x			x	x	x			x			x
Lithuania	x	x	x	x	x	x			x				X		x		
Norway		x	x		x		x	x	x	x			X	x		x	
Sweden			x		x	x	x	x	x	x			X	x	x	x	
Turkey	x	x	x	x	x	x	x			x	x		X	x			
UK		x	x	x	x		x		x							x	x
TOTAL	4	7	9	5	7	4	6	4	6	6	4	2	6	6	4	5	2

Exhibit 7 summarises the survey results by indicating what types of policy measures respondent countries have adopted in supporting R&D in services. Support for public sector research and education is the common way to contribute the services development directly and indirectly. Besides contributing the knowledge on services, public sector research and education can secure the supply of skilled labour for service organisations. Other common ways to support R&D in services include: fiscal measures (7), grants for industrial R&D (7), training and mobility of human resources (5), support programmes open for service R&D (6), use of ICT and existing technology in new service development (6), service concept and new business model development (6), service development in manufacturing context (6), promotion of

network based services (6), information brokerage (4), and systematic development of new services (4). Other measures were also used but by less than half of the respondents, see Exhibit 7 for measures used by 3 or less of the respondents.

6.3   Programme development for R&D in services

This section will give a brief overview of the policy / programme development situation in those respondent countries that were able to produce required information in time to be discussed in the Working Group meetings. While some of the respondents have already developed specific measures targeting service related R&D, other countries are still remaining cautious, relying on more generic types of R&D support.

6.3.1   Countries that have not adopted specific measures to target service R&D

6.3.1.1   Belgium

At present Belgium does not have specific policy measures targeting R&D in services. However, the importance of R&D in services is progressively taken into account by the different Belgian authorities. In the future the development will focus on policy instruments that can offer a better support for R&D in services. Also, some service sectors are viewed as a priority by the Regional governments. These include Transport and logistic, ICT and health. In order to promote networking between enterprises, governments are looking for measures designed to help the development of business services which are already developing rapidly in Belgium. Another important target is to increase venture capital available for service sector R&D activities.

6.3.1.2   Greece

Greece has not introduced specific support measures for services. However, services are being addressed via specific calls within existing programmes. The basic aim of the Greek RTD policy is the promotion of innovation in all sectors of the economy. The emphasis is on the key sectors, which play a crucial role in strengthening the competitiveness of the Greek economy, and as drivers towards knowledge-based economy. One could say that most of the RTD activities in the period 2000-2006 to a large degree are directly or indirectly linked with RTD in services. It is yet to be seen how effective all these programmes are in supporting R&D in services.

6.3.1.3   Lithuania

In *Lithuania* the R&D policy has been linked to the promotion of innovation oriented research only during the last few years time. Historically the strongest areas of R&D are biotechnology, laser technology and IT related research and development. These sectors have developed good relations with the business community. The emphasis in Lithuania has so far been in high technology, and a special production oriented program of higher technology has been running for 5 years.

6.3.1.4 Turkey

In *Turkey* the main emphasis of funding programmes is given to the manufacturing industries and their risky R&D activities. However, the technology related R&D carried out for the service sector can be supported within a number of existing programmes. The social and humanities studies related R&D in services are also being funded under the TUBITAK programme.

6.3.1.5 United Kingdom

The existing UK policy measures are not explicitly targeting R&D in services. However, all policies are sector neutral and thus open to firms operating in the service sector. The main policy measures in support of R&D are: R&D tax credits, technology programme, and knowledge transfer partnerships. In 2004 the UK Government published the ten-year Science and Innovation Investment Framework, which sets out a long-term vision for UK science and innovation, together with the ambition that public and private investment in R&D should reach 2.5 per cent of GDP by 2014. The UK Government keeps the framework under review for possible changes, R&D in services included.

6.3.2 Countries that have introduced specific measures to target service R&D

6.3.2.1 Finland

Finnish national R&D strategy has traditionally focused on the technological needs of manufacturing industries and in the creation of new scientific and technological knowledge. In recent years, the Ministry of Trade and Industry has recognized the increasing role of service sector as part of the economy and its transformation, and has together with its agencies broadened the national R&D strategy to be more sensitive and appropriate for the encouragement of R&D in the service sector. Majority of new actions and instruments on R&D and innovation in the service sector have been developed through Ministry's research funding agency, Tekes - The Finnish Funding Agency for Technology and Innovation.

Tekes runs several technology programmes that are targeting services. The main ones being Finnwell Programme (health care), Serve Programme (Innovative services in B2B services), Tourism and Leisure Services programme and VAMOS Programme (value added mobile services). New service concepts and service business development are the key objectives of the Serve and Tourism and Leisure programmes. In other words, service development in itself is the focus of these measures. Other programmes are more or less focusing upon technology development for services. The objectives of the programmes are to strengthen and diversify innovation activities in the service sector. Besides service specific objectives, these programmes have also adopted project evaluation criteria that are suitable for service development. Projects are being selected on the basis of their innovative potential and at least the following criteria will be considered. The project needs to demonstrate:

- A new or significantly improved service concept that can be launched on the markets

- A service innovation needs to involve replicable elements that can be identified and systematically reproduced in other cases or environments
- A service innovation is a service product or service process that is based on some technology or systematic method
- The innovation does not necessarily relate to the novelty of the technology itself but the innovation often lies in the non-technological areas. For instance it can be a new business model, new solutions in the customer interface, new distribution methods, novel application of technology in the service process, new forms of operation with the supply chain or new ways to organize and manage services

Overall, the development of innovative service concepts is a tool for strengthening and improving the performance and global competitiveness of service industries. Studies of service innovations bring to the fore neglected aspects of the innovation process, widely distributed throughout the economy. In Serve programme, the main focus is to encourage the development of innovative service concepts and service business. The programme focuses upon B to B services in certain industries:

- Industrial services
- Knowledge intensive business services (KIBS)
- Financing and insurance
- Trade
- Logistics
- Real Estate Services
- Asset Management Services

Serve – Innovative Services programme supports Finnish companies and research organizations in development of innovative service concepts that can be reproduced or replicated and where some technology or systematic method is applied. The Serve programme targets are to:

- Increase the 'service product' development capabilities in the service industries especially in professional services sector
- Promote systematic development of customer oriented service processes in small and medium-sized enterprises
- Boost the development of new business models based on service innovations in different sectors

The programme provides funding for challenging projects that are novel at least at the national level. Project proposals are evaluated primarily in relation to the novelty of the service innovation, rather than the novelty of the applied technology. In service demand side, Serve programme focuses on renewal of the public sector service provision. The objective is to create room for new innovative service concepts in among services that receive public sector funding. Service innovations will promote the strategic renewal of public sector service provision and create new service concepts and new ways to organise the production of public sector services. In the areas of academic research, Serve programme provides funding for strategic and applied research on service innovation.

6.3.2.2 Germany

Since 1999 until 2006 the German Federal Ministry of Education and Research has initiated diverse range of calls for research in the services area. The rationale for these policy measures has been the promotion of the tertiary sector of the German economy. The specific approach of the service R&D policy measures have been to develop the innovation management, new fields of growth and to promote the transfer and cross sectional activities in the service sector.

Exhibit 8   Specific targets of service R&D programmes in Germany

Innovation management area	Targeted growth area
Dealing with knowledge	Health Services
Cooperation management und virtual Companies	Financial Services
Marketing and Customer Relation	Facility Management
Procedures for designing Service provision (Service Engineering)	Handicraft, traditional skilled services
Benchmarking	**Transfer and Cross Sectional Areas**
Export of Services (efficiency and excellence)	Standardisation
Integration of product and services	Public Awareness for research and innovation in the service sector

The *German Federal Government*s service R&D support provides an example of a significant investment in services development. It is based on two different approaches executed by two ministries. The German Federal Ministry of Education and Research is in charge of service research, the German Ministry of Economics and Technology is responsible for innovation and development of different sectors of the economy, including services. There are also R&D activities initiated by several Federal States (Länder). However, this report will focus only to the R&D policy of the German Federal Government. The following will describe the service R&D specific policy measures by the Federal Ministry of Education and Research.

In 1998, Germany's Federal Ministry of Education and Research (BMBF) started its first service research programme, the funding priority "Innovative Services", thus laying a vital foundation for the broad based services development in the country. The most recent service development programme was officially launched in March 2006. Earlier preparations towards this programme included two funding activities: "Export and internationalisation of services" and "Integration of production and services". These activities involved some 150 projects, with total funding volume of EUR 40 million. The project management was charge to the agency called, 'Development of Work and Services'. These projects also signified the first instance where two project management agencies: 'Development of Work and Services' and agency called 'Production and Manufacturing Technologies' worked together. Their overall objective was to support the service sector development. This took place under the following more specific themes that aimed to:

- Encourage a more positive attitude towards research and development
- Provide incentives to private initiatives
- Draw attention to the consequences for training and recognised qualifications and support
- Facilitate appropriate implementation strategies, and

- Promote networking with other economic sectors of the economy

Exhibit 9   Targeting and funding volumes of the German 'Innovative Services' programme

Innovative Services Programme		
	Duration	Funding volume
Benchmarking in order to strengthen innovation, growth and employment in the services sector	1998-2004	€ 8.54 million
Work organisation, management and tertiarisation	1998-2004	€ 24.75 million
Service engineering and service design	1999-2005	€ 16.11 million
Standardisation and quality in the services sector	1998-2004	€ 4.40 million
Stimulation of development of innovative services in the crafts/trades sector	1999-2000	€ 2.81 million
Service co-operation in the crafts/trades sector	2001-2003	€ 3.00 million
Knowledge-intensive services	2000-2006	€ 34.60 million

In March 2006, the new service research programme "Innovation with services" was launched by the Federal Ministry of Education and Research. It has a budget of EUR 70 million and a planned duration of 5 years. The programme was developed in order to continue the research funding and to correspond to the challenges of internationalisation, globalisation and competition by steadily reduced innovation cycles. The main topics of the programme are:

- Innovation management for services (development of methods and tools, technology design for successful service innovations)
- Innovation in growth sectors of the German economy (business services, services for elderly people)
- Human resource management in service businesses (work design, "Dienstleistungsfacharbeit", i.e. skilled service work)

The programme attaches special attention to knowledge transfer activities. One important goal of the programme is to implement the research finding into practice. The programme is designed to be a 'learning programme', meaning that that there will be new calls for proposals on the areas that emerge as important ones. The key objectives of the programme are:

- To focus Service Research towards future trends and developments
- To orient Service Research towards Internationalisation and globalisation

- Customer Relationship Management
- Growing importance of Human Resources and Knowledge

6.3.2.3   Sweden

Sweden has launched specific programmes targeting services R&D since it was perceived that innovation system did not address R&D in services sufficiently. Both service design and delivery can benefit from increased level of R&D. As a result services could deliver greater value for the customers and this would facilitate the growth of the sector. The key objective of the programmes is to develop new methods, standards, demonstration projects and new ways of communication between service supplier and customers.

VINNOVA has launched a programme called 'Information and communication platform', to facilitate generic infrastructure innovations that can facilitate knowledge management in services, open value chains in services, e-trust, security and interfaces for e-design. VINNOVA has also started series of general calls targeting small businesses that carry on research on innovations. This activity is called 'Research and growth programme', and it is attracting increasing number of applications from service businesses. Another Swedish agency NUTEK has also launched a support programme targeting e-business development by small firms. Other, more specified, areas of service R&D actions by VINNOVA include:

- Efficient product development
- Industrial services in relation to manufacturing and product development
- IT for product development and manufacturing
- Functional sales
- Wood manufacturing for industrialised construction and interior design:
  - IT support services
  - services supporting new value chains
  - supporting knowledge based platform; Lean Wood Manufacturing Discipline
- City logistics:
  - Future sustainable retailing
  - Third part logistics
  - New logistic chains
- E-services in public administration:
  - Coordinated services
  - Common R and D
  - More research based products and services for national and global market
  - Common ontology and information architecture for e-services
  - Test actions in reality
- Use of ICT in Home care:
  - Focus on the patient is central when designing and developing products and services
  - The e-health system at home supports the IT-services surrounding the patient and is an integrated part with other information systems

- All relevant data is available regardless geography or organisation – if the patient consents
- The producers of services and devices are competent in creating solutions to secure medical diagnosis, effective therapy and relevant care
- Transport
  - Future Passenger Service
  - Market oriented public transport service research excellence centre
- Elderly care
  - WINNCARE – creating a sustainable new care system
  - Innovations for service society

6.4 R&D in services – future issues

Survey respondents expressed some views on the future developments regarding support policies targeting R&D in services.

Belgium, Lithuania, Turkey and the United Kingdom represent countries that have not introduces specific policy measures targeting R&D in services. From these countries:

- *Belgium* is increasingly paying attention to the importance of R&D in services and at present the main focus is on gaining better understanding of the specific features of R&D in services, and related indicators development. The new European framework for state-aid is also monitored closely. The impression is that the directive on state aids may be a positive signal for the public support targeting R&D in services.
- *Lithuania* is developing integrated national programme to improve effectiveness of the R&D and competitiveness of the national economy. The key objective of this programme is to create a chain where research and development activities will create products and service for markets.
- In *Turkey* service related R&D is funded under the technology support programmes. In the near future two new programmes will be launched. Both of these new programmes, SME funding program, as well as Technology and Innovation Based Entrepreneurship programme can support R&D in services.
- In the *United Kingdom* existing R&D support programmes are sector neutral and can offer support for R&D in services. Science and Innovation Investment Framework (2004-2014) will be reviewed for possible changes.

Finland, Germany, Greece and Sweden have introduced a range of service R&D specific support measures. Germany in particular has had a significant services R&D programme since 1998, and a new 70 mill. Euros programme was launched in 2006.

- In *Finland* the service sector is one of the core focus areas of the innovation strategy in coming years, and we aim to pay heightened attention to its development needs. Details on particular recommendations, actions and instruments are pending the completion of high-level innovation strategy to be prepared by the Finnish government. In Finland services R&D related activities started to gain momentum since 2003 when it got engaged into the OECD project, 'Innovation and Knowledge Intensive Service Activities'. Finland shared the lead

of this project with Australia, and it launched four national research projects under the umbrella of this 11country initiative. OECD KISA project effectively prepared ground for the national activities targeting R&D and innovation in services. Current projects offer funding for research institutes and businesses. The on-going programmes run for several years and target R&D in services in the following areas: business to business services, health care, tourism and leisure, and value added mobile services. New EU state aid framework will be carefully monitored for the possible that it could bring into R&D supports.

- *Germany*'s on going service R&D programmes will be complemented by three new calls that are planned to be in the areas of: services and demographic change, productivity of services and work in the service sector. The aim of these calls is to improve the national capabilities to cope with the changing society, increase the knowledge on services productivity and to address the esteem of the services industry. R&D in Services is also addressed as one field of innovation within the High-Tech Strategy for Germany. This is the first national level strategy for coordinated innovation policy developed jointly by all federal ministries. It seeks to create a climate that helps to translate research results into products, processes and services more rapidly The midterm target is to integrate R&D in the technological fields with R&D in services in order to tap the full potential of both sectors.

- In *Greece* the new programme period 2007-2013, is likely to further emphasis R&D in services. It is clearly identified within the programmes of the National Strategic Reference Framework (NSFR), as well as in the strategic plan for the development of RTD and Innovation activities. Also other policy measures to support service sector are underway. These will indirectly influence R&D in services. The new community rules for R&D are more conducive for services R&D. The Greek investment law provides a lot of investment possibilities for knowledge intensive services.

- In Sweden VINNOVA is currently developing a new service innovation initiative. It will have stronger focus on services than the earlier programmes and more resources are allocated to the programme. The approach is somewhat similar to the Serve programme run by Tekes. In addition, a new VINN Centre of Excellence on public transport services has been established. Further on, several test-beds in different locations in Sweden have been established by support from VINNOVA. These basically are technology platforms that have been established, and will now expand to services development and testing.

Those future issues that the survey respondents brought up indicate that R&D in services is an issue of interest and that the developments in the area are being monitored. Policy responses reflect the overall approach in the respondent countries. Those who favour more hands off approach are adopting this also in the case of service related R&D support. Equally, those who favour more direct interventions tend to use them also in the services R&D supports.

7   Case studies on R&D in service enterprises

This chapter synthesizes the key results from the case studies that were analysed as part of the project. These case studies are highlighting the real life business practices related to R&D in services in a range of different types of service enterprises. All these case studies are presented in a separate document. In addition to the specific nature of services related R&D attention will be given to development challenges that analysed businesses have identified.

Illustrative case studies serve an important purpose as they are grounding the literature-based concepts presented in the earlier chapters. While cases will provide valuable complementary material for the report they will also offer an effective way to communicate the key features of R&D in services to a wider audience. Finally, they will also demonstrate the heterogeneous nature of services and related R&D. For instance, in relation to sectors, size of the business and drivers of R&D and innovation in services. Each case study will provide an analytical description of service related R&D in examined case business.

Exhibit 10   The details of the case studies on R&D in services

COUNTRY	Name	Industry(ies)	No. of staff
BELGIUM	VADIS	Consulting	15
	Creax	Patent research, idea generation, innovation studies, methodological training, new technical marketing studies, and innovation software	20
	Quality Assistance	Contract Research	91
	Defimedia	e-business, e-marketing, e-learning consultancy	20
	Telemis	Software program for medical image management, and maintenance support	30
DENMARK	BDO ScanRevision	Accountancy and consulting	750
FINLAND	YIT Group	Building systems, construction, services for industry, networks and IT	22000
GERMANY	Claas	Agricultural engines and harvesters	8200
	Deutsche Industrie Wartung	Industrial maintenance and cleaning	12600
	Drees & Sommer	Project management and real estate consulting	850
GREECE	Singular Logic	Software and related services	650
LITHUANIA	Maxima LT	Retail trade	23000
NORWAY	Geelmyuden.Kiese	Strategic Communications Consulting	70
SWEDEN	Ekelöw	InfoSecurity	36
	TFS	Clinical Research	300
TURKEY	IES Education and Information Tech. Inc.	Education solution provision	114
	TURKTRUST Information Security Services Inc.	Electronic certificate service providing and information technologies security	30

In total nine countries conducted 15 case studies that analysed a broad range of businesses as presented in the Exhibit 10. The sample covers a wide range of different types and sizes of services from construction, to software and consulting, covering technology based (e.g. software) services as well as traditional services (e.g., retail trade).

7.1   Synthesis of case study findings and R&D in services

Public funding and R&D in services. In the examined service businesses public support for R&D tended to be concentrated towards the businesses that were carrying out technology related projects such as software development, or services development in connection with manufactured products. At the same time public supports for traditional services was limited among the case businesses. Here, the legacy of technology policy is recognisable, and also service businesses ability to utilise public R&D funding seems to be somewhat limited.

R&D staff in analysed service businesses. The number and status of dedicated R&D staff was also clearly related to the type of services that case firms were offering. In the technology related service businesses the number of full-time R&D staff was clearly higher than in service firms in general. Typical service firms had very small numbers of full-time R&D staff, and much of the work was carried out on part-time basis in connection with customer projects.

R&D resources and their use. The allocation and use of R&D resources portrays a wide variety of different practices. Organisational and personnel development seems to play a strong role as an R&D activity. In several cases, R&D in services was related to new skills and competences development within the business, rather than new service products development. Again, technology related and software services seemed to have most formalised type of R&D processes, with budgets and dedicated staff in place. Traditional and knowledge based services only seldom have R&D budget, or an R&D department. Instead, internal development projects are the key form of R&D and these are not typically recorded as R&D costs. According to interviewees, up to now there has not been internal, nor external incentives for keeping such records. Case businesses illustrated a wide variety of different practices in terms how they used the external R&D resources. While some digital content- and education businesses were extensively using external R&D services, many other businesses relied solely on their own resources, e.g., those businesses that were offering security services.

R&D process and organisation. Typically R&D in services were organised as projects that had budgets and objectives. So there were allocated resources for R&D in services, even if the R&D budged as such did not exist. However, the project budgets could be significant ranging from few thousands to several million Euros. It was mainly in manufacturing and software businesses where traditional R&D departments were carrying out the work. In most service businesses R&D in services was informally organised. The nature of R&D projects portrays wide variety of different configurations. While there were some projects aiming at a new service outcome, there were an equal number of projects that were targeting internal organisation, processes and competences development. Typical projects were team based and there was a clear emphasis on customer needs analysis, market and mega-trend analysis serving as important sources of new ideas for services. Some firms were utilising matrix type organisation where the R&D teams were involving marketing and sales people. Often the R&D staff was engaged in the development of incremental service improvements, and majority of the R&D outcomes seems to be

gradual changes to the existing services. However, sometimes the R&D in services may result into a change of the entire service offer, and in such situation services can act as a catalyst of change transforming the entire organisation. While ICT and other technologies play a key role as enablers of new services, availability of skilled staff is equally important for new services development.

Some R&D bottle-necks were identified. Cyclical nature of the business and lack of skilled personnel were brought up as issues that can have a negative influence on the R&D in services. In addition, inefficient markets can create a barrier for the take up of new ideas. For instance, service markets are often fragmented and very small firms may have limited capability for new services development. Instead, such businesses may focus on price competition that leaves little, if any room for longer-term service development. Also customers may be keen to go for lowest price rather than improved services. Internal organisation R&D in services can also create bottlenecks for new services development. It was indicated that too discipline-oriented organisation of R&D activities does not create a fertile ground for services development. In many industries life-cycle effectiveness is seen as a starting point for services development, and this approach requires a more horizontal type of R&D organisation. Service culture, or rather lack of it, was also brought up as an issue that can influence R&D in services. Highly developed service culture can be very beneficial for the service suppliers as it tends to facilitate the development of well functioning markets. Advanced service culture that emphasizes quick response to the customer needs can also speed up time to market cycle in the services R&D process. In many services businesses R&D staff is working on part-time basis. This seems to have both positive and negative influences. Especially in the SMEs, there is a trade-off in doing R&D and earning money by providing existing services. At the same time, part-time R&D staff is often working closely with customers that improves their understanding of the market needs. Finally, sudden changes in client requirements, problems in obtaining R&D grants, changes in standards and legislation were brought up as situations that can cause bottlenecks for the R&D in services.

Intellectual property management and protection was an area where technology related and software services were somewhat different from much of the other types of services. They used patenting, standardisation, software licensing as protection methods. In other types of services IP protection was often less formally organised and competitors were typically able to copy the service outcome in a couple of months. Such copying was hard to prevent, but in many instances competitors could only copy some aspects of the new service, not the entire process. Here lead-time advantage and time-to-markets were seen as an essential element of the IP protection and management.

Public policy support for R&D in services – some business perspectives. It is a common argument that the integration of service businesses to the public research and development institutions could be improved. Case studies brought up a number of barriers that are currently hindering closer co-operation between service businesses and public sector R&D institutions. Several service enterprises expressed their view that public research programmes could support R&D in services much more than they currently do.

- It was indicated that co-operation with research institutions is more appropriate in the fundamental level R&D projects, the further away the development is from

business projects the better. For instance, one such situation is the development of theoretical frameworks that the business can utilise in its business strategy development.

- As the R&D project is closer to everyday business, co-operation with individual academics were seen as more appropriate way to link with the public R&D system. To facilitate this, there could be more incentives for individual researchers to co-operate with businesses.
- Typically planning horizon in public research is much longer than the development cycle in the businesses. For businesses it is difficult to commit to one research topic for many years, as the public R&D often does.
- Too strict fixing of research questions was also as seen as a potential problem, since in businesses the research problems often evolve during the process, and also totally new problems may arise during the progress of the R&D project.

In addition to direct support for business R&D, public sector should pay attention to creating an eco-system and markets where services markets thrive. Brokers, suppliers, observatories, aggregators, policy makers, and commerce laws were brought up as important elements of such eco-system. Also tax incentives were seen as a useful way to develop favourable environment for R&D in services. For instance, it was suggested that tax incentives could be targeted to businesses that locate in research parks and carry out R&D projects. Legislation could also be used as a way to create demand digital services, like for instance, the use of a digital signature. Existing procurement legislation was seen as a potential problem as it seems to favour too much the lowest bidder, rather than innovative solutions. In the case of public funding for business R&D the following points were brought up.

- Public funding could benefit R&D in services better, if it could be more widely used for employee training.
- Several businesses indicated have had limited resources to cope with the administrative procedures of public funding. Administrative burden of public research processes may also overstrain the capacities of small firms that also had limited competence in applying public supports.

Future issues influencing R&D in services. Some of the emerging future issues included service related standards, evaluation methods and the need for high quality market research. It was indicated that there is a need for national and international level standards that are likely to develop for services such as helpdesks, software as service and maintenance services. Such standards can advance the competitive markets and thus act as drivers of innovation. There appear to an increasing need for market research groups that are able to track opportunities for new services and estimate when the demand for new services will emerge. Evaluation methods on services were seen as essential as well as the wider awareness on such methods.

8 Promoting R&D in services – some key policy implications

Policy makers have increasingly recognised the socio-economic importance of services. As a result, there is a growing interest to develop measures that address services within the EU but also in most other developed countries such as the USA, Japan, and Taiwan. A number of major EU level initiatives have already been launched in this area. These include such topics as innovation in services, service markets, and the support for service business development. In addition, at the Member State level there are several programmes aimed in the above areas, as well as the renewal of public sector services.

So far, there are only few policy measures specifically targeting R&D in services. Still, it is clear that this policy domain has wide spread needs for further research and development. These needs range from basic research to design and delivery of the policy. Policy development in the area of R&D in services is still at a very early stage of the development and there are many developments needs starting from the definition of key concepts such as R&D in the service context. Hence, there is a strong indication that the R&D in services is an area that deserves specific attention at the Member State and the Community levels. The following policy implications will address the issues that appear to be most relevant from the R&D in services perspective.

Major Policy Objectives and Strategies towards more effective R&D in services

Most member states have recognised the socio-economic importance of services and a need for more effective R&D in services.

a. Take action to increase knowledge base to enable service innovation by R&D in services

CREST WG highlights that there is a need for policy actions that enable better understanding of the nature of innovation in services by R&D. More accurate statistics and improved conceptual clarity are important enablers of further development in the area:

- *There is a request for research in services within the FP7 Social Sciences and Humanities. This request to expand research on services should evolve into a full programme under the FP8.*
- *Joint research initiatives by the Member States and Associated Countries are needed for R&D in services.*

The work carried out by the Crest Working Group indicates that R&D in services often remains an informal and embedded activity that escapes statistics, as well as systematic management attention. Both of these issues can benefit from the increased attention to multidisciplinary service science. Here, FP 7 as a European activity can

take a leading role in galvanizing action, and in pushing forward the frontiers of knowledge on innovation in the service sector and in the services science area.

The current statistical system does not provide very accurate picture on the R&D in services because informal activities are often not recognised, nor recorded as R&D in services. In addition, much of technology and product related R&D in services is recorded as manufacturing R&D. From policy perspective all this means that it is difficult to identify, understand and target R&D in services. Still, R&D in services is increasingly important element of competitiveness. Globalisation, and opening up of national markets (as a result of services directive) have created a situation where even traditional, and locally traded services are under increasing pressure to carry out systematic and effective R&D. More accurate statistics and conceptual knowledge on innovation established by research in services provide valuable information for the effective implementation of broad based innovation strategy. Better statistics can enable targeted policy actions on those services industries where R&D is under performing.

In order to allow innovation research has to be expanded. R&D in services is a multidimensional, multilayer phenomenon that needs further exploration. The notions of 'service sciences' and 'service engineering' may provide ways to develop deeper understanding of innovation and of R&D in services[29]. An effective dissemination of this knowledge to a wider audience including policy makers, academic community and business practitioners would be desirable:

- *There is a request to launch FP7 projects that can further explore the R&D in services area, which still has a lot of scope for exploratory research.*
- *An expert group that can further explore the potential to move forward in the areas of Service Science, Service Engineering and other relevant approaches in the European universities and research institutes should be set up.*

R&D policies should be based on thorough understanding of the service concept and its linkages to the wider national and international economic contexts. Service sector as such consists of highly heterogeneous group of industries.

Within the services domain universities, research institutions and businesses are carrying many different types of R&D that can be related to variety of disciplines such as social sciences, economics, mathematics, consumer research, marketing research, various technological fields, just to name some prominent areas. Finally, the R&D can happen in various stages of the service process, on strategic level, within the operational level projects, and in close connection with clients as part of the service delivery. All this creates a complex, multidimensional multilayer fabric that characterises R&D in services. Potentially, policy design and delivery will greatly benefit from the better understanding of the specificities of R&D within services.

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[29] The key to service science and service engineering is their interdisciplinary nature , focusing not merely on one aspect of service but rather on service as a system of interacting parts that include people, technology, and business. As such, service science draws on ideas from a number of existing disciplines – including computer science, cognitive science, economics, organizational behavior, human resources management, marketing, operations research, and others – and aims to integrate them into a coherent whole. http://en.wikipedia.org/wiki/Service_Science,_Management_and_Engineering

b. Initiate the development of knowledge base and structures benefiting R&D in service

The CREST WG gives emphasis to the fact that research based knowledge on innovation in services could be increased through a number of policy measures such as:

- *Establishing university chairs in the domain area R&D in services*
- *Providing support for multi-disciplinary curricula development, for example in the areas of service science, service engineering, services management studies leading into MSc and BSc degrees*
- *Establishing a European R&D in services doctoral programme operated by university consortia[30].*

The heterogeneous nature of the service sector implies that there hardly is any single, or uniform policy that could facilitate R&D in services across the variety of sectors. More extensive analysis of the R&D in services domain can point out the most prominent areas for policy intervention. Deeper knowledge of these areas is needed and could be included in FP 7 agenda, it could thus establish a distinct sub-programme. Possible areas for exploring the nature of R&D in services include:

- Building an understanding that links the wider socio-economic trends, such as demographic trends, and R&D in services
- R&D in different service industries covering both traditional services and new technology based services
- R&D in services in manufacturing industry context
- Outsourcing related R&D in services
- Management of R&D in services
- Human resources and skills related to R&D in services
- R&D related to service activities that cut across the industries (e.g., Knowledge Intensive Business Services, KIBS, and Knowledge Intensive Service actions, KISA)
- Further development of R&D in services related indicators and statistics
- Research that can facilitate the availability of qualified service workforce for all types of services
- The role of intellectual property management and protection in R&D in services context
- Research on the services-technology interface, in particular, services as driver of new technologies and innovation
- Standardization that can facilitate the development of large competitive service markets

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[30] The individual universities can take turns in organising the doctoral courses, for instance on a yearly basis. This will create an international faculty and an international cohort of students giving a strong boost for researcher mobility and knowledge dissemination.

c. Foster co-operation and knowledge exchange across policy areas that bear influence on R&D in services

There is a great variety of R&D activities in services indicating that many policies will bear influence on it. Services related R&D and innovation frequently relies on collaborations between disciplines, across the sectors and beyond regions – and it is often affected more by mainstream policies than by those aimed directly at innovation. Effective policy measures will require a sector-wide view, led by industry and service-based organizations, supported by government and bringing in users and suppliers where appropriate. Sometimes it can involve the extension of existing policies beyond their traditional focus on science and technology. Often it will also mean that public policy will take measures to ensure the right conditions for R&D and innovation. This can happen through intelligent regulation, taxation, procurement, and education policy.[31] Possible policy measures in the area of horizontal policy impacts on R&D in services include the following:

- *Further analysis of the meaning of horizontal policy for the R&D in services, what are the key policy actors and policy delivery methods in this area? The focus needs to be in the key policy areas that are most relevant for the R&D in services, such as research, education and training policies*
- *Joint research initiatives by the Member States and Associated Countries in the R&D in services*
- *Services Directive and its (expected) impacts on R&D in services. For instance, the influence of opening markets and increased competition*
- *To initiate an exchange of R&D and innovation in services bringing together different stakeholders including in particular those who have insufficient lobby within R&D/innovation policy like SMs.*

d. Initiate developments in the institutions and conventions so that they will more effectively support the development of R&D in services

It is important to take measures that build up the status and reputation of R&D in services. The official R&D definition is an important indicator that many policy measures and statistics rely on. At present, the classical definition for R&D excludes many elements that are fundamental for R&D in services. There are also policy measures that seek to support service development but the development activities are limited by the official R&D definition, e.g. by narrowing the support in the area of technological development. As a result, public support for R&D in services has a bias towards technology development. This is not optimal way to facilitate R&D in services which typically relies on the new applications of existing, often already commercialised, technologies rather than new technology development. This also involves a conflict with the broad based innovation strategy and new state-aid rules that both recognise the specific features of services. Also the official innovation definition presented in the Oslo manual, has already been updated to cover service innovation.

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[31] Nesta 2007, Hidden Innovation – How innovation happens in six 'low innovation' sectors, National Endowment for Science, Technology and the Arts, Research report, June 2007, London, UK.

Hence, it would be logical to grant official status also for the R&D in services by including its key elements into the updated Frascati manual definition. The Oslo manual could provide a solid starting point for this development work, bearing in mind that R&D is only one contributor to the innovation. The development and adoption of an up-dated R&D definition - inclusive of the key elements of R&D in services - can be seen as an important step forward in the development towards more favourable framework conditions for the R&D in services:

- *Development of an R&D definition that is more inclusive and has greater accuracy in recording all key aspects of the R&D in services.*
- *The NESTI group (National Experts on Science and Technology Indicators) that operates under the OECD, is encouraged to further develop the Frascati Manual, so that it will provide the tools and indicators by which the R&D in services can be better captured in statistics.*

The removal of such institutional barriers can give more prominent position for R&D in services, and it will also be a major step in the development of more accurate R&D statistics.

e. Make use of the Open Method of Coordination in sharing knowledge on the good practices in supporting R&D in services

The CREST Working Group on R&D in services has conducted an initial mapping of national policies that target services and seeks to facilitate services R&D. Further actions are needed in order to deepen the knowledge on R&D in services, and to keep up with the rapidly evolving policy measures, good practices and bottlenecks. Services represent a dynamic area that attracts increasing interest among policy makers, academics and business practitioners. Measures ought to be taken towards the mapping and sharing of good practice policy elements related to R&D in services. Information of policy measures, their impacts and practical R&D case studies ought to be collected, organised and disseminated on the need basis.

CREST and the Open Method of Coordination provide a well-functioning learning platform for the follow-up work on R&D in services. It is important to deepen and disseminate the latest knowledge related to the R&D in services. Possible policy measures include:

- *Monitoring and sharing the impacts of the policy measures related to R&D in services*
- *Mapping, analysis and dissemination of information on evolving R&D practices in services, business case studies and cluster analysis can be named as examples.*

In Conclusion:

- There is a need for policy actions that enable better understanding of the nature of service innovation and of benefits for R&D in services. More accurate statistics and improved conceptual clarity are important enablers of further development in the area.

- R&D in services is a multidimensional, multilayer phenomenon that needs further exploration. The notions of 'service sciences' and 'service engineering' may provide ways to develop deeper understanding of R&D in services[32]. An effective dissemination of this knowledge to a wider audience including policy makers, academic community and business practitioners would be desirable.

- The multidimensional character and variety of R&D in services implies that many policies will bear influence in it. This calls for horizontal policy approach to influence R&D in services more than specific R&D measures.

- It is important to initiate policy actions that can remove the institutional barriers that inhibit the development of R&D in services. The development and adoption of an up-dated R&D definition - inclusive of the key elements of R&D in services - can be seen as an important step forward in the development towards more favourable framework conditions for the R&D in services.

- Measures ought to be taken towards the mapping and sharing of good practice of policies related to R&D in services and service innovation. Information on policies and implementation instruments, their impacts and practical R&D case studies ought to be collected and disseminated.

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[32] The key to service science and service engineering is their interdisciplinary nature, focusing not merely on one aspect of service but rather on service as a system of interacting parts that include people, technology, and business. As such, service science draws on ideas from a number of existing disciplines – including computer science, cognitive science, economics, organizational behaviour, human resources management, marketing, operations research, and others – and aims to integrate them into a coherent whole. http://en.wikipedia.org/wiki/Service_Science,_Management_and_Engineering