Impact of the structural changes on jobs and industrial relations in the telecommunications and ICT

Final Report

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Directorate-General for Employment, Social Affairs and Inclusion
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List of Abbreviations

ICT	Information and communications technology
PSTN	Public switched telephone network
NACE	Statistical Classification of Economic Activities in the European Community
OECD	The Organisation for Economic Co-operation and Development
SBS	Eurostat Structural Business Statistics
LFS	Labour Force Survey
ITU	International Telecommunications Union
ISIC	International Standard Industrial Classification of All Economic Activities
DERP	Digital Economy Research Project
IR	Industrial Relations
ILO	International Labour Organization
EUROFOUND	The European Foundation for the Improvement of Living and Working Conditions
EUROSTAT	The statistical office of the European Union
HICP	Harmonised Index of Consumer Prices
SME	Small and medium-sized enterprises
VoIP	Voice over Internet Protocol
ILOSTAT	ILO's central statistics database
ESENER	Enterprise survey on new and emerging risks
OSH	Occupational safety and health
ETNO	European Telecommunications Network Operators' Association
TFEU	Treaty on the Functioning of the European Union
PIN-SME	The Pan European ICT & eBusiness Network for SMEs
TCA	Transnational Company Agreements
IFA	International Framework Agreements
EWC	European Work Council
OTT	Over-the-Top
MNEs	Multinational Enterprises

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Executive summary

Introduction and methodology

Over the last few decades, information and communication technology (ICT) has become a driving force for economic development and innovation, and a strong driver for change in work life, society and the overall economy. Paired with accelerated globalisation and market liberalisation, ICT has brought about profound and rapid changes to the telecommunications sector. This transformation questions whether we still can speak of the telecommunications sector in separation from the ICT sector and addresses the impacts these changes have had on jobs and industrial relations in the sectors.

This study examines the economic trends that have led to changes in employment and industrial relations in the telecommunications and ICT sectors at national and European level. It is intended to provide an analytical underpinning to establish new demarcation lines of the industry from the view point of the European social dialogue. As such, it is intended as an entry point for the representativeness study in the sector.

The specific objectives of the study were:

- To map the economic activities encompassed by the sectors as a whole as well as relevant subsectors

- To analyse total employment in the sectors and the main factors of growth/decrease, such as technological change; the nature and main characteristics of jobs the sectors encompass today

- To explore the state of play and main trends in the structure of sectoral industrial relations

The specific aim of the study was to establish the boundaries of the telecommunications and ICT sectors, the economic activities encompassed, convergence trends, and overlaps with other sectors. The study presents the predominant patterns of employment and working conditions in the telecommunications and ICT sectors and discusses them using a fairly broad definition of the sectors so that the diverse developments within sub-sectors are captured. In this way, the consequences of the structural changes on employment and working conditions in the sectors were assessed. Lastly, the impacts of the sectors' increasing complexity in the industrial relations systems, proliferation of the new work organisation forms on collective bargaining, as well as overall perception of belonging to the same sector, were examined with a particular focus on its effect on social dialogue.

In order provide to a solid analytical outcome, the key elements of the methodology employed were:

- Desk study consisting of review of literature and statistical data

- Field study consisting of case studies and interviews. The case studies were carried out for Denmark, France, Estonia, Romania, Germany, Ireland, Czech Republic, Portugal, Telefónica, Vodafone Group plc, IBM Global Services, Acxiom Corporation and Teleperformance

The changing boundaries of the telecommunications and ICT sectors

Even if distinct economic activities within the telecommunications and ICT sectors still exist, the technological developments over the last decade have brought about critical convergence between them. The study clearly indicates that telecommunications

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overlaps with or even integrates ICT services in terms of economic/employment convergence. This finding was confirmed by a vast majority of stakeholders interviewed.

In the traditional telecommunications sector, we observe the decline of traditional telecommunications services resulting from digitalization and the substitution of analogue technologies. This means that traditional activities and occupations such as radio and telecom technicians are not needed to the same extent as before due to the progress of Voice over IP telephony, over-the-top (OTT) and other new services that are using the existing telecommunications infrastructure. To some extent, we can speak of "cannibalisation" of the traditional telecommunications activities by the products relying on the internet-based technology.

In some aspects, the ICT sector can be considered as a moving target in terms of employment and boundaries. For instance, the workforce in the core ICT sector is outnumbered significantly by ICT workers in user sectors such as media, financial services, manufacturing, retail, logistics, health services, etc. Reflecting the broad technological trend of digitalisation, ICT today is a key feature in everyday life and business. ICT specific occupations, posts and functions are rapidly shaping core workforces, even in traditional sectors such as textiles or agriculture (not to mention retail with online web-portals or the automotive industry). Therefore, the overall digitalisation of the economy results in a shift of boundaries and makes the definition of the ICT sector relatively complex.

The study explored three different definitions of the sectors:

- A narrow definition, encompassing NACE codes 61 (Telecommunications), 62 (Computer programming, consultancy and related activities), 63 (Information service activities) and 82.20 (Activities of call centres);

- A medium range definition in line with the OECD definition;

- A broad definition as provided by the International Telecommunications Union (ITU) in 2012.

The findings of this study indicate that a medium range definition in line with the OECD definition[1] (with sub-sectors of: telecommunications, ICT manufacturing, ICT services and call centres) is preferred and best captures current and future economic trends in the telecommunications and ICT sectors. The stakeholders interviewed indicate that the narrow definition is outdated and does not comprise the activities that are present in the sector today. Therefore, a definition is required that is able to balance sufficient flexibility to cover the emerging activities. As a consequence of the development of the sectors, the definition can also be a useful tool in determining the best possible dialogues between the stakeholders relevant for both sectors. It should also be noted that the sub-sector of call centres requires further analysis in this respect, as it uses telecommunication and ICT tools rather than developing it.

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[1] http://www.oecd.org/sti/ieconomy/2771153.pdf

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Major trends with a view to the evolution of employment and working conditions

The process of digitalisation paired with accelerated global competition contributed to an overall increase in employment in the telecommunications and ICT sectors, but it has also resulted in significant shifts of economic/employment weights of specific sub-sectors, company types and forms of employment and working conditions.

Furthermore, the pressure in particular on the more established larger companies to restructure and reorganise is strong and is likely to also increase in the future. This pattern is particularly evident in the telecommunications sector, where traditional activities and jobs are disappearing due to the digitalisation. But companies also face the challenge of developing new services, value-added and markets, in order to sustain competitiveness. As recent large-scale restructuring programmes and takeovers illustrate, the reorganisation and consolidation of the sector may even accelerate in the future. The overall analysis indicates and interviewed stakeholders confirm that there has been a general degradation of working conditions in the sectors. For example, this can be seen by the fact that working time is increasing while job security is decreasing.

On employment creation and losses in terms of specific sub-sectors, our analysis has confirmed the long-term trends of declining employment in the ICT, in particular the manufacturing of computers, communication and consumer electronic equipment. This is all but a new result; due to the technological catch-up and dominance of multinational companies headquartered in the U.S., South Korea or China, European (as well as Japanese) producers of ICT devices and components have lost technological as well as market leadership. The telecommunication equipment manufacturing (ex. Nokia, Eriksson, Alcatel) has almost disappeared from Europe. We observe a similar trend in production of electronic consumer products and equipment, semiconductors, chip makers and other components. Looking at the globalised competition between ICT manufacturers, we find that the pressure on costs and productivity increases with new global actors and players. This results in persistent trends of job reduction, offshoring and outsourcing.

Similarly – reflecting the market liberalisation and fast-progressing liberalisation – the large telecommunications companies and in particular the formerly state-owned ones are facing an increasing pressure on jobs, costs and product/service portfolios. As a result, there is a constant pressure to restructure and reorganise, disinvest in traditional business areas and invest in new markets (e.g. business services, over-the-top OTT contents). This provides background for the large-scale job restructuring programmes run by European telecommunications companies over the last decade, while at the same time expanding their business with significant job creation. The analysis indicates that this affects the working conditions and is a particular strain on the psycho-social working environment. Evolvement of the sector over the years has resulted in more fierce competition in the market, which may cause companies to resort to employ workers on less attractive contracts, such as contracts on project basis, in order to secure flexibility to react to market development.

The analysis also shows that the employment in the sectors is shifting significantly. The telecommunications reduced by some 300,000 employees from 2008 to 2013, while other parts of the industry such as computer programming, consultancy and related activities experienced an increase of close to 400,000 employees. The activities of the latter employed some 2.86 million people in Europe in 2013; double the size of the telecommunications sector. Generally, we observe a shift from the traditional telecommunications sector jobs to jobs in areas such as data management, new language experts and community managers.

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The call centres sector has also experienced a dramatic growth, and the sector has more than doubled with an increase of close to 230,000 employees to reach 417,000 workers in Europe over the same period of time. All in all, these are quite dramatic changes over a relatively short timeframe and their impact on the employment landscape is crucial. The call centres are characterised by a work force that consists of employees with a relatively low level of education and with a high degree of control mechanisms governing the work life. Several studies show a trend towards a stressful working environment, and call centres do not follow the same trend as in other sectors where the demand for high level education labour force is increasing.

While employment in the larger and often more integrated companies of ICT manufacturing and telecommunications is decreasing, the pressure on the comparatively high wages and good working conditions (in terms of health and safety, qualification programmes, collective interest representation) is increasing due to stronger global competition and the emergence of a global network economy. The most dynamic sources of job creation have recently occurred in highly skilled sub-sectors such as software programming and publishing. Job creation has also been seen in specialized ICT services such as business consultancy and software solutions in fields such as networks, data handling or security. Concerning corporate structures, cultures and size, employment forms and working conditions, these companies are completely different from the more traditional, established companies in the telecommunications and ICT sectors and have a strong feeling of 'being different' (similar to the narrative of the 'New Economy' at the beginning of the last decade) in terms of corporate culture, working conditions and job security. The new jobs created in the so-called internet or digital economy are overwhelmingly located outside the established companies in rapidly growing start-ups (many of them 'born global' like in the apps or gaming industry) and smaller, very specialized companies. Despite the fact that reliable data are still missing and sometimes contradictory (ex. the German gaming industry where most of the jobs created being in direct, full-time and open-ended employment), there is also strong evidence that many of the new jobs in the ICT booming sectors have taken the form of self-employment and freelancing.

However, for highly-paid digital nomads, the lack of job security is only a marginal problem. Studies on job creation in the ICT sectors often blank out issues of precariousness, health and safety constraints and low pay. Here, new forms of employment such as 'clickworking' (both inbound as well as by external providers) that are based on a *tailorization*[2] of ICT works by own and external formally self-employed workers, but also well-studied employment in call centres experienced strong growth during recent years. However, these forms of employment in terms of working conditions, payment and job and social security have been described as very critical.

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[2] A Production efficiency methodology that breaks every action, job, or task into small and simple segments which can be easily analysed and taught, introduced in the early 20th century. Named after the US industrial engineer Frederick Winslow Taylor (1856-1915)

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Industrial relations, collective bargaining and social dialogue in the telecommunications and ICT sectors

Increasing sector complexity, competition, productivity gains and technological convergence have challenged the traditional organisation of work and are redefining the relationships between market actors. The emergence of new SMEs, including also micro-enterprises, the increased number of freelancers and a shift in demanded skills toward higher education levels are all factors that indicate that more employers and employees are free agents whom are not represented in formalised industrial relation schemes. In addition, there are new forms of work in particular in the field of software and digital services to be covered. These developments are likely to influence the relations between employers and employees in the sectors.

The telecommunications and ICT sectors are among those economic sectors where structural change, adjustments, adaptations and reorganisation are occurring rapidly. Certain skills are becoming obsolete, making way for highly demanded new skills and job creation, and job reduction is happening at the same time through outsourcing and reallocation, insourcing, mergers, takeovers and disinvestments.

In this context, the study findings indicate that collective bargaining is increasingly taking place at company level. For instance company-wide agreements concerning working conditions pay and other aspects in order to harmonise and regulate working conditions at company level in the ICT outsourcing business are interesting.

The heterogeneity of the telecommunications and ICT sectors is reflected in a very diverse landscape of industrial relations and social dialogue structures, practices and outcomes. As the study shows, both the telecommunications and ICT manufacturing sectors are characterised by a high degree of collective bargaining as well as traditional and well-established practices of social dialogue between a strong trade union and employer organisations. However, there is a stark contrast when comparing this with ICT and software services and programming, which tend to have weak or non-existent collective bargaining rights and a lack of employee representation and consultation. In these sectors, and also in fields such as call centres, organisation rates of employees and employers are very low.

The ICT sector reflects general patterns of weak collective bargaining and organisational affiliation according to company size groups. Consequently, institutional structures of collective interest representation and bargaining might be perceived as a barrier in the context of business reorganisation and adaptation to new market conditions, where companies may simply be trying to circumvent collective agreements. This is illustrated in particular by a number of prominent large scale restructuring cases that took place with limited information and consultation of employees or by deteriorated working conditions and benefits. As the conflict over the establishment of a works council in SAP[3] illustrates, many companies in the ICT sector are characterised by a rather reluctant approach with regard to collective interest representation by trade unions.

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[3] See page 96

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In contrast to this, our study has also presented some examples of a socially responsible way of anticipating a restructuring of the company and job reductions (in particular in the telecommunications sector). These were based on a strong social dialogue and active employee involvement, which illustrate the added value of social dialogue and negotiated solutions and agreements in managing necessary structural change for the benefit of both the business and employee interests.

The telecommunications and ICT sectors are among those economic sectors where structural change and the constant need to adjust. The sectors need to adapt and reorganise in order to keep track with the development. There are only a few other sectors that are characterized by a similar set of skills becoming obsolete, simultaneous job creation and reduction where outsourcing, insourcing, mergers, takeovers and disinvestments, offshoring and other forms of restructuring are occurring often.

In this context, collective bargaining and solutions at company level that are developed not unilaterally by management, but with active involvement of employee interest representations could result in concrete added-value also for employers as a number of examples described in this study have shown. Here, in particular the negotiation of company-wide agreements concerning working conditions, pay and other aspects in order to harmonize and regulate working conditions at company level in the IT outsourcing business are interesting (see the Atos case). Moreover, the agreements between management and employee interest representations that accompanied large scale restructurings, mergers or unavoidable redundancies illustrate a value added for employers as they created stability, a joint understanding and illustrated a certain social responsibility of the respective employer.

However, in general, such examples are still rare and collective bargaining and agreements at sectoral level is relative limited in the telecommunication and ICT sectors. Our study shows that a main barrier to a more structured and institutionalized social dialogue practice, which may also result in collective agreements at sectoral level, is the lack of bargaining mandate and competencies on the employers' side. Furthermore, despite a number of joint interests (i.e. qualification and skills development, labour shortage, public appreciation and support for the ICT sector, innovation and industrial policy) exist, many employer associations are still reluctant or even opposed to the idea of entering a more binding dialogue that may result also in binding collective agreements.

With regards to the challenges the telecommunications and ICT sectors are facing today but also with a view to lifting existing barriers and unlocking growth and employment creation potentials of the sector, a sectoral social dialogue both at national as well as European level should be regarded as a key factor of success and progress. Such a dialogue would not only benefit the situation and working conditions of the individual employee, but would also give added value to businesses as a whole, particularly regarding the need to develop a more suitable system of further qualification and skills development, produce solutions that address labour shortage and last but not least, enable the sectors to engage in policy co-determination at the national and European levels. This is particularly important as the telecommunications and ICT sectors can play a significant role in the recovery from the significant fall in employment due to the economic crisis and a return to sustained economic growth.

Overall conclusions

The two key findings of the study are:

1. The desk research findings on technological convergence and the developments in economic activities in the sectors as well as the results of

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the interviews conducted indicate that **we can no longer speak of the telecommunications in separation from the ICT sector**. The two sectors are presently interlinked technologically, organisationally and in terms of the stakeholders' sense of belonging to a specific sector. Moreover, the statistical data clearly point to a trend of **decreasing employment in the telecommunications sector and increasing employment in the ICT sectors**, which however remains weakly organised in terms of industrial relations. As the processes of social dialogue may be on the decline in the telecommunications sector and non-existent in many ICT service companies, there is a strong need for concerted action to reinstate its importance and indicate that it creates value for both employers and workers. Some examples of incentives for enhancing the level of collective bargaining are labour shortages, recruitment, working conditions and management of restructuring. In this respect, raising **the levels of employers' organisation in the ICT sector** was identified as a priority area for enhancing the robustness of the social dialogue.

2. The definitions of the sectors are of utmost importance in order to ensure a fruitful dialogue between the stakeholders. This applies both in relation to the social dialogue, the interaction between national labour market organisations and stakeholder interaction on a European level. Our findings clearly show that the preferred definition is **the broad OECD definition with sub-sectors of: telecommunications, ICT manufacturing, ICT services and call centres**. However, based on clear statements from both the employers and trade unions, the activities of the call centres cannot generally be defined as belonging to the sectors. This definition captures to the most comprehensive extent the technological and market developments in the industry.

Throughout the study, **the specific characteristics of call centres** were discussed with the stakeholders and especially trade unions emphasised the importance of addressing issues of employment and working conditions in the context of the call centres. With that being said, stakeholders also clearly indicated that the characteristics of the work being carried out in call centres are not always comparable with the work carried out in other sub-sectors of the telecommunications and ICT. However, there are numerous issues and challenges in relation to employment and working conditions in the rapidly growing sub-sector, and the European social partners are the best place to address those issues.

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1   Introduction

1.1   Background and context of the study

This is the final report of the Study mapping the structural changes and their impacts on jobs and industrial relations in the telecommunications and ICT sectors (Contract No. VT/2013/110). The study was prepared under the lead of COWI on behalf of the consortium with Fondazione G. Brodolini, Institute for Employment Research of the University of Warwick, CEPS and GVG.

Over the last decades, the information and communication technology (ICT) sector has become a driving force for economic development and innovation and a strong force of change for the economy, work life and society in general. Ever shorter cycles of technological innovation in IT hardware, software and telecommunications technologies are facilitating an accelerated change within the core telecommunications (and ICT) sector(s) but also result in far-reaching effects on employment in other sectors as well.

It is undisputed that ICT has become a key factor in terms of competitiveness in all economic sectors, and today ICT is a major source of jobs and growth creation. There is also a broad consensus within the EU that recovery from the significant fall in employment and a return to sustained economic growth depend on ICTs for the capability of services and industries to regain international competiveness and create new jobs.[4]

However, the overall picture of the landscape and structural change of telecommunications and ICT is more complex. Apart from an overall positive economic dynamic and employment growth, telecommunications and ICT sectors are also characterised by large-scale as well as 'below the radar' restructuring activities often resulting in redundancies, offshoring of jobs and significant consolidation processes. These are not only triggered by technological progress but also by changes in the regulatory frameworks (in particular in the telecommunications sector) as a result of deregulation of the market and an increasingly global competitive landscape.

Technological innovations have triggered structural sectoral change and corporate restructuring in the telecommunications and ICT sub-sectors that generally have been described as *convergence* (e.g. IT and media, telecommunications, industry, other services). However, at the same time, the telecommunications and ICT sectors are still in fact increasingly characterised by a markedly *heterogeneous* structure of enterprise types (ranging from global, highly integrated multinational enterprises to small local start-ups) and employment conditions (ranging from highly qualified, well paid and haunted professionals to low paid 'clickworkers' and call-centre agents).

The diversity in terms of size and type of enterprises (formerly state-owned monopolists – small owner controlled start-ups) have resulted in a business landscape

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[4] EU Commission: Commission Staff Working Document: Exploiting the employment potential of ICTs. Accompanying the Communication "Towards a job-rich recovery", COM(2012)173 final

of different corporate cultures, ways of working, innovation and growth. This heterogeneity in the form of employment and working conditions also implies a significant pluralism and fragmentation of industrial relations within the telecommunications and ICT sectors. There are the formerly state-owned large corporate structures in the telecommunications sector that stay in the tradition of strong employee representation, high coverage by collective agreements, active employee participation and well established company level social dialogue. These are in stark contrast to the myriads of small start-ups within the ICT sector where formal forms of interest representation and collective bargaining have no traditions and are often regarded as something alien and/or related to the past by both employers and employees. Perhaps more than other economic sectors, within the telecommunications and ICT sectors including call centres there are many examples of corporate cultures, which approach issues such as, employee participation, information and consultation and/or managing restructuring and change in a socially responsible way.

Despite the general political and public view that ICTs are a key factor of economic success and competitiveness, we still know surprisingly little about the size of employment and the impact of structural and technological change on employment conditions in the telecommunications and ICT sectors within the EU. Moreover, our knowledge on structures and practices of sector-specific industrial relations and labour relations is even smaller.

In particular against the accelerated change both within specific sub-sectors as well as with a view to sectoral boundaries and trends of divergence and convergence and the impact on employment and industrial relations. The purpose of this study is to account for the strong need for a thorough exploration of trends and structures of industrial relations and social dialogue actors, processes and outcomes at national level as well as European level.

This need also arises with a view to improving social dialogue at European level. So far, there is only a Sectoral Social Dialogue Committee for "Telecommunications", established in 1999.

Though the purpose of this study was not to analyse the representativeness of the social partners in the telecommunications and ICT sectors, one research aim was to analyse whether and in which way the technological and structural change and the changing sectoral delimitations also have an impact on the sectoral social dialogue committee structures.

The study will support the European social partners in having a good foundation to ensure that the Social Dialogue Committee has the best possible composition. This is done acknowledging that the European social partners are the best placed to address those issues.

1.2   Methodology

This section presents key elements of the methodology employed in this study and highlights its limitations.

A methodology including the following elements has been used:

- Desk study consisting of review of literature and statistical data

- Field study consisting of case studies and interviews

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The full methodology is enclosed in Appendix 2.

1.2.1 Desk studies

Literature review

The contribution from literature was particularly valuable for understanding the difficulties already experienced when defining the telecommunications and ICT sectors. Relevant literature was identified through academic databases and sector experts. The list of literature consulted is included in Appendix 1.

Statistical data

The study is mainly based on data gathered at EU level. From Eurostat, we have received a special sample of the European Labour Force Survey (LFS) with information on the employed labour force (e.g. number, sex, age), which covers the relevant NACE codes. However, information from the LFS is only available on a three-digit NACE code level. This means that for some of the NACE codes used to define the telecommunications and ICT sectors data cannot be obtained. Furthermore, data from the LFS is rather fragmented when looking at the different case countries. In for example Denmark, LFS information is only available for two subsectors. Finally, we have used data from Eurostat Structural Business Statistics (SBS) on number of companies and revenue. However due to the change in the NACE code classification in 2008, data on the employed and companies is only presented for the period 2008-2013. In cases where other statistical data sources have been used it is specifically mentioned and explained in the relevant sections. Moreover the sources are listed in the literature list.

1.2.2 Field studies

Case studies

The objective of the country case studies and the multinationals cases is to provide input to answering the study questions. The case studies do not in themselves answer all study questions, but aim to illustrate the development in different clusters of countries and inform the analysis at EU28 level, including findings from a selection of multinational companies.

The strengths of the case studies are that each of the case studies has contributed to inform the study questions by reviewing national sector-specific reports and technology outlooks whilst also analysing national data sets. Additionally they have contributed by obtaining the views of stakeholders through a number of interviews.

The relevance and usefulness of case studies depend very much on the reasoning underpinning their selection. Therefore, countries were selected based on an assessment of the system of industrial relations.

Eight Member States were selected for detailed case study analyses. The selection was based on a clustering exercise described in the methodology.

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Table 1-1   Member States selected for detailed case study analysis[5]

	Dense	**Political**	**Lean**	**Fragile**	**Empty**
Selected Member States	Denmark France	Estonia	Romania	Germany Ireland	Czech Republic Portugal

Another model for IR is the Visser typology[6], which is also referred to in chapter 4 of this report.

Table 1-2   Member States selected for detailed case study analysis sorted according the Visser typology

	Nordic Model	**Social Partnership Model**	**State-centred/Southern European**	**Anglo/Saxon/Liberal**	**Mixed/Central Eastern European**
Selected Member States	Denmark	Germany	France Portugal	Ireland	Czech Republic Estonia Romania

The case studies of multinational companies aim to illustrate the perceptions of large companies on the study questions and are included in the main analysis to illustrate certain phenomena identified.

The case studies and examples drawn from these do not necessarily represent a general opinion or state of play of multinational companies.

Table 1-3   Five multinational companies selected for detailed case study analysis

	Telecommunications	**Computer programming, ICT consultancy and related activities**	**Information services and activities**	**Call centres activities**
Multinationals	Telefónica Vodafone Group plc	IBM Global Services	Acxiom Corporation	Teleperformance

The interviews serve to inform the analysis both with regard to the case studies – at country and company level – and at EU level. An interview guide was developed based on a gap analysis of information gathered in the first phase of the study. The interview guide (enclosed in Appendix 6) is structured according to the key aspects of the study.

140 stakeholders were contacted for interviews. It has been a challenge, though, to make stakeholders contribute to the study, and 31 interviews were completed. The list of interviewees is enclosed in Appendix 5.

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[5] http://ejd.sagepub.com/content/18/3/185.abstract
[6] Visser, Jelle (2009) http://www.jus.uio.no/ifp/english/research/projects/freemov/publications/papers/2009/may/WP10_visser.pdf

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1.3   Structure of the report

The report is mainly structured according to the study questions presented in the terms of reference. The report is therefore structured as follows:

Chapter 2 discusses the boundaries of telecommunications and ICT sectors by presenting different definitions of the sectors, convergence trends, and its overlap with other sectors and finally the scope of economic activities in the sectors. The analytical purpose of chapter 2 is to understand how the structural changes have affected the boundaries/definition of the sectors.

Chapter 3 presents the patterns of employment and working conditions that are predominant in the telecommunications and ICT sectors. These aspects are discussed in relation to a fairly broad definition of the sectors, which are used in order to capture the diverse developments within sub-sectors. The analytical purpose of chapter 3 is to assess consequences that the structural changes may have for employment and working conditions in the sectors.

Chapter 4 discusses the impact of the sectors' increasing complexity in their industrial relations systems. On the one hand, new forms of work organisation pressure the existing industrial relations and hinder initiatives of collective bargaining. On the other hand, solid industrial relations are still seen as essential to coordinate the relationship between employers and employees. The analytical purpose of chapter 4 is to assess how changes in boundaries/definition affect the coverage of sectors' industrial relations, and how changes in employment and working conditions affect the issues the social partners will have to address.

Chapter 5 summarises the main conclusions that arise from the different layers of analyses, with a view to answering the key research questions and making recommendations.

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2 Boundaries of the telecommunications and ICT sectors

2.1 Existing definitions

The first part of the overall study question is to define and understand the changing boundaries of the telecommunications and ICT sectors due to the structural changes. This involves the search for a definition of the sectors that is consistent with that of most stakeholders - in particular the social partners - and preferably, aligned with the structure provided by the NACE rev.2 statistical classification of economic activities[7]. (NACE codes provide a framework for collecting and presenting a large range of statistical data according to economic activity in sectors).

This study explores three different definitions:

▪ A narrow definition, encompassing NACE codes 61 (Telecommunications), 62 (Computer programming, consultancy and related activities), 63 (Information service activities) and 82.20 (Activities of call centres).

 This definition implies that neither manufacturing of, trade with ICT products and services nor publishing services are part of the sector.

▪ A medium range definition in line with the OECD definition.

 Next to those activities already included in the narrow definition, also manufacturing of, trade with ICT products and services and publishing services are part of the sector.

 "The production (goods and services) of a candidate industry must primarily be intended to fulfil or enable the function of information processing and communication by electronic means, including transmission and display."[8]

▪ A broad definition as provided by the International Telecommunications Union (ITU) in 2012.

 This definition is essentially an extension of an OECD definition of ICT products in the OECD[9]. It states that *"The ICT sector represents economic activities including industries of which production of goods, networks and services shall be primarily intended to fulfil or enable the function of information processing and communication by electronic or optical means."[10]*

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7 Eurostat 2008
8 OECD (2011). NACE codes belonging to this definition can be seen in table 2-1 with the addition of call centres. The elaboration of the OECD definition to NACE codes is explained in detail the methodology appendix and in the proposal for this study.
9 2009a.
10 ITU (2012)

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The ICT sector is thus defined by the ITU as the activities and industries producing goods, networks and services adhering to the ICT product definition.

The table below illustrates the different coverage of the three definitions.

Table 2-1   Potential NACE Rev.2 categories to be included in the definition of the telecommunications and ICT sectors

Sector	Activity	NACE Rev 2	Broad	Medium	Narrow
Manufacturing	Manufacturing of electronic components and boards	26.11, 26.12	green	yellow	
	Manufacturing of computers and peripheral equipment	26.20	green	yellow	
	Manufacturing of communication equipment	26.30	green	yellow	
	Manufacturing of consumer electronics	26.40	green	yellow	
	Manufacturing of magnetic and optical media	26.80	green	yellow	
Whole-sale	Wholesale of computers, computer peripheral equipment and software	46.51	green	yellow	
	Wholesale of electronic and telecommunications equipment and parts	46.52	green	yellow	
Services	Software publishing	58.21, 58.29	green	yellow	blue
	Telecommunications	61	green	yellow	blue
	Computer programming, consultancy and related activities	62	green	yellow	blue
	Data processing, hosting and related activities; web portals	63.1	green	yellow	blue
Call centres	Activities of call centres	82.20	green	yellow	blue
Repair	Repair of computers and communication equipment	95.1	green		

Source: Eurostat NACE Classification, United Nations Statistics Division, OECD and COWI assessment.

2.2   Economic activities

This section comprises a brief characteristic of the telecommunications and ICT sectors, including the number of companies and employment in comparison with the economy in general. The description of the economic activities supports the understanding of the boundaries of the sectors and especially the overlaps between the sub-sectors. This is considered to be a necessary primer for analysing in greater detail the developments in employment and working conditions and in industrial relations in the following two chapters. The description focuses on the following elements:

▪   Number of companies

▪   Annual turnover

▪   Number of employees.

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The major challenge for providing a statistical description of the telecommunications and ICT sectors in a historical perspective is that many of the ICT sectors as defined in Table 2-1 perform activities which did not exist or were performed on a very limited scale a few decades ago. Therefore, no economic data were collected concerning them. Only in recent years have the activities gained a scale which has meant that statistical agencies have prioritized defining specific ICT sectors. For example, in Denmark the 2007 version of the statistical classification of industries included an ICT and telecommunications sector for the first time. Previously, information and telecommunications was contained in the transport sector. Only recently, Internet trade with physical products has been recognized as an economic sector in the Danish classification: before 1 January 2014, Internet trade with physical products was covered by the sector "Retail trade via mail order services".[11] After 1 January 2014, Internet trade with physical products was covered by eight different industry codes. It means that before 2014, Internet trade with physical products in Denmark made up between zero and the entire 'Retail trade via mail order services' sector. Similarly, the industry 'Database activities' did not exist in NACE rev. 1.1, and hence it is not possible to make statistical analysis of that industry at a European level on the basis of systematically collected and comparable data before 2008.

Therefore, the data provided concerning ICT industries only cover the period 2008-2011 after which no data are available. For this part of our analysis, we have utilised the Eurostat Structural Business Statistics for information on the number of companies and the turnover. As the Structural Business Statistics only contains limited information on the number of employees in the sectors and only contains information until 2011, we have used the European Labour Force survey (LFS) for this element, which includes information until 2013[12]. National accounts data also contain employment and turnover data at the industry level, but the data are provided at a higher level of aggregation, making it impossible to identify the sub-industries which constitute the ICT sector.

Furthermore, due to the changes in the NACE classification in 2008, it is only possible to provide data on the elements from 2008 and onward. Furthermore, the use of the sector definitions described in section 2.1 results in some of the sectors being defined as four-digit NACE codes. However, information on the number of employees from the LFS is not available on a four-digit level. Hence, information on the number of employees only covers the sectors on two or three-digit NACE code levels.

Finally, the financial crisis in Europe after 2008 combined with ICT data being limited to the period after 2008 imply that the available data are probably not representative for the long run development of the ICT sector. In a business cycle down-turn, firms are more likely to experience changes in organisation, strategy and management. The changes experienced in the ICT and telecommunications sector thus come from both the technological development, developments in the market, and from the general economic situation.

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[11] Physical products are in contrast to digital products which the buyer downloads himself or herself.
[12] We also use the LFS data for describing the employed by gender and their working conditions (see section 2.5).

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2.2.1 Increasing number of companies

Table 2-2 below shows the number of companies in the telecommunications and ICT sectors in the period 2008-2011.

Overall, the number of companies in the telecommunications and ICT sectors has increased by around 12% in the period 2008-2011[13]. Table 2-2 below illustrates that the largest sector is 62 - computer programming, consultancy and related activities. This is also the sector where the number of companies has increased most. The data from SBS on the number of companies has many gaps. In Table 2-2 below, we have calculated the total number of firms in the telecommunications and ICT sector by summing over the available numbers in 2008 and 2011. The change from 2008 to 2011 is calculated by summing over the calculated changes. The calculated changes are numbers, if the data contain information on the number of companies in both 2008 and 2011, otherwise they are missing values, indicated by "-". This means that the calculated change may differ from the value one obtains when deducting the total number of firms in 2011 from that of 2008. When interpreting the development over time, the calculated change from 2008 to 2011 is the number that should be used.

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[13] Note that no data exist for the sectors 26.30 in 2011 and 26.12 in 2008. If the number of companies in sector 26.12 is set to 0 in 2011 and the number of companies in 26.30 is set to 0 in 2008, the increase in the number of companies is still 12%.

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Table 2-2   Number of companies EU28 – all sectors, 2008-2011

EU Number of enterprises	2008	2011	Change 2008-2011	% change 2008-2011
26.11 - Manufacture of electronic components	7,113	6,960	-153	-2%
26.12 - Manufacture of loaded electronic boards	-	3,380	-	-
26.20 - Manufacture of computers and peripheral equipment	7,335	6,323	-1,012	-14%
26.30 - Manufacture of communication equipment	8,013	-	-	-
26.40 - Manufacture of consumer electronics	2,959	2,798	-161	-5%
26.80 - Manufacture of magnetic and optical media	427	411	-16	-4%
46.51 - Wholesale of computers, computer peripheral equipment and software	38,603	37,567	-1,036	-3%
46.52 - Wholesale of electronic and telecommunications equipment and parts	20,953	23,514	2,561	12%
58.21 – Publishing of computer games	-	-	-	-
58.29 - Other software publishing	20,643	17,549	-3,094	-15%
61 – Telecommunications	40,234	41,138	904	2%
62 - Computer programming, consultancy and related activities	459,813	533,054	73,241	16%
631 - Data processing, hosting and related activities; web portals	77,326	89,413	12,087	16%
95.1 - Repair of computers and communication equipment	41,766	46,609	4,843	12%
82.20 Activities of call centres	8,003	8,936	933	12%
Total	**733,188**	**817,652**	**89,097**	**12%**

Source: Eurostat, Structural Business Statistics (sbs_na_1a_se_r2), (sbs_na_ind_r2) and (sbs_na_dt_r2).

Note: "-" indicates that data are not available.

In comparison, the total number of companies in EU28 in the period 2008-2011 has increased only by around 1%[14]. Hence, the number of companies in the telecommunications and ICT sectors has increased more than the total business economy. The result is that the share of companies in the telecommunications and ICT sectors has increased from 3.4% of the total business economy in 2008 to 3.8% in 2011.

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[14] Source: Eurostat, Structural Business Statistics (sbs_na_sca_r2). No aggregate for EU28 exists. Estimated by adding all EU28 countries. Data for Ireland is not available for 2008 – assumed to be the same as for 2009. Similarly, data for Greece are not available for 2011 – assumed to be the same as for 2010.

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The trend showing an increase in the number of companies in the telecommunications and ICT sectors is evident in five of the case countries, i.e. the Czech Republic, Denmark, Estonia, France and Germany. The number of companies has only decreased in Portugal and Romania in the period[15].

In the case countries, there is a clear declining trend in the number of manufacturing companies – one exemption is Germany, which has experienced an increase of approximately 18%. In the other subsectors, however, there are some intriguing differences. For example, while the number of companies in trade has decreased in Denmark, Romania and Portugal, it has increased in the Czech Republic, Estonia, France and Germany.

Available data show some differences in company size between subsectors. Traditionally, companies in telecommunications were large public companies with many employees. However, since the liberalisation of the sector in the 1980s, many small telecommunications companies have seen the light of the day. The telecommunications sector, however, is still characterised by being on average three times as large as the average company size in the EU. Furthermore, the manufacturing sectors are also on average larger than the average company size in the EU. On the contrary, companies in repair and data processing, hosting and related activities; web portals are rather small (three to four times smaller than the average company size in the EU). Table 2-3 presents the data on company size in the subsectors and years for which data are available.

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[15] Data for Ireland are not evident, which is why it is not possible to analyse the trend in the period 2008-2011.

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Table 2-3   Average company size for subsectors EU28, 2008-2011 (number of employees)

Activity	2008	2009	2010	2011
262 - Manufacturing of computers and peripheral equipment	17	-	-	24
263 - Manufacturing of communication equipment	28	32	-	-
264 - Manufacturing of consumer electronics	40	44	43	45
61 – Telecommunications	36	32	31	30
280 - Manufacturing of magnetic and optical media	25	19	23	36
62 - Computer programming, consultancy and related activities	5	-	5	5
631 - Data processing, hosting and related activities; web portals	2	2	2	2
822 - Activities of call centres	24	37	34	44
951 - Repair of computers and communication equipment	3	4	3	4
Total business economy	**10**	**11**	**10**	**10**

Source: Eurostat, Structural Business Statistics (sbs_na_1a_se_r2), European Labour Force survey and COWI.

Note: "-" indicates that data are not available. The missing values in the table come from missing values in the SBS data.

Information on the average company size in the different case countries is rather poor and is only available for a limited number of subsectors and years. Overall, however, the data support the trend that the average company size in the telecommunications sector is larger than the overall company size in the Member States. On the other hand, the knowledge-intensive subsectors like data processing, hosting and related activities; web portals and repair of computers and communication equipment are composed of rather small companies. One exception is Romania where the companies in telecommunications on average are at the same size or somewhat smaller than the average company in the country. The Romanian exception is caused by both the average Romanian company having more employees than the average EU28 company and the average Romanian telecommunications company having fewer employees than the average EU28 telecommunications company.

The average number of employed per company has grown for four out of the nine industries shown in Table 2-3. The industries with an increasing number of employed per company are manufacturing industries and call centres. Telecommunications, programming, database hosting and repairs have a more or less constant number of employed per company.

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2.2.2 Decrease in turnover, but a smaller decrease than in the total business sector

The data on annual turnover[16] for companies in the telecommunications and ICT sectors are from the Structural Business Statistics. The available data are somewhat fragmented, which means that the overall development in the sectors cannot be assessed. In 2011, the turnover in the subsectors in the telecommunications and ICT sectors for which data are available was around EUR 1.3 billion. Table 2-4 shows the development over time in the turnover of companies in the ICT and telecommunications sector. The numbers have been adjusted for inflation using the harmonized European consumer price index, HICP. We have chosen to adjust the numbers for inflation in order to make the turnover-indicators comparable over time. We believe this is useful in a period of inflation.

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[16] Adjusted for inflation by HICP (Harmonised Indices of Consumer Prices), the base year is 2011.

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Table 2-4 Turnover, 2008–2011 – million euros, adjusted for inflation by HICP (2011=100))
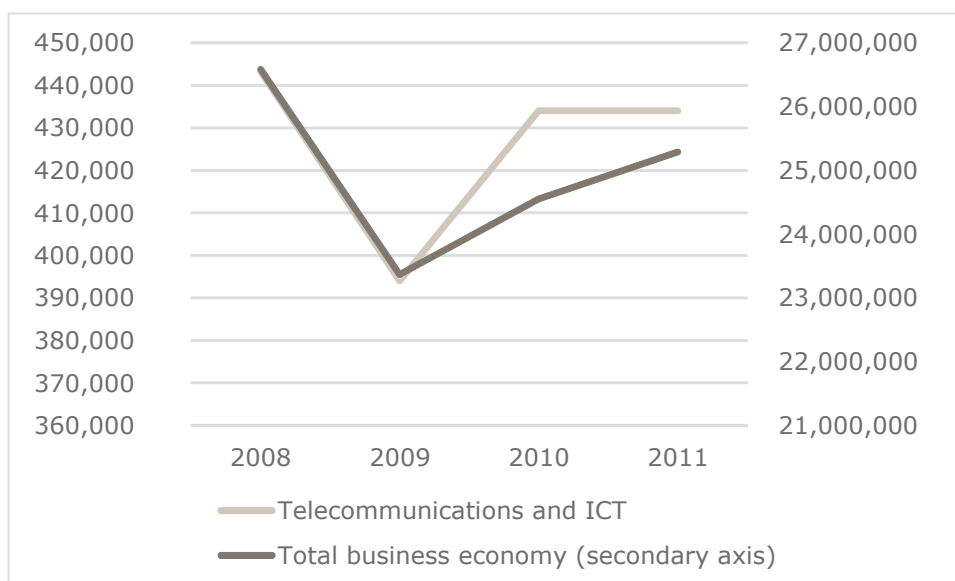
	2008	2009	2010	2011
26.11 - Manufacture of electronic components	66,206	46,843	58,652	52,868
26.12 - Manufacture of loaded electronic boards	12,799	10,527	-	14,795
26.20 - Manufacture of computers and peripheral equipment	49,797	39,361	-	30,226
26.30 - Manufacture of communication equipment	-	-	-	-
26.40 - Manufacture of consumer electronics	36,160	28,830	31,862	-
26.80 - Manufacture of magnetic and optical media	-	296	279	-
46.51 - Wholesale of computers, computer peripheral equipment and software	233,939	220,920	229,118	232,984
46.52 - Wholesale of electronic and telecommunications equipment and parts	120,251	105,316	123,798	124,995
58.21 - Publishing of computer games	2,787	2,114	3,032	3,182
58.29 - Other software publishing	-	-	-	-
61 – Telecommunications	-	438,368	435,801	412,911
62 - Computer programming, consultancy and related activities	-	353,977	372,615	400,765
631 - Data processing, hosting and related activities; web portals	-	-	-	-
82.20 Activities of call centres	20,043	18,836	19,447	20,010
951 - Repair of computers and communication equipment	-	14,650	14,294	14,066

Source: Eurostat, Structural Business Statistics (sbs_na_1a_se_r2) and (prc_hicp_aind).

Note: "-" indicates that data are not available.

The graph below describes the total development in these five sectors together with the development in the total business economy in the same period. However, it is worthwhile to note, as demonstrated in Table 2-4 above, that data are only available for five sectors (26.11, 46.51, 46.52, 58.21 and 82.20) for the whole period 2008-2011.

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Figure 2-1   Annual turnover, 2008–2011 – million euros, adjusted for inflation by HICP (2011=100))

Source: Eurostat, Structural Business Statistics (sbs_na_1a_se_r2).

Note: Telecommunications and ICT only cover the sectors 26.11, 46.51, 46.52, 58.21 and 82.20.

Figure 2-1 illustrates the turnover in these five sectors decreased by around 2 % from 2008-2011, but there are large differences between the different sectors, however. Sector 58.21 — publishing of computer games has experienced an increase of around 14% in the period, while sector 26.11 — manufacturing of electronics components experienced a decrease in turnover of around 20%. The turnover in the other sectors has remained stable throughout the selected time period of analysis.

Moreover, Figure 2-1 also illustrates that the development in the turnover in the total business economy in EU28 and that of the telecommunications and ICT sectors were relatively similar for the two time periods 2008-2010 and 2009-2011. Despite the increase from 2009-2011, the general turnover in the total business economy had decreased by 5% from 2008 to 2011. Comparing this 5% contraction with the telecommunications and ICT sectors, we notice a much smaller decline for the latter. This could potentially arise from a number of factors such — for example differences in income elasticity meaning that the telecommunications and ICT sectors being less sensitive to falls in income.

Focusing on the case study countries, data are only available for some sectors in some years. Hence, we are unable to directly compare the development in the case countries, because they are based on different sectors. Looking at the different case countries individually, however, the data show that the turnover in the sectors where data are available throughout the whole period has decreased in the Czech Republic,

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Denmark, Portugal and Romania. Yet, in Estonia, France and Germany, the turnover has increased[17].

The turnover per employed differs greatly among the different subsectors of the telecommunications and ICT sectors[18]. While it is around EUR 225,000 per year in 262 - manufacturing of computers and peripheral equipment, it is only around EUR 30,000 per year in 268 - manufacturing of magnetic and optical media. The turnover per employed in call centres is around EUR 65,000 per year and in 951 - Repair of computers and communication equipment it is around EUR 92,000 per year. In comparison, the turnover per employed in the total business economy is around EUR 105,000-115,000 per year. Hence, there is some variability in the turnover of specific subsectors within the telecommunications sectors.

2.2.3 Overall increase in the number of employees but decrease in telecommunications

In this section, we present the development in the number of employees in the telecommunications and ICT sectors. In section 2.5, we describe the employment in more depth in terms of age, gender and type of employment. The number of employees is based on data from LFS. It should be mentioned that the coverage of the LFS may differ from the SBS and, hence, so will the employment figures. In particular, the level of detail of the industry classification in the LFS data only extends to 3-digit NACE. This means that it is not possible to identify the following 4-digit ICT sectors:

- 46.51 - Wholesale of computers, computer peripheral equipment and software

- 46.52 - Wholesale of electronic and telecommunications equipment and parts

- 58.21 - Publishing of computer games

- 58.29 - Other software publishing.

The implication is that the entire ICT trade sector cannot be described using LFS data, which is why no information on ICT trade is included in this subsection.

We have chosen to use the LFS, because these data are more detailed as regards the characteristics of the employed, which we use in the next sections.

In the following, we present the development in the number of employees in the following sectors:

Manufacturing:

- 26.2: Manufacturing of computers and peripheral equipment,

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[17] Very little data exist for Ireland.
[18] The data on turnover in the different sectors are rather poor, which is why we only describe the key results of the analysis of turnover per employee.

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- 26.3: Manufacturing of communication equipment,

- 26.4: Manufacturing of consumer electronics

- 26.8: Manufacturing of magnetic and optical media.

Services:

- 61: Telecommunications,

- 62: Computer programming, consultancy and related activities,

- 63.1: Data processing, hosting and related activities; wed portals.

Call centres:

- 82.2: Activities of call centres.

Repair:

- 95.1: Repair of computers and communication equipment.

Table *2-5* below shows that the overall number of individuals employed in the telecommunications and ICT sectors has increased by around 10% in the period 2008-2013. When focusing on the different sectors, however, we see large differences between the sub-sectors. Two sectors (61 - Telecommunications and 264 - Manufacturing of consumer electronics) have experienced a decrease in employment in the period, while the number of employees has increased in the other sectors. The declining trend of employment in 61 - telecommunications is part of a long-term trend, which is described in section 0. Furthermore, sector 264 – Manufacturing of consumer electronics is one of the traditional manufacturing sectors in the telecommunications and ICT sectors. Hence, this sector can be expected to be under pressure from competition from for example Asia and other areas where the labour input is cheaper.

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Table 2-5   Number of employed - all sectors, 2008–2013 (1,000 employed)

	2008	2009	2010	2011	2012	2013
262 - Manufacturing of computers and peripheral equipment	122	153	136	150	141	147
263 - Manufacturing of Communications equipment	224	231	236	238	208	228
264 - Manufacturing and consumer electronics	118	125	123	125	114	100
268 - Manufacturing of magnetic and optical media	11	8	11	15	13	20
61 – Telecommunications	1,436	1,287	1,269	1,228	1,208	1,132
62 - Computer programming, consultancy and related activities	2,489	2,532	2,556	2,693	2,832	2,866
631 - Data processing, hosting and related activities; web portals	134	143	150	214	217	241
82.20 - Activities of call centres	190	287	278	391	400	417
951 - Repair of computers and communication equipment	123	157	144	166	159	177
Total	**4,847**	**4,923**	**4,904**	**5,219**	**5,293**	**5,327**

Source: Eurostat, Labour Force Survey (special data extraction from Eurostat).

*Note: 'Employed' is defined as the population that have the working status (ILOSTAT)
'Employed' in LFS.*

The most striking trend is the decreasing trend of employment in the
telecommunications sector. A further trend is the strong growth in sectors such as call
centres (119%), manufacturing of magnetic and optical media (92%)[19] and data
processing, hosting and related activities; web portals (80%). This indicates that the
telecommunications sector is now a small part of the sectors and that the proportion is
declining. NACE code 62 is the predominant activity in the telecommunications sector.

The interview responses obtained for this study indicate that stakeholders notice that
the number of jobs in telecommunications to be decreasing, yet they recognise that
more knowledge intensive jobs are increasing in numbers. The respondents also
expect this development to continue into the future.

If we compare these figures with the total business economy, the figures above show
that the general employment in EU28 in the same period has decreased from around
223 million to 218 million – a decrease of around 3%[20]. This means that the share of
employed in the telecommunications and ICT sectors has increased from
approximately 2.2% in 2008 to 2.5% in 2011.

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19 The starting point is very low – around 10,500 in 2008.
20 Covers only the population with the working status (ILOSAT) 'employed'.

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The upward trend in total employment in the sectors can be found in all of the case countries[21]. When looking at the different sectors, however, there are some differences among the case countries. The overall decreasing trend of sector 61 - telecommunications can be found in Denmark, France, Germany, Ireland, the Czech Republic and Portugal, while the number of employees in this sector has increased in Estonia and Romania. Information on sector 262 - manufacturing of computers and peripheral equipment is only available for five of the case countries and the data show that in two of these countries (France and Romania); the number of employees has increased, while it has decreased in Germany, the Czech Republic and Portugal.

As described above, the employment pattern in the subsectors within the telecommunications and ICT sectors has evolved differently. Interviewees confirm that this trend will continue and specifically also note that the need for low-level staff will decrease. This is a trend, which is confirmed by several of the interviewees. Today, even top software engineers have to develop consultancy skills and not just be limited to being ordinary coders, which is also relevant for chapter 3. Similarly, the trend is confirmed in e.g. France, Romania and Denmark. In several interviews, it is anticipated that the knowledge-intensive industries will experience growth. Digitisation, automation, outsourcing to companies abroad and to specialised companies influences the employment in traditional telecommunications. Globalisation is also pointed to as a development that negatively affects employment in telecommunications. One interviewee even doubts that employment in traditional telecommunications will exist in the future. Also, the interviewees confirm that if this trend continues and IT services, television and broadcasting services are likely to move towards more knowledge-intensive industries.

Moreover it is pointed out by the respondents that employment in the ICT sector is complex and includes a plurality of different operators, and that the overall employment in the telecommunications and ICT sectors is larger than ever.
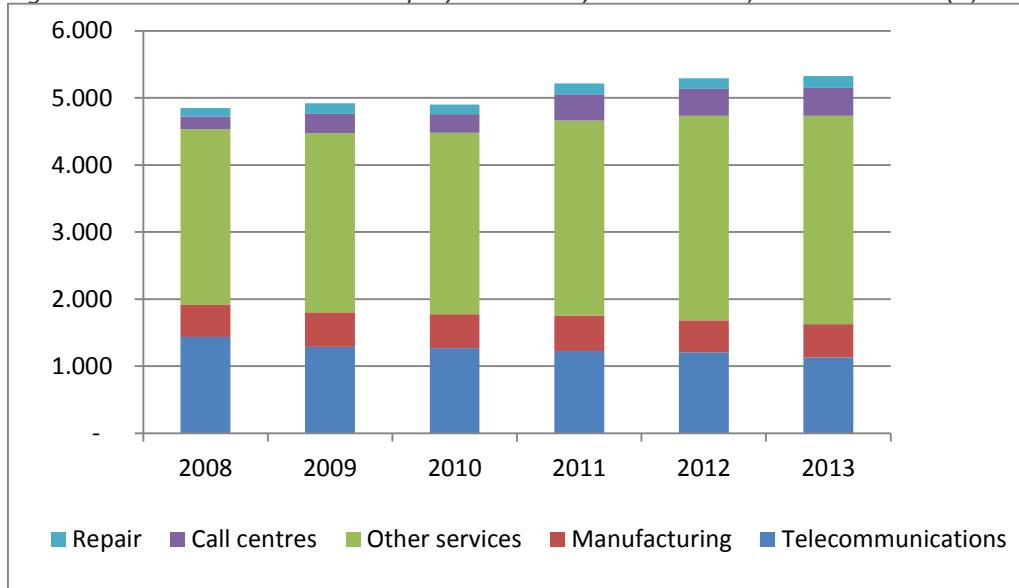
As an example it is also relevant to mention the decrease – almost disappearance – of telecommunications equipment manufacturing (mobile phones – Nokia, Eriksson and Alcatel) in Europe. This has resulted in an employment decline of more than 30% in NACE 26.3 Germany.

Finally, interviewees confirm this trend also by elaborating on the underlying causes for observed employment declines and point to outsourcing, fierce competition and technological developments. Also, an interviewee points to the likelihood that manufacturing will be reduced substantially for the same reasons.

Clustering the sub-sectors into the five sectors reveals some rather large differences as displayed in Figure 2-2 below.

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21 Information on all sectors in the case countries is not available.

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Figure 2-2   Number of employees – by sub-sector, 2008–2013 (1,000 employed)

Source: Eurostat, Labour Force Survey (special data extraction from Eurostat).

Note: 'Employed' is defined as the population that has the working status (ILOSTAT) 'Employed' in the LFS.

All sectors have experienced an increase in the number of employed except from telecommunications. But while manufacturing and services have only had a minimal increase in the number of employees (4%), the number of employees in call centres and repair has increased by 119% and 44%, respectively.

The interviewed respondents indicate that this could due to the effect of digitalisation and technological development. There is an increasing demand for ICT related services (e.g. in customer contact centres) and companies do outsource these services. However, the respondents did not provide hard evidence for the indication.

In Portugal, the Czech Republic, Romania, Estonia and France[22], the number of employed in manufacturing has decreased. Though, in Germany the number of employed in manufacturing has increased. At the same time, Germany is the only case country where the number of employed in services has decreased (3% mainly resulting from a strong loss in telecommunications services, see country case study), while the increase in the other case countries is between 1% (Portugal) and 41% (Romania). Finally, the number of employed at call centres has increased in all case countries, while the number of employed in repair has increased in Portugal, Romania, Estonia and France.

One interviewee mentions software development as a growth area, whereas Danish interviewees point to the growth being observed in regard to content services. More specifically, one interviewee refers to software development, consultancy,

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[22] Data on Ireland and Denmark are limited and thus not included.

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telecommunications and electronics, small subsectors (e.g. computer programming and gaming) and design and communication solutions as the main drivers of growth. Also with regards to trade, an interviewee mentions growth, which is combined with new types of pricing, e.g. subscriptions.

One respondent mentions growth in broadband as the driver for economic growth in the telecommunications and ICT sectors, which is now taking place at a slower pace. On the contrary, mobile internet is currently growing very rapidly in some segments, e.g. social platforms, search engines and e-trade. Other interviewees also point to the internet as a driver for growth, and some also mention cable TV including all the services enabled by it. In this context, the general growth is also considered to influence employment of the sectors.

Overall the respondents have specifically acknowledged the ICT sector as a sector with a high growth potential. This is also as indicated by the statistical evidence on the economic activities in the sectors in this chapter. The recent growth and possibly also largest potential lie within ICT services in general. The findings have also shown a decrease in economic activities in e.g. manufacturing.

Generally, there is a tendency that the ICT activities are increasing compared with those of traditional telecommunications activities.

The relevance of emphasising the ICT service as a potential area of growth is underlined by the latest Commission priorities published by President Juncker. It is stated that '*By creating a connected digital single market, we can generate up to EUR 250 billion of additional growth*'[23]. When looking at the objectives for the Commission it has launched initiatives, such as modifying copyright rules to reflect new technologies, simpler consumer rules for online purchases, making it easier for innovators to start their own company and boosting digital skills and learning. These are all initiatives to support the ICT sector and unleash its growth potential.

Those priorities are also a product of several Member States' efforts to ensure that a significant part of the Connecting Europe Facility funds were allocated to facilitate content rather than "just" infrastructure[24]. When that is said, the telecommunications infrastructure is of course also a prerequisite for efficient roll out of ICT activities.

Some clear conclusions can be drawn from the statistical evidence presented above; e.g. the overall employment grows but the share of telecommunications diminishes and some sub-sectors are subject to fast changes such as sub-contracting and outsourcing.

2.2.4   Long-term trends in the telecommunications sector

This section focuses on some of the long term trends in the telecommunications sector to show the significant developments in the sector.

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[23] EC Priority Digital Single Market http://ec.europa.eu/priorities/digital-single-market/index_en.htm
[24] EC Digital Agenda for Europe http://ec.europa.eu/digital-agenda/en/connecting-europe-facility

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As mentioned in the introduction to section 1.2.1, due to the changes in the NACE classification codes the sections above only consider the period from 2008 onwards. By the use of different data sources, however, we present the long trend in the telecommunications sector in this section.

Employment data in the telecommunications sector are available for all OECD countries from 1985 to 2011. Figure 2-3 below shows the development of employment in the telecommunications sector in the EU OECD countries where data are available for the whole period[25]. It should be mentioned that the figures do not capture employment that is outsourced to other sectors or employment from for example production of applications.

Figure 2-3 suggests that there were more than 500,000 employees in the telecommunications sector in 2011. Table 2-5 suggests a figure of 1,128,000. It is important to explain the discrepancy in particular when reading earlier on that the definition of OECD is wider than the narrow NACE definition

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[25] It should be noted that there is not necessarily consistency between the telecommunications sectors as defined by NACE code 61 and the definition used by OECD.

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Figure 2-3   Development in employment and revenue in the telecommunications, 1985-2011

I.e. you are not talking about net-revenue, i.e. subsequent to lean production and outsourcing, vertical integration of production has shrunk and subsequently revenues/employee have increased
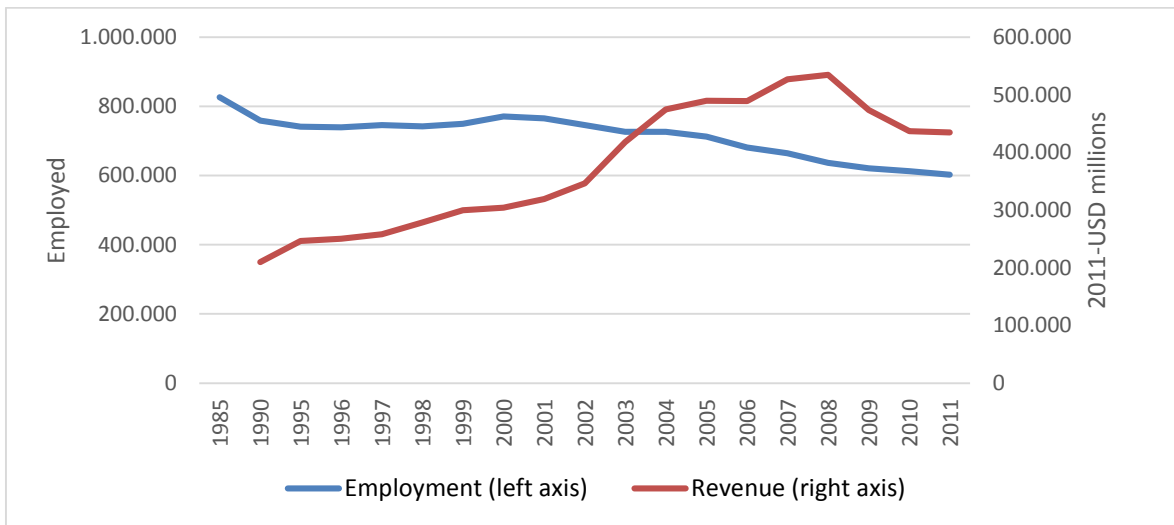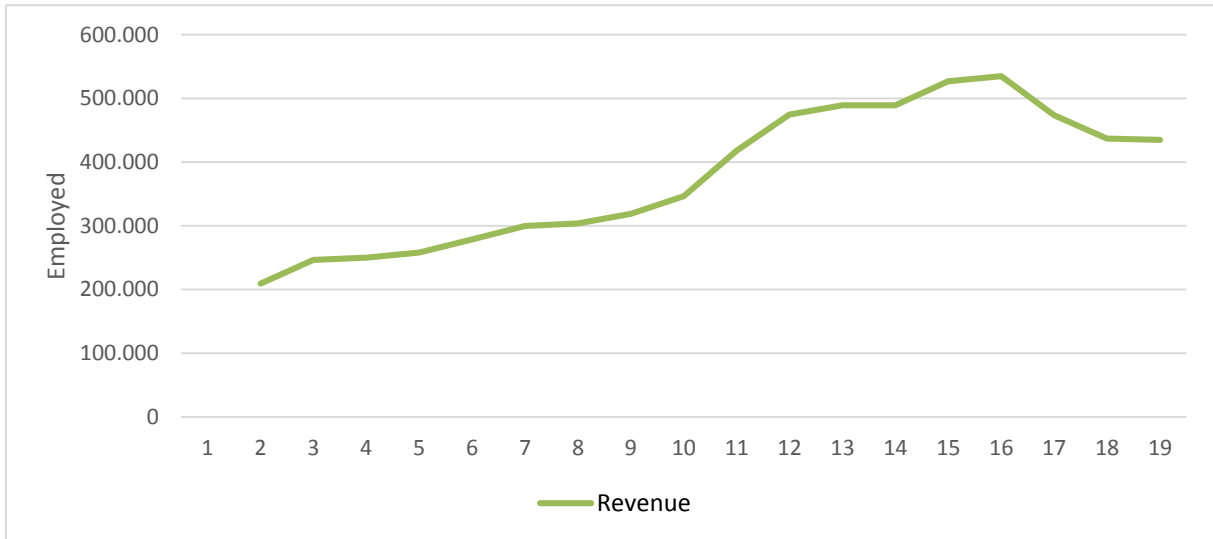
Source: OECD Communications Outlook 2013, tables 3.15 and 3.1. Total staff in telecommunications services and OECD Communications Outlook 1999: Table 9.1. Number of PTO employees in the OECD area. Telecommunications revenue in the OECD area, OECD Consumer Prices Indices and COWI.

Note (employment): Data is not available for all years between 1985 and 1995. Graphs include data for Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Poland, Spain and Sweden. For Ireland, data are not available for 2004-2006, which is why data are estimated using linear interpolation and figures from 2003 and 2007. Similarly, data are not available for 2004 in Poland, which is why data are estimated using figures from 2003 and 2005.

Note (revenue): Graphs include data for Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Poland, Portugal, Spain, Sweden and the UK. Note that data on consumer prices is not available from 1991 for the Czech Republic, which is why it is assumed to be the same as that of 1992.

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As Figure 2-4 shows, employment in telecommunications sector has decreased from around 825,000 in 1985 to around 600,000 in 2011. This corresponds to a yearly decrease of around 2%, i.e. more than 25% in total. This trend has been rather stable over the period. Similarly, ETNO also realises a decrease in employment in the 2000s[26]. The decrease is likely to come from a shrinking of the manufacturing branches included in the telecommunications sector as well as from the liberalisation of the telecom markets.

The overall decrease can be found in 13 out of the 16 Member States for which data are available as displayed in Figure 2-4 below. Only Poland and Luxembourg have experienced a large increase in employment, while Spain has experienced only a small increase[27].

Figure 2-4   Change in employment in the telecommunications sector, 1985-2011 (percentage change)
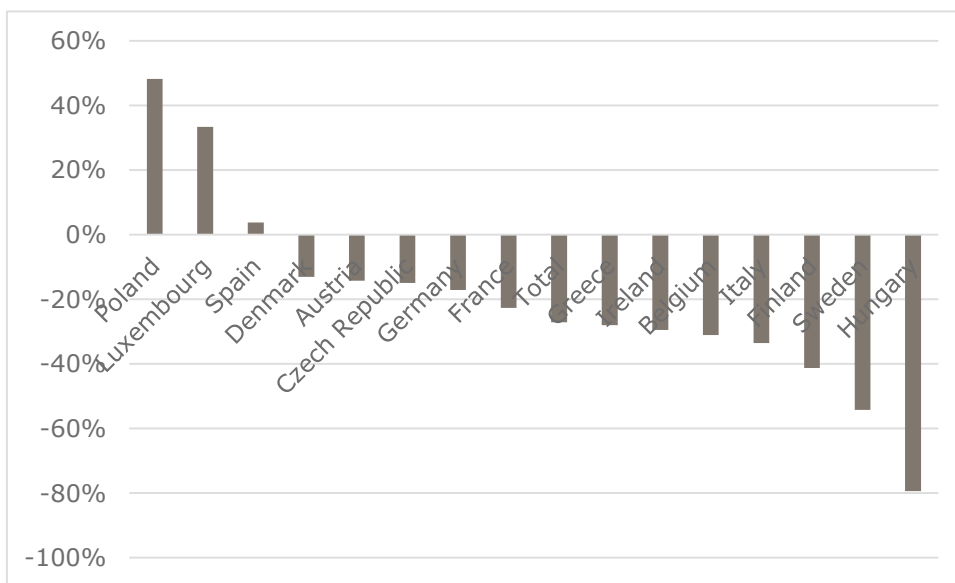
Source: OECD Communications Outlook 2013 table 3.15. Total staff in telecommunications services and OECD Communications Outlook 1999: Table 9.1. Number of PTO employees in the OECD area.

Hungary (80%), Sweden (54%) and Finland (41%) are the three Member States, which have experienced the largest decrease in employment within telecommunications, while Member States like Denmark (13%), Austria (14%) and the Czech Republic (15%) have experienced a much smaller– although still significant decrease.

In all the country case studies, there has been a decrease in employment in the telecommunications sector, however, with some variation across the different Member

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[26] ETNO, Facts and figures about European Telecom operators 2007-2008 and annual economic reports 2010-2013. It should be noted that the data for employment in the different reports is not comparable. For example in the Fact and Figures report from 2007, the number of employees is estimated at 1,022,000 and in the 2008 edition, the number is estimated at 1,090,000.

[27] Note, that the number of employed in Luxembourg in 1985 was only 675, which is why the percentage change seems high.

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States. The variations are mainly due to the significant changes in sector, which may also have led to changes in national company registration. The variations do not, however, change the general trend of a decrease in employment in the telecommunications sector.

Although there has been a significant decrease in employment, the revenue in the telecommunications sector has increased significantly in the period from 1990 to 2011 as displayed in Figure 2-3 above. According to the OECD, the revenue in 1990 was around EUR 210 billion (2011 prices) and in 2011, revenue reached EUR 435 billion. However, as Figure 2-3 displays, the revenue in the telecommunications sector hit an all-time peak in 2008 with a revenue of EUR 534 billion (2011 prices) before it declined in 2009 and 2010.

Due to the decrease in 2009 and 2010, the revenue in 2011 was somewhat lower than the 2004 level. The decreasing trend in the latest year is also found by the ETNO (2013), which reports a decrease in revenues from 2008 until 2012[28]. Furthermore, in the period 1990-2011, the largest increase can be found in the early 2000s with rates of 9% in 2002, 21% in 2003 and 14% in 2004.

All Member States from which data are available have experienced an increase in the revenue in the period 1990-2011. While some Member States such as Sweden (1%) and Hungary (9%) have only experienced marginal increases, other Member States have experienced substantial increases in revenue, for example the Czech Republic (312%) and Spain (204%) have experienced massive increase in revenue. Figure 2-5 below shows the change in revenue between 1990 and 2011.

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[28] ETNO, 2013, ETNO Annual Economic Report 2013.

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Figure 2-5   Change in revenue, 1985-2011 (percentage change)

Source: OECD Communications Outlook 2013, table 3.1. Telecommunications revenue in the OECD area, OECD Consumer Prices Indices and COWI.

It should be underlined that the data in this section only cover part of the EU – hence, the OECD countries in the EU. The EU OECD countries are mainly the Western-European Member States, which is why the development in the newer EU Member States could be somewhat different than presented above. The data point to a long-term trend of decreasing employment in the telecommunications sector in the EU and, at the same time, rising revenues. The trend of the former is most evident in the 2000s, yet revenue has decreased in recent years and only in 2011 did we experience a reversion to a level similar to 2013only at the same level as around 2003.

2.3   Technological convergence in the telecommunications and ICT sectors

The description of the technological convergence helps us understand how the sectors are changing and how the boundaries have become more difficult to define.

Technological convergence can be defined as the interlinking of computing and other information technologies, media content and communication networks. Technological convergence has arisen as the result of the evolution and popularization of the

internet as well as the activities, products and services that have emerged in the digital media space[29]. Specifically, this involves converging previously distinct media such as telephony and data communications into common interfaces on single devices, such as the fact that most smart phones can make phone calls and search the web.

Historically, the communication networks were designed to carry different types of information independently. Radio was designed for audio, and television was designed for video. The older media, such as television and radio are broadcasting networks with passive audiences. Convergence of telecommunications technology permits the manipulation of all forms of information, voice, data and video. Telecommunications has changed from a world of scarcity to one of seemingly limitless capacity.

Some experts believe that the convergence that we are experiencing today is simply the tip of the iceberg, as all facets of institutional activity and social life such as business, government; art, journalism, health and education are increasingly being carried out in these digital media spaces across a growing network of information and communication technology devices.

Interviewees indicate that specialisation happens simultaneously with convergence. A point made is that boundaries are floating together vis-à-vis other sectors. An example brought forward was the fact that the automobile industry now integrates ICT tools in design, but ICT industries do not see themselves as part of the car manufacturing industry. One interviewee says that the specialisation reduces the understanding of 'belonging': as you become more specialised, the difference between your area of work and the neighbour's is widening, and you come to feel a greater gap. Also the effect on the sense of belonging is widely shared. Another interviewee disagrees that there is an observed trend of specialisation, as it in turn necessitates cooperation across specialities and, hence, supports the sentiment of belonging. Another interviewee notes that the successful companies are often not so thankful to specialisation, but thankful to being generalists. However, when looking at the sectors the picture is of diverse. There are many different cultures across companies and countries. In some countries not all interviewees agree with the trend of specialisation, and, in particular, not with it affecting the 'sense of belonging'. However, they do point to the specialisation that results from the business-to-business orientation, i.e. that ICT companies develop solutions tailored to a particular business or sector, and that it can happen that in this instance the sense of belonging applies (more) to the cluster in question, e.g. agriculture. However, that being said one interviewee actually notes the opposite development: successful companies focus on their core products, but increase their partnership with others within the sector.

The implications for the sectors and the social partners are naturally substantial where the traditional structure of the telecommunications industry comprised of a few large companies, which owned the infrastructure and provided a single service, namely PSTN telephony. The historical roots of convergence can be traced back to the emergence of mobile telephony and the internet, although the term properly applies only from the point in marketing history when fixed and mobile telephony began to be

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[29] Messerschmitt, D.G.(1996) http://www.eecs.berkeley.edu/~messer/PAPERS/96/Proc1/Proc1.pdf. Already back in 1996 this paper predicted convergence that is a reality today in the telecommunications and ICT sectors.

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offered by operators as joined products. Fixed and mobile operators were, for most of the 1990s, independent companies. Even when the same organisation marketed both products, these were sold and serviced independently.

The structure of the ICT sector was similar in the 1990s when the sector was dominated by a few large multinationals (e.g. IBM, Apple and Hewlett-Packard), which were engaged in both hardware and software development. In the ICT sector, the changes really started with the internet and the numerous related services, which created a whole new sector of start-up, SMEs and microbusinesses. Moreover, the manufacturing of the industry also changed with the significant drop in process for ICT equipment, especially with the introduction of 'no name' computers, which were assembled with parts from several different producers and adapted to the specific customer.

As for the telecommunications sector, the structural changes over the last 25 years in the EU were initiated by legislative measures with a political goal of ensuring a market for telecommunications services but also to ensure that crucial investments in new innovative technologies were made. Those two targets are of course closely interlinked (liberalisation of the telecommunications sector), whereas the convergence and introduction of new services were mainly a natural follow-up to the technological developments[30]. Convergence between the sectors has also been an ongoing trend in the legislation governing the sectors. This is illustrated by the European Parliament's rejection of the 'telecom package' in 2009. The reason for not accepting the Commission was the 'three strikes and you are out'[31] clause, which made telecommunications companies responsible for customers' actions when using their infrastructure[32].

Telecommunications companies must provide a broad range of services to their customers, including streaming services (music and video, telephony (mobile, fixed and VoIP), internet access etc., but as a consumer you also have the possibility to choose each required service from different providers. This has led to a significantly different employment structure, from the telecom companies were state monopolies, in this sector where each telecommunications company must have a broad range of competencies to maintain the networks and to develop and maintain its services. Those changes have led both to outsourcing and outplacement[33].

As regards the ICT sector today, the structure is less regulated and much more fragmented with numerous start-ups, SMEs and microbusinesses, but also a sector with large multinational companies such as Apple and Microsoft. Often innovation and the latest developments in the sector are brought about by small companies,

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[30] http://europa.eu/legislation_summaries/information_society/legislative_framework/l24216a_en.htm
[31] "Three strikes and you are out" refers to a specific article, which allowed Member States to cut of interconnection for copy right violators
[32] http://www.bcs.org/upload/pdf/3strikes_the_full_story_on_amendment_138.pdf
[33] E.g. ICT cluster activities in countries like Lithuania and Romania

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sometimes only by one or two persons with an innovative idea or a vision to improve an existing service (e.g. Google, Facebook, Ello[34] or Uber[35]).

This means that in terms of products, it can be considered that there is increased convergence in the sectors. In terms of the understanding of belonging to the sector, the picture is more blurred. From the interviews, it is not clear that there is an increased understanding of belonging to both the telecommunications and ICT sectors. In companies providing a broad range of services to their customers, employees are more likely to see themselves as part of a company rather than as belonging to one or both sectors. With that in mind and assessing the statistical data, both the long-term trends in the telecommunications sector and the more general economic activities in the sectors, indicate a clear trend that the ICT activities in the sectors are increasing, whereas traditional telecommunications activities are proportionally becoming smaller in relation to the ICT sector but also in absolute terms. This indicates that the understanding of belonging to a specific sector could be stronger, if a broader definition of the sectors could be applied when describing the activities of the sectors.

2.4 Overlaps between sectors

The description of the overlap between sectors gives us an insight into how telecommunications and ICT processes have become an integral part of work processes in other sectors. The overlap of the telecommunications and ICT sectors is assessed by pursuing an insight into whether all activities that we normally would call telecommunications and ICT activities are carried out by the defined sector, or whether some of these activities are also carried out by other sectors. This implies that the overlap refers to the cross-sectoral nature of ICT (e.g. ICT in banking or ICT in manufacturing). This is mainly addressed as background knowledge in the general discussion on ICT as a widespread tool. The fact that ICT activities are also carried out in other well-defined sectors does not add much significance to defining the telecommunications and ICT sectors.

Cloud services are a major object of telecommunications operators (both of traditional players as well as new players such as Microsoft and IBM are entering this market).

Another example is the banking sector where the IT developers are also closely linked to the entire business development. In order to compete in the market, banks will have to deliver high quality e-banking services.

Overall, the structural landscape of the telecommunications and ICT sectors is characterised by rapid restructuring and economic growth driven by new technologies. This movement is the main reason for the increase in overlapping areas of the telecommunications and ICT sectors with services such as voice telephony, online communications and broadcasting media. The stakeholders were asked whether they

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[34] Ello is an ad-free social network that does not sell data about the members, including advertisers and data brokers.(https://ello.co/beta-public-profiles)

[35] Uber is an app-based transportation network and taxi company headquartered in San Francisco, California, which operates in cities in many countries.(www.uber.com)

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agree that the overlapping areas of the telecommunications and ICT sectors represent an increasing part of the economic activities in these sectors, cf. Table 2-6 below.

In general, the stakeholders agree that the overlapping areas of the telecommunications and ICT sectors represent an increasing share of the economic activities in these sectors. In addition, the data indicate a minimal, but likely not a statistically significant difference between the trade union and other stakeholders.

All stakeholders agree to some extent to the hypothesis that the overlapping areas of the telecommunications and ICT sectors represent an increasing part of the economic activities in the sectors. There is a small tendency, however, that trade unions agree to a lesser extent with this hypothesis than the other stakeholders.

Furthermore, one several interviewees notes that growth and high innovation rates are mainly seen in IT software programming and in consultancy; areas that interact with telecommunications and digital agencies.

Along the same lines, other interviewees note the trend of convergence within the sector with different subsectors and specialist areas becoming increasingly dependent on one another. Moreover, an interviewee confirms the tendency of convergence, as it is not possible to provide similar services with different cores, e.g. broadcasting with different services and the use of networks in different ways. Also, several interviewees confirm the trend of overlaps.

Below are some main findings, which are specific to the telecommunications sector, but also indicates the trend of convergence and shows how the traditional telecommunication service companies increasingly are offering a much broader range of services. This includes both telecommunication and ICT services:

▪ The European market is dominated by a large number of telecommunications service/network providers and a highly competitive market in general across Europe with some variations. The telecom market is mainly based on costs[36].

▪ The market is also characterised by the previous monopolies that still exist and which have had to extend their range of products and services (i.e. developing own ICT services) because traditional telecommunications were no longer very profitable and required massive investments (broad-band, networks).

▪ At the same time, technology and, in particular, the internet is revolutionising the telecommunications sector, which is becoming more and more web-based.

▪ The importance of owning a physical network has significantly reduced, thus allowing smaller companies (which do not have the means to maintain a network) to enter into the market. Also the digitalisation of technology means that many things are software instead of hardware driven, which reduces the

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[36] Here it is quite striking that in the USA, only five large telecommunications companies exist, while in Europe the situation is totally different with more than 200 companies on the market.

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specificity of the sector. Internet-telephony and satellite are further elements to merge ICT and telecommunications.

▪ Against this, the telecommunications sector not only merges with ICT services, but is also losing economic weight and employment (see the figures on long-term trends in telecommunications).

2.4.1 Increasing ICT activities in other sectors

The unclear boundaries of the sectors are affected by the fact that there are a growing proportion of ICT technologies in other sectors, which are not part of the ICT sectors *per se*, but should also be acknowledged. ICT-related services are thus present in for instance the energy and finance sectors.

Furthermore, the sectors become fuzzy when e.g. workers in a call centre, which is a communication service with a set of ICT skills, work within finance companies. There are crossovers that are very hard to define. If you provide a service that uses ICT tools and/or skills, one could argue that you should be defined within the sector.

Companies that previously provided very dissimilar services, like Direct TV and Amazon, are now competing and provide overlapping services such as video streaming service. Five years ago, Amazon and Direct TV were mainly acting in different markets but now Amazon is continuously increasing its range of services even though the company is still statistically listed as a retailer. These developments are a clear indication of the blurring boundaries of not just the telecommunications and ICT sectors but also their relationship with other sectors.

The music industry has been a pioneering sector with technological progress changing a whole sector, starting with the invention of the MP3 format and with the music streaming providers today.

2.4.2 Heterogeneity and belonging in the sectors

The stakeholders indicate that companies are becoming more specialised, which increases the heterogeneity in the sectors. However, the discussion on belonging to one common sector was treated differently.

The stakeholders were all asked whether they see the economic activities of the telecommunications and ICT sectors as homogeneous or heterogeneous. Their answers are displayed in Table 2-6 below.

The large majority of the stakeholders rate the economic activity of the sectors as rather heterogeneous and only one stakeholder rates the economic activity as homogeneous.

There is a tendency that the trade unions rate the activities of the sectors more heterogeneous than the other stakeholders. 67% of the trade unions rate the economic activities as either very heterogeneous or extremely heterogeneous, while the share is only around 53% for the other stakeholders.

However, the degree of heterogeneity is not the same across sectors, as was noted by an interviewee. For example, we see convergence of telecommunications activities with the content delivery of television services and also in the field of consumer electronics, which converges with software developments. Furthermore, an interviewee notes the strong heterogeneous nature of the sector covering

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manufacturing, telecommunications, software and consultancy. Another interviewee mentions the 'disruptive' competition from other sectors where companies innovate and generate unexpected competition.

One interviewee notes that the rapidly changing business environment is due to the change from primarily voice to primarily data transfer.

One interviewee notes a difference between actors that own a legacy and those that do not. Examples of the latter include traditional operators, which were heavily opposed to the emergence of the internet, as they would lose the benefit of the legacy and the traditional voice organisations that lost market share due to the emergence of internet-based solutions such as Skype. From this understanding, innovation can be expected mainly from actors without a legacy, whereas others will defend and stay in the business that they developed on the basis of their legacy.

Another perspective was brought up by an interviewee, who mentions that other sectors are in increasing need of solutions that originate in the telecommunications and ICT sector. This drives a trend according to which sector the companies specialise in developing profiles to match the different dimensions and requirements of the other sectors.

Furthermore, there are trends of diversification, e.g. in the telecommunications sectors, which develop services for industry 4.0, cloud computing, media and entertainment and business services (e.g. Telecom). On the other hand, mobile telecom providers such as Vodafone have also diversified their services.

Some trade unions believe that heterogeneity hinders the relationship with telecommunications and ICT sectors. The value added is increasingly concentrated in the hands of the US-based monopoly platforms, e.g. Google, Apple, Amazon and eBay, which create economic inequalities that constrain the feeling of belonging to a common sector. Others believe that industries that were originally different now have something in common, namely ICT activities. The advocates of this view are companies incorporating electronics and on-board software into their products, which are designed and manufactured by persons working on the same set of issues as those explicitly related to the telecommunications and ICT sectors. The feeling of belonging might be limited and local, but it is present.

A further perspective indicates that companies might feel they are part of a hyper-sector where they compete for products and services. Even though competition might show that the companies belong to one common sector, these companies still have diversified trajectories and blurred boundaries that create difficulties when evaluating whether or not they belong to one common sector.

2.5   Defining the sectors

A definition is required that is able to balance sufficient flexibility to cover the emerging activities that continue to surface, with the necessity to be able to measure economic activities in the sectors and to describe the employment and working conditions in these sectors. As a consequence of the development of the sectors, the definition can also be a useful tool in determining the best possible dialogues between the stakeholders relevant for both sectors.

There is, however, one important exemption, namely the ETNO, which has clearly stated a position to keep the narrow definitions and especially in relation to the Social Dialogue emphasised the significant differences between telecommunications and ICT.

Table 2-6   Examples of stakeholder preference for a specific definition

Telecommunications as its own sector

According to the ETNO, even the narrowest definition presented under the interview was too broad to be useful for the EU social dialogue.

The ETNO supports a more narrow definition that differentiates between network owners and ICT, which only offers services. The activities of call centres should not be included. The ETNO also argues that there is no good official definition of ICT.

The ETNO's proposal for a definition of the ICT sector is described as

'ICT has more recently been used to describe the convergence of several technologies and the use of common transmission lines carrying very diverse data and communication types and formats.

Information and communications technology (ICT) refers to all the technology used to handle telecommunications, broadcast media, intelligent building management systems, audio-visual processing and transmission systems, and network-based control and monitoring functions'.

UniEuropa and UniGlobal presented similar views in the interviews mostly with a view to maintain a fruitful EU social dialogue.

When that is said all interviewees acknowledge the trends of convergence and overlaps with the ICT sector as a result of the digitisation.

A broad approach

According to industriAll, the narrow definition *'is an accurate definition, it is rather narrow. It completely ignores the fact that ICT is also present in manufacturing. There are a significant number of other NACE codes than presented in the narrow definition that deserves to be included as telecommunications and ICT activities. There are also a growing proportion of ICT technologies in other sectors, which are not part of the ICT sectors per se, but that should also be acknowledged.*

The OECD is more adequate after the addition of the following NACE codes: 26.5 and 26.6 (codes that refers to instruments that have a significant amount of software incorporated in their design and electro medical equipment, e.g. imaging processing). These are sectors where the proportion of ICT technologies is important and growing. Moreover, code 27.51 (manufacture of domestic appliances) 28 (machinery) 29 (motor vehicles) 30 (transport equipment) and codes 25 to 30 of value of motor vehicle are electronics.

The ITU definition can include banks and insurance companies, paradoxically, which also includes ICT products. The main focus of the ICT sector is extremely pervasive, which makes the definition very difficult to underline'.

The need for flexibility

According to Telefonica the narrow definition is problematic, *'especially when considering the late changes in these sectors. One factor that has to be kept in mind is the definition of the basic players. A lot of agents are moving towards each other, there is now a constant movement in the sectors. The levels of innovation are also very high, which makes it is hard to define the sectors. In general, however, the narrow definition is not accurate'.*

Telefonica also states

'It is not easy to match a definition of the telecommunications and ICT with the NACE codes. To design a good definition, it is important to take into account new services, e.g. digital ICT services, media services, cloud computing, and how communication services are evolving. The latest developments show that typical ICT services are now provided by a very different kind of player – for example IBM is a traditional software player that provides a variety of services in ICT. In other words, traditional players like IBM would formerly be considered to belong in different sectors'.

Telefonica concludes

'The OECD definition is much better, since it is more flexible and it sets out the candidate's interest. It is important that any definition has the flexibility to include or capture the traditional and emerging services, e.g. cloud computing and so on. This definition, however, incorporates the dynamic characteristics of the sector more than the ITU definition'.

Stakeholders do not fully agree on which definition is the most accurate one, though depending on their undertakings, they prefer different activities to be included in the sectors.

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Some trade unions argue that the correct definition is somewhere in between the definition based on the NACE classification and the OECD definition. However, other stakeholders prefer an even broader definition due to technology development. This is often hard to predict, hence, the definition should provide sufficient flexibility to incorporate both emerging activities and other industries that provide the same services. Many agents are moving towards each other, and there is a continuous movement in the sectors.

The organisations interviewed argue that the definition of the telecommunications and ICT sectors should also consider the increase in outsourcing and the broader selection of providers. In this context, stakeholders indicate a distinction between two categories: providers and users. Users would normally not be considered to be part of the sector, with the exception of call centres that have the skills to work with ICT tools. Due to an increase in the level of outsourcing, however, more people are becoming users of the ICT products rather than owners. This has caused new practices to emerge, and the level of service is becoming increasingly important. In 2000, ICT was mainly owned by the users. Now, ICT is (partly) owned by providers, and the end-users subscribe to ICT services. Technological development is the reason for this; in the year 2000 ICT, was mainly comprised by infrastructure.

The activities of call centres are in the study methodology and as mentioned also added to the NACE codes covering the OECD definition. When assessing the interview results, however, several of the stakeholders specifically refer to the OECD definition as accurate and suitable, but question the inclusion of call centres activities as relevant for the definition of the sectors. Organisations, which raise doubt regarding the inclusion of call centres in the definition, include: UNI Europa, ETNO French trade union and DI ITEK (Danish ICT employer organisation and member of Digital Europe).

When looking at the figures in telecommunications, computer programming, consultancy and related activities and data processing, hosting and related activities; web portals (NACE 61, 62 and 63.1) together account for more than 80% of employment and more than 80% of enterprises in the overall sector.

The telecommunications sector on its own accounts for around 20% of employment and 5% of companies. As discussed above, the formulation of a clear definition is a key element in answering the main study question: how have the technological and structural changes in telecommunications and ICT affected the definition of the sectors, its workforce and industrial relations?

Similarly, many of the European and national social partners or employer organisations and multinationals consulted during this study cover several of the sectors – not only services, but also the manufacturing sectors.

The sectors are discussed in literature[37]. Given the advancements in technological development based on internet communication and the ability to share information. A

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[37] E.g. H. Koski et. al. (2002), Bart van Ark (2001)

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broader definition of the telecommunications and ICT sectors is therefore being investigated in the Digital Economy Research Project (DERP)[38].

It is evident that the telecommunications and ICT sectors include a lot of grey areas, which are difficult to determine in terms of sector membership.

The specific choice of sector definition in the literature is highly dependent on the particular focus of the study. It cannot be concluded that the definitions presented in literature with a more narrow focus are an expression of the definition of the whole sector. For instance, a study by the European Telecommunications Network Operators' Association from 2009[39] on good practice guidelines regarding health at work only considers the telecommunications sector like Doellgast et al. (2013). Thus, the starting point is the narrowest one where ICT is excluded. At the broader end of the scale, the FPM (2014), which maps the employers' and trade unions in Europe, makes use of a definition presented in the 2012 Assinform Report. The definition is the 'Global Digital Market definition, which comprises four segments: (i) Devices and Systems; (ii) Software and Solutions; (iii) ICT Services; (iv) Digital Contents and On-Line Advertising. This definition does not include manufacturing; however, it includes some services that are not included in the OECD definition.

The literature within telecommunications and ICT often focuses on specific sectoral issues, and the focus of the studies is therefore limited to an appropriate definition for the specific issue, rather than using a common telecommunications and ICT definition.

Moreover, because of the rapid changes in technology and therefore also in the structure of the sectors, our analysis covers a broad range of inputs from literature and stakeholders, including looking at developments at national and company levels,and even though the sectors still cover many 'grey' areas and overlapping activities, it is possible to speak of one definition of the sectors. As seen in the review of the literature and the interviews with key stakeholders, it is suggested that the telecommunications and ICT sectors may best be defined with reference to the OECD definition as translated to NACE codes in Table 2-1. However, based on clear statements from both the employer and trade unions it is concluded that the activities of call centres cannot generally be defined as belonging to the sectors. Moreover, when assessing the economic activities of the sectors, especially the long-term trends in the telecommunications sector and the convergence trends presented below, there is a clear indication that a suitable definition includes both telecommunications and ICT. Finally, the desk research and secondary analysis clearly indicate that telecommunications overlaps with or is even an integral part of ICT services in terms of economic/employment convergence. This finding was confirmed by a vast majority of stakeholders interviewed. Based on the findings the final specification of the boundaries of the sectors should be decided by the social partners. This also includes the inclusion or exclusion of call centres activities.

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[38] European Commission (2012) ICT Employment Statistics in Europe: Measurement Methodology (ftp://ftp.jrc.es/pub/EURdoc/JRC76385.pdf)

[39] ETNO et al. (2009)

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2.6 Recommended definition

In order to recommend a definition, we are using the findings both qualitatively and quantitatively. We are using elements from the description of convergence and overlap in order to understand the changes and we are especially relying on the interviews in order to understand how the stakeholders see and perceive the sector, their interconnectivities and boundaries.

The recommended definition as identified in this section is the definition we will use for our analysis throughout the rest of the report. However, in some cases it has also been deemed necessary to discuss relevant issues outside the definition. This is e.g. work carried out in call centres.

Interviews with social partners indicate that a relatively broad definition is preferred and it should be broader than the four NACE codes referred to in the narrow definition[40].

Respondents indicate that the narrow definition is outdated and does not comprise the activities that are present in the sector today. For instance, the definition ignores the fact that ICT is also present in manufacturing (Industry 4.0, i.e. the increasing digitalisation/use of ICT in manufacturing processes).

Most of the respondents therefore prefer a broader definition of the sectors. It should also be mentioned that the majority of the stakeholders do not regard call centres as being part of the ICT sector. The reasoning from the stakeholders was mainly that activities of call centres have a specific nature and it is rather activities that use ICT rather than applying it. Call centres would normally also apply different business models than the innovative part of the ICT sector.

Our analysis indicates a clear preference with both trade unions and employer organisations towards a definition similar to the OECD definition. However, only a few stakeholders are convinced that the activities of the call centres should be included in the definition.

This analysis acknowledges the dynamics of the sectors and thus the possible change in definitions/boundaries over time, which also may lead to varying overlaps between the different sectors. For example, many telecommunications and ICT companies also engage in trade and service provisions, and the trend may actually go two ways – i.e. some companies look at outsourcing, while others look at in-sourcing previously out-sourced activities.

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[40] 61: Telecommunications; 62: Computer programming, consultancy and related activities; 63: Information service activities, and 82.20: Activities of call centres.

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3   Employment and working conditions

The Lisbon strategy for growth and jobs highlighted the need for maintaining Europe's unique social model whilst stressing the need for addressing pressures from a globalised economy in terms of increasing the productivity levels[41] and the focus on employment is also at the core of the EU 2020 strategy[42]. As shown in chapter 2, telecommunications and ICT sector has changed over the last decades, and such structural changes influence the working conditions significantly[43]. The type of employees in demand may change and this again influences the composition of the workforce, similarly demographic changes and global competition influence type of skills and level of experience available. Some skills become more demanded, other obsolete. Some companies reallocate, and this again may render some types of professions obsolete or put pressure on flexibility of the workforce re contractual arrangement or working time.

Sectors also react differently to changes in production patterns, technological developments or changes in customer demand[44] for instance concerning re-allocation or outsourcing. For a sector as diverted as the telecommunications and ICT sector this is important to be aware of when addressing changes in working conditions. The changes in employment and working conditions are important also for its impact on industrial relations and this will be analysed in chapter 4.

This chapter addresses the characteristics of the working conditions in the telecommunications and ICT sectors as proposed defined in chapter 2 as well as call centres and discusses how the structural changes have influenced working conditions by assessing effects for the workforce re composition of the workforce – gender, and age, skills and education levels - as well as contractual and mobility effects, salary, working time and psychosocial risks.

3.1   Gender differences

The telecommunications and ICT sectors are largely dominated by males compared with the general labour market, where the rate of male employees is approximately 55%[45]

The largest share of men can be found in sector 951 - repair of computers and communication equipment, where around 84-87% of the employed in the period 2008-2013 were men. Other highly male dominated sectors are sectors 62 - Computer programming, consultancy and related activities and 262 - Manufacturing of computers and peripheral equipment. The share of male employees has been relatively constant in all sectors, except sector 264 - manufacturing of consumer electronics where the share of males has increased by 18% and in 268 -

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41 EC OTH-Lisbon Strategy http://cordis.europa.eu/programme/rcn/843_en.html The Lisbon strategy for growth and jobs
http://cordis.europa.eu/programme/rcn/843_en.html
42 EC(2010) Europe 2020 FIN
43 Härenstama et al (2003)

45 55% in 2008-20011 and 54% in 2012-2013. Source: Eurostat (lfsa_egan) and Labour Force Survey (special data extraction from Eurostat).Note: Data cover the population with the working status (ILOSTAT) 'Employed' in LFS.

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manufacturing of magnetic and optical media where male dominance has declined (from 70% in 2008 to 58% in 2013).

The call centres sector (sector 820 – Activities of call centres) is the only sector where the majority of the workforce is female with males representing approximately 35% of the workers in the sector. Hence, this sector also stands out from the rest of the sector on this parameter compared with the rest of the sub-sectors analysed.

Table 3-1   Share of males employed – all sectors, 2008-2013

	2008	2009	2010	2011	2012	2013
262 - Manufacturing of computers and peripheral equipment	70%	75%	75%	72%	73%	72%
263 - Manufacturing of Communications equipment	68%	69%	70%	71%	71%	72%
264 - Manufacturing of consumer electronics	53%	58%	56%	56%	60%	62%
268 - Manufacturing of magnetic and optical media	70%	70%	67%	64%	68%	58%
61 – Telecommunications	67%	66%	68%	68%	68%	67%
62 - Computer programming, consultancy and related activities	78%	78%	78%	78%	78%	78%
631 - Data processing, hosting and related activities; web portals	69%	61%	63%	62%	61%	66%
820 - Activities of call centres	37%	37%	36%	34%	33%	35%
951 - Repair of computers and communication equipment	84%	86%	87%	85%	86%	86%

Source: Eurostat (lfsa_egan) and Labour Force Survey (special data extraction from Eurostat).

Note: Data cover the population with the working status (ILOSTAT) 'Employed' in LFS.

Overall, this shows that Manufacturing, services and particularly repair have a high share of male employees while call centres have an over representation of woman employees. This is illustrated in Figure 3-1 below

Looking across the case countries, in the Czech Republic, Germany, Romania and France, Ireland[46] and Denmark[47], the sectors manufacturing, services and repair are dominated by males. However, in Portugal, the manufacturing sector is dominated by women while services and repair is dominated by men as in the other countries. Similarly, in Estonia the manufacturing sector is dominated by women. Yet, services are dominated by men, while there are no data for repair.

Compared with the general trends in the telecommunications and ICT sectors as demonstrated in chapter 2, there is no indication that the sectors are changing. The two sectors covering some 75% of the employees in the sectors Telecommunications (61) and particularly Computer programming, consultancy and related activities (62) show a stable, high share of male employees – particularly for the latter where 78% of the workforce are men.

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[46] Data only available for services, there is thus no information about gender balance in Manufacturing and repair
[47] Data only available for services

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The share of woman employees is increasing in 268 – Manufacturing of magnetic and optical and in 820 - Activities in call centres. Both are sectors which are experiencing strong growth. For the former, this contributes to strengthening gender balance in the sector, however, as the sector is still small (20,000 employees in 2013), its impact is limited. For the latter, the increased share of woman indicates a further imbalance as this sub-sector is already dominated by female employees.

Overall, this indicates that there is a gender imbalance in the sector. For instance, global companies like HP, Google, Twitter, and Facebook have about 30% female employees. Apple 20%, Ebay and Yahoo have slightly higher percentages, i.e. close to 40%[48].

Social partners involved in the Sectoral Social Dialogue Committee on Telecom recently have taken a joint initiative to foster gender equality in the telecommunications sector by signing a Joint Declaration on Gender Equality.[49] The declaration was signed in September 2014 and stresses the need to increase female employment and equal opportunities in the sector as it is viewed as an important aspect of employment recruitment. Interestingly, UNI Europa and ETNO in their joint declaration refer not only to the telecommunications sector but to all of the ICT.
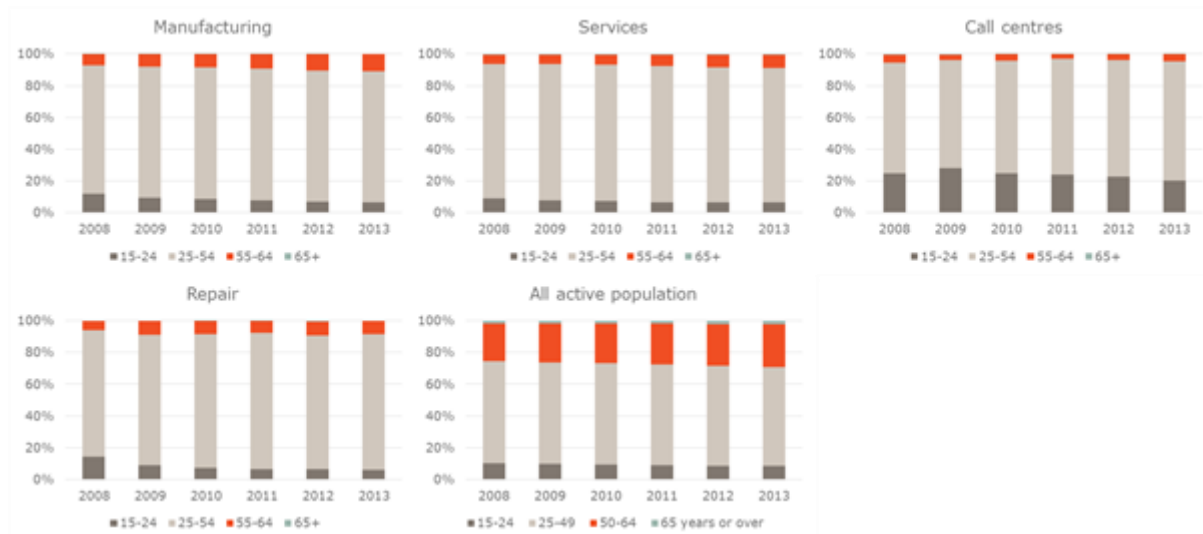
3.2   Age distribution

In this section, we discuss the distribution of the working age of employees in the ICT sub-sectors. Overall, the sectors are dominated by middle-aged employees, between 25 and 54, and increasingly it has a younger workforce relative to the overall active population. This perhaps illustrates some of the changes in working age of the four main sub-sectors and also the active population.

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[48] Diversity stats: 10 tech companies that have come clean
[49] ETNO (2014)

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Figure 3-1   Development of age distribution 2018-2013

Source: Eurostat (lfsa_egan) and Labour Force Survey (special data extraction from Eurostat).
Note: Data cover the population with the working status (ILOSTAT) 'Employed' in LFS.

In the period 2008-2013, the data show limited variations. Data suggest that the share of employees below 55 years has declined in manufacturing (from 93% to 89%), services (from 94% to 91%) and repair (from 94% to 91%) while the shared has remained constant at 95% for employees of call centres.

Exploring the data in more detail, exemplified by 2013 as the most recent year covered, we find that there are some differences between the sub-sectors. Table 3-2 below shows the age distribution by sector and by all the active population in 2013.

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Table 3-2   Age distribution – all sectors, 2013

	15-24	25-54	55-64	65+	Total
262 - Manufacturing of computers and peripheral equipment	8%	83%	9%	0%	100%
263 - Manufacturing of communication equipment	6%	83%	11%	0%	100%
264 - Manufacturing of consumer electronics	8%	78%	14%	0%	100%
268 - Manufacturing of magnetic and optical media	0%	100%	0%	0%	100%
61 – telecommunications	7%	83%	10%	0%	100%
62 - computer programming, consultancy and related activities	6%	86%	7%	1%	100%
631 - Data processing, hosting and related activities; web portals	7%	87%	5%	0%	100%
820 - Activities of call centres	20%	75%	4%	0%	100%
951 - Repair of computers and communication equipment	6%	85%	9%	0%	100%
All active population	**10%**	**64%**	**24%**	**2%**	**100%**

Source: Eurostat (lfsa_egan) and Labour Force Survey (special data extraction from Eurostat).

Note: All active population means the population with the working status (ILOSTAT) 'Employed' in LFS.

Table 3-2 indicates that the share of employees below the age of 55 is higher in all the sectors compared with the total active population where 26% are over 54 years old.

The sectors with the highest share of employees below the age of 55 are 268 – manufacturing of consumer electronics (100%), 820 – call centres (95%) and 631 – data processing (94%). Again the call centres (820) stand out. This sub-sector has a significantly higher share of very young employees (aged 15-24) than the rest of the sub-sectors and double the active population average.

The relatively young workforce in the telecommunications and ICT sectors may have implications for industrial relations. This is further discussed in chapter 4.

3.3   **Education and required skills**

Knowledge and learning is an important driver of the information society[50]. Generally, the telecommunications and ICT sectors are characterised by workers with higher level of education compared to the average workforce in the EU28, c.f. Table 3-4 below. As illustrated by data in 2013, all sub-sectors apart from 264 - manufacturing of consumer electronics and 822 – call centres, have a workforce with a larger share of employees with a higher level of education i.e. Short-cycle tertiary, bachelor or higher education, compared with the average. The share of employees with low education levels (meaning less than lower secondary education) is significantly below that of the average workforce.

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[50] DiDomenico (2010)

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Table 3-3   Educational distribution – all sectors, 2013

	Low	Medium	High	Total
262 - Manufacturing of computers and peripheral equipment	9%	47%	44%	100%
263 - Manufacturing of communication equipment	9%	47%	44%	100%
264 - Manufacturing of consumer electronics	15%	58%	27%	100%
268 - Manufacturing of magnetic and optical media	5%	48%	46%	100%
61 – Telecommunications	8%	45%	47%	100%
62 - computer programming, consultancy and related activities	3%	30%	66%	100%
631 - Data processing, hosting and related activities; web portals	4%	43%	53%	100%
820 - Activities of call centres	11%	59%	30%	100%
951 - Repair of computers and communication equipment	10%	55%	35%	100%
All employed workers	**19%**	**49%**	**32%**	**100%**

Source: Eurostat (lfsq_egaed) and Labour Force Survey (special data extraction from Eurostat).
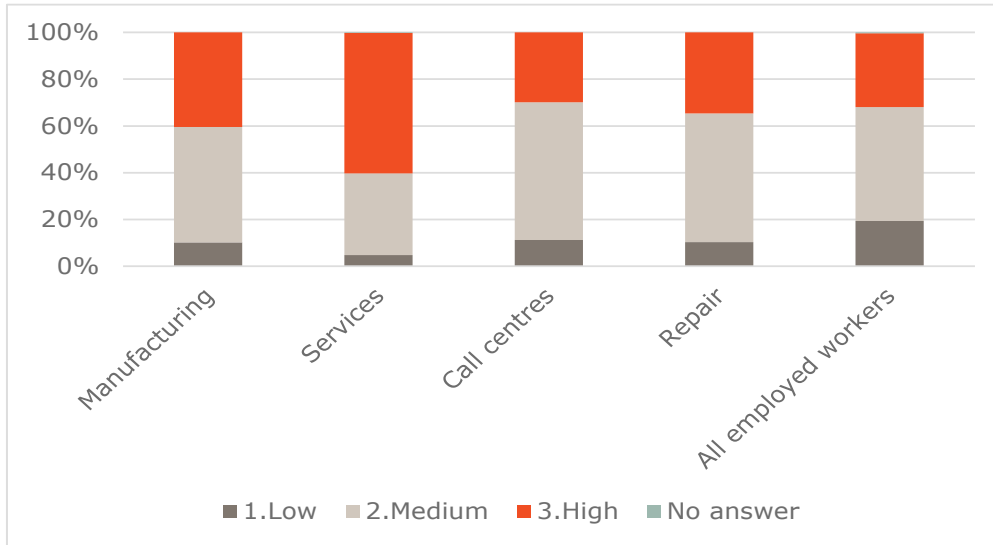
Note: Data cover the population with the working status (ILOSTAT) 'Employed' in LFS. Low is defined as less than primary, primary and lower secondary (levels 0-2), medium is defined as Upper secondary and post-secondary non-tertiary (levels 3 and 4) and high is defined as Short-cycle tertiary, bachelor or equivalent, master or equivalent and doctoral or equivalent (levels 5-8)

Not surprisingly, the highest educational level is found in 62 - computer programming, consultancy and related activities and in 631 - data processing, hosting and related activities; web portals where 66% and 53% respectively of the employed are among those with the highest educational level. This is well above the rest of the sectors and more than 50% higher than the average of all employed workers (32%).

On the other hand, the lowest educational level is found in 264 - manufacturing of consumer electronics and in 820 - activities of call centres where 15% and 11% respectively are in the group with the lowest educational level. However, it should be noted that the shares are still somewhat below the total share of employed with the lowest educational level (19%).

Looking at the different clustering sectors, data show some rather large differences in the level of education of the employed, as displayed in Figure 3-2 below. As indicated above the level of education is highest in the service sectors while it is lowest in call centres and in repair. The findings from the case studies confirm that those employed in the telecommunications and ICT sectors are generally higher educated than the average workers in EU28, albeit with some differences in the case countries. For example in Estonia, Germany, the Czech Republic and Portugal, workers with the highest educational level are found in services, while in Romania the same applies to the call centres. However, generally on the whole, the trend is that the level of education is highest in services and lowest in call centres.

Figure 3-2   Distribution on levels of education – clustering sectors, 2013

Source: Eurostat (lfsa_egan) and Labour Force Survey (special data extraction from Eurostat).

Note: Data cover the population with the working status (ILOSTAT) 'Employed' in LFS. Low is defined as less than primary, primary and lower secondary (levels 0-2), medium is defined as Upper secondary and post-secondary non-tertiary (levels 3 and 4) and high is defined as short-cycle tertiary, bachelor or equivalent, master or equivalent and doctoral or equivalent (levels 5-8)

From 2008 to 2013, it seems that education levels overall are increasing across the sectors.

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This development is confirmed by the interviews where both employer and trade
unions[51] stated that the sector generally requires higher skills now than in the past.
The demand for low-end developers and database administrators is replaced by
demand for workers such as business analysts, sales specialists and high-end
developers[52].

Furthermore, stakeholders confirm that the overall European trends of employment in
traditional telecommunications have declined and employment in the knowledge
intensive sectors has increased. Stakeholders from one Member State elaborated on
this and explained the development by three key factors:

- A strong need for high-end developers and yet a demand for all ICT skills

- A shift from workers being self-taught towards workers with higher education

- Activities that demand fewer skills are being outsourced.

Low-end developers and database administrators are still needed. Although the
number of low-end developers does exhibit a declining trend, this applies in particular
to the telecommunications field[53].

Size and type of firms also influence the demanded level of skills as demonstrated by
the three case study examples below. In the case countries, the share of higher
educated workforce in the sector is increasing although the share is significantly
different as indicated below.

Figure 3-3   Development in education levels across the case study countries
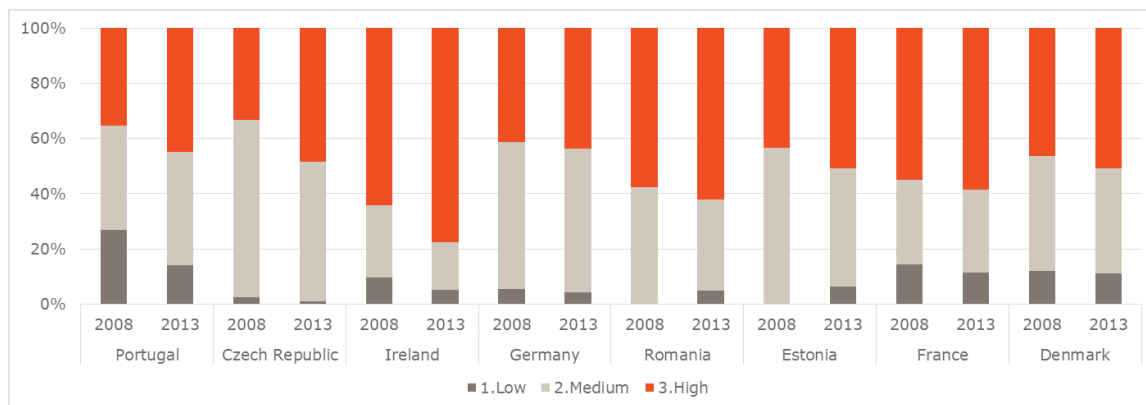
*Source: Source: Eurostat (lfsq_egaed) and Labour Force Survey (special data extraction from
Eurostat). Note: Data cover the population with the working status (ILOSTAT) 'Employed' in
LFS. Low is defined as less than primary, primary and lower secondary (levels 0-2), medium is
defined as Upper secondary and post-secondary non-tertiary (levels 3 and 4) and high is
defined as Short-cycle tertiary, bachelor or equivalent, master or equivalent and doctoral or
equivalent (levels 5-8)*

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[51] 96% either agree or fully agree. 23 interviewees answered this question.
[52] 75% of interviewees agree or fully agree. 24 respondents answered this question.
[53] Emphasized during interviews

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Example from Ireland

A large number of well-established global leaders such as Intel, HP, Microsoft and Apple have been joined by newer 'giants' (Google, Facebook, PayPal, eBay, Twitter) in setting up operations in Ireland. As a result, this has contributed to the development of knowledge-insensitive economy. Moreover, multinationals such as Telefónica confirms the shift from traditional telecommunications to more knowledge-intensive sectors/jobs. However, it remains necessary to employ workers with different backgrounds and levels of expertise to maintain its core activities.

Example from Denmark

The average size of ICT companies has increased significantly during the past decade, and consequently the role of SMEs small enterprises therein has fallen. The sector is now characterised by a series of relatively bigger firms with production in many countries. As a result, expectations and requirements have become higher in terms of documentation and standardisation in these firms in order to enhance control, communication and overview. Furthermore, the demand has shifted from highly specialized technical competences in programming towards employees with skills in standard programmes and software and the capability to tailor solutions within these programmes to customers' needs. This development towards more standardisation is experienced by the employees as a deterioration of their working conditions.

However, low-end workers still perform important activities, and it is noted that to some extent, experience can also been seen as partly balancing out not necessarily having the most up-to-date training. It should also be mentioned, that some people work with technologies that have not changed for a significant amount of time, e.g. mainframe structures are the same as they were 20 years ago. Interestingly, the Portuguese case study points rather to an increase in the demand for specialized workers – contrary to the Danish case study that highlights some key geographical differences in the demand for labour.

Example from Portugal

When asked about their expectations concerning the developments in the education composition of the telecommunications and ICT workforce, respondents agree that the technological development will require increasingly specialized workers, and that jobs requiring fewer skills are more likely to be outsourced in the future. Furthermore, respondents agree that the technological and market developments require constant skill upgrading and that skills are becoming obsolete at a faster rate compared to previously.

The difference between the cases may reflect that the countries' sectors are in different phases in their product lifecycle. The sectors in both countries are moving forward in the product lifecycle. **Half-life of skills and training** employees are to a large extent expected to be adaptable to change depending on developments of markets, occupational requirements, employer employee relations and technologies[54]. Reducing the half-life of skills is part of securing continuous learning. According to a study presented at the Conference for Industry and Education Collaboration in 2010[55], the half-life of technical skills for engineers was at that time between seven and a half and two and a half years. For engineering professionals in the telecommunications and ICT sectors where technological development is moving at a relatively fast pace, half-life can therefore be expected to be in the lower end of the scale. This is supported by the interviews where the half-life of skills learning of the most rapid areas of the

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[54] DiDomenico C.F. (2010) and Ryan, P. (unknown)
[55] DiDomenico C.F. (2010)

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sector is said to be around three to five years. However, in some areas of the sector technological development is limited and mainframe structures are basically the same as they were 20 years ago; hence the qualifications of working with these technologies have not changed significantly either[56].

As for workers in call centres, the importance of half-life of skills is likely to be of relatively limited importance as the turnover of workers is high. Workers stay in these jobs for a very short time and generally shift to other employment if possible[57].

The stakeholders interviewed[58] suggest that qualifications in the telecommunications and ICT sectors are continuously increasing, particularly in comparison with other sectors. Workers are expected to be updated on the latest technological developments and multiple skills are required, e.g. the ability to ease and support business professionals are now essential.

For training, there are some discrepancies in the approach where there is a tendency for employers to focus on already highly skilled personnel and keeping them up to date with the latest developments. However, for the employees, the focus is more on the groups who are at risk of losing their jobs given the reduced job security and reduced fixed working time.

3.3.1   Transferability of skills

The increasing requirements to be more qualified raises the issue of unpredictability in the telecommunications and ICT sectors, in which it is difficult to determine the evolution of technologies and the adequate themes to focus on training. These skills are often not easily identifiable or transposable. The multinationals provide training programmes, e.g. IBM certification and CISCO CCNA Security certification, which can be considered as more or less important depending on the developments in the sectors and on whether the company who provided the certificate has a large enough market share. Consequently, workers with those qualifications might be increasingly dependent on the companies' activities, e.g. their skills can get out of demand if the training provider experiences some poor performance.

The trade unions and employer organisations have contributed to this debate, whilst emphasising the importance of promoting e-skills and improving conditions for reskilling outside companies. This raises the question of transferability of skills and who are responsible for paying for the upgrading of skills. In general, workers are expected to search and finance training by themselves, which constitutes a financial burden on the employees. The issue of who finances the required training is in constant debate among social partners.

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[56] Emphasized during interviews
[57] Interview with European trade union
[58] 92% of the interviewees. 24 respondents answered this question.

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3.4   Contractual situation and mobility

The telecommunications and ICT sectors are characterized by a higher share of full-time jobs than the general labour market (except call centres). Figure 3-4 below shows the differences between the distribution of full-time and part-time jobs in the different sectors.

Figure 3-4   Share of full time jobs – clustering sectors, 2008-2013
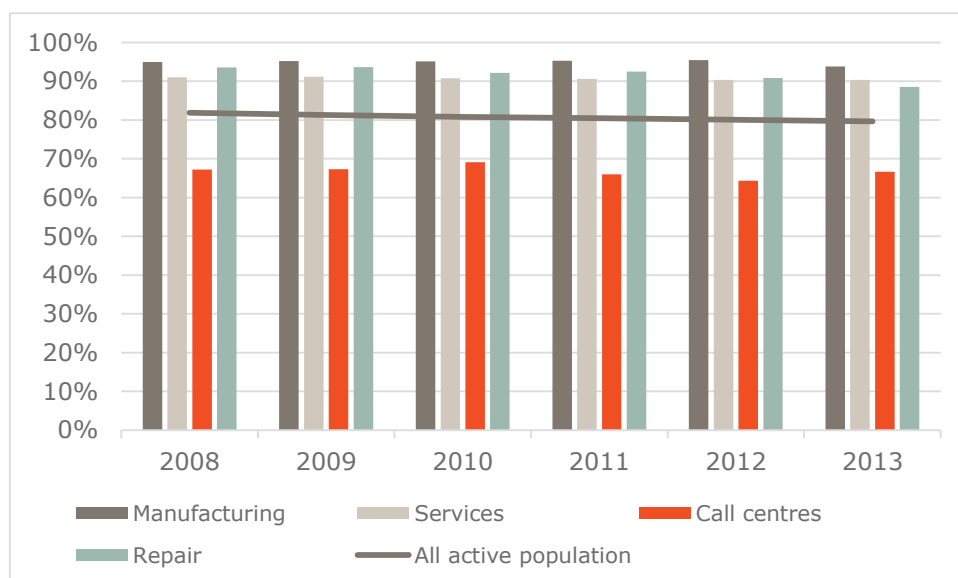
*Source: Eurostat (lfsa_epgan2) and Labour Force Survey (special data extraction from
            Eurostat).*

Note: Data cover the population with the working status (ILOSTAT) 'Employed' in LFS.

Generally, full-time jobs are the most common job type in the telecommunications and ICT sectors. In manufacturing, services and repair, more than 90% of the jobs are full time jobs. In call centres, the share of part-time jobs is more than twice the size of part-time jobs in the other sectors (31-36% in the period). Figure 3-4 also shows limited variations in the period 2008-2013, meaning that the distribution between part -time and full-time jobs has been constant over the period.

Similarly, the underlying data only show limited variations for the different subsectors. The share of full-time jobs in the subsectors of manufacturing is between 89% and 100%, and in services the share of full-time jobs is between 88 and 94%[59].

A comparison of the different case countries reveals some differences in the type of jobs[60]. In Germany, France, the Czech Republic, Romania and Portugal, the share of full-time jobs are high (around 85-100%) in manufacturing, services and repair.

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[59] The remaining two sectors only consist of one subsector why there is naturally no variation for these.
[60] Information from Denmark, Estonia and Ireland is limited and hence not included in the description.

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However, the job types in call centres differ significantly across the case countries; In Germany, for example part-time jobs are employed extensively (around 35%) and even lower in France (around 10%) On the other hand, in Romania, the Czech Republic and Portugal, the share of part time jobs in call centres varies largely in the 2008-2013 period; ranging between 63 and 100% in Romania, between 67 and 100% in the Czech Republic and between 62 and 81% in Portugal. According to interview with UniGlobal, a trade union with particular focus on call centres emphasise that turnover in the sector is very high - generally three months - and there is a high share of students employed.

The use of temporary contracts is also quite widespread in some parts of the telecommunications and ICT sectors. Figure 3-5 below displays the use of permanent contracts in the telecommunications and ICT sectors in the 2008-2013 period.

Figure 3-5   Share of permanent contracts – clustering sectors, 2008-2013
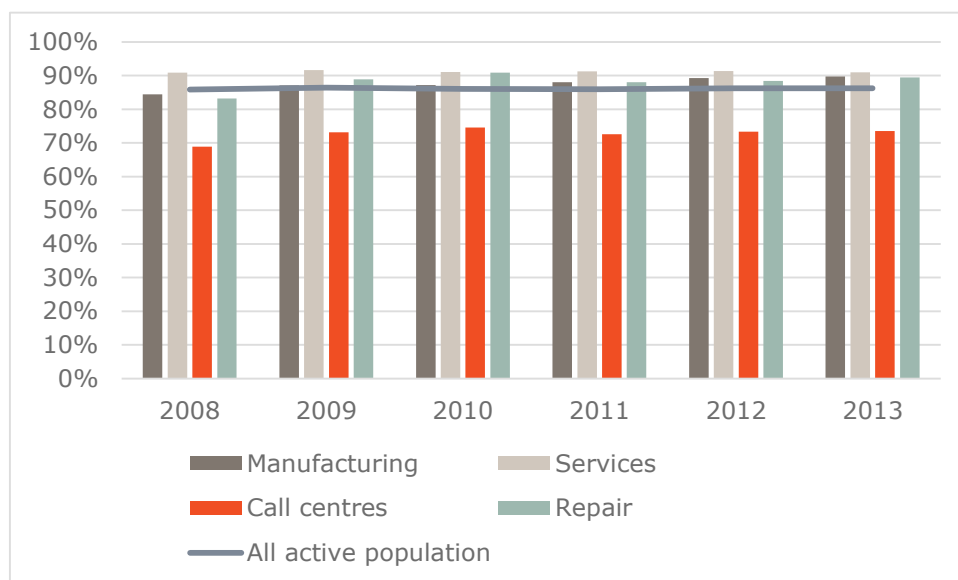
Source: Eurostat (lfsa_etpga) and Labour Force Survey (special data extraction from Eurostat).

Note: Data cover the population with the working status (ILOSTAT) 'Employed' in LFS.

As mentioned above, the use of temporary contracts is widespread in call centres (around 27% throughout the period); compared with the total active population where the share is around 14%. In manufacturing, services and repair, the use of temporary contracts exhibits similar rates, which are lower than in the general labour market.

Looking at the sectors within manufacturing and services, the data show only slight variations in the service sectors (61 - Telecommunications, 62 - computer programming and 631 – data processing), while there are some differences in the manufacturing sectors. Sectors 262, 263 and 268 are in line with the general labour market but the use of temporary contracts in sector 264 is at a similar level to call centres.

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There are major differences in the use of temporary contracts across case study countries. These changes are largely due to the difference in the general use of temporary contracts in the countries. For example, in Portugal the general use of temporary contracts is higher than in Denmark and France. A general trend in the case countries – except Romania[61] - is that the use of temporary contracts is highest (and above the general labour market) in call centres. In the Czech Republic, Germany and France, the use of temporary contracts in services, manufacturing and repair is generally lower than in the overall labour market while the opposite is the case for Portugal[62].

The use of temporary contracts and part time jobs may also influence the industrial relations in the telecommunications and ICT sectors. Employees on temporary contracts and part time employees may have a shorter time horizon and hence may not be interested in participating in the social dialogue and in the process of making longer-term changes in the sectors.

Freelancing and solo-self-employment in the ICT sector seems to be a very important issue, in particular in sub-sectors such as software development and publishing, data processing, hosting, web-portals. Also, it seems that new forms of employment such as crowd-employment (clickworkers), co-working of freelancers, etc. are particularly widespread. However, we face a lack of data and figures here, although in Germany data exist on the strong increase of 'non-traditional' and new forms of employment in the creative industries that today are largely shaped by ICT employment.

"Solo" self-employment in Germany

Also favoured by labour market reforms and employment policy priorities, various forms of solo self-employment (e.g. freelancing, service contract works) are amongst the fastest growing new forms of employment in Germany. In 2010, nearly 2.4 million self-employed in Germany had no employees which was 56% of all self-employed and 6% of all employed persons. 'Solo' self-employment has increased by 30% since 2000 and today is particular widespread amongst 'creative industries' and ICT. According to recent studies, solo self-employment amongst software developers between 1998 and 2008 has increased by 91.1%. Moreover, according to a study on the creative sector in Berlin, around 45% of all employees have been working as self-employed or freelancers in 2009. (For further details see country case study for Germany).

The multinational organisation has stated that freelance workers do not have the same working conditions as workers employed for an indefinite period. The advantages of this arrangement are related to the use of an expertise that was not developed in-house. On the other hand, this service might come with a high cost and, ultimately, the specific knowledge will not be owned by the company.

The trade unions and employer organisations have generally not experienced an increase of freelance and/or self-employed workers in their membership. However, one exemption is a French organisation that indicates that the number of freelancers/self-employed is increasing. But still, those workers constitute a minority within the organisations, if they exist at all. This pattern can be attributed to the background of freelance and/or self-employed workers, since they are usually younger

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[61] In Romania, the data shows no use of temporary contracts in any of the sectors in the telecommunications and ICT sectors.
[62] Data for Denmark and Ireland are weak and information is only available for a limited number of sectors.

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and have not been exposed to unions as much as the traditional ICT workers, e.g. telecommunications operators. The organisation around professional associations might also promote the collaboration necessary to keep up with the development of the sectors.

Solo-self-employment in the ICT sector seems to be a very important issue, in particular in sub-sectors such as software development and publishing, data processing, hosting, web-portals. However, at the same time, evidence gathered at micro-level, e.g. on the strong increase of employment in the gaming industry in Germany (e.g., in the city of Hamburg) is rather surprising as most new jobs created were on the basis of direct and open-ended contracts (see textbox).

The Gaming industry in Hamburg

The most recent labour market survey that is carried out on the gaming industry in Hamburg by the cities' gaming industry initiative ('Gamecity Hamburg') shows that the gaming sector in 2014 employs around 4,350 workers in local development and service centres run by more than 150 companies. The survey reports a job creation rate of around 12% between August 2012 and August 2013. Even more impressive is a longer-term view on job creation: since 2009 the gaming industry in the city has created nearly 2,000 jobs.

Interestingly, most of the jobs in the gaming industry in Hamburg are in direct employment and the share of direct employment has increased since 2009: In August 2014, it is reported that 83% of all employees are employed directly, compared to 7.5% as freelancers and 9.2% as employees that work for Hamburg-based companies but – for example due to mergers or takeovers worked in other places.

Exploring the structure of the gaming industry in Hamburg, more than 50% of the companies were in the software development/publishing business and around 15% of the companies are providing services such as sound, technology, graphics, data traffic, the rest of the companies providing PR, media support and consultancy services.

Despite Hamburg hosting the largest national gaming company GOODGAME Studios, which in October 2010 reported to have hired its 1,000th employee, most of the gaming sector is characterised by small firms: 70% are micro companies with up to 10 employees, nearly a quarter of all companies employ only up to 50 employees and only 5 out of 151 companies have more than 100 employees.

The main jobs offered by the gaming industry are game and web developers and designers, game producers and programmers. This is excluding IT jobs and jobs such as sales and marketing, business development, translators, HR and finance/accounting.

The business is quite desperately seeking young professionals in all occupational fields but in particular professionals that already have some experience in the ICT business (e.g. team leading, project/budget management). In October 2014 GOODGAME Studios alone has posted several 100 job vacancies on its website and offered a premium of EUR 1,000 for individuals who would successfully promote another person for a job at the company. According to their own estimates, the company, which was only established in 2009, is the fastest growing games developer in Europe and during the last few years has hired several hundreds of employees. However, as there is a lack of young talents in the fields from Germany, the company is characterised increasingly by global recruitment and a multi-cultural workforce from more than 50 countries.

Against this somehow contradictory evidence, it is also important to make a more in-depth analysis of employment created by start-ups and new-born companies. Here, it seems that new forms of employment, such as crowd-employment (clickworkers), co-working of freelancers, etc. are particularly widespread. However, we face a lack of data and figures here (though for example in Germany data exist on the strong increase of 'non-traditional' and new forms of employment in the creative industries that today are largely shaped by ICT employment. This is a major challenge in many countries (e.g. in Germany regarded as the most important barrier/hurdle to economic growth in the ICT sector).

With regard to job security, both employer organisations and trade unions agree that job security has decreased significantly. However, the employer organisations have the view that this is a positive development as it gives employees the possibility of pursuing a varied and balanced career. This point is emphasised by the Danish ICT

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(employer organisation) who mentions flexi-security as a positive element. Moreover, a flexible labour market in general is mentioned as a positive element and contributes to growth and innovation. Employers organisations also highlight that the decrease in job security is a general trend in the labour market, which been going on for more than 20 years. On the other hand the employees' organisation stresses the disadvantages of short term employment contracts and outsourcing.

As regards career conditions, trade unions argue that the conditions are only good for highly skilled young males, whereas other groups have fewer opportunities.

Example from Denmark

> The interviewee from the trade union states that the working conditions are characterised by a high level and fast pace of technological changes, which demand both a high level of flexibility and create uncertainty about the future of one's job, but also provide carrier opportunities.

On the other hand, evidence from Germany points to the emergence of more flexible forms of work:

Example from Germany

> … Also favoured by labour market reforms and employment policy priorities, various forms of solo self-employment (e.g. freelancing, service contract works) was amongst the fastest growing new forms of employment. In 2010, nearly 2.4 million self-employed in Germany had no employees which was 56% of all self-employed and 6% of all employed persons. Solo self-employment is particular widespread amongst 'creative industries' and ICT. According to a study on the creative sector in Berlin, around 45% of all employees have been working as self-employed or freelancers in 2009.

This tendency has been found by earlier research of the German Parliament to be linked to increasingly discontinuous careers in the ICT sector, c.f. Deutscher Bundestag (Hrsg.) (1998): *Deutschlands Weg in die Informationsgesellschaft/ Enquete-Kommission „Zukunft der Medien in Wirtschaft und Gesellschaft; Deutschlands Weg in die Informationsgesellschaft"*, Bonn, p. 134

From the interviews it seems that flexible employment is used with very specialized tasks where the firms cannot have the specialists they need as full time staff all the time. The projects are different and the tasks are different why flexible employment is a necessity.

3.5   Salary

Salary levels in the sector provide an indication of the supply of the demanded workforce in the sector. High salary levels may indicate that there is demand for specific skills with limited availability. On the other hand, low wages indicate that skills requirements are fairly low and access to labour with the right skills is abundant. In different sub-sectors of the telecommunications and ICT, wage levels are likely to differ significantly. Salary levels in call centres are generally fairly low[63] whereas it can be expected that specialised IT engineers or programmers are in the higher end of the salary scale.

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[63] interview with an European -level trade union with particular focus on call centres

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There is only limited information regarding salary levels across the EU as Eurostat does not provide this information at sector level. However, the case studies provide an indication of salary ranges in France, Estonia and Ireland. The cost and wage levels in these three countries vary significantly and the indicative salary levels can thus not be compared. It is worth noting that both for Estonia and Ireland, the jobs in the telecommunications and ICT sectors are among the better paid. In this context, it should also be mentioned that the salary is only a part of the total labour cost and in particular sectors with a high demand for training and adaption, the salary can constitute only a limited part of the total labour cost, if paid by employer.

As demonstrated in Table 3-4 below, for the three countries where sector specific salary information has been available, it is well above the average national yearly gross salary. However, as indicated for Ireland, salary levels vary significantly within the sectors. However, information about salary levels is rather uncertain as it was not available from a peer reviewed source.

Table 3-4   Indication of sector salary level in three case countries

Country	Wage tendency	Average national yearly gross salary[64]	Yearly gross salary
France	Salaries vary considerably from job to job, as the telecommunications and ICT sectors include a vast range of jobs requiring very different levels of qualification. While there is only limited, precise information on salaries for all job levels within the telecommunications and ICT sectors, the compensation for professionals can be found[65].	EUR 31,000	In the ICT sector: EUR 35,000-40,000 Telecommunications and network functions: EUR 30,000-35,000[66]
Estonia	According to Statistics Estonia, the average monthly gross wage in the ICT sector has been much higher compared with the average monthly gross wage in other sectors of Estonia and also the highest compared with all other sectors. The average gross wage in the ICT sector is almost 40% higher compared with the average gross wage in other sectors of Estonia, and its increase has been much faster (18% compared to the 13% increase in the average gross wage in Estonia in the period 2008-2013). A recent analysis indicates that the demand for labour in the ICT sector is greater than the supply[67].	EUR 10,000	ICT sector 2008: EUR 15,500 ICT sector 2013: EUR 18,900 Telecommunications: no information available
Ireland	Traditionally, Ireland has had very predominant mining and chemical industries, which used to contain the best-paid jobs. The best-paid jobs are now found in the IT sector	EUR 42,000	ICT sector[71]: Senior software engineer: EUR 61,238,

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[64] Eurostat [earn_ses10_20], data for 2010
[65] http://www.zdnet.fr/actualites/tic-32500-euros-de-salaire-annuel-moyen-pour-les-cadres-francais-39370247.htm
[66] http://www.zdnet.fr/actualites/tic-32500-euros-de-salaire-annuel-moyen-pour-les-cadres-francais-39370247.htm
[67] See: Jürgenson, A., Mägi, E., Pihor, K., Batueva, V., Rozeik, H., Arukaevu, R. (2013). Eesti IKT kompetentsidega tööjõu hetkeseisu ja vajaduse kaardistamine. Tallinn: Poliitikauuringute Keskus Praxis. http://www.praxis.ee/wp-content/uploads/2014/03/2013-IKT-kompetenstidega-toojoud-uuringuaruanne.pdf.

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Country	Wage tendency	Average national yearly gross salary[64]	Yearly gross salary
	and in the financial sector. The telecommunications sector also pays above-average salaries[68]. Naturally, the median yearly salaries vary across jobs and level of skills required[69]. In telecommunications, there are also considerable variations in salaries[70].		Network engineer: EUR 35,000[72]. Telecommunications[73]: A project manager around EUR 62,288, Computer-aided design technician: EUR 28,938

Source: case studies in appendix 3

The stakeholders interviewed state that the salary regime is increasingly flexible but less transparent, which would normally benefit the highly skilled workers and could lead to increasing differences between high and low-skilled labour. As the diversity of the sector has increased, so has the wage range of the different areas of the niche. This is supported by all interviewed organisations. This increased wage range and differences between wage levels in the EU MS might lead to increased worker mobility. Mobility from typical low wage countries to higher wage countries could be induced by large differences in salaries and general expected quality of life. The ICT sector is believed to be *particularly susceptible to this potential brain drain*[74]*.* This might be because of relatively high wages in the sector and opportunities for start-ups and demand for highly skilled workers

On the other hand, high-wage countries experience constant global pressure to minimise costs, which may induce companies to outsource or reallocate jobs to minimize cost levels.

An example is TDC, the former Danish state monopoly telecommunications company. TDC is now a market player in the competitive the telecommunications market.

TDC has over the last years bought a number of upcoming low-cost telecommunications companies, including Telmore, and is putting heavy pressure on the newcomers' salary package. Benefits that in general is very common on the Danish labour market.

The low cost company Telmore was acquired by TDC and became part of a TDC daughter company TELCO. May 2014 employees from Telmore received a letter with an ultimatum – reduce your pay or be fired. Employees were requested to accept annulment of extra pay for seniority, payment under maternity/paternity leave*, payment for child's first day of sickness, free mobile phone, health insurance and 15-minute daily break.

Dansk Metal, the trade union of TDC employees, is appalled by this action and calls it a grim stain on the

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[71] http://www.payscale.com/research/IE/Industry=Information_Technology_(IT)_Services/Salary Please note that these numbers are very indicative and is just providing an indication based on a limited selection and not a representative analysis of salary levels
[68] Just landed, Working in Ireland, http://www.justlanded.com/english/Ireland/Ireland-Guide/Jobs/Working-in-Ireland .
[69] http://www.payscale.com/research/IE/Industry=Information_Technology_(IT)_Services/Salary. Please note that these numbers are very indicative and is just providing an indication based on a limited selection and not a representative analysis of salary levels
70 http://www.payscale.com/research/IE/Industry=Telecommunications/Salary Please note that these numbers are very indicative and is just providing an indication based on a limited selection and not a representative analysis of salary levels
[72] http://www.payscale.com/research/IE/Industry=Information_Technology_(IT)_Services/Salary Please note that these numbers are very indicative and is just providing an indication based on a limited selection and not a representative analysis of salary levels
[73] http://www.payscale.com/research/IE/Industry=Telecommunications/Salary Please note that these numbers are very indicative and is just providing an indication based on a limited selection and not a representative analysis of salary levels
[74] Turlea, G. and Bogdanowiscz, M. (2007).

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> Danish collective bargaining model. In Denmark, a minimum of 50% of the employees must be member of a trade union in order for the workplace to be covered by a collective agreement and this was not the case in Telmore. This example is further discussed in chapter 4.
>
> Moreover, starting hourly salary for new employees was reduced from EUR 16.7 to EUR 14.7**.

Source: TV2News 1. February 2015 http://nyhederne.tv2.dk/samfund/2015-02-01-tdc-til-ansatte-gaa-ned-i-loen-eller-bliv-fyret *(05/2/2015)*
*Note: *in addition to the minimum guaranteed under Danish Law ** from DKK 125 to DKK 110. Calculated by consultant using exchange rate 7.5. Minimum hourly wage in Denmark for unskilled labour working normal hours is DKK 107.46 Danish Kroner[75].*

A senior analyst in one of Denmark's biggest banks argues that the toughened competition in the telecommunications sector leads to deteriorating salary and working conditions in the sector[76].

Salary levels seem to be the primary target when it comes to lowering costs in call centres. It has not been possible to identify statistical data on this issue but it was emphasised by several stakeholders. Case studies on Teleperformance also indicate that the company puts downward pressure on salary levels and counteract attempts of unionisation and collective bargaining at certain locations – although not necessarily within the EU.

Data from the US labour statistics also show that women in computer and mathematical occupations earn less than men for the same work – 83% to the dollar[77]. This is not necessarily the same in the EU, but it could indicate that there is a challenge of securing equal pay for equal jobs also considering the massive gender imbalance identified above. It is safe to say that there is a salary gap between the sectors dominated by male and female employees, which might be due to the characteristics of the sector and not necessarily to the gender difference.

3.6   Working time

Given the fact that jobs vary in content description, it is natural to assume that the working time also varies. While people in sales or in manufacturing often work specific, predetermined hours, developers and ICT service personnel might have to be available outside typical office hours and work longer hours in general.

The different sectors have some distinct characteristics regarding working time, as displayed in Figure 3-6 below.

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[75] Minimum wages Denmark: http://nbl-landsforening.dk/onlinepdf/diverse/Mindste_timeloen_i_butikker_%20doegnkiosker_servicestationer.pdf

[76] Telecommunication sector expert and senior analyst in Sydbank, Morten Imsgaard http://nyhederne.tv2.dk/samfund/2015-02-01-tdc-til-ansatte-gaa-ned-i-loen-eller-bliv-fyret

[77] ftp://ftp.bls.gov/pub/special.requests/lf/aat39.txt, 2010

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Figure 3-6   Working time – clustering sectors, 2008-2013

Source: Labour Force Survey (special data extraction from Eurostat).

Note: Data covers the population with the working status (ILOSTAT) 'Employed' in LFS.

A rough estimate indicates that the average working week in manufacturing, services and repair is around 42 hours while it is somewhat lower in call centres (35 hours per week)[78]. In comparison, the general working week for all employed in EU28 is around 37[79] hours per week. This may indicate that, in large areas of the telecommunications and ICT sectors, the work pressure is high. For call centres, this finding is somewhat surprising as this sector has a relatively large share of part-time employees as indicated in section 3.4.

Trade unions and employer organisations agree that working time is becoming more flexible, but whilst employer organisations consider this a positive element of the work-life balance, the trade unions has more negative views on flexible/not fixed working time.

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[78] Assuming that workers working less than 19 hours, work 10 hours per week, workers working between 20-29 hours' work 25 hours on average, workers working between 30-39 hours' work 35 hours on average, workers working between 40-49 hours per week work 45 hours on average and workers working above 50 hours on average work 60 hours per week.
[79] Source: Eurostat (lfsa_ewhun2)

This trend is also evident when looking at the share of workers working more than 40 hours per week. In manufacturing, services and repair, this share was between 65 and 82% in the 2008-2013 period, while the same share in call centres was between 30 and 45%, cf. Figure 3-7 below.

Figure 3-7   Share of workers working more than 40 hours per week – clustering sectors
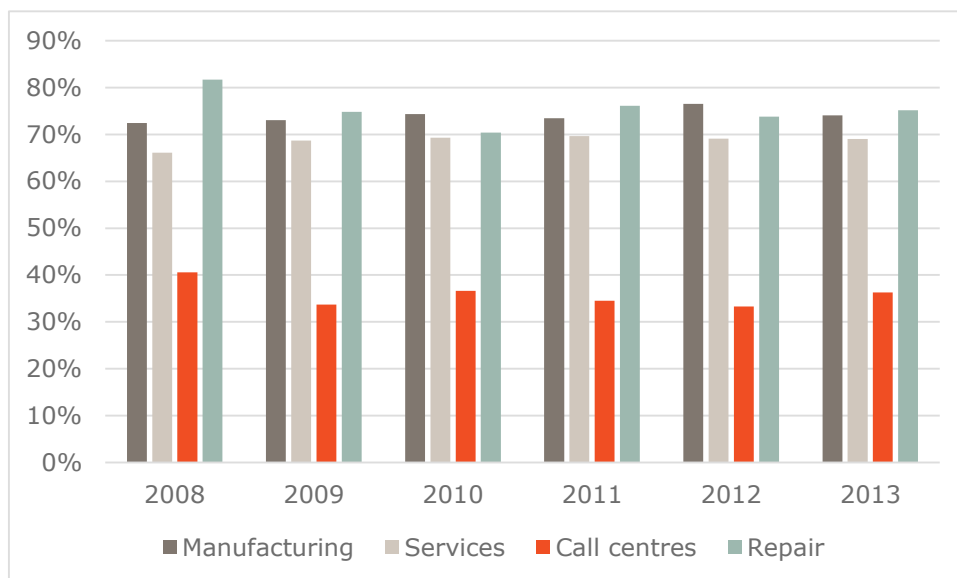
Source: Labour Force Survey (special data extraction from Eurostat).

Note: Data cover the population with the working status (ILOSTAT) 'Employed' in LFS.

Figure 3-7 illustrates that all sectors have experienced differences in the development of the share of workers working more than 40 hours per week. In manufacturing and services, the share has increased slightly (2% and 4% respectively) while it has decreased in call centres and repair by 10 and 8% respectively. One explanation can be the increased use of part-time workers in the repair sector and in the call centre sector.

A comparison of the case study countries reveals that there are large differences in the weekly working time in the telecommunications and ICT sectors. The working time is highest in Portugal, the Czech Republic, Romania and Estonia, but these countries are also those with the highest general working hours per week. The working time is lowest in France and Denmark[80] where the general weekly working time is similarly lowest. Furthermore, a rough estimate also suggests, that the weekly working time in manufacturing, services and repair is higher on average across all sectors in all the case countries. Finally, in all the case study countries where data are available – except Romania – the weekly working time are lowest in the call centre sector.

This is illustrated in Figure *3-8* below.

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[80] Information for Denmark is only available for sectors 61 and 62

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Figure 3-8   Examples development in working hours over time from, Portugal, Ireland and Germany

Call centres - Portugal

Services - Ireland

Services - Germany
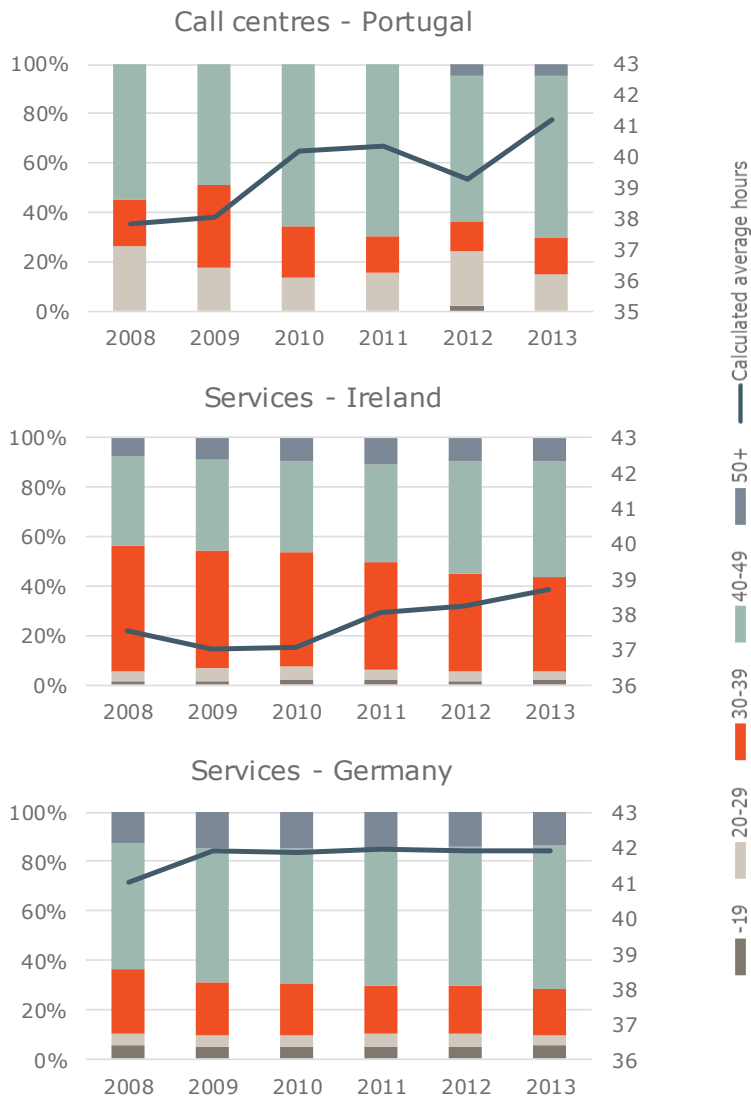
Overall, there is thus a tendency of increasing working hours across the sectors and case countries. According to stakeholders interviewed, there has been a development towards a deterioration of the work life balance. This is mainly caused by the technological development where workers are always online, e.g. checking emails on their mobile phones[81].

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[81] General view of interviewees

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3.7   Psychosocial risks

Psychosocial risks at the workplace falls under the Framework Directive 89/391/EC on occupational safety and health (OSH) covering all safety and health risks at the workplace. Employers are thus obliged to assess the risk and introduce initiatives to address the identified risks. The Directive is implemented into national legislation in all EU Member States[82].

A recent study by the European Agency for Safety and Health at Work (ESENER) is on the agenda for the majority of managers in Europe[83]. Based on ESENER data, the study states that nearly 80% of the European managers (hence not limited to telecommunications and ICT sectors) *"are concerned about problems with stress in their establishments, and about one in five also considers workplace harassment and violence to be of major concern"*[84].

In contrast, less than 30% of the managers have management systems addressing these risks. The integration of systems to address psychosocial risks as part of their OSH management systems is particularly poor among small companies with 10-19 employees where the share is less than 20%. Among large enterprises (250+ employees), this percentage grows to 40–50%. The distribution of specific measures taken to deal with psychosocial risks also varies considerably according to establishment size, sector and country. Hence, a systematic, comprehensive and preventive approach to managing psychosocial risks in European workplaces should be further promoted and supported. [85]

The awareness of European managers on this issue, though, might be reflected in the existing voluntary agreements between the social partners on this topic. At the EU level, social partners[86] across a number of sectors have signed autonomous agreements addressing psychosocial risks in regard to Article 155 of the TFEU, the Framework Agreement on Work-related Stress (2004) and the Framework Agreement on Violence and Harassment at Work (2007). This indicates a commitment among the social partners to address psychosocial risks. In addition to this, several EU-level social partners have developed multi-sectoral guidelines to tackle third-party violence and harassment related to work, which complement the work at cross-industry level[87].

Initiatives on psychosocial risks have been taken by several sectors, for example the railways sector, the educational sector, the telecommunications sector and the steel

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[82] National implementation reports on the implementation of OSH Directives in EU Member States.
[83] EU OSHA (2014) EU –OSHA Psychosocial risks in Europe Prevalence and strategies for prevention, 2014
https://osha.europa.eu/en/seminars/eu-osha-seminar-on-psychosocial-risks-in-europe/psychosocial-risks-in-europe-report.pdf.
[84] EU OSHA (2014) EU –OSHA Psychosocial risks in Europe Prevalence and strategies for prevention, 2014
https://osha.europa.eu/en/seminars/eu-osha-seminar-on-psychosocial-risks-in-europe/psychosocial-risks-in-europe-report.pdf.
[85] EU OSHA (2014) EU –OSHA Psychosocial risks in Europe Prevalence and strategies for prevention, 2014
https://osha.europa.eu/en/seminars/eu-osha-seminar-on-psychosocial-risks-in-europe/psychosocial-risks-in-europe-report.pdf.
[86] EPSU (European Federation of Public Service Unions), UNI Europa, ETUCE (European Trade Union Committee for Education), HOSPEEM (European Hospital and Healthcare Employers' Association), CEMR (Council of European Municipalities and Regions), EFEE (European Federation of Education Employers), EuroCommerce and CoESS (Confederation of European Security Services).
[87] EU OSHA (2014) Psychosocial risks in Europe Prevalence and strategies for prevention, 2014
https://osha.europa.eu/en/seminars/eu-osha-seminar-on-psychosocial-risks-in-europe/psychosocial-risks-in-europe-report.pdf.

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industry. Joint declarations are found in construction, electricity, private security and telecommunications.[88]

ETNO, representing the European telecommunications industry, has prepared guidelines for improving the mental well-being of workers within the telecommunications sector[89]. The guidelines present tools for assessing and addressing risks to mental health as well as a number of good practice examples from telecommunications companies throughout Europe. One of the key elements in the ETNO approach is stakeholder engagement and the dialogue between the social partners. They emphasise the importance of:

- Agreeing on the governance mechanism for addressing mental health

- Determining high-level objectives and shaping a programme

- Establishing a shared vision between the social partners

- Awareness of 'mission creep' – regular review against objectives

- Ensure 'expert' input is acceptable to both parties.

Conclusions from the joint ETNO-UNI Europa project "Good Work-Good Health"

The factors in work which help to promote mental well-being or which can pose a hazard to mental health are becoming increasingly well understood. The telecommunications industry is well placed to apply this learning because of its size, structure, access to new technology and history of collaborative working through social dialogue. Every organisation will have to develop its own solutions which reflect the business environment, culture and social framework in which it operates. This document sets out common principles that apply to all who work in the sector and practical guidance, based on what a range of companies are already doing, which can be used selectively to meet local needs. It is hoped that managers, employees and their representatives in the telecommunications industry will find the document helpful and that it may also have wider applicability to other employment sectors.

Source: ETNO

A recent assessment of the psychological working conditions in the telecommunications and ICT sectors provides a basis for highlighting some of the characteristics of the working conditions in the sectors[90]. There is an understanding of the ICT sector as being network-based and globally oriented, since it is a fast-evolving sector that looks towards the future. After the crisis in the early 2000s, however, it has also been recognised that the psychological working environment can be quite tough. It is a relatively privileged sector with learning and development potentials, committed employees, relatively high wages and also strong union organisation[91].

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[88] EU –OSHA (2014) Psychosocial risks in Europe Prevalence and strategies for prevention, 2014
https://osha.europa.eu/en/seminars/eu-osha-seminar-on-psychosocial-risks-in-europe/psychosocial-risks-in-europe-report.pdf.
[89] ETNO (year unknown), Good Work – good Health, Good practice guidelines;
https://www.etno.eu/datas/publications/studies/etno-goodpracticeguidelines-en.pdf; received funding from the European
Commission, DG Employment, Social Affairs and Equal Opportunities (Grant VS/2009/0162).
[90] Psykisk arbejdsmiljø mellem standardisering og selvledelse, Center for Arbejdslivsforskning, Roskilde Universitet, Maj 2014.
[91] Psykisk arbejdsmiljø mellem standardisering og selvledelse, Center for Arbejdslivsforskning, Roskilde Universitet, Maj 2014.

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A Danish report from Roskilde University Centre concludes that the current development of the sectors in Denmark poses a challenge for the following components of the psychological working environment: influence, learning possibilities and professional development, workload, (un)predictability and social support[92]. There are no indications from the other case studies that the challenges should differ significantly in other European countries.

Restructuring and downsizing might have significant psycho-social effects on employees in the sector. One tragic example is French Telecom where the restructuring of the former monopolist had fatal consequences and this led to the company increasing the presence of psychological support workers and pledged to reduce workplace stress and staff difficulties [93]. .

Less information is available about the psychosocial working environment in the ICT sector. Based on the characteristics of the sector, however, one might deduct that it is a sector where there is a risk. The sector consists of a relatively high number of SMEs – particularly companies in repair and data processing, hosting and related activities; web portals are rather small (three-four times smaller than the average company size in the EU) as indicated in Chapter 2. As mentioned above, SMEs are less progressive in addressing occupational safety and health, carrying out risk assessments and addressing the risks identified[94]. The sector is fast moving with shifting trends and market structures, and working conditions are increasingly challenged as shown in the analysis above.

Working hours are relatively high, and stakeholders mention a difficult work life balance. Several trade unions mention stress as a psychosocial risk of working in the telecommunications and ICT sector. The front line workers are particularly at risk. The sector is becoming more results and performance oriented, which leads to a higher level of pressure on the workers and thereby leading to stress and burn-outs. Re-allocating or outsourcing of jobs or the threats of reallocation/outsourcing are also likely to influence the psycho-social environment in the sector negatively. Call centres in the EU are growing as are call centres outside EU28 indicating a significant outsourcing of call centre services. The Maghreb countries address the French market, Latin America the Spanish and Hispanic population of the USA, Romania caters for the Italian market and the Philippines are large in the English-speaking market. Globally, working conditions are very similar, no matter where the call centre is located and there seems to be a well-accepted business model for how to run call centres.

The working environment of call centre workers are characterized by high stress, tight control, limited influence own work as a script is often required and fear of going outside the given script[95].

Hence all in all, this is a sector where psycho-social risk factors indeed are present.

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[92] Psykisk arbejdsmiljø mellem standardisering og selvledelse, Center for Arbejdslivsforskning, Roskilde Universitet, Maj 2014.
[93] http://www.theguardian.com/world/2011/apr/26/france-telecom-worker-kills-himself 25/11/2014.
[94] Ongoing study carried out by COWI for DG EMPL on Implementation of OSH directives in EU Member States.
[95] interview with European trade union

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3.8   Summary of employment trends and challenges

Employment in the sectors is changing. As indicated in chapter 2, the telecommunications sector (61) was reduced with some 300,000 employees from 2008 to 2013, other sectors such as computer programming, consultancy and related activities (62) experienced an increase of close to 400,000 employees. There has been a shift from the traditional low-level jobs in the telecommunications sector to jobs in areas such examples might be DevOps, data analysis, new language experts and community managers.

Call centres (82.20) has also experienced a dramatic growth, and the sector has more than doubled with an increase of close to 230,000 employees over the period. These are quite dramatic changes to what was a relatively small sector over a relatively short timeframe. Also other parts of the sector experience significant growth although less dramatic in numbers.

Overall, evolvement of the sector over the last years has resulted in more fierce competition in the market, which may cause companies to resort to employ workers on less attractive contracts, such as contracts on project basis, in order to secure flexibility to react to market development. For workers operating within areas of high demand, the consequences of this condition are relatively low. And the observed lower employee affiliation with one company also reduces the need for highly secure and stiff contracts.

Although most of the industry is still using fixed contracts to a large extent, the above-described change in employment structure has given room for more freelancers and self-employed workers within the telecommunications and ICT sectors. Geographical differences are also significant in this respect, for instance with higher use of flexible contract in southern European countries than in the north. However also countries with a long tradition for strong worker protection and collective agreements are under pressure increased competition and companies are redefining themselves and reducing salary levels and employee benefits as illustrated by the TDC case from Denmark.

The analysis above indicated that there is a gender imbalance in the sector. Manufacturing, services and repair have predominantly male employees, whereas call centres are predominantly staffed by women. This is as such not necessarily a problem for the sector. Women are increasingly seeking higher education[96] which is increasingly in demand. Some companies have special programmes to attract women and inspire women to take up managerial positions. However, the issue might be that a sector such as call centres has worse working conditions than other sectors and women might thus be working under poorer conditions than men with more flexible contracts and lower salary. This is due to the sector they are working in. We do not have available information to assess differences of working conditions among genders inside the different sectors.

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[96] In EU28 the share of woman graduating at level 5 or 6 is 59% hence significantly higher than the share of men graduating. In certain countries e.g. Estonia the difference is even higher – with as high as 70% women.

However, overall the analysis indicates and stakeholders interviewed confirm that there has been a general degradation of the working conditions in the sectors. For example, this can be seen by the fact that working time is increasing while job security is decreasing. This is mainly due to the competitive nature of the sectors and the fact that telecommunications and ICT activities are much easier to relocate and outsource than jobs in other sectors. This process is likely to be accelerated by the emergence of cloud computing, big data and network industries. In terms of working conditions, there is a general agreement among the stakeholders on the negative influence of the restructuring of the old state monopolies on job security, working time, salary, career conditions and training, which also influences the psycho social environment of the workplace.

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4 Industrial relations

Industrial relations (IR) is the study of the relationship between employers and employees and their respective representatives at collective level, examining agreements, labour disputes and their resolution, worker participation and other forms of social dialogue[97]. The relationship between employers and workers continues to evolve. The significant diversity of the telecommunications and ICT sectors in terms of specific economic activities ranging from manufacturing to services, from blue-collar to white collar jobs, employment conditions as well as company characteristics also results in a marked variety of industrial relations structures and features of the sector.

The telecommunications and ICT sectors also confirm findings that sectoral differences do not necessarily match those types and models that have been identified by comparative IR research.[98] This has recently been illustrated by an analysis of nine different sectors, including the telecommunications sector.[99] The reasons for sectoral varieties of industrial relations that also influence European sectoral social dialogue[100] result from specific characteristics of industrial relations at sectoral level, namely trade union and employers' density, centralisation and fragmentation of social partners organisations, levels and coverage by collective bargaining, centralisation of bargaining or the influence of social dialogue in social and economic policy making and regulation.

Due to their internal diversity and hybrid nature, the telecommunications and ICT sectors are characterised by a number of industrial relations patterns and characteristics that both reflect general and national patterns of industrial relations (for example main levels of bargaining, organisational strength of trade unions and employers' organisations, role of social dialogue in policy making) but also specific patterns of the telecommunications and ICT sector.

This chapter is structured as follows:

- Section 4.1 analyses the collective bargaining coverage and how this is affected by the changes in the composition of the sectors, workforce and increased use of outsourcing and re-allocation

- Section 4.2 analyses incentives for social dialogue and collective bargaining; and

- Section 4.3 presents the main tendencies identified in the sector and reflects on what trends we can expect in the future.

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[97] Eurofound, Industrial relations themehttp://eurofound.europa.eu/ef-themes/industrial-relations; 30/11/2014
[98] The most widely accepted typology is based on five basic types of industrial relations: the clusters of 'organised corporatism' (Nordic Countries); 'social partnership' (Germany, Austria, Benelux, Slovenia); 'state-centred' (France and Southern Europe); 'liberal' (UK, Ireland, Cyprus, Malta) and a 'mixed' cluster, consisting of the new member states in Central and Eastern Europe. See European Commission 2009: Industrial Relations in Europe 2008, Luxembourg.
[99] See Bechter, Barbara; Brandl, Bernd, Meardi, Guglielmo: Sectors or countries? Typologies and levels of analysis in comparative industrial relations, European Journal of Industrial Relations, Vol. 18, No. 3, Sep 2012, p. 185-202.
[100] See also the following study prepared by Bechter et al.: Eurofound 2011: From national to sectoral industrial relations: Developments in sectoral industrial relations in the EU, Luxembourg.

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4.1 Collective bargaining coverage

Collective bargaining is defined as the "*process of negotiation between unions and employers regarding the terms and conditions of employment of employees, and about the rights and responsibilities of trade unions*"[101]. The sectoral level is still an important scene in industrial relations both at national and increasingly at European level[102]. Recent research[103] concludes that differences in industrial relations tend to vary more by sector than by country. This underlines the importance of awareness of the characteristics of the sector where attempts are made to improve social dialogue or collective bargaining.

European level social dialogue is strongly linked to sectoral industrial relations traditions at national level[104]. However, industrial relations vary significantly across the EU Member States and in particular with a view to collective bargaining at sector level. There is a gap between the different IR models, however, this is not a strict taxonomy and there are large differences also within countries. While in the Nordic countries as well as in (Western) continental and South Europe, sectoral collective bargaining is an important factor, the sectoral level in the Anglo-Saxon and Central and Eastern European countries with few exceptions has a much more modest role – here the most important bargaining level takes place in the companies[105]. To a large extent the findings of Bechter et al. are confirmed by EIRO[106]. In several countries, the economic crisis has led to increased decentralisation and dismantling of collective bargaining systems for instance in Greece and Ireland collective bargaining systems where increasingly bargaining is at company level. In the UK, there is no specific trend to which level bargaining is taking place, however, a weak preference for company level is mentioned by EIRO compared to the assessment of Bechter.

Dominant level of bargaining	Country
Company	Bulgaria, Estonia, Hungary, Ireland, Latvia, Lithuania, Malta, Poland, United Kingdom**
Industry	Austria, Germany, Netherlands
National	Belgium,
Company and Industry	Cyprus, Denmark, France, Greece, Italy, Luxembourg, Portugal, Romania*, Slovakia, Spain, Sweden
Industry and National	Norway***, Slovenia

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[101]   Eurofound industrial relations dictionary: http://eurofound.europa.eu/observatories/eurwork/industrial-relations-dictionary/collective-bargaining 05/03/2015
[102] See Bechter, Barbara; Brandl, Bernd, Meardi, Guglielmo: Sectors or countries? Typologies and levels of analysis in comparative industrial relations, European Journal of Industrial Relations, Vol. 18, No. 3, Sep 2012, p. 185-202.
[103] See Bechter, Barbara; Brandl, Bernd, Meardi, Guglielmo: Sectors or countries? Typologies and levels of analysis in comparative industrial relations, European Journal of Industrial Relations, Vol. 18, No. 3, Sep 2012, p. 185-202.
[104]See Bechter, Barbara; Brandl, Bernd, Meardi, Guglielmo: Sectors or countries? Typologies and levels of analysis in comparative industrial relations, European Journal of Industrial Relations, Vol. 18, No. 3, Sep 2012, p. 185-202.
[105]See Bechter, Barbara; Brandl, Bernd, Meardi, Guglielmo: Sectors or countries? Typologies and levels of analysis in comparative industrial relations, European Journal of Industrial Relations, Vol. 18, No. 3, Sep 2012, p. 185-202.

[106] http://eurofound.europa.eu/observatories/eurwork/industrial-relations-dictionary/coordination-of-collective-bargaining

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Dominant level of bargaining	Country
Company, Industry and National	Finland

*Source: Eurofound (http://eurofound.europa.eu/observatories/eurwork/industrial-relations-dictionary/coordination-of-collective-bargaining) based on EIRO. Industrial Relations Profiles for the EU27 Member States, Comparative Analytical Report Impact of the crisis on Industrial Relations and worker-participation.eu *Likely to be industry and company, following abolition of national agreement, **No particular trends, although pay freeze in the public sector, ***member of the European Economic Area*

The coverage of specific sectors by social dialogue and collective bargaining is also strongly related to specificities of sectoral social partners, namely whether or not strong union organisations and membership exists, whether or not employer organisations with a bargaining mandate exist as well as the existence of extension mechanisms by the state, whereby a collective agreement is rendered compulsorily applicable in all enterprises falling within its occupational and territorial scope.

The level of unionisation is hence a factor influencing the presence and effect of collective bargaining[107] and vice versa – unionisation may also depend on a country's structure of collective bargaining. Countries with more centralised bargaining are generally considered to have higher union density.[108]

The level of unionisation is equally different throughout Europe. A recent study commissioned by the EU level social partners' organisations UNI Europa and PIN-SME[109] analysed amongst others trade union and employers organisations in the telecommunications and ICT sectors in Europe. This stock-taking illustrates a strong fragmentation and pluralism of social partners' organisations in these sectors[110]. However the study thereby confirms what also has been a result of the national analysis of our study – that only in a minority of EU Member States, collective bargaining takes place at sectoral level, covering telecommunications and ICT services either as a whole or in part.

Characteristics of the sector, identified in chapters 2 and 3, are further analysed here with a view to assessing collective bargaining in the different sectors and how it is expected to develop based on:

▪ Structure composition of the sector

▪ Composition of the workforce

▪ Increased outsourcing and reallocation.

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[107] Schnabel (2013)
[108] Schnabel (2013)
[109] Fondazione Politecnico di Milano 2013: Mapping of relevant employers' and workers' associations in Europe operating in the ICT sector, Brussels.
[110] The purpose of this current study is not to assess the representativeness of social partners as this is the mandate of a planned representativeness study by Eurofound.

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4.1.1   Structure of the sector

As mentioned in Chapter 2, the telecommunications and ICT sectors are changing to becoming less dominated by state-owned telecommunications giants to a more heterogeneous mix of companies on different sub sectors.

An analysis from Eurofound on Developments of sectoral industrial relations in Europe indicates that collective bargaining may differ significantly within a country across sectors. Centralised bargaining in some sectors may co-exist with decentralised bargaining in other sectors[111]. This is also likely to be the case for the telecommunications and ICT sector switch covering i.e. manufacturing – which is traditionally considered as a sector with relatively high level of unionisation and services which is thought of as a lower unionised sector[112].

Different national traditions

As shown in Table 4-1 below, only four EU Member States have sectoral collective agreements for the ICT service sector. In contrast, some additional countries at least have sectoral agreements that cover the telecommunications sector as well as the manufacturing of ICT products (as part of collective agreements in the metalworking sector).

However, in the majority of EU member states, there are sectoral collective agreements that cover neither (parts of) the ICT sector nor telecommunications. Here – at best – collective agreements are concluded at company level only.

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[111] This tendency is not clear in "the small group of Nordic countries, in addition to Austria, Malta and France, where national industrial relations structures are rather similar across all sectors" Eurofound (2011)
http://eurofound.europa.eu/sites/default/files/ef_files/pubdocs/2011/10/en/2/EF1110EN.pdf
[112] Eurofound (2011), and Schnabel (2013)

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Table 4-1   Collective bargaining pattern and levels covering the telecommunications and ICT sectors

Collective bargaining practice	Countries
Employers organisations with the mandate to conclude collective agreements in the telecommunications and ICT sectors	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Finland, France, Hungary, Ireland, Italy, Malta, Netherlands, Portugal, Spain, Sweden (16)
ICT service sector agreements	Austria, Finland, France, Netherlands (4)
Telecommunications sector agreements	Belgium, Bulgaria, Czech Republic, Denmark, France, Italy, Sweden (7)
ICT manufacturing covered by sectoral agreements in the metalworking sector	Belgium, Denmark, France, Germany, Portugal, Slovakia, Slovenia, Spain (8)
Only company based agreements	Croatia, Cyprus, Estonia, Greece, Hungary, Ireland, UK, Latvia, Lithuania, Luxembourg, Malta, Poland, Romania (13)

Source: Fondazione Politecnico di Milano, 2013 and COWI

The coverage of collective bargaining is related to the level of unionisation and the availability of social dialogue in the particular countries, across sectors and of the level of international competition.

Apart from the low presence of employer organisations that have a mandate for collective bargaining, a major reason for the low coverage of the telecommunications and ICT sector by sectoral bargaining stem from the low organisational density of trade unions.[113]

For instance in Germany, there is a structural lack of social dialogue and collective bargaining both at company and sector level that contrasts to the overall typification of Germany as an IR model that is strongly shaped by social partnership and sectoral collective bargaining.

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[113] In a paper published in 2009 for example UNI Europa estimated that the union density of employees in the ICT service sector in Europe in 2008 only was around 11%. UNI Europa 2009: Building UNI Europa ICTS for the 21st Century. Trends in employment, workforce, industrial relations and the social partners within the ICT sector. A report prepared for the UNI Europa ICTS Inaugural Conference, 10-11 September 2009 by Kendra Kreider and Lorenzo De Santis, Final version, Brussels, August 2009, p. 10.

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A structural lack of social dialogue and collective bargaining in the ICT sector – the example of Germany

In order to counterbalance the organisational weakness and low trade union membership in the ICT sectors, both ver.di as well as the IG Metall is seeking new forms of organisation and the inclusion of new issues in their scope, e.g. campaigns to address freelancers and solo self-employed. Regarding call centres, it should also be mentioned that trade unions have been quite successful in running campaigns on minimum wages and working conditions. The multinational organisation also perceived the reduction of collective bargaining, but it still acknowledges the importance of unions as mediators to dialogue.

Characteristics and trends of ICT trade union membership in Germany

Although no official data on trade union membership in the ICT sectors exist, the following aspects and trends have been reported:

In general, trade union membership in ICT companies is comparatively low (below 10%) but there are a number of companies (e.g. within IT manufacturing, outsourced IT and telecommunications branches of larger companies) where membership rates are very high, sometimes reaching 90%.

There is a strong positive correlation between trade union membership and the presence of work councils and the coverage by a collective agreement and vice-versa (i.e. trade union membership both increases the likeliness of establishing a works council and a concluding agreement as well as it is likely to increase as a result of the establishment of a works council and the concluding of an agreement).

Recent membership figures as published by IG Metall and ver.di indicate a changing trend, i.e. the loss of members has been halted and membership figures amongst ICT employees are increasing. Against this and also the fact that trade union membership was always very low amongst white collar and highly qualified employees, there seems to be a trend of increasing trade union membership in the ICT sectors.

Source: German case study, see Appendix

Company vs sector bargaining

Membership in worker and employers organisations as well as collective bargaining coverage is highest within the hardware and manufacturing sub-sectors. Many hardware and ICT manufacturing firms are covered by sector-wide agreements for manufacturing that also cover ICT workers. Against the presence of a comparative large number of big and multinational companies in this sub-sector also company-level collective agreements that supplement bargaining coverage at the sector level exist[114].

Against the background of a comparative strong membership basis of trade unions also the telecommunications sector is characterised by sector-level collective agreements in a number of countries. However, in most EU countries, and given the rapid reorganization of the telecommunications sector due to the liberalization of the telecommunications market, collective bargaining today is taking place at the company level. Furthermore – and resulting from the appearance of 'new entrants' that compete with the incumbent national providers, the sector is characterised by a growing number of companies that are not covered by a collective agreement. This creates pressure for the incumbent to diminish working conditions in order to compete and can threaten collective bargaining[115].

Finally, the sub-sector of ICT services is mirroring the pattern that membership in trade unions as well as employers organisations and collective bargaining coverage

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[114] UNI Europa 2009
[115] UNI Europa 2009

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rates are positively correlated to company size as well as employment characteristics. The ICT service sector with its high share of small companies and salaried employees thus have the lowest rates of collective bargaining coverage. Thus only in a few countries that are in general characterised by a high collective bargaining coverage (either based on membership strength or legal extension mechanisms); collective agreement exists at sectoral level for ICT services. These countries are Austria, Finland, France, and the Netherlands[116].

In all other EU countries collective bargaining coverage is very low in the software and ICT services sectors. Bargaining takes place primarily at the company level, for example as the agreements between IG Metall or ver.di and IBM, HP or SAP in Germany as shown in the text box below.

The first sectoral collective agreement on IT services in Germany

In January 2014 for example, the regional branch of the IG Metall in North-Rhine Westphalia was able to conclude the first ever sectoral agreement in the IT service industry that covers the whole sector. This agreement, titled "Framework Agreement IT Services" was concluded with the regional employer organisation in the metalworking section (Metall NRW) following a request of the German branch of the French IT provider Atos. The framework agreement includes the regulation of working time, defines different wage groups and flexible wage components and links the wage development in the IT service sector to the wage agreements concluded in the metalworking and electricity sector. Interestingly, the collective agreement was designed as a collective agreement for IT services, open to further IT companies to join.

Source: German case study, see Appendix

Role of MNEs (Multinational Enterprises)

The rate of unionizing tends to increase with company size[117]. However, research indicates that this is up to a certain company size. As for collective bargaining, a 2009 study by Eurofound analysed Multinational companies and their collective bargaining in Europe[118].

Role of MNEs

The study finds that under multi-employer bargaining arrangements, MNEs have been a major source of pressure for decentralisation, giving greater scope for company negotiation. In relation to single-employer bargaining, MNEs often set the pace. Moreover, they make widespread use of cross-border comparisons of costs and performance in local negotiations in manufacturing. The result is the implementation of cost-saving and flexibility-enhancing measures, particularly in the context of company restructuring. Relocations – actual and threatened – heighten the coercive pressures of MNEs on local negotiators.

Source: Eurofound, 2009

This is in line with the findings of the case studies where a number of obstacles to collective bargaining were identified (appendix 4). The representatives of the three multinational companies interviewed stressed that the characteristics of the workforce make collective bargaining not the main form of negotiation. First, it was mentioned that professionals in the telecommunications and ICT sectors are considered to be individually focused and centred on their own developments. These professionals are also often recruited on the global market, which favours individual negotiation of working conditions. Secondly, it was argued that collective bargaining is difficult due

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[116] Source to be included in final report
[117] Schnabel (2013)
[118] Eurofound (2009) Multinational companies and collective bargaining

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to diversity of company activities. This is illustrated by the example from Vodafone below.

Example from Vodafone

Vodafone has described its membership of employer organisations as a means to discuss the standardisation within the sector and the laws on competition. These organisations are perceived as commercial bodies, and not as arenas of social dialogue. According to the participant, social dialogue tends to be kept locally, since industrial relations are considered to be country-specific.

According to Vodafone, the chances of collective bargaining delivering improvements in the working conditions are relatively small because the sectors are so different and disperse. In a market where the applications to fill in vacancies are highly globalised, collective bargaining is seen as almost irrelevant by Vodafone. Consequently, negotiations on working conditions are commonly done on an individual basis. It is possible to have global principals of collective bargaining, but the implementation of these principles shall be country-specific.

Source: Appendix 4

A recent study on the developments in Ireland, found that US-based multinationals have had "*significant impact on collective bargaining through the introduction of the variable payments systems used in their home operations, including individual performance-related pay and profit-related bonus*".[119]

Moreover, many multinationals make use of outsourcing and relocations. This is further discussed in the following section. The input from the MNEs indicates that the existence of collective bargaining structures depends mostly on the national practices and requirements. The dominance of American enterprises in the telecommunications and ICT sectors has also had consequences to collective bargaining. European companies tend to follow the American model where there in some circumstances is strong opposition to unionism (Levinson, 2013) and in other situations collective bargaining is used as a forum for containing or reducing labour costs (Chaison, 2010).

This could indicate that the presence of large multinationals, many with roots outside Europe, tends to lead to reduced collective bargaining. MNEs and collective bargaining are a relatively new research area and Marginson and Meardi present a review of the research in the field[120]. The study finds that the presence of MNEs has both 'destructive' and 'constructive' effects. The destructive effects are in line with the above mentioned, however the constructive effects may be that they "*themselves develop new mechanisms of negotiation, including transnational collective bargaining.*[121]"

Voluntary company agreements
One of these mechanisms is Transnational Company Agreements (TCAs) or International Framework Agreements (IFAs). These are voluntary agreements concluded at company level between the global (sometime only the European)

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[119] Marginson P and Meardi G. (2012) Big players, Different rules? Multinationals and collective bargaining in Europe Industrial Relations Research Unit, University of Warwick (UK) Gusto WP6 Working Paper - March 2012

[120] Marginson P and Meardi G. (2012) Big players, Different rules? Multinationals and collective bargaining in Europe Industrial Relations Research Unit, University of Warwick (UK) Gusto WP6 Working Paper - March 2012

[121] Marginson P and Meardi G. (2012) Big players, Different rules? Multinationals and collective bargaining in Europe Industrial Relations Research Unit, University of Warwick (UK) Gusto WP6 Working Paper - March 2012

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management and global trade union federations. These agreements or texts focus on basic (ILO) labour rights and issues of corporate social responsibility. A more recent trend has been European Agreements that have addressed particular issues, such as the anticipation and (social responsible) management of corporate restructuring, training, mobility, health and safety at work, or equality.[122].

In particular in these company based framework agreements that were concluded between management and European Industry Federations, European Works Councils are playing an important role as the initiator of transnational bargaining and negotiation processes.

The ICT sector is characterised by quite different experiences with a view to European level interest representation and social dialogue.[123] Well-established EWC structures and transnational information and consultation practices exist in European based companies such as Nokia, the major European Telecom companies, Siemens or Atos. This is in contrast to the situation of the US-based big players; whilst IBM and HP have European EWCs established, the relationship with unions and employee representation bodies at national and European level is much more conflict-ridden, and giants such as Microsoft still lack an EWC.

Given the difficult situation of social dialogue at transnational level, the two major European trade union organisations in the ICT sector industriAll and UNI Europa have tried to develop transnational union cooperation and joint activities – in particular in response to transnational restructuring programmes of ICT multinationals such as HP (see textboxes below). As shown in the example below and confirmed in interviews carried out in this study with Trade Union representatives, the works councils are a tool to bring together employer and worker representatives to discuss common challenges such. However, the dialogue is not yet optimal and trade unions point to employers not fulfilling their obligations for dialogue and consultations in the workers council[124].

EU Directive on Information and Consultation of Workers

The Directive imposes a works-council or an information and consultation procedure in Community-scale undertakings and Community-scale groups of undertakings on the basis of an agreement negotiated between employees' representatives forming a special negotiating body and the central management of the undertaking. It also defines the procedures for the operation of this body. In the cases identified by the Directive in which an agreement cannot be reached, it stipulates the provisions which subsidiary requirements to be established by the Member States must satisfy.

Source: Europa[125] Note: the Directive has been extended to include UK by Directive (97/74/EC) and adapted by a third Directive (2006/109/EC) to the accession of Bulgaria and Romania.

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[122] EC (2012), Transnational company agreements: realising the potential of social dialogue, SWD(2012) 264 fl ina
[123] See EMF 2005: EMF Conference for European Works Councils within the ICT sector, Brussels, European Metalworkers Federation in cooperation with UNI Europa.
[124] Uni Global, interview. It should be noted that during this study, it has not been possible to get a statement from employers on this matter.

[125] http://ec.europa.eu/social/main.jsp?catId=707&langId=en&intPageId=211

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> **IndustriAll Europe and UniGlobal establish HP European Alliance UniGlobal Union and IndustriAll**
>
> European Trade Union bring together European trade unions to address HP job cuts
>
> Berlin 19 October 2012 - UNI Global Union and IndustriAll Europe, together with more than a dozen unions, today launched a European alliance to coordinate a unified plan to address Hewlett Packard (HP)'s decision to cut over 8,000 staff from its Europe-based operations by 2014 without proper explanation or consultation.
>
> Marcus Courtney, Head of UNI ICTS said, "*HP has acted in a high-handed manner over its plans to cut jobs. HP management has not been transparent about informing employees in individual countries how the job cuts will affect them. HP has flagrantly disregarded its obligations to inform and consult under its European Works Council Agreement.*"
>
> Luc Triangle, industriAll European Trade Union Deputy General Secretary said "*The new alliance will present a united union front on the European level and will challenge HP to change its plans and secure sustainable jobs. Together we will present a force that HP will not be able to ignore.*"
>
> HP has approximately 350,000 employees worldwide, of which more than 80,000 are based in Europe. More than a dozen trade unions in ten different European countries represent HP employees. In addition, a series of national works councils or representative bodies and a European Works Council also represent HP employees.
>
> In 2012, HP announced that it would cut 29,000 jobs globally, including 8,000+ in Europe, by 2014. Not only did the company fail to provide adequate information to employee representatives at the national level, it also disregarded the procedures for information and consultation under its European Works Council Agreement. In order to effectively influence the company to change its current employee policy and secure sustainable jobs in the future, a united trade union front in HP is needed at the European level.

Source: IndustriAll Europe[126] This example is purely based on information from IndustriAll and has not been verified or discussed with HP.

4.1.2 Composition of the workforce

The characteristics of the workforce were discussed in chapter 3 above. The analysis indicated that the workforce is relatively young or middle aged, dominated by men – apart from the call centre sector where almost two thirds of employees are women. Employees are increasingly well educated and working on fixed contracts – again apart from call centres where flexible contracts are more common. As to the latter, namely geographical factors also appear to be important. These are factors that are likely to influence collective bargaining in the sector.

It is a common perception that women, young, white collar workers and highly skilled employees are less likely to be members of a trade union than other workers. This assumption is questioned by Schnabel in his Meta study of existing literature on level of Unionisation.[127] Below Schnabel's findings are related to the developments in the telecommunications and ICT sector.

Gender
As regards gender, Schnabel's analysis[128] finds that there is indication that women are less unionised than men. This was thought to be an expression of their weaker link to the labour market and hence reducing both their and the unions' benefit of their

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[126] http://www.industriall-europe.eu/news/list3.asp?stid=54, 30/11/2014
[127] Schnabel (2013)
[128] Schnabel (2013)

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membership. He points to studies by Visser (2006) that membership of women in many countries covered in the study was equal or even higher than that of men.[129]

As for the telecommunications and ICT sectors, it is not likely that the gender (in) balance of the sub-sectors will have an influence on unionisation and collective bargaining first of all in the sectors. However, it should be mentioned here that the weak link of workers in call centres, with rapid turnover, part-time contracts and lower education levels than the rest of the sector, could have a negative influence on unionisation levels. This is not necessarily due to gender but to other working conditions in this sector that happens to be primarily employed by women. Schnabel emphasises that it is likely to be many women's atypical employment patterns rather than gender that could be an obstacle to union growth. The impacts of contractual conditions are outlined below.

Age

Schnabel's review of existing IR literature finds that there is likely to be a relationship between age and the level of unionisation and those younger generations are less likely to unionise. Together with decreasing birth-rates after 1960, he finds that this poses a challenge to unions in general[130].

As for the telecommunications and ICT sectors, the sector has a slightly younger workforce than the average workforce. Most employees are between 24 and 55 years, hence young to middle aged. Middle aged workers - maximising in mid40's – are in several of the analysis' Schnabel reviews (e.g. Ebbinghaus (2006), Blanchflower (2007)) regarded as the most unionised. Hence the employees potentially have quite some time on the labour market before they retire.

Again, call centres have the largest share of very young employees – under the age of 24 and this is strengthen the assumption made above that that unionisation might be a challenge in this sub-sector. As for Manufacturing, Service or Repair development in age is not likely to be a significant stand-alone factor.

Education levels

Unions have traditionally been stronger among blue collar workers than white collar workers. This could also imply that in the manufacturing and repair sectors, unions would stand relatively strong compared with for instance the service sector or call centres. However, the study by Schnabel and Wagner (2007) only showed weak evidence of this. The traditional gap is closing.

The impact of education levels is therefore believed to have a larger impact, and highly educated professionals are often regarded as less likely to unionise than lower educated. They are likely to have a better chance of negotiating favourable, individual agreements and thus have less need for collective bargaining. However, Schnabel finds no clear evidence to support these assumptions[131]. Brady (2007) actually finds that unionisation is likely to rise with education levels[132]. Hence, findings on this factor are inconclusive and regarding the telecommunications and ICT sectors, it cannot be

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[129] Schnabel (2013)
[130] http://www.industriall-europe.eu/news/list3.asp?stid=54, 30/11/2014
[131] Schnabel (2013)
[132] Schnabel (2013)

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concluded how the rising educational levels in the sectors affect or is likely to affect unionisation and potential for collective bargaining in the sector.

Contractual conditions

Generally speaking, recruitment for unions is easier when employees are on open-ended contracts and fixed-term contracts often pose recruitment challenges. However, the latter type for contracts are on the rise – also in the telecommunications and ICT sectors. Despite the majority of workers overall in the sectors are on fixed contracts, the use of freelancers or part time contracts is on the rise, particularly in call centres and with certain specialist services.

This could pose a challenge for unions in the future.

4.1.3   Increased outsourcing and reallocation

The traditional outsourcing countries, e.g. India and China, are investing massively in the education and training of ICT professionals. This development increases the competitive pressure and the outsourcing trends in Europe but also the need to develop own resources, e.g. on initial and further training. Pressure on outsourcing and reallocation affects both high and low-skilled labour. Stakeholders interviewed[133] support assessment that skills upgrading in the traditional outsourcing countries would make more knowledge-intensive sectors subject to outsourcing in the future.

In the multinational organisation, for instance, it is possible to observe that both technical and support areas: HR and accounting are increasingly managed by outsourced subsidiaries. This movement has been incorporated to the organisation's strategic plan, since they seek to outsource part of their work process in order to reduce labour limitations, union reviews, inflexibility and costs.

From the perspective of the trade unions, outsourcing creates two classes of employees. First, those in the main company that tend to be covered by collective agreements, and, secondly, the employees in the subsidiaries which are to a much higher extent normally independent, having their own forms of organisation and bargaining procedures. The possibility for collective agreements in these cases is also related to the extent to which the national legislation enables the workers' collective bargaining. For instance, the regulation of freelancers and self-employed varies widely from country to country.

Employer organisations interviewed perceive that the role played by trade unions has changed and argue that it is a different game today with diverse job descriptions and skills required for these jobs. Thus, the bargaining power of unions has decreased, and there is more individualized negotiation among the workers and employers. However, some employer organisations have observed that unions are increasingly supporting workers in these individual negotiations and have adapted their practice (for example by a larger autonomy of company based trade union committees).

The trade unions also indicated that one of the biggest problems with outsourcing is that the companies do not feel responsible for the outsourced workers. for example in

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[133] 20 organisations responded. 75% agree or fully agree that more knowledge intensive sectors will become subject to outsourcing in the future.

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call centres where there is a tendency that working conditions are worse for outsourced call centre staff than for in-house call centre staff[134].

For that reason, global and European framework agreements have been initiated and in some cases successfully negotiated[135] in order to establish a minimum standard of working conditions and labour relations that are also respected in subsidiaries. The ideal arrangement, according to the trade unions, would be the establishment of agreements between the national companies and their counterparts at the global level, which would ensure coverage of all workers. However, the effectiveness of the framework agreements as well as European Works Councils is questioned by some of the trade union representatives interviewed. UniGlobal has recently assessed five European Works Councils and characterises them rather as symbolic forums with rather poor information and consultation practices.

Outsourcing might also lead to positive effects and stimulate innovative processes. In 2013, the Joint Research Centre (JRC) made an empirical investigation into the impact of crowdsourcing[136] on employability and presents an alternative angle to approach outsourcing and outplacement. The study is part of a series of reports from the Institute for Prospective Technological Studies of the European Commission's Joint Research Centre ICT4EMPL Future Work study.

The Crowd Employ study[137]

The studies focus on the changing shape of work in the 'internet age', with technology, culture, globalisation and the economic crisis together creating new opportunities and encouraging people, businesses, public bodies and the third sector to explore new forms of business and work. These relatively recent online interactions present new opportunities, impacting on the way people interact with each other and with organisations, and have led to changes in skills required and used. This report is based on a set of in-depth qualitative cases commissioned from The University of Warwick (the 'Crowd Employ' study).

The Crowd Employ case studies explore the relationship between the use of internet-enabled exchanges and employability. These case studies address the following interrelated research questions:

How do internet-enabled models based on exchange or donations of labour or capital operate from both the user and operator perspectives?

What are the opportunities and challenges that these services present for employment and employability?

The starting point of the ICT4EMPL and the Crowd Employ studies was the term 'crowdsourcing', coined by Howe (2006). Crowdsourcing was originally used to refer to the act of outsourcing a function once performed internally in a company or institution to a network of people in the form of an open call.

For the purpose of the Crowd Employ study, a much broader definition of crowdsourcing was adopted and allows focusing on the possibility to access a wide range of resources via the internet and on the challenges and opportunity that this presents for individuals.

As regards relocation of production, where companies transfer production activities from one country to another, this has become an important issue in industrial relations due to the increasing internationalisation of the economy. The process of relocation

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[134] Analysis in chapter 3 and interview with European trade union

[135] The database on transnational company agreements that has been established by DG Employment, Social Affairs and Inclusion currently contains 14 TCAs that are related to the information and communication sector. See:
http://ec.europa.eu/social/main.jsp?catId=978&langId=en

[136] Defined in the study as "An online mediated exchange that allows users (organisations or individuals) to access other users via the internet to solve specific problems or to achieve specific aims"

[137] https://ec.europa.eu/jrc/sites/default/files/lfna26351enn.pdf

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involves restructuring and loss of jobs, which produce a number of different consequences for each of the actors involved, namely, the company, the origin country and the destination country[138]. It is important to emphasize, however, that relocation affects mainly multinationals or relatively big companies. As indicated by one SME organisation, relocation is not a common process in SMEs due to the high costs associated with management of companies in the value chain that are outside the country of origin.

Representatives of the multinational companies interviewed indicated that the decision to relocate production activities is closely tied with technological and economic aspects. Very little attention is paid to the state of collective bargaining either at the company level or in the destination country. The participants have also identified nuances that confirm the complex nature of the relocation processes.

On the other hand, there are a few examples of insourcing within the telecommunications and ICT sectors[139]. These companies are bringing activities back to Europe in order to ensure the quality of the service provided or because transaction costs were much higher than expected. Knowledge intensive functions are being relocated in Eastern European countries such as Hungary, Romania and Poland since employers have recognised the value of a better understanding of the European customer.

The case of Portugal illustrates major concerns of employees concerning restructuring, job security and working conditions that certainly are exemplary for many other EU countries (see textbox below).

Typical concerns of the Portuguese stakeholders

An analysis of the websites of Portuguese unions, which represent the telecommunications and ICT sectors, indicates that workers are particularly concerned with the following topics:

- the impact of the merging of large enterprises, which might outsource jobs and increase job insecurity;

- the deterioration of the working conditions, especially for temporary workers employed in the call centres;

- development of collective agreements that ensure a minimum standard to working conditions;

- increase in the current investment on training and educational programmes, in order to promote re-skilling of workers.

Source: Portuguese case study Appendix D

Overall, the process of relocation can be a source of conflict in which organisations have varying degrees of bargaining power. Unions try to ensure the existence of a safety net for those workers who lose their jobs when relocation/outsourcing is carried.

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[138] Carley, 2006
[139] Interview. See list of conducted interviews in Appendix E

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Research also shows that some multinational companies use the threat of reallocation in collective bargaining, in order to obtain concession agreements[140]. According Marginson and Meardi[141] who has conducted a broad study of multinationals and collective bargaining in Europe, some research indicates that the threat of relocation already has a devastating in impact on collective bargaining (e.g. Pastore 2007), whereas other research considers the process as more complex and diverse, and that there is scope for more proactive involvement of trade unions (Galgóczi et al 2008; Meardi et al 2009). This was supported by stakeholders interviewed during the course of this study.

4.2   Incentives for social dialogue and collective bargaining remain

Even though collective bargaining may be declining in the telecommunications and ICT sectors or be non-existent in many ICT service companies, the social partners interviewed acknowledge its importance and indicate that it creates value for both employers and workers – since social dialogue provides a means to discussing issues of common interest.

During interviews, social dialogue and collective bargaining were mentioned as a forum for addressing the following challenges of the sectors:

- Labour shortages and recruitment

- Education (including school education) and initial as well as further training (in many countries social partners play a crucial role in VET curricula development)

- Working conditions, work-life balance and coping with demographic change

- Develop concepts that deal with the challenges related to the increase in self-employment and new forms of work in the sector, e.g. with a view to social security coverage, pensions, unemployment, low wage, etc.

- Handling restructuring in a more sustainable way and provide guidance, advice and support for workers negatively affected by restructuring and reorganisation at company level.

It is clear that being able to cope successfully with these challenges is also a precondition for maintaining skilled labour and increasing the innovation capacity of telecommunications and ICT companies as well as how for tackling some of the difficult situations, e.g. coming from re-allocations and downsizing.

The example below from Telefonica supports collective bargaining as a valuable tool.

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[140] Marginson, P. and G. Meardi (2012)
[141] Marginson, P. and G. Meardi (2012)

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Example from Telefónica

Telefónica considers collective bargaining a significant tool in the negotiation of working conditions. It is understood that collective bargaining brings added value to both employers and employees, whilst improving the relationships within the companies.

Negotiations with trade unions often focus on downsizing and restructuring, which are processes that affect many jobs and, consequently, workers. In these cases, Telefónica attempts to develop negotiated transitions together with the trade unions.

Source: Telefónica case study

Collective bargaining can be done at a company or a centralised level. At which level bargaining is taking place affects the incentives of supporting it – both for employers and employees.

On the one hand, centralised bargaining can lead to lower transaction costs as a positive effect of centralised bargaining and it could help solve the potential conflicts between workers and employers. It might also reduce the employers' incentive to eliminate unionisation at the workplace because trade unions tend to interfere less with local work place management and wage setting at the workplace when negotiations are carried out centrally[142].

On the other hand, centralised bargaining may have negative impacts; it might for instance make room for free-riding on collecting agreements without being a member, particularly if agreements are extended to non-unionised employees and workplaces[143]. Moreover, this may be a challenge for unions depending on membership fees to finance their work and where the membership base is part of the unions' bargaining power versus the employers.

Collective bargaining at company level could provide a forum for direct dialogue between the employer and workers in the specific company and it could thus be seen as a valuable tool for strengthening internal cooperation and dialogue between management and workers. However it could also leave the workers in a weaker bargaining situation without the backing of a trade union.

Collective bargaining at company level might be a challenge for companies operating in different countries, where regulation of labour markets might differ significantly, e.g. on retirement age, working hours, parenting leave, etc. Some of the companies interviewed also pointed to the difficulty of performing collective bargaining in a multinational context. For example, Vodafone considers that the difficulties of organising workers and employers are a result of different cultures in the different countries. On the other hand, Marginson and Meardi (2012) and Eurofound (2009) found that multinational companies contribute to changing the institutional structures of the bargaining in the countries where they operate. Specifically, multinational companies have been a source of pressure for decentralization of bargaining arrangements[144]. This is done both directly through the membership of employer

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[142] Schnabel 2013
[143] Schnabel 2013
[144] Marginson, P. and G. Meardi (2012):

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organisations and indirectly through opting out of sector arrangements or switching sector of affiliation.

The interviewees from both employers and trade unions considered that collective bargaining has a very high potential to create added value in the following aspects of the working conditions:

- Job security: It mostly depends on the market, but collective bargaining and social dialogue can improve the framework conditions, e.g. by mechanisms of internal flexibility, the negotiation of restructuring plans, social packages, etc.

- Pay and salary: If a collective agreement exists a common frame for remuneration is negotiated between employers and trade unions/worker representatives. At company level individual variations may be negotiated within this frame or as an add on. If a collective agreement does not exist it will be treated as an individual matter. What is most beneficial for the employee depends on the individual bargaining power.

- Motivation of employees: It increases when the performance and engagement of employees is acknowledged and when they feel that their voices are heard.

- Skills development: Further training and skills development schemes are often an important aspect of social dialogue and also collective agreements at company level; active involvement of employees in decisions on training activities increases the effectiveness and adequacy of training programmes

- Productivity: The relationship created by collective bargaining can increase productivity and efficiency. The impact of social dialogue in ensuring the coverage of health issues also increases productivity in the form e.g. of reduction of absenteeism.

- Recruitment and retention: Social dialogue and collective bargaining practices, if established in a stable and cooperative way can have a positive impact of the image and corporate culture of a firm and thus increases the attractiveness for candidates as well as the own workforce. The stakeholders interviewed[145] generally confirmed that new incentives arise, such as resorting to collective bargaining patterns in the light of the challenges faced by the industry to maintain competitiveness, e.g. restructuring or downsizing.

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[145] 14 out of 21 respondents

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Establishing formal structures of social dialogue at company level

Perhaps the most striking example of a large player in this context is SAP, the largest IT service provider in Germany (in terms of turnover) and number four worldwide with a global workforce of 65,000 employees. Although the company employs around 14,000 in Germany alone, until 2006, management openly has fought against any initiative to establish a works council with the argument that there is no need and that such a form of interested representation is not compatible with the corporate culture. However in 2006, initiated by SAP employees that are also member of the IG Metall trade union and aided by public campaigns of both the IG Metall and the ver.di trade unions works councils elections were held, the elected works council was dominated by non-trade union members which also illustrates the complicated relationship between the management as well as a large majority of employees on the one side and trade unions on the other side.

The SAP case not only illustrates the difficulties of social dialogue at company as well as sectoral level that characterise ICT service companies but also trends that may indicate a changing perception of employers' views on social dialogue: In 2006, the initiative of trade union members within the company to set up a works council that should substitute the SAP specific 'cooperation forum' resulted in fierce opposition from the SAP owners and management, who threatened to relocate the company if a works council would be established. However, the relationship between trade union and non-trade union members within the works council as well as between the trade union organisations and the SAP management has become civil since then. Today, the works council structure at SAP is regarded both by employees as well as the management as the main platform of social dialogue and consultation (e.g. on reorganisation plans that have been announced recently) providing added value for both sides. Furthermore, the trade union organisations (via an external expert) have been involved actively in the negotiations of an agreement of employee participation in the context of the transformation of SAP into a European Company that was concluded by an agreement in May 2014. This means that the company today also at European level has established a structure of employee participation at board level as well as formalised information and consultation practice with the SAP SE works council at European level. In turn, this may also result in more openness of the respective national managements towards social dialogue with trade unions in Germany and other European countries.

A more recent example has been Hewlett-Packard (HP) and the closure of the 1,200 strong HP site in Rüsselsheim. Though the decision to shut down the site was taken unilaterally by the management without any prior information and consultation of employee interest organisations this also resulted in a change of minds: Confronted with strong opposition not only by employees and trade unions but also in local communities, government and nationwide media, the HP management risked a potentially severe tarnishing of their public image. This has not only transcended into the implementation of measures to cushion the social effects of the redundancies (e.g. by redundancy payments and the setting up of a job-transition company) but also in an increased preparedness to enter into social dialogue with trade unions at national as well as European level. Consequently, it has improved the rather negative image of the company with view on the respect of basic labour rights and trade union relations. In terms of the regulation of basic labour protection rights and employment at the company level, IG Metall has recently initiated negotiations with the HP management in Germany on a company-wide national collective employment agreement.

The tension between the incentives and the decline of collective bargaining has been channelled by the trade unions in their search for new forms of collective bargaining through European Works Councils and Company Framework agreements as mentioned above. It has been necessary to include new issues and focuses to generate interest among workers. In addition to new issues, trade unions have to manage the new profile of telecommunications and ICT workers, who might be people who want to work longer hours, that are interested in their projects and that work with international partners. The challenges faced by both trade unions and employer organisations are to show employers the importance of collective bargaining, the need for compensation that follows their working conditions and the actual means to tackle employment issues.

Examples of agreements at company level: T-Systems

Trade unions have concluded a company-wide collective agreement with T-Systems that aims at establishing a system of employment security in situations restructuring resulting in redundancies. The agreement establishes a company commission in which works councils and other employee representatives as well as trade unions are involved at an early stage. Regarding supporting workers affected by restructuring and dismissals the agreement foresees a variety of measures, ranging from qualification measures and further training in order to support transitions within the company, external qualifications and support for job-placements by a company-based placement agency as well as

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redundancy payments/packages.

There is also a company agreement that was concluded between the T-Systems group management and works council on employment restructuring (GBV 'Personalumbau') that focuses on cushioning the effects of near- and off-shoring. Apart from brief information and involvement of employee representatives in restructuring processes, the agreement defines the priority to avoid redundancies whenever possible, e.g. by internal job transitions, or re-qualification. Redundancies should be the last resort and cushioned by compensation payments.

Source: ver.di: Gehalts- und Arbeitsbedingungen in der IT-Branche, http://www.ibr.cs.tu-bs.de/news/ibr/verdi-vortrag-2013/verdi-vortrag-2013.pdf.

4.3 Main tendencies and trends in industrial relations in the sectors

Given the low existing level of collective bargaining coverage in the ICT software and service sectors which at the same time (and here in particular the segment of fast growing start-ups and small companies) are the fastest-growing segment within the telecommunications and ICT sectors, it is very likely that the coverage by membership in social partners' organisations and collective bargaining will further weaken in the future.

Furthermore, increasing sector complexity, competition, productivity gains and technological convergence have challenged the traditional organisation of work and are so redefining the relationships between market actors. The emergence of new SMEs, including also micro-enterprises, the increased number of freelancers and a shift in demanded skills towards higher education levels are all factors that indicate that more employers and employees are free agents that are not represented in formalised industrial relation schemes. In addition, there are new forms of work in particular in the field of software and digital services to be covered. These developments are likely to influence sectoral industrial relations between employers and employees.

The diversity of employment in the sectors also brings together different traditions for unionising. This might result in even further difficulties for employers´ and employees´ to reach common agreements and thus collective bargaining might be on a downturn. The organisation of telecommunications and ICT workers depends on an adaptation to the new ICT landscape, e.g. workers currently engaged in these sectors do not traditionally unionize. The workers employed in the "traditional" telecommunications sector, e.g. incumbent operators, are more likely to have been exposed to unions and, thus, engage in collective bargaining. The IT share of the sector, on the other hand, has workers with a heterogeneous background and little interest in and tradition for participating in collective agreements.

The trade unions have also stated that the difficulties of organising workers do not necessarily come from the fragmentation of activities in the telecommunications and ICT sectors. Companies are different from one another, in size and internal policies, which also fragments the workforce, e.g. large multinationals and start-up companies. Moreover, many of the key stakeholders in the telecommunications and ICT sectors have a deliberate non-union strategy, which is derived from US-based companies. To increase level of employer willingness to participate in collective bargaining increasing visibility of employer benefits from such participation seems important. The table below illustrate benefits from collective bargaining emphasised by telecommunications companies and employer organisations during the interviews carried out under this study.

The text box below expands on some of the statements from the stakeholders.

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Examples of reasoning for reduced organisation

▪ Although not specific to this sector, today it is a question of which union you decide to belong to, and whether you decide not to be member at all. Unions are losing members and there is an increasing focus on individual rather than social covalence which can partly explain this. (DK)

▪ Difficulties in organising can result from the different activities within the sector and the different related salaries and working conditions. There is a challenge of ensuring coherence across enterprises, jobs and the CSR of the different companies. (FR)

Examples of benefits of collective bargaining emphasised by employers

▪ Collective bargaining can contribute to reduce potential conflicts with employees during downsizing. It has nothing to do with competitiveness but protecting employees' future.

▪ Collective bargaining also opens the possibility to improve the relationships within the company.

▪ We need to coordinate our activities with these union organisations because a lot of working conditions are negotiated with them.

▪ An incentive to resort to collective bargaining, where we say that collective bargaining can essentially be used as a tool to set framework conditions for the sector to operate.

▪ The dialogue that we have with unions shows that we care about the collective issues. Moreover, being a serious employer can also be important for your brand.

Source: Interviews

The telecommunications and ICT sectors are among the economic sectors where structural change and the constant need to adjust, to adapt and reorganise are happening in a fast way. Skills are becoming obsolete and new skills are in demand. At the same time, job creation and reduction take place with outsourcing and reallocation, insourcing, mergers, takeovers and disinvestments also being intense. The sector is very diverse and dominated by relatively few very big market leaders such as google, Apple and IBM, big old telecom giants such as France Telecom and Telefonica and lots of innovative micro, small and medium enterprises demanding high skilled labour and on the other end of the scale the call centres. As seen throughout chapters 3 and 4, call centres differ significantly from the telecommunications and ICT sectors with view on working conditions, workforce profiles and labour relations. In particular the high share of temporary, part-time and other forms of flexible employment, low pay and high job insecurity often linked to business models that are not based on innovation or quality but low cost have a significant impact on industrial relations and collective bargaining. Recent comparative studies have shown[146] that employers are adept at exploiting very specific forms of temporary contracts in order to circumvent working conditions regulations and evade collective bargaining.

In this context, collective bargaining and solutions at company level that should be developed where social dialogue at company level create added-value also for employers. For instance company-wide agreements concerning working conditions, pay and other aspects in order to harmonize and regulate working conditions at

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[146] Shire, K.A.; Schönauer, A.; Valverde, M.; Mottweiler, H. (2009)

company level in the ICT outsourcing business are interesting (see the Atos case). Moreover, the agreements between management and employee interest representations that accompanied large scale restructurings, mergers or unavoidable redundancies generated added value for employers by creating stability, a joint understanding and a certain social responsibility on the part of the respective employer. However, during interviews trade unions questioned the real level of negotiation in these company-based negotiation fora.

In conclusion, there is thus a potential for improved collective bargaining and social dialogue in the sectors. As a consequence of structural and technological changes, the sectors are increasingly diversified and increased international competition lead to pressure for companies to minimise costs to stay competitive. The above analysis indicates that this has influenced the composition of the labour force and led to increased outsourcing. There should therefore be a common incentive for both trade unions and employers to engage in social dialogue to optimise working conditions to strengthen the sectors competitiveness in a globalised economy.

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5 Conclusions

In the following, we summarise the key findings and draw conclusions arising from the different layers of our analysis (comparative EU level evaluation of statistical data, stakeholder interviews, studies on national cases and multinational companies) with a view on the three key research interests and the respective guiding research questions that have driven our study:

- The changing boundaries of the telecommunications and ICT sectors

- Major trends with a view on the evolution of employment and working conditions

- Industrial relations, collective bargaining and social dialogue in the telecommunications and ICT sectors.

5.1 The changing boundaries of the telecommunications and ICT sectors

The telecommunications and ICT sectors are still 'sectors' in terms of specific economic activities (thus encompassed by statistical codes such as within the NACE classification) but at the same time – and increasingly – ICT is "cannibalising" the traditional telecommunications activities. The workforce in ICT producing companies is outnumbered significantly by ICT workers in user companies and sectors such as media, financial services, manufacturing, retail, logistics, the health service, etc. Reflecting the broad technological trend of digitalization, ICT today is a key feature in everyday life and business. ICT specific occupations, posts and functions are rapidly shaping core workforces, even in traditional sectors such as textiles or agriculture (not to mention retail with online web-portals or the automotive industry).

But, the mega-trend of digitisation not only means that structural change in most economic sectors is driven by ICT related technological change. It also results in a shift of boundaries, overlapping and an increase/decrease of economic activities along with, value and job creation within the telecommunications and ICT sectors. Concerning the telecommunications sector, our research and many other studies have illustrated the decline of traditional telecommunications services resulting from digitalisation and the substitution of analogue technologies. This means that traditional activities and occupations such as radio and telecom technicians are no longer needed due to the progress of VoIP telephony, over-the-top (OTT) and other new services that are using the existing telecommunications infrastructure.

Given this and further trends (i.e. the fact that for example statistical figures of employment in call centres only reflect external call-centres while at the same time in-bound call-centre employment within the telecommunications, financial, marketing, media and other sectors is much higher), it is necessary to question the relevance of sectoral boundaries that are drawn for mainly statistical reasons.

5.2 Major trends with a view on the evolution of employment and working conditions

Our comparative evaluation of existing data in conjunction with the national analyses in the case studies highlighted a number of aspects relating to major job characteristics, employment development and effects of structural change on employment and working conditions in telecommunications and ICT.

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On employment creation and losses in terms of specific sub-sectors, our analysis has confirmed the longer-term trends of declining employment in the manufacturing of ICT products, in particular the manufacturing of computers, communication and consumer electronic equipment. This is all but a new result: Due to the technological catch-up and dominance of multinational companies headquartered in the U.S., South Korea or China, European (as well as Japanese) producers of ICT devices and components have lost technological as well as market leadership. From today's perspective, the time when major global mobile handset producers where located in France, Germany, Sweden or Finland seems to be a very long time ago despite is not even 15 years since this was the norm. Similar to mobile handsets are producers of electronic consumer products and equipment, semiconductors, chip makers and other components. These producers have disappeared or saw their presence weakened to other global competitors, mainly in Asia and the U.S.

This is not something new. Over the last decade, the European ICT manufacturing industry has experienced a significant loss of jobs, not only because activities were no longer profitable due to global competition, but also because of outsourcing and offshoring many activities in order to reduce costs.

During the more recent wave of technological innovation that is based on the internet protocol, big data have occurred with little input from some of Europe's global ICT leaders. European champions like Ericsson, SAP or Gemalto can barely compete with global giants such as IBM, Google, Apple, Amazon, Samsung, Microsoft or Huawei.

These changes in the global telecommunications and ICT markets and corporate landscapes have had significant effects on employment, working conditions and major trends of corporate restructuring and reorganisation in Europe.

Concerning producers of ICT and communication producers, the pressure on costs and productivity still exists and in fact increases with new global actors and players. This results in persistent trends of job reduction, offshoring and outsourcing.

Similarly – reflecting the technological revolution of digitisation - the large telecommunications companies and in particular the formerly state-owned ones are facing an increasing pressure on jobs, costs and product/service portfolios. As a result, there is a constant pressure to restructure and reorganise, disinvest in traditional business areas and invest in new markets (e.g. business services, OTT contents). This explains why large European telecommunications companies during the last few years have run large-scale job restructuring programmes, while at the same time expanding their business resulting in significant job creation. The analysis indicates that this affects the working conditions and is a particular strain on the psycho-social working environment.

While employment in the larger and often more integrated companies of ICT manufacturing and telecommunications is decreasing, the pressure on the comparatively high wages and good working conditions (in terms of health and safety, qualification programmes, collective interest representation) is increasing due to stronger global competition and the emergence of a global network economy. The most dynamic sources of job creation have recently occurred in sub-sectors, such as software programming and publishing, telecommunications and ICT consultancy, data processing and hosting, web portals.

Concerning corporate structures, cultures and size, employment forms and working conditions, the companies mentioned above are totally different from the more traditional, established companies in the telecommunications and ICT sectors. Based

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on a strong feeling of 'being different' (similar to the narrative of the 'New Economy' at the beginning of the last decade) in terms of corporate culture, working conditions and job security. Even though there is a significant lack of comparable data across countries, our national analyses showed that the most dynamic clusters of job creation were in software programming and publishing of specialised ICT services, such as business consultancy and software solutions in fields such as networks, data handling or security. The new jobs created in the so-called internet- or digital economy are overwhelmingly located outside the established companies in rapidly growing start-ups (many of them 'born global' like in the apps or gaming industry) and smaller, very specialized companies. Despite the fact that reliable data are still missing and sometimes contradictory (see the example of job creation in the German gaming industry with most of the jobs created being in direct, full-time and open-ended employment), there is strong evidence that many of the new jobs in the ICT booming sectors have taken the form of self-employment and freelancing.

However, for highly-paid digital nomads, the lack of job security is only a marginal problem (as it is easy to find a new and perhaps even better paid job), studies on job creation in the ICT sectors often blank out issues of precariousness, health and safety constraints and low pay. Here, new forms of employment such as 'clickworking' (both inbound as well as by external providers) that are based on a tailorization of ICT activities by own and external (formally self-employed) workers but also the well-studied employment in call centres experienced strong growth during recent years. However, these forms of employment in terms of working conditions, payment and job and social security have been described as very critical.

To sum up, our study shows that the mega-trends of technological digitalization in a context of accelerated globalization and global competition. This has not only contributed to an overall increase in employment in the telecommunications and ICT sectors, but it has also resulted in significant shifts of economic/employment weights of specific sub-sectors, company types and forms of employment and working conditions.

Furthermore, the pressure in particular on the more established larger companies to restructure and reorganise is strong and will also increase in the future. This pattern is particularly evident in the telecommunications sector where traditional activities and jobs are disappearing due to the digitalization. But companies also face the challenge to develop new services, value added and markets in order to sustain competitiveness. As recent large-scale restructuring programmes and takeovers illustrate, the reorganisation and consolidation of the sector may even accelerate in the future.

5.3 Industrial relations, collective bargaining and social dialogue in the telecommunications and ICT sectors

The heterogeneity of the telecommunications and ICT sectors is reflected in a very diverse landscape of industrial relations and social dialogue structures, practices and outcomes. As the study shows, both the telecommunications and ICT manufacturing sectors are characterised by a high degree of collective bargaining as well as traditional and well-established practices of social dialogue between a strong trade union and employer organisations. However, there is a stark contrast when comparing this with ICT and software services and programming, which tends to have weak or non-existent collective bargaining and a lack of employee representation, and consultation. In these sectors but also in areas such as call centres, organisation rates of employees as well as employers are very weak as documented in chapter 3.

The ICT sector reflects general patterns of weak collective bargaining and organisational affiliation according to company size groups. Consequently, they regard institutional structures of collective interest representation and bargaining rather as a barrier in the context of business reorganization and adaptation to new market conditions. This is illustrated by a number of prominent large-scale restructuring cases that took place with limited information and consultation of employees. Additionally, the conflict over the establishment of a works council in the DAX 30 Company SAP illustrates this rather reluctant approach with regard to collective representation and interest representation by trade unions that characterizes many companies in the ICT sector.

In contrast to this, our study has described some examples of a socially responsible way of anticipating a restructuring of the company and job reductions (in particular in the telecommunications sector). These were based on a strong social dialogue and active employee involvement, which illustrate the added value of social dialogue and negotiated solutions and agreements in managing necessary structural change for the benefit of both the business and employee interests.

The telecommunications and ICT sector are among those economic sectors where structural change and the constant need to adjust, adapt and reorganise are happening in a fast way. There are also few sectors that are characterized by a similar set of skills becoming obsolete, job creation and reduction happening at the same time and where outsourcing, insourcing, mergers, takeovers and disinvestments, offshoring and other forms of restructuring are occurring often.

In this context, collective bargaining and solutions at company level that are developed not unilaterally by the management but with active involvement of employee interest representations could result in concrete added value also for employers as a number of examples in this study have shown. Here, in particular the negotiation of company-wide agreements concerning working conditions, pay and other aspects in order to harmonize and regulate working conditions at company level in the IT outsourcing business are interesting (see the Atos case). Moreover, the agreements between management and employee interest representations that accompanied large scale restructurings, mergers or unavoidable redundancies illustrate a value added for employers as they created stability, a joint understanding and illustrated a certain social responsibility of the respective employer.

However, in general, such examples are still rare and collective bargaining and agreements at sectoral level hardly exist in the telecommunications and ICT sectors. Our study indicates that a main barrier to a more structured and institutionalised social dialogue practice that may also result in collective agreements at sectoral level is the lack of bargaining mandate and competencies on the employers' side. Furthermore, despite a number of joint interests (i.e. qualification and skills development, labour shortage, public appreciation and support for the ICT sector, innovation and industrial policy) exist, namely the employers' associations at national (and thus EU level) are still reluctant or even opposed to the idea of entering a more binding dialogue that may result also in binding collective agreements.

Regarding to the challenges the telecommunications and ICT sector are facing today but also with a view to lifting existing barriers and unlocking growth and employment creation potentials of the sector, a sectoral social dialogue both at national as well as European level should be regarded as a key factor of success and progress. Such a dialogue would not only benefit the situations and working conditions of the individual employee working conditions but also give added value to the business as a whole,

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particularly regarding the need to develop a more suitable system of further qualification and skills development, produce solutions that address labour shortage and last but not least represent the sectors' interests in active industrial policy at EU and national level.

5.4   Overall conclusions

The two key findings of the study are:

1. The desk research findings on technological convergence and the developments in economic activities in the sectors as well as the results of the interviews conducted indicate that **we can no longer speak of the telecommunications in separation from the ICT sector**. The two sectors are presently interlinked technologically, organisationally and in terms of the stakeholders' sense of belonging to a specific sector. Moreover, the statistical data clearly point to a trend of **decreasing employment in the telecommunications sector and increasing employment in the ICT sectors**, which however remains weakly organised in terms of industrial relations. As the processes of social dialogue may be on the decline in the telecommunications sector and non-existent in many ICT service companies, there is a strong need for concerted action to reinstate its importance and indicate that it creates value for both employers and workers. Some examples of incentives for enhancing the level of collective bargaining are labour shortages, recruitment, working conditions and management of restructuring. In this respect, raising **the levels of employers' organisation in the ICT sector** was identified as a priority area for enhancing the robustness of the social dialogue.

2. The definitions of the sectors are of utmost importance in order to ensure a fruitful dialogue between the stakeholders. This applies both in relation to the social dialogue, the interaction between national labour market organisations and stakeholder interaction on a European level. Our findings clearly show that the preferred definition is **the broad OECD definition with sub-sectors of: telecommunications, ICT manufacturing, ICT services and call centres**. However, based on clear statements from both the employers and trade unions, the activities of the call centres cannot generally be defined as belonging to the sectors. This definition captures to the most comprehensive extent the technological and market developments in the industry.

Throughout the study, **the specific characteristics of call centres** were discussed with the stakeholders and especially trade unions emphasised the importance of addressing issues of employment and working conditions in the context of the call centres. With that being said, stakeholders also clearly indicated that the characteristics of the work being carried out in call centres are not always comparable with the work carried out in other sub-sectors of the telecommunications and ICT. However, there are numerous issues and challenges in relation to employment and working conditions in the rapidly growing sub-sector, and the European social partners are the best place to address those issues.

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