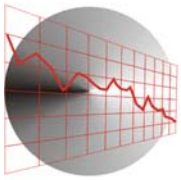
MINISTERIO
DE INDUSTRIA, TURISMO
Y COMERCIO



Industrial Observatory of the Electronics and Information and Telecommunications Technology Manufacturing Sector

ANALYSIS AND PROPOSALS FOR A CLASSIFICATION OF THE ELECTRONICS AND TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY SECTOR

DATE: 4th July 2006

CONTENTS

This document was prepared by independent experts under AETIC's supervision with the aim of proposing an improved classification of sector activities mainly for statistical purposes and does not in any way represent AETIC's official position in regard to other matters which might arise beyond the mere classification of activities.

EXECUTIVE SUMMARY

Technical, business and market developments in telecommunications, the media and information technology, along with electronics, have given rise to a vast sector covering information and communications technologies (eICTs) in a process known as “convergence” which is not truly reflected or embodied in the classifications currently in use (CNAE, OECD, INE, NACE, etc.).

Given the growing complexity of the constantly-evolving electronics and ICT sector, this report proposes an updated classification of the industry which embodies its many aspects in the various markets and in the economy, both at the product level and at the level of systems or applications and services.

The proposed classification aims to cover the sector comprehensively, to note the influence of ICTs in those sectors heavily reliant on them, to be statistically consistent with existing data, to reflect the sector’s current situation, to fit in with present market criteria and various existing European and international initiatives and, lastly, to be detailed enough to allow its practical application.

The classification is presented on three levels - area of activity, activity and sub-activity - together with definitions and criteria which clarify the delineations and criteria used.

Lastly, this report also covers future lines of development of the proposed classification, outlining the most likely changes so that it would be able to accommodate foreseeable technological, business and market variations.

1. Introduction

Technical, business and market developments in telecommunications, the media and information technology, along with electronics, have given rise to a vast sector covering electronics, information and telecommunications technologies (henceforth, eICTs) in a process known as “convergence” which is not truly reflected or embodied in the classifications currently in use (CNAE, OECD, INE, NACE, etc.).

Any ICT application imaginable, such as web browsing, digital television, mobile internet, video conferencing, security, fixed or mobile communications, messaging, interactive content broadcasting, e-commerce, etc., relies heavily on components which are sourced from the sphere of communications networks, software and hardware and are the technical items supporting convergence and, therefore, shaping this broad sector.

It can thus be said that, unlike sectors with more static activities which have scarcely evolved over time, others, headed by the ICT sector, are permanently steeped in change brought about by technological progress. This development, which was initially technological, has brought radical changes in supply by sector agents and - in a process of mutual feedback - in user and market expectations.

The phenomenon of convergence, the driving force behind this vast sector, first emerged in the 90s. However, it is only now at the beginning of the 21st century that its enormous potential is becoming clear, particularly in aspects related to the tremendous industrial, social, communicative and entertainment power of technology, leading to the continuous appearance of new products and services which neither existed nor were imaginable only a few years ago.

As a result, this is a complex sector which is fundamental and decisive in driving the economies of advanced countries. Its influence on all aspects of economic and social life and the horizontal support it offers other sectors of production make the eITC sector strategically important for countries’ industrial and social development.

It is thus imperative, now more than ever, to attempt to model this sector as a prerequisite to ordering and subsequently measuring it, in order to study and gauge its impact on countries’ economies and progress, among other things.

2. Objectives

Given the growing complexity of the constantly-evolving electronics and ICT sector, the main objective of this report is to set out a classification of the industry which embodies its many aspects in the various markets and in the economy, both at product level and at the level of systems or applications and services.

This arrangement must also enable an updated classification of the sector which, along with the more traditional activities at its core, takes into account others of more recent appearance as a result of the above-mentioned convergence, allowing for the constant innovation and development which are a feature of this sector and which will no doubt influence the appearance of new activities in future.

The criteria followed for drafting the classification of the electronics and ICT sector were:

- completeness with regard to activities within the sector itself,
- inclusion of electronics and ICT-based activities in those sectors which rely heavily on them,
- assurance of the greatest degree of consistency possible with available statistical data sets about the sector,
- approximation to the actual current situation of the sector's activities,
- accommodation of current market criteria,
- accommodation of various existing European and international initiatives in order to tackle the classification of the electronics and ICT sector, and
- sufficient detail and definition to allow its practical, unequivocal application.

The work involved drafting this report, covering the following partial objectives:

- To assess the current situation, verifying the greater or lesser degree of obsolescence of sector classifications officially in use at present both nationally and internationally, as well as looking at recent approaches to this organization
- To draw up a proposal for a new, rigorous and documented organization, developed with the cooperation of the sector as a whole, as well as a comparison with analogous classifications in other countries
- To look at foreseeable developments in ICT sector solutions in order to enable future updates of the classification, which will be an inevitable requirement.

3. Methodology

3.1. AETIC's role

The methodology used to draw up the classification presented later in this report is taken from AETIC's experience in the ICT sector since 1980.

AETIC is the Spanish association of electronics, information and telecommunications technology companies (Asociación de Empresas de Electrónica, Tecnologías de la Información y Telecomunicaciones). It represents some 1000 members, 300 of which are individual companies, the remainder being business groups with activities related to electronics and information and communications technology. The activities of companies belonging to AETIC generate over 65,000 million euro and are responsible for 40% of the national private participation in research and development and innovation (R&D&I) in the sector.

AETIC is structured in specific groups and committees representing the sector's different areas of activity, so there is a natural pathway to access company knowledge and expertise, making possible a greater degree of accuracy in the classification devised.

This work arose from a specific agreement of collaboration signed by AETIC with the Ministry of Industry, Trade and Tourism, trade union organizations and FEDIT, the Spanish Federation of Innovation and Technology Organizations (Federación Española de Entidades de Innovación y Tecnología) for the creation of an industrial observatory for the electronics, information and telecommunication manufacturing sector (Observatorio Industrial del Sector de Fabricantes de Electrónica, Tecnologías de la Información y Telecomunicaciones). The main purpose of this observatory is to serve as a permanent forum and a basic tool for analysing the sector, capable of systematising the gathering and processing of information about its needs and demands, its results and outlook, and the implementation of new items of innovation and of strategic systems. At its core is the aim to make companies more competitive and ensure the future of the industry, as well as creating wealth and employment in a globalized world.

It was in the course of the Observatory's work for 2005 that the present classification of ICT sector activities was undertaken.

3.2. Methodological framework

Firstly, the drafting of the documents which are the focus of this paper (the classification of sector activities and a report thereof) has been undertaken by renowned independent experts in matters both technological and professional.

The task was divided into the following stages:

- Gathering of information about existing classifications, international initiatives in progress and trends in activities within the electronics and ICT sector
- Research, study and analysis of the information gathered
- Drafting of a report for discussion with sector professionals through AETIC
- Establishment and development of a classification of the electronics and ICT sector, building on previous meetings
- Setting out lines of development of the classification, discussing and consolidating them through AETIC.

To these stages has been added a general coordination task which has allowed feedback between the various stages in order to take action on the aspects considered most important and useful and to contribute new ideas and suggestions to the proposed classification.

The schedule is shown in following table.

Table 1. Project schedule

Task	Start date	End date	Duration (working days)
Drafting of questionnaire	19/12/2005	23/12/2005	5
Study of questionnaire	23/12/2005	11/01/2006	14
Joint meeting	13/01/2006	----------	1
Discussion on sector classification map	18/01/2006	27/01/2006	8
Final draft of taxonomic map	30/01/2006	----------	1
Drafting of report	31/01/2006	16/02/2006	13
Draft report distribution and revision	17/02/2006	23/02/2006	5
Meeting to validate draft report	24/02/2006	----------	1
Drafting of final report	27/02/2006	02/03/2006	4
Meeting to approve final report	28/02/2006	----------	1

4. Need and benefits of a new classification of the electronics and ICT sector

The existence of a generally-accepted classification is justified by its usefulness in reflecting the diverse aspects of a country's economic situation. It embodies (or should embody) products and activities which come about naturally in the industry and in services each year and it should necessarily readapt to a changing situation with sufficient speed so that the theory behind the classification is not out of step with reality.

The urgent need to review and modify the way in which the electronics and ICT sector is classified at present is made patent by the difficulties which arise when categorizing and measuring the sector's daily activities using existing methods of classification.

The sporadic nature of any updates to official classifications to date and the dynamism of the sector constitute two opposing forces which have led to serious inadequacies in forecasts made by organizations and agencies using these classifications.

This happens in almost all aspects of the situation and almost all fields of activity, from industrial manufacturing, the importation of goods, equipment and systems, training, and the emergence of new, unforeseen kinds of activity, to trade union affairs such as negotiation and the application of collective agreements.

From the point of view of classification, this sector does not really exist in and of itself. Rather, if proof of its existence were required, it would be necessary to dip into all the diverse groupings within current classifications in order to make up what is nowadays one of the driving forces of the economy.

At this point it seems necessary to create a classification which gathers together in an orderly fashion electronics and ICTs as a whole.

As mentioned previously, this sector is undergoing dynamic development and permanent changes which, combined with the difficulty which any speedy change to official classifications implies, means there is a widening gap between reality, day-to-day needs and out-of-date classifications.

This can be seen in all the sector's day-to-day activities, from collating general statistics, with products and services currently spread across disparate groups, through to structuring training in the industry – which is of strategic importance for companies and for the country – or to company appointments when it comes to negotiating collective agreements, to name a few examples referred to in the following sections.

4.1. Measuring economic activity

The present complexity of the supply, equipment, systems and products currently generated by the electronics and ICT sector in Spain, a consequence of the enormous technological momentum experienced and its effects on society and the economy, is currently limited to what is embodied in CNAE (the Spanish National Classification of Economic Activities), a purportedly comprehensive list which was compiled in 1993 and has since been updated only once in a very necessary but limited exercise. It omits any products and services resulting from convergence, while assigning others to groups and activities which no longer exist. This limitation brings with it serious problems when it comes to measuring, monitoring and comparing industrial activity undertaken by this sector under headings such as foreign trade, R&D&I, GDP, etc.

It's a particularly significant situation in this sector and one which probably does not arise to the same degree in others (mechanical engineering, metallurgy, textiles, etc.), where technology has had a lesser influence and long-standing methods of measuring activity have seen little change. This situation is giving rise to erroneous ways of measuring the basic parameters of our economy (ICT sector balance of trade, common external tariff, R&D&I, etc.) and data which simply do not reflect reality.

4.2. Social matters

As a result of taking on board the implications of this broad sector - CNAE being one of the consequences - many of the activities developed within it fall under the metals sector, which leads to dysfunctions in the implementation of activities which, because of the peculiarities of this sector, should be treated differently. Foremost among these is training.

The training of professionals and specialists in this sector, given its special features and, above all, its high technological profile, merits a differential treatment which it currently does not receive.

Public assistance for training, its content, continuous training, and so on - undertaken each financial year by the sector is in the hands of a group which has little to do with the knowledge and expertise taught in relation to new technologies and digital society.

As an example, any request for subsidies under the auspices of Programme Contracts for training employed workers, Order TAS/2783/2004, must be channelled through membership of the Fundación del Metal para la Formación, Cualificación y el Empleo (Foundation for Training, Qualification and Employment in the metals sector), a mixed bag of business associations such as metallurgy, industrial supplies and distributors, machine tool manufacturers, dealers in automotive equipment and spare parts, locks and security, etc. This hinders any real advance towards complex and technologically-differentiated training which adequately prepares technicians for the Information Society.

The current situation means, for instance, that only those employees of companies belonging to the metals sector can attend continuous training courses offered by AETIC through the Fundación Tripartita para la Formación en el Empleo (Spanish Tripartite Foundation for Employment Training), thus hampering any single, common training policy in the ICT employers' organization and reducing the benefit to be gained from this assistance.

With all due respect to other technologies, combining such disparate activities is not the best way forward; instead, differentiated schemes should be created according to the type of knowledge to be shared, something which is currently difficult to implement due to the absence of a clearly-differentiated ICT sector like those which exist for other areas of activity.

Moreover, it is precisely due to this lack of definition which characterizes the electronics and ICT sector that businesses making up AETIC fall into not only in the metals sector but also various others, making administration of these subsidies particularly difficult. With the Knowledge Society in full swing, it would make sense for this to be recognised and to include all businesses in the sector - those operating in telecommunications, information technology, professional electronics, consumer electronics, components, telecommunications operators and content generators - in one single sector, similarly to how they are currently classified within AETIC and other European organizations.

And lastly, another of the social matters made difficult by the way the ICT industry is considered is the negotiation of collective agreements.

4.3. Technological, business and market convergence

Finally, there is the phenomenon of convergence among the telecommunications, media and IT sectors which has been partially evident since the late 70s when telematics materialised from the convergence of information technology and telecommunications. However, the phenomenon of integrated convergence between sectors was first shown in its basic form in the mid 1990s when the three worlds (these being constituted by a few digital technologies and infrastructures, a handful of operators, a market and a few consumers) began to satisfy one demand: the consumption of multimedia information (audio, video and data) through various interfaces and one or several operating platforms.

In this regard, the debate about convergence was rekindled when in December 1997 the Green Paper on convergence[1] was published and various public consultations were held around the impact of convergence on different areas, including regulation. This Commission initiative notwithstanding, debate faded in the European Union, with some states under greater short-term pressure due to the urgent action required because popular access to the Information Society was lagging behind rather than because of convergence *per se*, which is a more significant process with profound implications. However, with definite procedures in progress aimed at developing the internet–(and broadband in particular) through national policies and strategies, the enormous potential presented by "convergence" in its global sense is once again beginning to be taken on board, especially with regard to access, treatment, processing and communicating multimedia information in the context of growing inter-platform competition. This is essentially directed towards the satisfaction of the (in some cases newly arisen) demands and needs of end users.

In short, now that the market and main agents within it have begun to commit themselves to businesses which are close to acquiring critical mass (broadband access, 3G mobile communications, interactive digital TV, etc.) it has become necessary to review the conditions in which this convergence arises and the changes implied by this process in the regulation and new availability of the ICT sector, as well as economic activities embedded in it.

The situation demands a revision of the current classification of activities and services in order to adapt it to the consequences of convergence, with the process of adaptation necessarily taking place in stages both because of the need to trace statistics and because convergence is a continuous phenomenon, making constant adaptation a necessity, as evidenced throughout this report.

[1] "Green Paper on the convergence of the telecommunications, media and information technology sectors and the implications for regulation. Towards an approach for the information society". COM(97)623, 3/12/1997.

5. Previous national classifications

The following sections review the main national classifications that exist for the electronics and information and communication technology sector. The first one covered is the current "official" classification embodied in CNAE, followed by various other classifications originating in fields of practical professional experience in the sector: those of AETIC, ICEX and CMT.

5.1. CNAE

The Clasificación Nacional de Actividades Económicas 1993 (Spanish National Classification of Economic Activities) was drawn up according to conditions contained in the implementation regulations for NACE Rev. 1.1 (1990), the official statistical nomenclature of economic activities in the European Community, and was approved by Royal Decree 1560/1992, dated 18th December.

It is structured around six levels of aggregation and aims to establish a hierarchical set of economic activities which can be used to:

1) Favour the implementation of national statistics which can be differentiated according to established activities

2) Classify statistical units and entities according to the economic activity undertaken.

The CNAE is part of a system of harmonization of economic nomenclatures set by the European Union, although new subdivisions may be added to differentiate certain Spanish economic activities.

The 1993 CNAE currently in force was drawn up after analysing and organizing the information already existent in various bodies: INE (National Statistics Institute), Ministries, autonomous regions and other entities.

The following is a critical examination of this classification.

Firstly, it should be recognised that when a country like Spain needs to measure its economy, (mainly to assign resources, promote certain undertakings, or become familiar and compare the real situation with that of third parties) it makes use of the national classification of economic activities, in this case the Clasificación Nacional de Actividades Económicas (CNAE).

In the original classification, the current sector of electronics and ICT is included in Divisions 30 (Manufacture of office machinery and IT equipment), 32 (Manufacture of electronic material; manufacture of radio, TV and communications equipment and apparatus), 33 (Manufacture of medical and surgical, optical precision and watch-making instruments and equipment) and 64 (Post office and telecommunications).

The following table shows the CNAE Rev. 1 which indicates that the development of the sector made necessary a revision of the original classification.

The inevitable conclusion is that the CNAE classification cannot represent the vast ICT sector as it currently stands or it would do so imprecisely and insufficiently

Table 2. Structure of the CNAE-93 Rev. 1 classification for the ICT sector

CNAE-93 rev. 1	Denomination
	ICT sector
3001	Manufacture of office machinery
3002	Manufacture of computers and other information processing equipment
3130	Manufacture of insulated wire and cable
3210	Manufacture of electronic valves and tubes and other electronic components
3220	Manufacture of television and radio transmitters and apparatus for wireless telephony and telegraphy
3230	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus
3320	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
3330	Manufacture of industrial process control equipment
5143	Wholesale of electrical household appliances and radio and television goods
5160	Wholesale of other electronic components and equipment
5167	Wholesale of computers, computer peripheral equipment and software
7133	Renting of office machinery and equipment including computers
6420	Telecommunications
7210	Hardware consultancy
7221	Software publishing
7222	Other software consultancy and supply
7230	Data processing
7240	Database activities
7250	Maintenance and repair of office, accounting and computing machinery
7260	Other computer-related activities
	Content sector
2214	Publishing of sound recordings
2231	Reproduction of sound recording
2232	Reproduction of video recording
2233	Reproduction of computer media
9211	Motion picture and video production
9212	Motion picture and video distribution
9220	Radio and television activities

5.2. AETIC group structure

As an association of ICT sector companies, AETIC has an internal group structure which approximates that of the sector in terms of a categorization based on purely business criteria.

AETIC's group structure thus reflects the diverse areas within the sector, subdividing them into a second level, which allows this business association to work in an orderly manner. In this case, the classification used by AETIC groups together companies with similar business models, enabling lines of work that are consistent with company objectives.

As embodied in the Spanish electronics and information and communication technology sector annual report for 2004 (the latest available), the structure of the electronics and ICT sector used by AETIC is shown in Table 3.

However, despite an approximation to business reality, the classification does not mirror certain significant changes which have recently taken place in the sector, in particular aspects related to convergence. In addition, the development of the sector has meant that some new activities are taking on a key role, while others are increasingly less important.

This classification does allow us, nevertheless, to benefit from professional and business expertise of long standing.

It is this classification that has been applied when recording basic parameters and preparing the most common indicators in order to gauge the situation of the ICT sector, a fact which should be borne in mind when analysing the sector's status,possible business alternatives and development.

Table 3. AETIC's classification of activities

AETIC's structure	
Group	**Subgroup**
Electronic components	Tubes
	Semiconductors
	Capacitors
	Resistors and potentiometers
	Inductive components
	Electroacoustic components
	Printed circuits
	Electromechanical components
	Other components and antenna
	Electronic subcontracting
Consumer electronics	Audio
	Television
	Digital cameras
	Video
	Magnetic media
Professional electronics	Educational instruments and equipment
	Defence, detection and navigation electronics
	Industrial electronics
	Electromedicine
	Radio and television
	Systems integration and installation
Telecommunications industries	Systems installation and integration
Telecommunications service providers and operators	Carrier and fixed telephony services
	Mobile services
	Data transmission/switching
	Cable telecommunications services
	Internet access services
Information technology	Hardware
	Software
	Computer services
	Telematics services
	Consumables
	Office automation equipment
Other	Discographic content
	Audiovisual content
	Videographic content
	Publishing content
	E-commerce (payments)
	Automotive electronics

5.3. ICEX

Similarly, the Instituto Español de Comercio Exterior (ICEX) (Spanish Institute of Foreign Trade) has been evaluating this sector's export production, both in terms of electronic components ("Questionnaire for the directory of electronic component manufacturers and exporters") and in industrial electronics ("Repertoire of Spanish industrial electronics manufacturers") and adjacent sectors such as electromedicine ("Spanish electromedical apparatus manufacturers").

For this a classification is being used which, while significant, only reflects certain subsectors and areas of activity and, moreover, is in some cases out of step with reality and uses criteria for the differentiation of activities which are less than clear.

The following tables show data extracted from the ICEX information available:

Table 4. Classification of electronic components according to ICEX

Electronic components	
Code	**Product**
01	*PASSIVE ELECTRONIC COMPONENTS*
01.01	Capacitors
01.02	Resistors
01.03	Transformers
01.05	Coils
01.06	Filters
02	*INTERCONNECTION COMPONENTS*
02.01	Printed circuits
02.02	Connectors
02.03	Switches and relays
03	*SEMICONDUCTORS*
03.01	Integrated semiconductors
03.02	Discrete semiconductors
03.03	Optoelectronics
04	*ELECTRONIC TUBES*
04.01	TV tubes
04.02	Laser tubes
04.03	Other electronic tubes
05	*ELECTROACOUSTIC COMPONENTS*
05.01	Electrodynamic speakers (free diaphragm or compression)
05.02	Electromagnetic speakers
05.03	Piezoelectric speakers
05.04	Ionic speakers
05.05	Other electroacoustic components
06	*POWER SUPPLIES*
06.01	Switched power supplies
06.02	Progammed power supplies
06.03	Linear power supplies

06.04	Modular power supplies
06.05	Reference voltage supplies
06.06	AC/AC inverters
06.07	AC/AC, DC/DC converters
06.08	Photovoltaic elements
06.09	Chargers and rectifiers
06.10	Frequency converters
06.11	Uninterrupted power supply systems
06.12	Other power supplies
07	*ELECTRONIC SUB-ASSEMBLIES*
07.01	Analogue digital/digital analogue (AD/DA) sub-assemblies
07.02	Battery sub-assemblies
07.03	Bluetooth modules
07.04	CATV amplifier modules
07.05	Cable TV CCD modules
07.06	Electron gun modules
07.07	Fibre optic modules
07.08	Waveguides
07.09	Magnetic heads
07.10	Mobile phone camera modules
07.11	Laser optical readers
07.12	Print heads
07.13	RF modules
07.14	Remote control transmitter modules
07.15	Sound modules
07.16	Subsystems
07.17	Tuners
07.18	Other electronic sub-assemblies
08	*ANTENNAS AND THEIR COMPONENTS*
08.01	Car radio antennas
08.02	Indoor aerials (radio and TV)
08.03	Outdoor aerials (individual and collective)
08.04	Satellite dishes
08.05	Other antennas
08.06	Accessories for passive electronic antennas
08.07	Accessories for active electronic antennas
08.08	Items for radio signal distribution networks
08.09	Items for direct satellite reception
08.10	Antenna positioners
08.11	LNBs
08.12	ICT components
08.13	Other antenna components
09	*OTHER COMPONENTS AND ACCESSORIES*
09.01	Batteries

09.02	Cables
09.03	Sensors
09.04	Recording and reading components
09.05	Piezoelectric devices
09.06	Other components and accessories
09.07	Batteries
09.08	Sensors
09.09	Keyboards

Table 5. Classification of industrial electronic products according to ICEX

Industrial electronics	
Code	**Product**
01	Automation
02	Cells
03	Meters
04	Controllers
05	Distribution, control and manoeuvering panels
06	Displays
07	Control and signalling elements
08	Automation elements
09	Energy-saving items
10	Emulators
11	Solar energy
12	Installation equipment
13	Management and registration equipment
14	X-ray based non-distributed control equipment
15	Photoelectric equipment
16	Measurement and control equipment
17	SMD technology electronic manufacturing equipment
18	Equipment for testing single functions and ageing of printed circuit boards and electronic components
19	Automatic equipment
20	Industrial weighing and classification equipment
21	Personnel monitoring equipment
22	Printed circuit manufacturing equipment
23	Power factor correction equipment
24	Testing equipment
25	Electronic equipment for renewable energy monitoring and control
26	Voltage stabilisers
27	Projects and installations
28	Power supplies
29	Systems engineering and instrumentation
30	Interphones
31	Automatic controls

32	Security controls
33	Inverters
34	Recorders
35	Monitoring and control
36	Voltage regulators
37	Signalling
38	Traffic, motorway, parking, maritime and rail traffic monitoring and control systems
39	Electronic braking systems
40	Alarm systems
41	Sound level meters
42	Frequency and voltage shifters
43	Line conditioners
44	Alternators
45	Emergency lighting
46	Amplifiers
47	Analysers
48	Anemometers
49	Transport, traction and cable control apparatus
50	Measurement, manoeuvering, distribution and control apparatus
51	Magnetic measuring apparatus
52	Apparatus for electrical panels and installations
53	Starters
54	Special automatisms
55	Accessories for construction of panels and equipment
56	Databases
57	Calibrators
58	Capacitance meters
59	Battery chargers
60	Electronic loads
61	Meter centralization
62	Control and distribution centres
63	Circuit breakers
64	Synoptic panels
65	Detectors
66	Dynamometers
67	Dynamos
68	Sinks
69	Phase meters
70	Frequency meters
71	Generator sets
72	Motor-generator sets
73	Emergency sets
74	Electronic overload limiters
75	Overhead lines

76	Electronic scoreboards
77	Transformation ratio measurement
78	Meters
79	Micro motors
80	Stepper motors
81	Queue number display
82	Measuring bridges
83	Voltage rectifiers
84	Centralized measurement control register
85	Electronic clocks
86	Isolating switches
87	Sensors
88	Servo motors
89	Handwriting identification systems
90	Motor protection sensors
91	Tacometers
92	Keyboards
93	Thermometers
94	Thermostats
95	Transducers
96	Voltage absence checking devices
97	Digital counters and displays
98	Accessories
99	Sundry electronics

Table 6. Classification of electromedical products according to ICEX

Electromedicine	
Code	**Product**
01	X-ray generators, cables and tubes
01.01	X-ray generators
01.02	Other
02	General-purpose equipment
02.01	Radiology tables
02.02	Remote controlled tables
02.03	Wall Bucky
02.04	Universal equipment
03	Specialized radiology equipment
03.01	Dental
04	Radiological data processing
04.01	Digital image processing
04.02	Other radiological data processing
05	Mobile radiology units
05.01	Para-radiography
06	Radiography accessories
06.01	Automatic exposure meters
06.02	Other radiography accessories
07	Physical therapy and rehabilitation equipment
07.01	Electronic stimulators
07.02	Ultrasound
07.03	Other physical therapy and rehabilitation equipment
08	Cardiology equipment
08.01	Monitors
08.02	Electrocardiographs
08.03	Other cardiology equipment
09	Diagnostic equipment
09.01	Audiometers and audiometric booths
09.02	Other diagnostic equipment
10	Other electromedical equipment
10.01	Headphones
10.02	Electronic coagulators
10.03	Electrosurgical scalpels
10.03	Electronic recuperators
10.04	Respirators

5.4. Telecommunications Market Commission (Comisión del Mercado de las Telecomunicaciones, CMT)

The Telecommunications Market Commission (Comisión del Mercado de las Telecomunicaciones) is an independent Spanish regulatory body for the telecommunications and audiovisual services market.

Among its areas of responsibility is the regular publication of information about the sector, for which it employs a classification for electronic and audiovisual communications as shown in the following table.

Table 7. CMT classification (first quarter report 2005)

Area	Activity
Fixed communications	
	Retail market
	Wholesale market
	Business communications
Mobile communications	
	Retail market
	Wholesale market
Internet	
	Narrowband
	Broadband
Audiovisual	
	Retail market
	Audiovisual signal transport and broadcasting

Statistical consistency and the obligation of operators to provide corresponding data make it advisable to use the same structure for this part of the ICT sector in the classification proposed later in this report.

6. Previous international classifications

This section analyses the international classifications which are the most significant in terms of the need for compatibility with them, as well as those which – while not sharing this binding nature – provide information of interest for the purposes of the classification proposed herein.

The figure below is a graphic representation of the various classifications considered and the relationship among them.

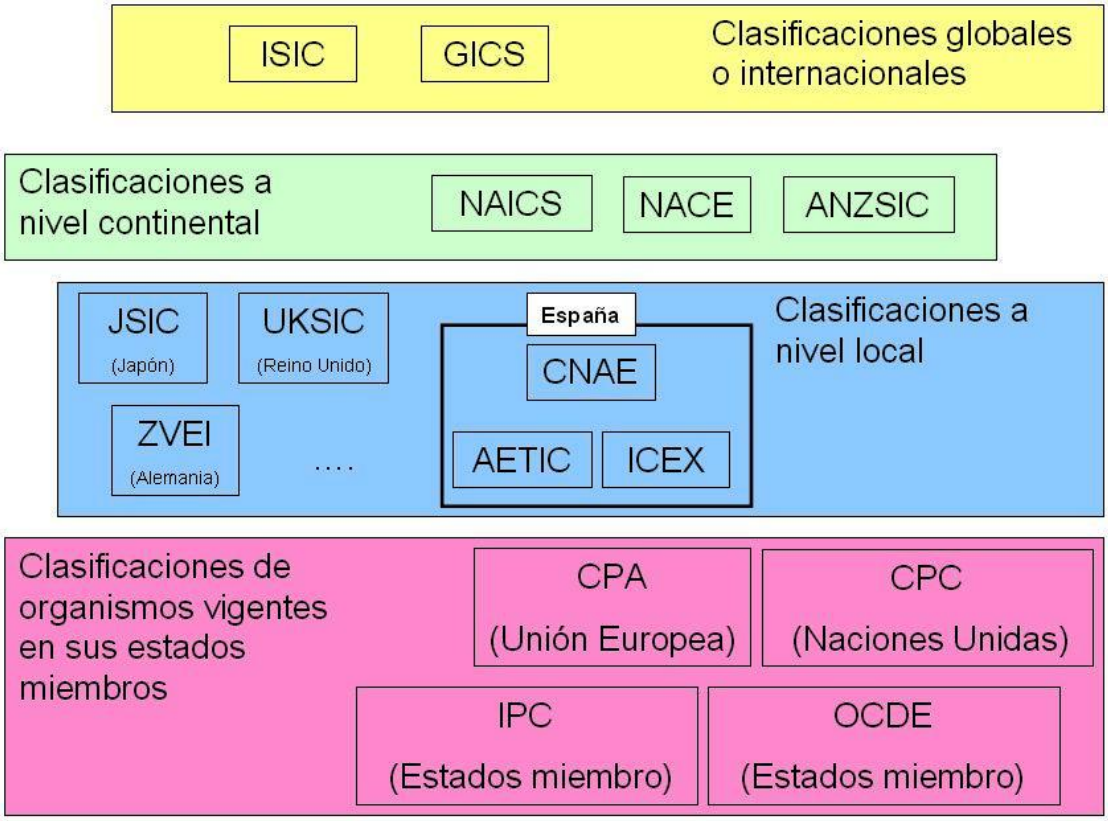


Figure 1. Diagram of the various classifications analysed

6.1. Standard Industrial Classification Codes (SIC)

The Standard Industrial Classification[2] was established by the US Government in the 1930s as a system of classifying and uniquely identifying the various existing industries and business activities by means of a four-digit code.

One of its principal objectives is to promote better communication among countries and among specific sectors. It is a classification of economic activities and not of industries or products and services.

This classification has been extensively used, both in the United States and in other countries, in order to gather information about the type of economic activity in areas such as population, production, employment, national income and similar statistics. It has sprouted global classifications such as ISIC (International Standard Industrial Classification) and GICS (Global Industry Classification Standard), as well as others at

[2] Reference website: http://www.osha.gov/pls/imis/sic_manual.html

a continental level, such as the later version of NAICS 1997 (which includes Canada, the United States and Mexico, and which was subsequently revised in 2002) or ANZSIC (Australia and New Zealand), as well as some of more local scope such as JSIC (Japan) and UKSIC (United Kingdom).

Similarly, other associations use these codes for their own internal classifications, speeding up the compilation of statistical information. Each adaptation strives to ensure, as far as possible, that categories at more detailed levels of classification are in tune with the original SIC classification.

The need to continuously adapt a classification, both in terms of its categories and in their definition, arises because of technological advances, a self-evident factor in a sector as dynamic as that of electronics and ICT. The first revision of ISIC was undertaken in 1958, with further revisions in 1968 and 1989, among others.

6.2. NACE

The Statistical Classification of Economic Activities in the European Community, Revision 1.1, known as NACE, is a classification of economic activities which is derived from the International Standard Industrial Classification (ISIC Rev. 3), which comprises a set of classifications of economic activities in existence since 1948. Its aim is to establish a hierarchical set of economic activities which can be used to implement community statistics, to serve as a framework for community and international comparison of statistics and organisms according to the economic activity carried out and, lastly, to constitute a regulatory framework for the development of national classifications of economic activities.

This classification is currently undergoing an extensive revision (Rev. 2) requiring the participation of associations and institutions of member countries. AETIC is therefore providing a detailed overview of the ICT sector via the classification proposed in this report.

Between 6th and 7th October 2005 the Working Group Information Society Statistics (ISS) held a series of meetings seeking opinions about the current definition of the ICT sector and about the various approaches to collecting data related to this sector and the need for improvement.

According to the report submitted about these projects, analysis of the sector focuses on the development, production, maintenance and/or distribution of a specific group of products and/or services, according to users' needs. There are currently various definitions of the ICT sector, although many of them refer back to the one agreed by OECD member countries in 1998 which led to a classification of ICT products, referred to in section 6.1.

The classification proposed by NACE regarding the ICT sector is shown in Table 8.

The NACE classification is based on ISIC codes, adopting the same criterion of defining and classifying economic activities and not industries or products and services.

A revision of this classification is necessary, as per the Eurostat project, *Operation 2007*[fn], as are those planned for other systems of classification of activities and products, such as Classification of Products by Activity (CPA)[fn].

Interestingly, this classification makes a distinction between provision and manufacture of services, although it is probably too soon to know the final outcome of this revision.

Table 8. Proposed revision of the NACE-93 structure

NACE Rev. 2 compared to NACE Rev. 1.1	
NACE activities	
ICT Manufacturing	
26.20	**Manufacture of computers and peripheral equipment**
26.30	**Manufacture of communication equipment** *- includes Communication signal testing apparatus*
26.51	**Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes except industrial process control equipment** *(class was included in OECD ICT sector definition; now relevant part of it seems included in division 26.3)*
26.52	**Manufacture of industrial process control equipment**
27.31	**Manufacture of fibre optic cables** *(new class; item was included in OECD 1998 definition but appeared as class 31.30 with high non-ICT specialisation)*
ICT Services	
46.51	**Wholesale of computers, computer peripheral equipment and software**
46.52	**Wholesale of electronic and telecommunications equipment and parts**
47.41	**Retail sale of computers, peripheral units and software**
47.42	**Retail sale of telecommunications equipment**
47.43	**Retail sale of audio and video equipment** *(These specialised ICT retail sale classes are new. Retail sale was not included in the OECD ICT sector definition)*
58.20	**Software publishing** *(item was included in the OECD ICT sector definition but appeared with others in division 72)*
61.10	**Wired telecommunications activities**
61.20	**Wireless telecommunications activities**
61.30	**Satellite Telecommunications activities**
61.90	**Other telecommunications activities**
62.01	**Computer programming activities**
62.02	**Information technology consultancy activities**
62.03	**Computer facilities management activities**
62.09	**Other information technology service activities**
63.11	**Data processing, hosting and related activities**
63.12	**Web portals**
63.29	**Other information service activities n.e.c.**
77.33	**Renting of office machinery and equipment, including computers**
82.20	**Activities of call centres** *(Rev.1.1.:74.86 Call centres activities - were not included in the OECD ICT sector definition)*
95.11	**Repair of computers and peripheral equipment**
95.12	**Repair of communication equipment** *(Rev.1.1: repair was included in group 72.5 under computer and related activities)*

6.3. OECD

The Organisation for Economic Co-operation and Development (OECD)[3] is an international organization in which the governments of member countries work together to respond to economic, social and environmental challenges, a product of interdependence and globalization.

It was created after World War II as the Organisation for European Economic Co-operation, whose purpose was to coordinate the Marshall Plan. In 1961 it became the Organisation for Economic Co-operation and Development with a transatlantic and, later, worldwide remit.

The OECD currently has 30 member countries and some 70 developing or transitional countries or economies associated with its work, as shown in Figure 1 - countries in which the main mission is to coordinate their economic and social policies.

The principal objectives of this organization are:

A. To promote employment, economic growth and a better standard of living in member countries while maintaining their stability

B. To foster economic expansion in the process of development, both of member countries and of those outside the Organisation

C. To broaden multilateral global trade, excluding any discriminatory criteria, in accordance with international agreements.

The classification used by the Organisation for Economic Co-operation and Development (OECD) is reflected and developed in the following documents: Reviewing The ICT Sector Definition: Issues For Discussion[4] and A Proposed Classification Of ICT Goods[5], both published in 2003.

The first of these forms the basis for addressing the structuring of the ICT sector with regard to the implementation of various national approaches to defining and classifying this complex sector. It reviews the current definition of the sector, discussing which parts require revision, in order to compare statistical data obtained in different countries and which reflect the sector's current situation.

The second document proposes a classification taking as a starting point projects carried out by the Working Party on Indicators for the Information Society (WPIIS) beginning in 1998, in which various international delegations and organizations collaborated. The last proposal was submitted by Canada at the 2003 WPIIS Congress. This was subsequently revised by various WPIIS member countries as well as by Eurostat.

This classification is geared towards easing the adoption of international indicators about the market and production of ICTs, as well as subsequent developments enabling the measurement of consumption and development in this sector.

[3] Reference website http://www.oecd.org

[4] Reference http://www.oecd.org/dataoecd/3/8/20627293.pdf

[5] Reference http://www.oecd.org/dataoecd/5/62/22341267.pdf

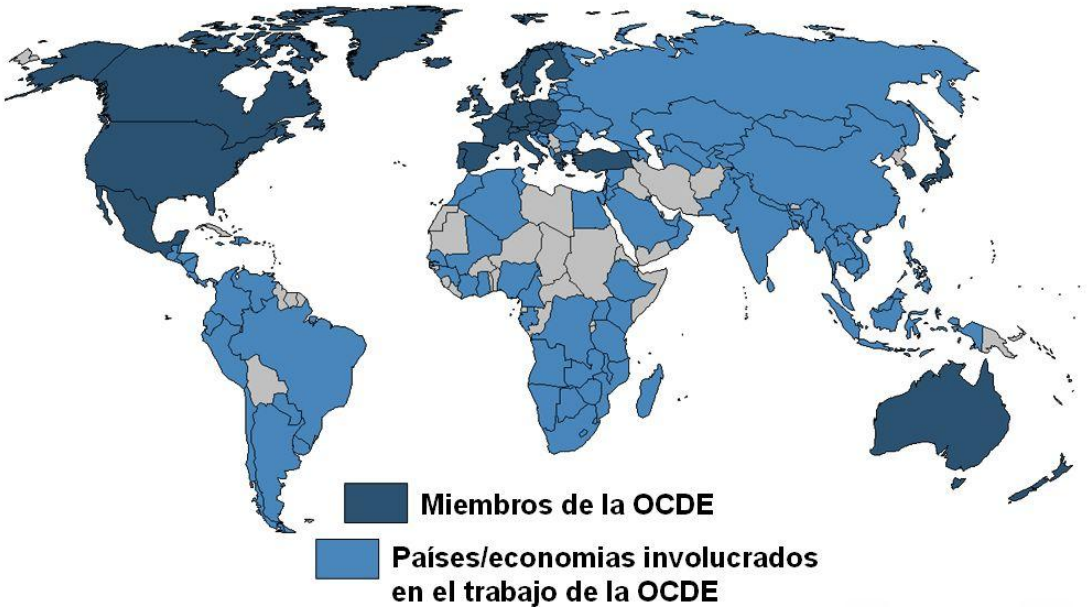


Figure 2. OECD coverage

List of OECD member countries

Australia	Korea
Austria	Luxembourg
Belgium	Mexico
Canada	Netherlands
Czech Republic	New Zealand
Denmark	Norway
Finland	Poland
France	Portugal
Germany	Slovakia
Greece	Spain
Hungary	Sweden
Iceland	Switzerland
Ireland	Turkey
Italy	United Kingdom
Japan	United States

Another reason for undertaking this work is to refine the definition of the ICT sector suggested by the OECD which, as agreed in 1998, would be divided into two large sections whose criteria for definition are:

- For manufacturing industries, producers of material goods, these must:

- be geared towards carrying out communications and information processing functions, including transmission and display, or

- use electronic processes to detect, measure and/or record physical phenomena or monitor physical processes.

- For service industries, these must:

- be geared towards enabling the communications and information processing function by electronic means.

According to these criteria, the industries included in the International Standard Industrial Classification (ISIC) which belong to the ICT sector are:

Table 9. Industries included in the ICT sector according to the OECD

Products
3000: Office, accounting and computing machinery
3130: Insulated wire cable
3210: Electronic valves and tubes and other electronic components
3220: Television and radio transmitters and apparatus for line telephony and line telegraphy
3230: Television and radio receivers, sound or video recording or reproducing apparatus and associated goods
3312: Instruments and appliances for measuring, checking, testing, navigating and other purposes except industrial process equipment
3313: Industrial process equipment
Services
5150: Wholesale of machinery, equipment and supplies (part only, where possible)
6420: Telecommunications
7123: Renting of office machinery and equipment (including computers)
72: Computer-related activities

This report makes explicit the difficulty in undertaking a precise classification of products and services belonging to the ICT sector due to the changing nature of the sector and dated classification standards.

The first decision in this connection involved splitting the sector's classification into two sections, one for products and the other for services, as shown in the document mentioned[6]. A secondary reason mentioned is the need to use the numbering and nomenclature of the Harmonized System (HS) in its 1996 and 2002 versions[7] in order to keep an official nomenclature.

The OECD classification uses the same codes as the Harmonized Commodity Description and Coding System (known as Harmonized System or HS), a classification by code created by the Customs Co-operation Council to serve as a basis for the classification of import and export traffic in international trade.

It is based on the fundamental principle that products should be classified on the basis of what they are and never in relation to their state of manufacture or other similar criteria. The nomenclature used is structured in relation to the economic activity it represents or the material component of the product.

[6] A Proposed Classification Of ICT Goods

[7] In order to avoid adding unnecessary information in completing the objectives of this report, of the two used in the OECD classification only the HS 2002 numbering has been shown, purely on the basis of it being more up to date.

Table 10. Structure of the OECD classification of products in relation to ICTs

	Computer and related equipment
847110	Analogue or hybrid automatic data processing machines
847130	Portable digital automatic data processing machines, weighing not more than 10 kg, consisting of at least a central processing unit, a keyboard and a display
847141	Digital automatic data processing machines comprising in the same housing at least a central processing unit and an input and output unit, whether or not combined
847149	Other digital automatic data processing machines, presented in the form of systems
847150	Digital processing units other than those of subheadings 8471.41 and 8471.49, whether or not containing in the same housing one or two of the following types of unit : storage units, input units, output units
847160	Automatic data processing machines, input or output units, whether or not containing storage units in the same housing
847170	Automatic data processing machines, storage units
847180	Other units of automatic data processing machines
847190	Magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included
847330	Parts and accessories of the machines of heading No. 84.71

	Electronic components
850431	Electrical transformers having a power handling capacity not exceeding 1 kVA (2)
850450	Inductors
850490	Parts of: electrical transformers, static converters (for example, rectifiers) and inductors
852330	Cards incorporating a magnetic stripe, unrecorded
852460	Cards incorporating a magnetic stripe, recorded
852990	Parts suitable for use solely or principally with the apparatus of headings Nos. 85.25 to 85.28 except aerials and aerials reflectors
853221	Capacitors, fixed, tantalum having a reactive power handling capacity of less than 0.5 kvar
853224	Capacitors, fixed, ceramic dielectric, multilayer having a reactive power handling capacity of less than 0.5 kvar
853230	Variable or adjustable (pre-set) capacitors
853310	Fixed carbon resistors, composition or film types
853321	Electrical resistors, fixed, (including rheostats and potentiometers), other than heating resistors, for a power handling capacity <= 20 W
853329	Electrical resistors, fixed, (including rheostats and potentiometers), other than heating resistors, n.e.s..
853331	Wirewound variable resistors, for a power handling capacity <= 20 W
853339	Wirewound variable resistors, for a power handling capacity <= 20 W
853340	Other variable resistors, including rheostats and potentiometers
853390	Parts for electrical resistors (including rheostats and potentiometers), other than heating resistors
853400	Printed circuits
854011	Cathode-ray television picture tubes, including video monitor tubes, colour
854012	Cathode-ray television picture tubes, including video monitor tubes, black and white or other monochrome
854020	Television camera tubes; image converters and intensifiers; other photo-cathode tubes
854040	Data/graphic display tubes, colour, with a phosphor dot screen pitch smaller than 0.4 mm
854050	Data/graphic display tubes, black and white or other monochrome
854060	Other cathode-ray tubes
854071	Microwave tubes, magnetrons, excluding grid-controlled tubes
854072	Microwave tubes – klystrons, excluding grid-controlled tubes
854079	Microwave tubes, other, excluding grid-controlled tubes
854081	Receiver or amplifier valves and tubes
854089	Valve and tubes, n.e.s.
854091	Parts of cathode-ray tubes
854099	Parts of thermionic or photo-cathode, valve and tubes, other than cathode-ray tubes
854110	Diodes, other than photosensitive or light emitting diodes
854121	Transistors, other than photosensitive, dissipation rate < 1 W
854129	Transistors, other than photosensitive transistors, n.e.s.
854130	Thyristors, diacs and triacs, other than photosensitive devices
854140	Photosensitive semiconductor devices, including photovoltaic cells; light emitting diodes
854150	Other semiconductor devices
854160	Mounted piezo-electric crystals
854190	Parts for semiconductor devices
854210	Cards incorporating electronic integrated circuits (“smart” cards)
854221	Digital monolitihic integrated circuits
854229	Other monolithic integrated circuits
854260	Hybrid integrated circuits
854270	Electronic microassemblies
854290	Parts for electronic integrated circuits and microassemblies

	Audio and video equipment
851810	Microphones and stands therefor
851821	Single loudspeakers, mounted in their enclosures
851822	Multiple loudspeakers, mounted in the same enclosure
851829	Other loudspeakers, n.e.s
851830	Headphones and earphones, whether or not combined with a microphone, and sets consisting of a microphone and one or more loudspeakers
851840	Audio-frequency electric amplifiers
851850	Electric sound amplifier sets
851890	Parts of microphones, loudspeakers, headphones, earphones, combined microphone/loudspeaker sets, audio-frequency electric amplifiers and electric sound amplifier sets
851910	Coin- or disc-operated record-players
851921	Record-players, without loudspeaker
851929	Record-players, n.e.s.
851931	Turntables with automatic record changing mechanism
851939	Turntables, n.e.s.
851940	Transcribing machines
851992	Pocket-size cassette-players
851993	Other sound reproducing apparatus, cassette-type
851999	Sound reproducing apparatus, not incorporating a sound recording device, n.e.s.
852010	Dictating machines not capable of operating without an external source of power
852032	Other magnetic tape recorders incorporating sound reproducing apparatus, Digital audio type
852033	Other magnetic tape recorders incorporating sound reproducing apparatus, cassette-type
852039	Other magnetic tape recorders incorporating sound reproducing apparatus
852090	Magnetic tape recorders and other sound recording apparatus, whether or not incorporating a sound reproducing device, n.e.s.
852110	Video recording or reproducing apparatus, whether or not incorporating a video tuner – magnetic tape type
852190	Video recording or reproducing apparatus, whether or not incorporating a video tuner – other type
852210	Parts and accessories suitable for use solely or principally with the apparatus of headings Nos. 85.19 to 85.21 – pick-up cartridges
852290	Parts and accessories suitable for use solely or principally with the apparatus of headings Nos. 85.19 to 85.21 – other
852311	Magnetic tapes, unrecorded, width <= 4 mm (1/6 in.)
852312	Magnetic tapes, unrecorded, width > 4 mm (1/6 in.) but <= 6.5 mm (1/4 in.)
852313	Magnetic tapes, unrecorded, width > 6.5 mm (1/4 in.)
852320	Magnetic discs, unrecorded
852390	Other prepared unrecorded media for sound recording or similar recording of other phenomena, other than products of Chapter 37
852540	Still image video cameras and other video camera recorders, digital cameras
852712	Pocket-size radio cassette-players capable of operating without an external source of power
852713	Radio-broadcast receivers, capable of operating without an external source of power, combined with sound recording or reproducing apparatus
852719	Other radio-broadcast receivers, capable of operating without an external source of power, not combined with sound recording or reproducing apparatus
852721	Radio-broadcast receivers with sound recording or reproducing apparatus, for motor vehicles, requiring external source of power
852729	Other radio-broadcast receivers for motor vehicles, not combined with sound recording or reproducing apparatus
852731	Other radio-broadcast receivers, including apparatus capable of receiving also radio-telephony or radiotelegraphy, combined with sound recording or reproducing apparatus
852732	Other radio-broadcast receivers, including apparatus capable of receiving also radio-telephony or radiotelegraphy, not combined with sound recording or reproducing apparatus but combined with a clock
852739	Other radio-broadcast receivers, including apparatus capable of receiving radio-telephony or radiotelegraphy, n.e.s.

852812	Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus, colour
852813	Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus, black and white or other monochrome
852821	Video monitors, colour
852822	Video monitors, black and white or other monochrome
852830	Video projectors

	Other ICT goods
846911	Word-processing machines
847010	Electronic calculators capable of operation without an external source of electric power and pocket-size data recording, reproducing and displaying machines with calculating functions
847021	Other electronic calculating machines incorporating a printing device
847029	Other electronic calculating machines
847040	Accounting machines
847050	Cash registers
847310	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with machines of heading No. 84.69
847321	Parts and accessories of the electronic calculating machines of subheading No. 8470.10, 8470.21 or 8470.29
847350	Parts and accessories equally suitable for use with machines of two or more of the headings Nos. 84.69 to 84.72
852691	Radio navigational aid apparatus
852692	Radio remote control apparatus
901041	Apparatus for the projection or drawing of circuit patterns on sensitised semiconductor materials – direct write-on-wafer apparatus
901042	Apparatus for the projection or drawing of circuit patterns on sensitised semiconductor materials – step and repeat aligners
901049	Apparatus for the projection or drawing of circuit patterns on sensitised semiconductor materials – other
901410	Direction finding compasses
901420	Instruments and appliances for aeronautical or space navigation (other than compasses)
901480	Other navigational instruments and appliances
901490	Parts and accessories of direction finding compasses, other navigational instruments and appliances
901540	Photogrammetrical surveying instruments and appliances
901580	Other surveying instruments and appliances
901811	Electro-cardiographs
901812	Ultrasonic scanning apparatus
901813	Magnetic resonance imaging apparatus
901814	Scintigraphic apparatus
901819	Other electro-diagnostic apparatus (including apparatus for functional exploratory examination or for checking physiological parameters)
902212	Computed tomography apparatus
902213	Other apparatus based on the use of X-rays, for dental uses
902214	Other apparatus based on the use of X-rays, for medical, surgical or veterinary uses
902219	Other apparatus based on the use of X-rays, for other uses
902410	Machines and appliances for testing the hardness, strength, compressibility, elasticity or other mechanical properties of materials, metals
902480	Other machines and appliances for testing the hardness, strength, compressibility, elasticity or other mechanical properties of materials
902490	Parts and accessories for machines and appliances for testing the hardness, strength, compressibility, elasticity or other mechanical properties of materials
902620	Instruments and apparatus for measuring or checking the pressure of liquids or gases, excluding instruments and apparatus of heading Nos. 9014, 9015, 9028 or 9032
902710	Instruments and apparatus for physical or chemical analysis, gas or smoke analysis apparatus
902730	Spectrometers, spectrophotometers and spectrographs using optical radiations (UV, visible, IR)
902740	Instruments and apparatus for measuring or checking quantities of heat, sound or light, exposure meters
902750	Other instruments and apparatus using optical radiations (UV, visible, IR)
902780	Other instruments and apparatus for physical or chemical analysis
902810	Gas meters
902820	Liquid meters

902830	Electricity meters
902890	Parts for gas, liquid or electricity supply or production meters, including calibrating meters therefore
902910	Revolution counters, production counters, taximeters, mileometers, pedometers and the like
902920	Speed indicators and tachometers; stroboscopes
902990	Parts and accessories for revolution counters, production counters, taximeters, mileometers, pedometers and the like; speed indicators and tachometers, other than those of heading No. 90.14 or 90.15; stroboscopes
903010	Instruments and apparatus for measuring or detecting ionising radiations
903020	Cathode-ray oscilloscopes and cathode-ray oscillographs
903031	Multimeters without a recording device
903039	Other instruments and apparatus for measuring or checking voltage, current, etc. without a recording device
903040	Other instruments and apparatus, specially designed for telecommunications (for example, cross-talk meters, gain measuring instruments, distortion factor meters, psophometers)
903082	Other instruments for measuring or checking semiconductor wafers or devices
903083	Other instruments for measuring or checking semiconductor wafers or devices with a recording device
903110	Measuring or checking instruments, appliances and machines n.e.s, machines for balancing mechanical parts
903120	Measuring or checking instruments, appliances and machines n.e.s, test benches
903130	Measuring or checking instruments, appliances and machines n.e.s, profile projectors
903141	Other optical instruments and appliances, for inspecting semiconductor wafers or devices or for inspecting photomasks or reticles used in manufacturing semiconductor devices
903180	Other measuring or checking instruments, appliances and machines, n.e.s.
903190	Parts and accessories for measuring or checking instruments, appliances and machines, n.e.s.
903210	Thermostats
903220	Manostats
903289	Other automatic regulating or controlling instruments and apparatus, n.e.s.
903290	Parts and accessories for automatic regulating or controlling instruments and apparatus

Although not officially stated, the idea of services being included within the structuring of the ICT sector by the OECD is latent. In fact, in 2004 a classification of services associated with ICTs was proposed, with the following categories:

A. Carrier services
B. Fixed telephony services
C. Mobile telephony services
D. Private network services
E. Data transmission services
F. All other communication services
G. Internet backbone services
H. Internet access services
I. Other internet services
J. Leasing or rental services concerning other machinery and equipment without operator
K. IT technical consulting and support services
L. IT design and development services
M. Hosting and IT infrastructure provisioning services
N. IT infrastructure and network management services

O. Computer hardware servicing, repair and maintenance

P. Published software (further split into two categories – excluding and including multimedia)

Q. Records, tapes and other recorded media for sound or other similarly recorded phenomena (except cinematographic film and cards with magnetic stripe) packaged computer software

R. Licensing services for the right to use computer software

Despite the objective of the classification proposed by the OECD being clearly stated as being to approximate the various perspectives of member countries in order to bring together ICT sector results and statistics, the very title of this classification of "goods" is closer to products generated in the heart of the sector than to services, which undoubtedly constitute a most significant part of the sector and are becoming more important by the day. Rather than proposing a detailed classification of the whole broad sector, this one is limited to manufactured industrial products, leaving aside the services and applications which characterize the sector.

We can conclude that it is a purely industrial classification based on the state of generation of the products, making no provision for the process of digital convergence and, above all, technological developments of the sector, to a large extent brought about by the existing circumstances of a business affected by consumer trends.

It likewise doesn't include factors as important as software, suggesting its intangibility as the reason for exclusion from industrial classifications such as the HS used in the preparation of the product classification. This is particularly surprising given that the logical aspect of products and services proposed by the ICT sector, made up of software, is doubtless an intrinsic and inseparable component of their physical part.

6.4. Common External Tariff

It is also particularly important to consider the Common External Tariff (CET), which involves one of the essential features of the European customs union: the application of uniform customs duties to products imported from third countries, regardless of the target Member State.

When it first appeared, the CET was the arithmetic mean of customs tariffs applied in 1957 by Member States. The Council, on the basis of Article 28 of the Treaty and after a qualified majority vote on the Commission's proposal, has since modified it many times, both independently and through negotiations on tariffs.

Setting a common external tariff resulted in homogenization of the protection of Member States in relation to third countries and in the *de facto* creation of a Community preference (given that imports from another Member State are not subject to customs duties, by definition they enjoy a more favourable régime than imports from an external state).

In this section on the Common External Tariff, and in references to the electronics and ICT sector, we can see the data for tariff entries for June 2005, classified according to product type:

Table 11. Structure of the Common External Tariff related to the electronics and ICT sector (June 2005)

Description of Professional Electronics headings	
Heading	***Description***
85.21	Video recording or reproducing apparatus, whether or not incorporating a video tuner
85.25	Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras; still image video cameras and other video camera recorders; digital cameras
85.26	Radar apparatus, radio navigational aid apparatus and radio remote control apparatus
85.29	Parts suitable for use solely or principally with the apparatus of headings 85.25 to 85.28[8]
85.31	Electric sound or visual signalling apparatus (for example, bells, sirens, indicator panels, burglar or fire alarms)
85.43	Electrical machines and apparatus, having individual functions, not specified or included elsewhere in this chapter 85[9]
90.18	Instruments and appliances used in medical, surgical, dental or veterinary sciences, including scintigraphic apparatus, other electromedical apparatus and sight-testing instruments
90.22	Apparatus based on the use of X-rays or of alpha, beta or gamma radiations, whether or not for medical, surgical, dental or veterinary uses, including radiography or radiotherapy apparatus, X-ray tubes and other X-ray generators, high tension generators, control panels and desks, screens, examination or treatment tables, chairs and the like
90.30	Oscilloscopes, spectrum analysers and other instruments and apparatus for measuring or checking electrical quantities, excluding meters of heading 90.28; instruments and apparatus for measuring or detecting alpha, beta, gamma, X-ray, cosmic or other ionising radiations
90.32	Automatic regulating or controlling instruments and apparatus

Description of consumer electronics headings	
Heading	***Description***
85.18	Microphones and stands therefor; loudspeakers, whether or not mounted in their enclosures; headphones and earphones, whether or not combined with a microphone, and sets consisting of a microphone and one or more loudspeakers; audio-frequency electric amplifiers; electric sound amplifier sets
85.19	Turntables (record-decks), record-players, cassette-players and other sound reproducing apparatus, not incorporating a sound recording device
85.20	Magnetic tape recorders and other sound recording apparatus, whether or not incorporating a sound reproducing device
85.21	Video recording or reproducing apparatus, whether or not incorporating a video tuner
85.25	Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras; still image video cameras and other video camera recorders; digital cameras
85.27	Reception apparatus for radio-telephony, radio-telegraphy or radio-broadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock
85.28	Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound

[8] 85.27: Reception apparatus for radio-telephony, radio-telegraphy or radio-broadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock

85.28: Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; video monitors and video projectors

[9] Chapter 85: Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles

	or video recording or reproducing apparatus; video monitors and video projectors
85.29	Parts suitable for use solely or principally with the apparatus of headings 85.25 to 85.28

Description of electronic components headings	
Heading	***Description***
85.04	Electrical transformers, static converters (for example, rectifiers) and inductors
85.07	Electric accumulators, including separators therefor, whether or not rectangular (including square)
85.18	Microphones and stands therefor; loudspeakers, whether or not mounted in their enclosures; headphones and earphones, whether or not combined with a microphone, and sets consisting of a microphone and one or more loudspeakers; audio-frequency electric amplifiers; electric sound amplifier sets
85.22	Parts and accessories suitable for use solely or principally with the apparatus of headings 85.19 to 85.21
85.29	Parts suitable for use solely or principally with the apparatus of headings 85.25 to 85.28
85.31	Electric sound or visual signalling apparatus (for example, bells, sirens, indicator panels, burglar or fire alarms)
85.32	Electrical capacitors, fixed, variable or adjustable (pre-set)
85.33	Electrical resistors (including rheostats and potentiometers), other than heating resistors
85.34	Printed circuits
85.38	Parts suitable for use solely or principally with the apparatus of headings 85.35, 85.36 or 85.37[fn]
85.40	Thermionic, cold cathode or photocathode valves and tubes (for example, vacuum or vapour or gas-filled valves and tubes, mercury arc rectifying valves and tubes, cathode-ray tubes, television camera tubes)
85.41	Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made-up into panels; light-emitting diodes; mounted piezo-electric crystals
85.42	Electronic integrated circuits and microassemblies
85.43	Electrical machines and apparatus, having individual functions, not specified or included elsewhere in this chapter 85
90.13	Liquid crystal devices not constituting articles provided for more specifically in other headings; lasers, other than laser diodes; other optical appliances and instruments not specified or included elsewhere in this chapter

Description of linformation technology equipment headings	
Heading	***Description***
84.69	Typewriters other than printers of heading 84.71; word-processing machines
84.70	Calculating machines and pocket-size data recording, reproducing and displaying machines with calculating functions; accounting machines, postage-franking machines, ticket-issuing machines and similar machines, incorporating a calculating device; cash registers
84.71	Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included
84.72	Other office machines (for example, hectograph or stencil duplicating machines, addressing machines, automatic banknote dispensers, coin-sorting machines, coin-counting or wrapping machines, pencil-sharpening machines, perforating or stapling machines)
84.73	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with machines of headings 84.69 to 84.72
85.04	Electrical transformers, static converters (for example, rectifiers) and inductors
85.07	Electric accumulators, including separators therefor, whether or not rectangular (including square)
85.24	Records, tapes and other recorded media for sound or other similarly recorded phenomena, including matrices and masters for the production of records
85.28	Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; video monitors and video projectors
85.43	Electrical machines and apparatus, having individual functions, not specified or included elsewhere in this chapter 85
90.17	Drawing, marking-out or mathematical calculating instruments (for example, drafting machines, pantographs, protractors, drawing sets, slide rules, disc calculators); instruments for measuring length, for use in the hand (for example, measuring rods and tapes, micrometers, callipers), not specified or included elsewhere in this chapter

Description of telecommunications equipment headings	
Heading	***Description***
8517	Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones
8518	Microphones and stands therefor; loudspeakers, whether or not mounted in their enclosures; headphones and earphones, whether or not combined with a microphone, and sets consisting of a microphone and one or more loudspeakers; audio-frequency electric amplifiers; electric sound amplifier sets
8520	Magnetic tape recorders and other sound recording apparatus, whether or not incorporating a sound reproducing device
8525	Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras; still image video cameras and other video camera recorders; digital cameras
8527	Reception apparatus for radio-telephony, radio-telegraphy or radio-broadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock
8529	Parts suitable for use solely or principally with the apparatus of headings 85.25 to 85.28
8544	Insulated (including enamelled or anodized) wire, cable (including coaxial cable) and other insulated electric conductors, whether or not fitted with connectors; optical fibre cables, made up of individually sheathed fibres, whether or not assembled with electric conductors or fitted with connectors

Despite a clear division between different areas making up the electronics and ICT sector, the CET only considers the industrial part; its classification is not one of economic activities, but only of products.

6.5. IPC (International Patent Classification)

The International Patent Classification (IPC[10]) is a hierarchical classification system consisting of sections, classes, subclasses and groups (main groups and subgroups). This classification was created following the 1971 Strasbourg Agreement as one of the various treaties administered by the World Intellectual Property Organization (WIPO) and subsequently updated by an Expert Committee formed by representatives of the countries which took part in this agreement (and those which later acceded to it, up to a total of 55[11]) and observers from other organisations such as the European Patent Office (EPO). The eighth edition of the IPC (IPC-2006) contains some 70,000 groups and came into force on 1st January 2006, a progression of work carried out since 1999.

This classification divides all technological fields into eight sections, designated A to H, as follows:

A. HUMAN NECESSITIES
B. PERFORMING OPERATIONS; TRANSPORTING
C. CHEMISTRY; METALLURGY
D. TEXTILES; PAPER
E. FIXED CONSTRUCTIONS
F. MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING
G. PHYSICS
H. ELECTRICITY

Considering that ICT-sector technologies are used nowadays in practically all the other sectors, ICT-related patents will be found to exist under each and every one of the headings; however, of these headings those which are closest to the ICT sector are G and H.

One of the indicators of technological development is undoubtedly the number of patents related to a particular activity. The IPC maintains statistics about the development of different fields related to industrial activity. This classification, too detailed to be fully expounded here, should ideally show which sectors include ICT-based innovations and, therefore, to which sectors the classification of ICT activities should be applied.

However, at the top level the sectors closest to electronics and ICTs – headings G and H, as previously mentioned – are structured as follows and, unfortunately, there is no classification which specifically identifies innovations in the ICT sector.

[10] Website reference http://www.wipo.int/classifications/ipc/es/

[11] Reference to contracting parties of the Strasbourg Agreement http://www.wipo.int/treaties/es/ShowResults.jsp?lang=es&treaty_id=11

Table 12. Structure of electronics and ICT-related groups in the IPC

Section G — Physics
Instruments
G01 Measuring; testing
G02 Optics
G03 Photography; cinematography; analogous techniques using waves other than optical waves; electrography; holography
G04 Horology
G05 Controlling; regulating
G06 Computing; calculating; counting
G07 Checking devices
G08 Signalling
G09 Education; cryptography; display; advertising; seals
G10 Musical instruments; acoustics
G11 Information storage
G12 Instrument details
Nucleonics
G21 Nuclear physics; Nuclear engineering
…..
G99 Material not otherwise provided for in this section
Section H — Electricity
H01 Basic electric elements
H02 Generation, conversion or distribution of electric power
H03 Basic electronic circuitry
H04 Electric communication technique
H05 Electric techniques not otherwise provided for
…..
H99 Material not otherwise provided for in this section

6.6. Other contributions of interest

Some of the member associations of the European Information & Communication Technology Industry Association (EICTA) have produced classifications of the ICT sector.

Perhaps the most interesting is that of the ZVEI (Zentralverband Elektrotechnik- und Elektronikindustrie e.V.), a German electrical and electronics industry association, shown in the following table.

Table 13. Index of products of the German ZVEI sector association

Code	Activity
51	*Information and communication technology services*
	Telecommunication, access and transmission services
	Information and communication technology consulting and planning services
	Computing and communications application services
	Digital information media services
	General (business) services for the Information economy
52	*Execution of information and communication technology solutions and projects*
	Network setup and network access
	Data processing systems infrastructure solutions
	Information and communication technology application solutions
53	*Suppliers of information, communication and security technology systems*
	Information acquisition, processing and transmission systems
	Communications, information and security technique systems and installations
54	*Switching and transmission equipment (incl. antenna systems)*
	Transmission systems
	Broadcasting and receiving equipment
	Satellite radiocommunication commercial installations
	Equipment for directed radio link
	Radioelectric equipment for mobile application
	Complete switching systems
	Antennas and antenna systems
	Mechanical materials for antennas
	Electrical materials for antennas
55	*Information and communication technology apparatus and terminal equipment*
	Telecommunications installations
	Terminals and terminal equipment
	Auxiliary equipment
	Apparatus and equipment for the technique of conductor-guided transmission
	Connection and distribution equipment and terminals
	Accessories, components and spare parts
56	*Navigation devices and systems, traffic management and telematics*
	Navigation and radiotelemetry equipment
	Traffic management systems

	Traffic and telematics systems
57	*Electric signalling and safety/security apparatus and systems, timing equipment*
	Complete safety/security systems
	Calling (signalling) installations
	Road traffic signalling apparatus
	Maritime traffic signalling apparatus
	Railway signalling and safety/security equipment
	Surveillance cameras
	Surveillance equipment and observation analysis devices
	Surveillance sensors
	Individual apparatus for security and alarm devices
	Acoustic signalling apparatus
	Optical signalling apparatus, display devices
	Clocks, electric clock installations
	Time measuring and checking instruments
	Accessories (safety/security and signalling techniques)
58	*Hardware for information technology and data systems*
	Mainframes, multiprocessor computers
	Computers (general data processing)
	Networks and networking components
	Connecting equipment, network terminations
	Typewriters, composition systems, photocopiers and mail handling machines
	Input and registration apparatus for data processing systems
	Screens, monitors, displays, output units
	Printers, plotters and sundry output devices
	Terminals, units and complete systems
	Apparatus and systems for payment services
	Data storage devices and equipment
	Computer extension cards and modules
	Accessories (data processing)
59	*Software for information technology and data systems*

The federation of German industries, BDI (Bundesverband der Deutschen Industrie e.V.), has likewise summarised and classified products related to the sector, as shown in the following table.

Table 14. Summary of German exporter products (BDI)

Code	Activity
A	Large telecommunications installations
A1	Networks and complete communications systems
A2	Complete transmission installations
A3	Complete communications systems
B	Apparatus and installations for wired communication techniques
B1	Terminal equipment
B2	Telecommunications installations
B3	Additional telecommunications equipment
B4	Wired transmission apparatus and installations
B5	Connection and distribution equipment
B6	Accessories and spare parts
C	Apparatus and installations for radio communication techniques
C1	Transmitting and receiving installations
C2	Directed radio link systems
C3	Portable radio installations
C4	Television systems and studio installations
D	Radio and television receiving aerials
D1	Radio and television receiving aerials
D2	Aerial construction materials
E	Apparatus and equipment for electronic treatment of information (hardware)
E1	Complete installations
E2	Telephone exchange equipment for data transmission
E3	Terminals, units and complete systems
E4	Computer extension cards and modules

The most interesting point of these two classifications is their approximation to the phenomenon of convergence, as well as the consideration of both hardware and software and the separation between products and services. However, both are lacking in any methodologically rigorous and complete arrangement of the electronics and ICT sector.

7. Current proposed classification

We have drafted a classification which builds on existing ones (CNAE, NACE, OECD and others) and on experience in the ICT sector with the aim of situating the technology, products and services in existence today and ensuring statistical continuity in sector measurements. This classification meets the following criteria: it offers a comprehensive sector-wide classification, notes the influence of ICTs in sectors which are heavily reliant on them, is statistically consistent with existing data, reflects the current situation of the sector, fits in with present market criteria and various existing European and international initiatives and, lastly, is detailed enough to allow its practical application.

Three levels are distinguished in this classification. The first consists of nine different areas within the sector, comprising the main fields of classification of products and services generated by the sector. These nine areas are detailed in the following table:

Table 15. Structure of areas within the classification

	Areas
1.	Electronic components and devices
2.	Outsourcing of manufacturing processes
3.	Consumer electronic equipment
4.	Professional electronics
5.	Telecommunications equipment
6.	Information systems and technology industry
7.	Operation and provision of telecommunications and audiovisual services
8.	Services related to the ICT sector
9.	Content production

Each of these areas includes a set of activities which characterize it and which constitute the second level; the intention is that this next level is covered by the same criteria applied to the first.

Each of these activities is in turn divided into sub-activities which form the third level and which are also intended to mirror the situation of the sector in each specific activity referred to. In this case, the intention has been to include specific technologies, products and services associated with each of the activities.

The classification can be extended to more detailed levels (up to two more in some areas and activities) in later stages, although for present purposes the three levels mentioned have been considered sufficient.

7.1. Criteria followed by the classification

Firstly, it is a classification of activities and not of business models or product/service life cycles, which would be additional dimensions to this classification.

We have also considered that, given the broad range of products and services offered by the sector, there are other sectors such as health, transport, energy, defence and so on which rely on them fairly heavily. This fact is mirrored in various

headings which, without going into detail – a subject for a broader study – reflect the existence of activities devoted to those sectors which are outside the ICT sector.

As explained in the following sections, the classification attempts to mirror the phenomenon of convergence in order to allow easy development or modification of the current version as the need arises.

As we have emphasized, the intention has been to take into account the current structure of the sector in order that the changes be smooth, rather than radical. At the same time, special efforts have been made to introduce new areas not specifically considered in previous classifications. In this regard there are areas which will require greater revision in future years in order for them to truly reflect a changing, not completely settled situation.

As mentioned earlier, a three-level classification has been used which enables handling the sector's activities in a comprehensible manner, although as many as five classifications are possible in certain well-defined areas.

The idea of three levels has also been used in different ways throughout the classification, since it allows for rapid categorization of the activity. For instance, a distinction has been made among components, subsystems/equipment and systems.

In order to facilitate its practical use, together with the final classification (which takes the form of an easily-managed list in an Excel file and which is attached as an appendix), there are additional fields of definition of the activity, examples, comments and criteria used.

7.2. Structure of the various areas

7.2.1. Electronic components and devices

This area covers the field of basic devices and components supporting the operation of ICT systems and equipment. It is divided into the following activities:

Table 16. Structure of the area of electronic components and devices

Activities within the area of electronic components and devices	
1.1.	Passive components
1.2.	Semiconductors
1.3.	Screens and display devices
1.4.	Electroacoustic components
1.5.	Radio frequency tubes and components
1.6.	Antennas
1.7.	Cables
1.8.	Interconnection components
1.9.	Batteries
1.10.	Other electronic components and devices

This division, very close to AETIC's own classification of this particular area, is an attempt to streamline the classification and accommodate technological innovations and changes which have occurred over recent years.

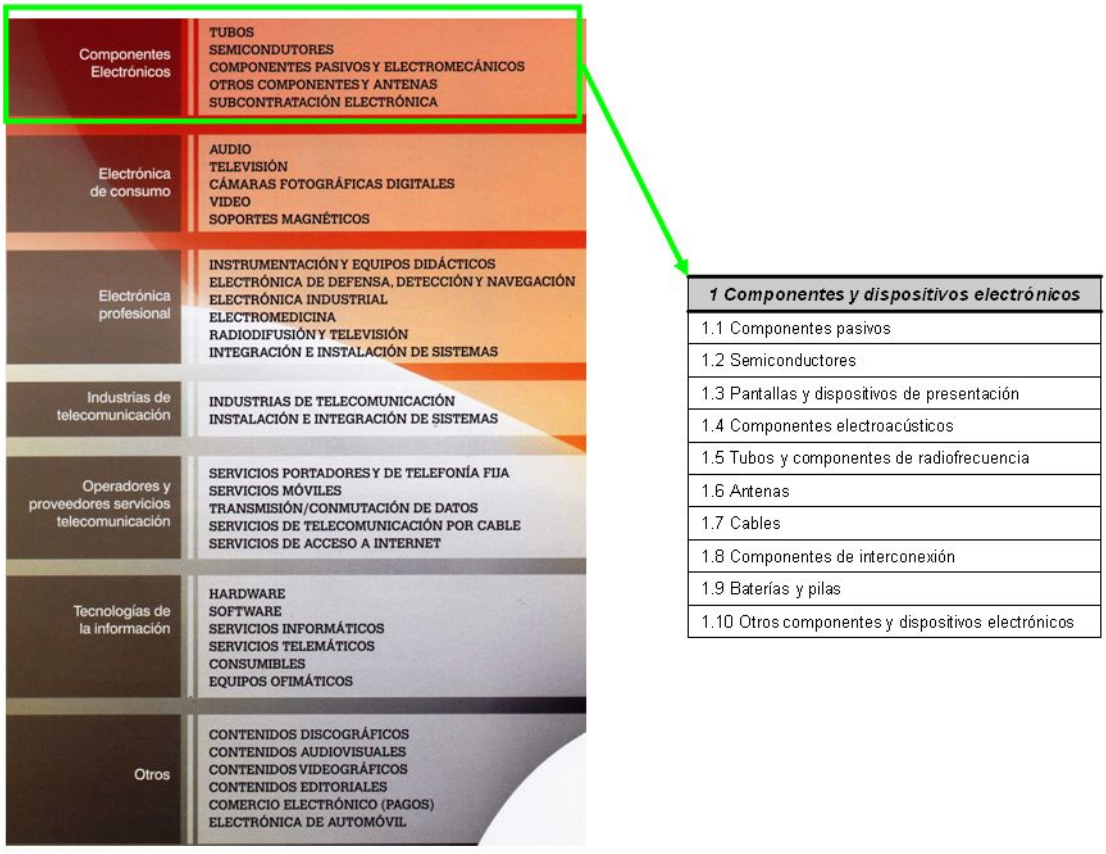


Figure 3. Arrangement of the area of electronic components and devices based on AETIC's structure

7.2.2. Outsourcing of manufacturing processes

This section covers the horizontal activity of making manufacturing processes available to clients with specific outsourcing needs.. This is an increasingly acceptable business option. The following main activities (level two) are recognised within this area:

Table 17. Structure of the area of Outsourcing of manufacturing processes

	Activities within the area of Outsourcing of manufacturing processes
2.1.	Printed circuit boards and sub-assemblies
2.2.	Finished equipment
2.3.	Other outsourced manufacturing processes

7.2.3. Consumer electronic equipment

ICT manufacturing activity has traditionally made a distinction between the mass consumer sector and professional activity. Recently, this consumer sector has significantly increased its scope of activities, with the appearance of new categories (such as digital media or electronic entertainment equipment) and the inclusion of activities which a few years ago were considered more appropriate to either the telecommunications industry or the information technology industry (personal computers or wireless terminals, for instance). The following main activities (level two) have been recognised within this area:

Table 18. Structure of the area of consumer electronic equipment

	Activities within the area of consumer electronic equipment
3.1.	Digital and analogue media
3.2.	Wireless terminals and devices
3.3.	Personal computers and components
3.4.	Computer peripherals
3.5.	Equipment for accessing communications networks
3.6.	Audio equipment
3.7.	Video equipment
3.8.	Television receiving equipment
3.9.	Digital photography
3.10.	Video game consoles and electronic entertainment equipment
3.11.	Location and orientation equipment
3.12.	Other consumer electronic equipment

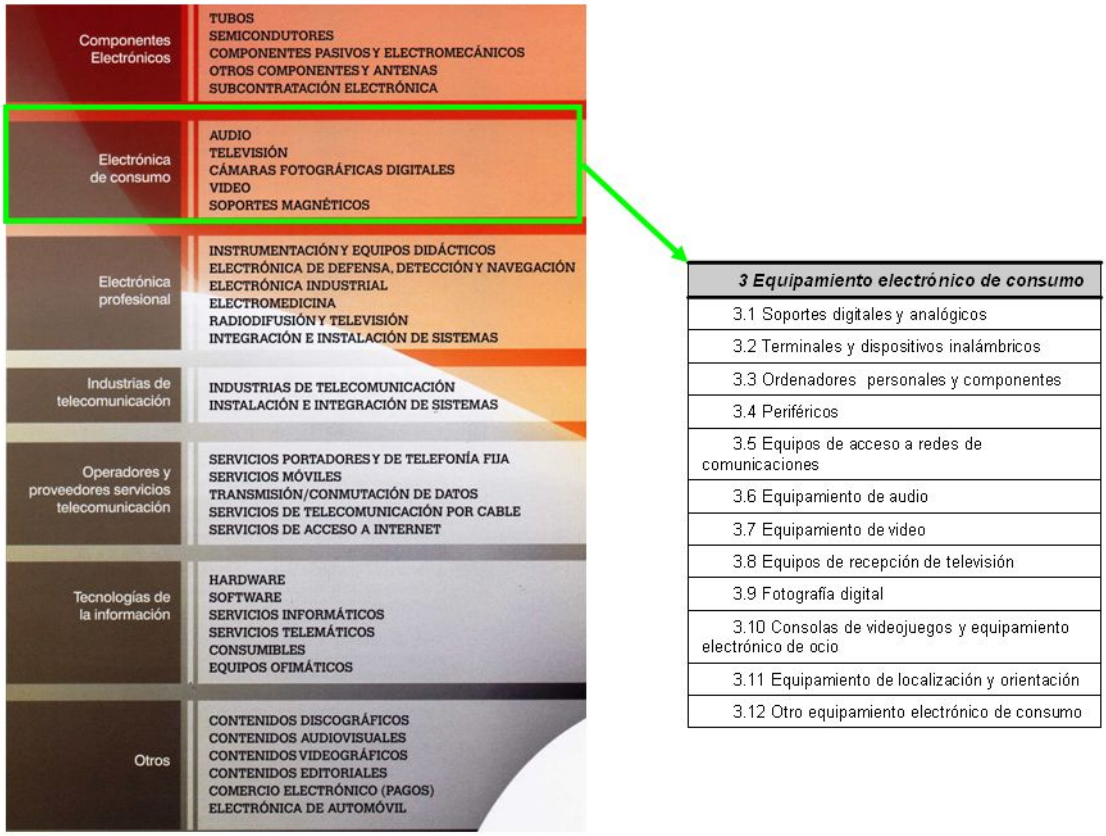


Figure 4. Arrangement of the area of consumer electronic equipment based on AETIC's structure

7.2.4. Professional electronics

This group covers all those activities which, on the one hand, include complex systems and equipment, and on the other, have one main user (typically, another company) within the professional field. These activities tend to be included within customized turnkey projects. It is also the area which reflects the horizontalization of ICTs towards other sectors which rely heavily on them (industry, energy, medicine, transport and so on). It has been categorized into the following main activities:

Table 19. Structure of the area of professional electronics

	Activities within the area of professional electronics
4.1.	Instruments and measurement
4.2.	Defence, detection and navigation electronics
4.3.	Physical security electronics
4.4.	Electromedicine and bioengineering
4.5.	Industrial electronics
4.6.	Automotive electronics
4.7.	Audiovisual production and transmission systems and equipment
4.8.	Power supply systems

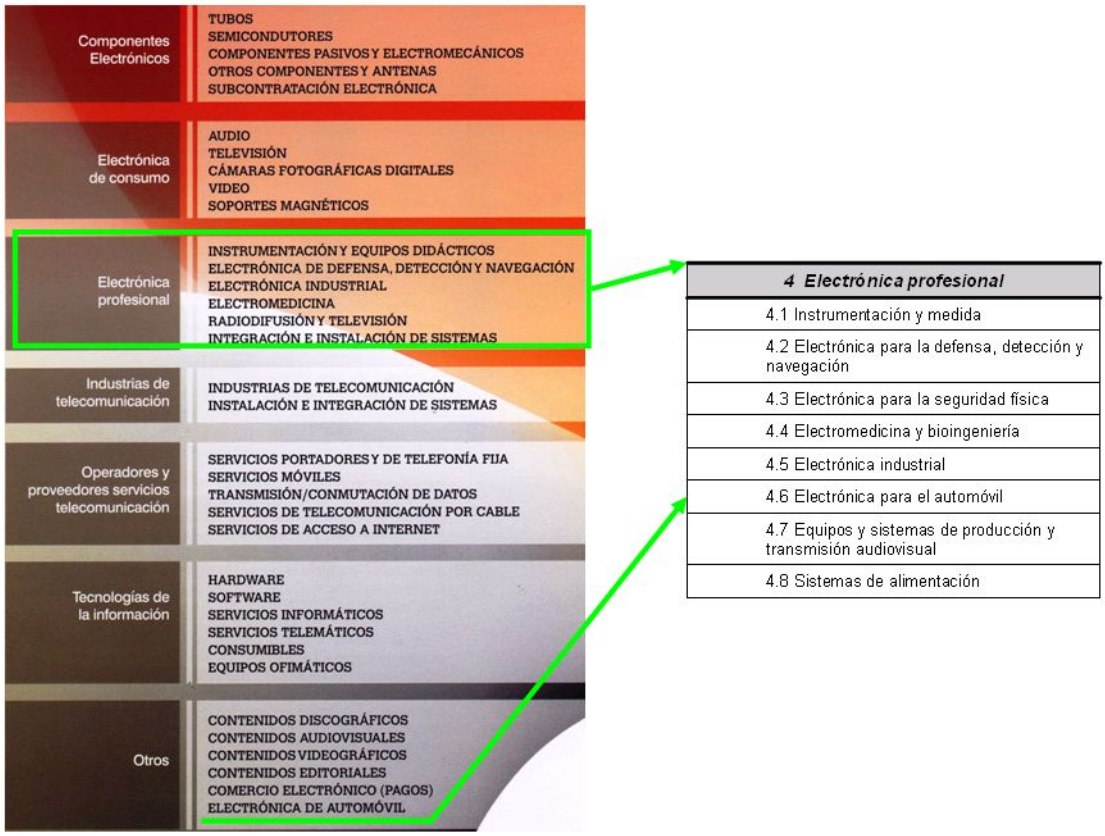


Figure 5. Arrangement of the area of professional electronics based on AETIC's structure

7.2.5. Telecommunications equipment

The area of Telecommunications equipment covers a traditional field in existing classifications. An attempt to improve on it has been made by separating the different elements/activities within the area to include new-generation networks and the growing field of software and application platforms for telecommunications infrastructures themselves. It has been categorized into the following main activities:

Table 20. Structure of the area of telecommunications equipment

Activities within the area of telecommunications equipment	
5.1.	Access network systems and equipment
5.2.	Transport network systems and equipment
5.3.	Network core systems and equipment
5.4.	Telephone exchanges and terminals
5.5.	Services and application software and platforms
5.6.	Engineering and basic services

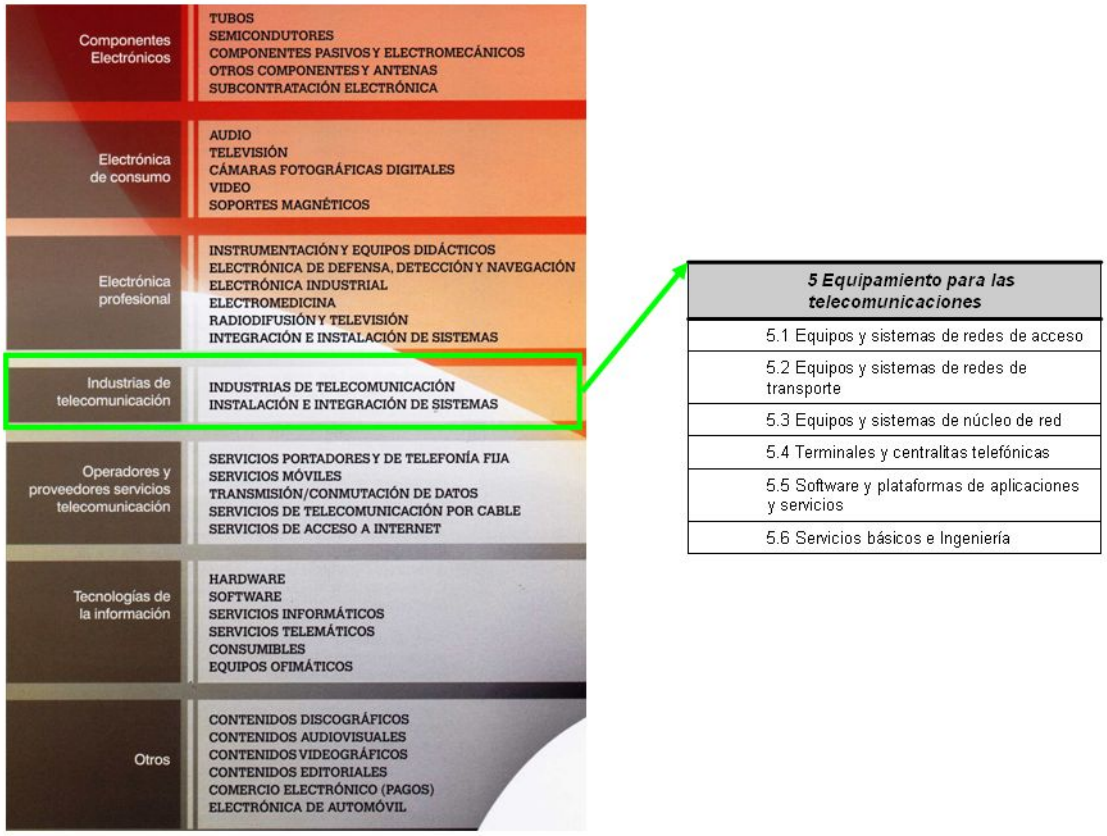


Figure 6. Arrangement of the area of telecommunications equipment based on AETIC's structure

7.2.6. Information systems and technologies

The area of activity encompassing the information systems and technology industry is based on AETIC's long-standing experience, with a few minor changes - basically carrying over the hardware section to consumer electronics (personal computers and such). It has been categorized into the following main activities:

Table 21. Structure of the area of the information systems and technology industry

Activities within the area of the information systems and technology industry	
6.1.	Manufacture of information technology equipment
6.2.	Office automation equipment
6.3.	Software
6.4.	Computer services
6.5.	Telematics services
6.6.	Consumables

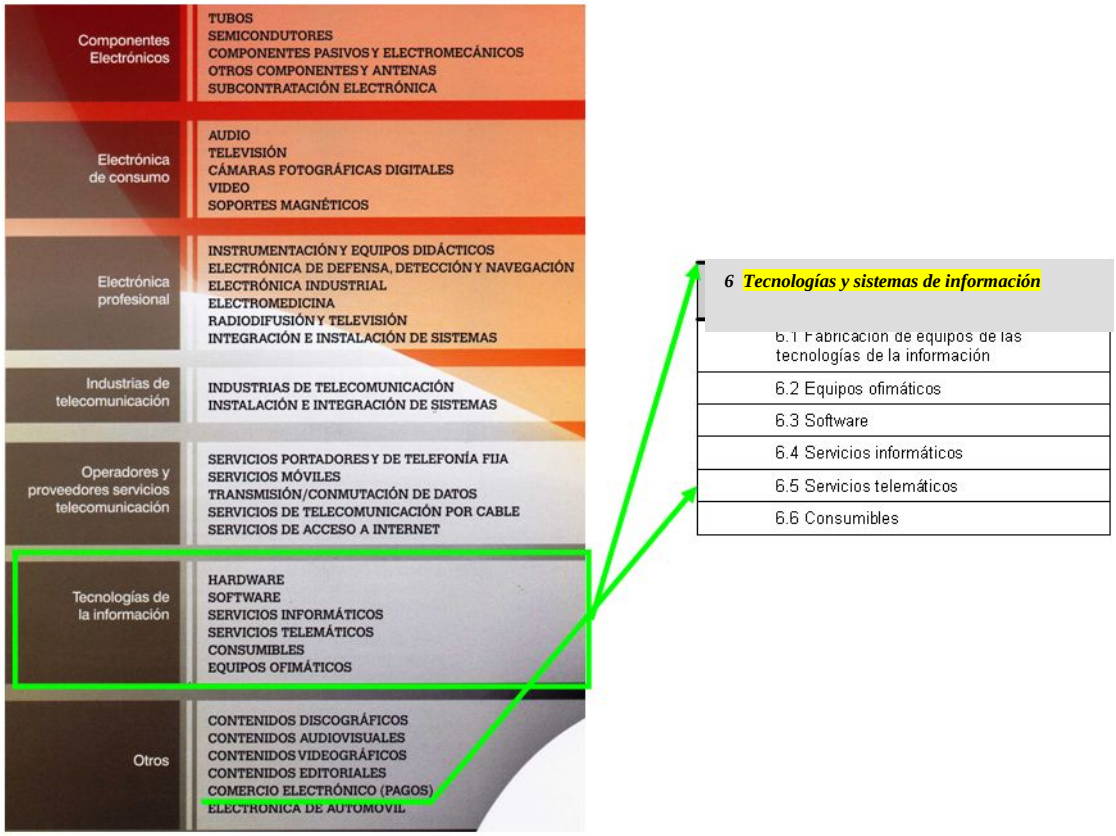


Figure 7. Arrangement of the area of the information systems and technology industry based on AETIC's structure

7.2.7. Operation and provision of telecommunications and audiovisual services

The area of operation and provision of telecommunications and audiovisual services covers the field of information transport (audio, data, video or any combination thereof), as well as the basic services necessary for this information to be made available to interested users. In order to achieve statistical consistency in the presentation of data within this area, we have basically followed the classification used by the Telecommunications Market Commission (Comisión del Mercado de las Telecomunicaciones orCMT), extending the breakdown of the audiovisual section so as to allow a clearer vision of the transition towards new forms of digital broadcasting. It has been categorized into the following main activities:

Critical note on the classification of the area of operation and provision of telecommunications and audiovisual services

From a purely pragmatic point of view it would make sense to choose the classification used by the Telecommunications Market Comisión. However, from the point of view of the market and in keeping with trends in the electronic communications market (packaging, convergence, IP services, etc.), it's clear that the CMT's classification itself should be developed to encompass other headings, about which the following points should bear in mind:

- ✓ It would make no sense to separate the provision of services according to the network supporting it (satellite, for example), since the services offered from

that platform may be varied and can be included in other categories (data, voice, audiovisual signal transmission).

- ✓ Telephone information services and user guides are a service related to the ICT sector and, as such, they can be incorporated into the area discussed in the next section.
- ✓ Audiovisual services increasingly overlap fixed or mobile communications, since the bundling of audiovisual, voice and data services render it impossible to draw lines between them.
- ✓ The main distinction will probably be between the provision of fixed services and those capable of being provided on the move, without attempting to differentiate the content of this traffic (IP technologies will make this separation increasingly irrelevant).
- ✓ Nevertheless, in terms of market trends, fixed-mobile convergence might also complicate this last division.

Table 22. Structure of the area of operation and provision of telecommunications and audiovisual services

Activities within the area of operation and provision of telecommunications and audiovisual services	
7.1.	Fixed communications
7.2.	Mobile communications
7.3.	Internet access
7.4.	Audiovisual
7.5.	Satellite
7.6.	Telephone information and user guides

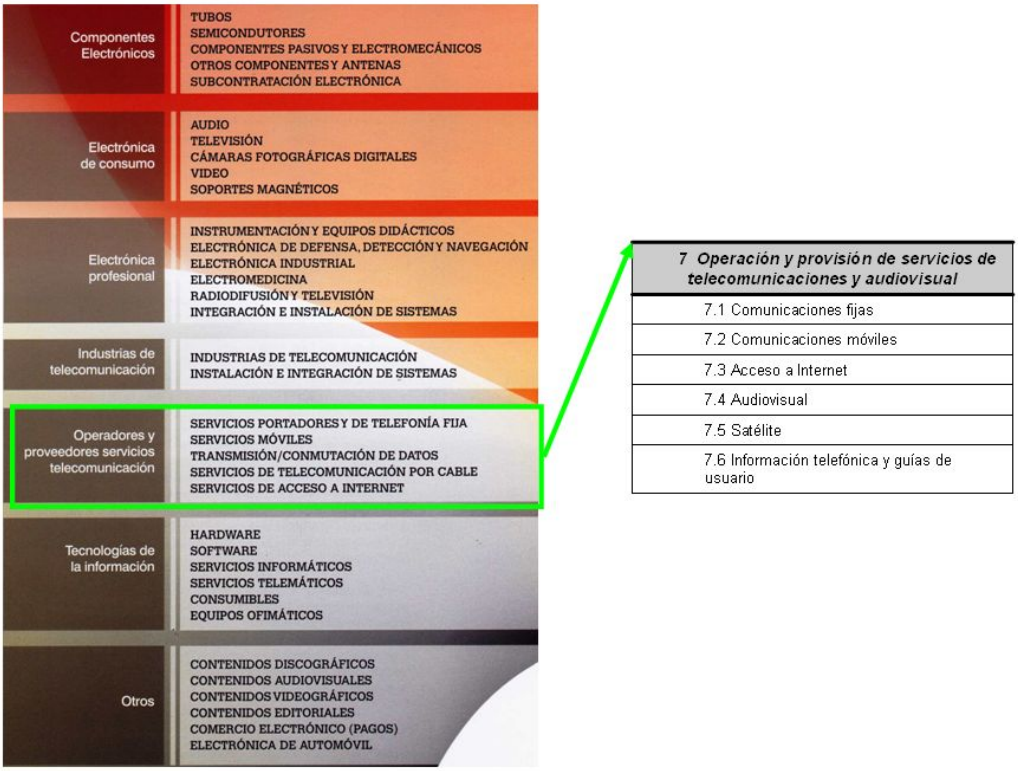


Figure 8. Arrangement of the area of Operation and provision of telecommunications and audiovisual services based on AETIC's structure

7.2.8. Services related to the electronics and ICT sector

The area of services related to the information and communication technology sector is an innovation which attempts to clarify a field which up to now has been barely dealt with, let alone classified. It covers a set of activities which exist (and are based on) thanks to the ICT sector and which are necessary for the normal development of activities taking place within it, but at the same time are subsidiary to it in the sense of requiring its prior existence. These also rely heavily on ICT. The area has been categorized into the following main activities:

Table 23. Structure of the area of services related to the information and communication technology sector

	Activities within the area of services related to the information and communication technology sector
8.1.	Consultancy
8.2.	Certification
8.3.	Training
8.4.	User service
8.5.	Other ICT-related services

Being a novel area, it is not reflected in the structural classification currently used by AETIC except in the heading ***E-commerce (payments)*** under the group **Others**.

7.2.9. Content production

This area follows the nomenclature typical of the content sector to distinguish between two basic activities: on the one hand, production (and its variants) and, on the other, exploitation (which might rely heavily on ICT or not). In this classification, exploitation is included within the ICT section under operation and provision of telecommunications and audiovisual services. The necessary hardware and software support would be in the corresponding headings for the telecommunications industry, information technologies and professional electronics. It has been categorized into the following principal activities:

Table 24. Structure of the area of content production

	Activities within the area of content production
9.1.	Phonographic production
9.2.	Television and motion picture production (audiovisual)
9.3.	Video game production
9.4.	Publishing content production
9.5.	Content publishing and packaging

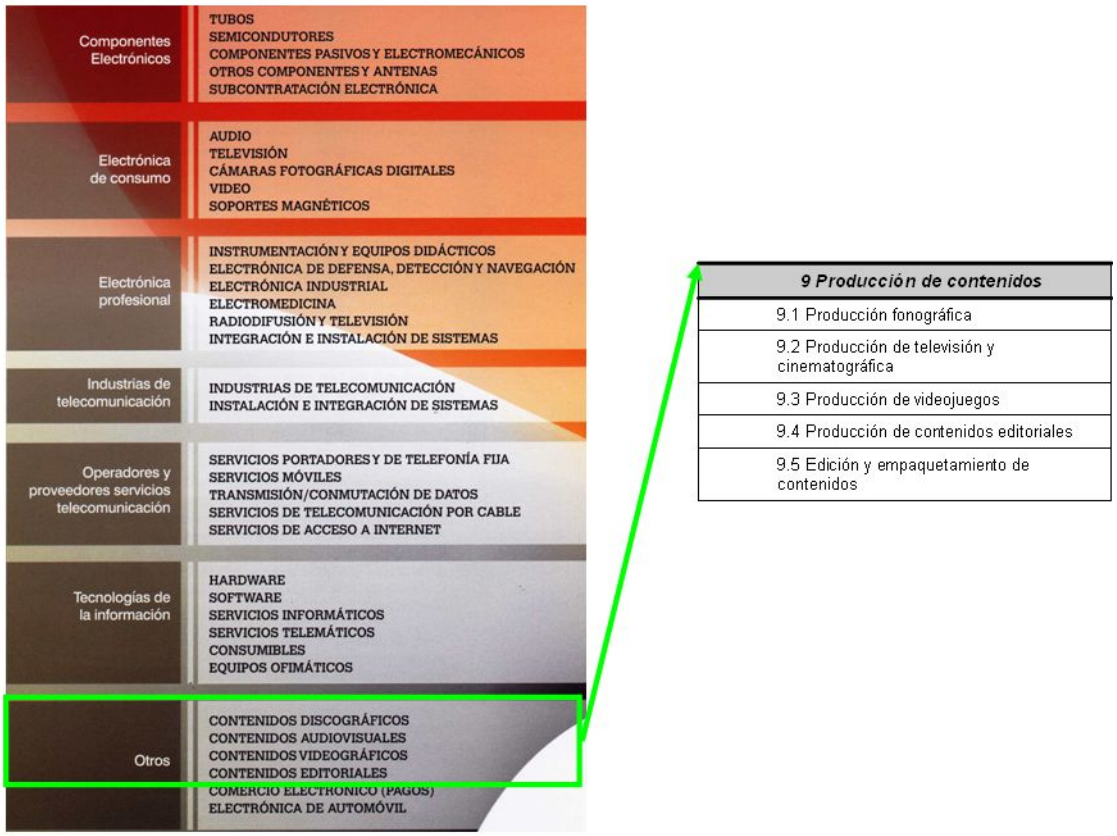


Figure 9. Arrangement of the area of content production based on AETIC's structure

7.3. Final structure of the proposed classification

To round up this chapter, the following table summarises the contents in two levels of the proposed classification, showing the areas of operation and the activities making up these areas.

The table of acronyms and the colour coding (shown below) serve as a guide for comparative analysis of the various classifications already detailed, relating their criteria to those of the proposed classification, covered in the next chapter.

Table 25. Map of abbreviations of the proposed areas

	Area	*Abbreviation*
1.	Electronic components and devices	1ELCD
2.	Outsourcing of manufacturing processes	2OUTMP
3.	Consumer electronic equipment	3CONEE
4.	Professional electronics	4PROFE
5.	Telecommunications equipment	5TELE
6.	Information systems and technologies	6ISTEC
7.	Operation and provision of telecommunications and audiovisual services	7OPTAS
8.	Services related to the ICT sector	8SRICTS
9.	Content production	9CONTP

Table 26. Structure of the area of services related to the information communication and technology sector

Area	*Activities*
1. Electronic components and devices	1.1. Passive components
	1.2. Semiconductors
	1.3. Screens and display devices
	1.4. Electroacoustic components
	1.5. Radio frequency tubes and components
	1.6. Antennas
	1.7. Cables
	1.8. Interconnection components
	1.9. Batteries
	1.10. Other electronic components and devices
2. Outsourcing of manufacturing processes	2.1. Printed circuit boards and sub-assemblies
	2.2. Finished equipment
	2.3. Other outsourced manufacturing processes
3. Consumer electronic equipment	3.1. Digital and analogue media
	3.2. Wireless terminals and devices
	3.3. Personal computers and components
	3.4. Computer peripherals
	3.5. Equipment for accessing communications networks
	3.6. Audio equipment
	3.7. Video equipment
	3.8. Television receiving equipment
	3.9. Digital photography
	3.10. Video game consoles and electronic entertainment equipment
	3.11. Location and orientation equipment
	3.12. Other consumer electronic equipment
4. Professional electronics	4.1. Instruments and measurement
	4.2. Defence, detection and navigation electronics
	4.3. Physical security electronics
	4.4. Electromedicine and bioengineering
	4.5. Industrial electronics
	4.6. Automotive electronics
	4.7. Audiovisual production and transmission systems and equipment
	4.8. Power supply systems
5. Telecommunications equipment	5.1. Access network systems and equipment
	5.2. Transport network systems and equipment
	5.3. Network core systems and equipment
	5.4. Telephone exchanges and terminals
	5.5. Services and application software and platforms
	5.6. Engineering and basic services
6. Information systems and technologies	6.1. Information technology equipment
	6.2. Office automation equipment
	6.3. Software
	6.4. Computer services
	6.5. Telematics services
	6.6. Consumables
7. Operation and provision of telecommunications and audiovisual services	7.1. Fixed communications
	7.2. Mobile communications
	7.3. Internet access
	7.4. Audiovisual
	7.5. Satellite
	7.6. Telephone information and user guides
8. Services related to the ICT sector	8.1. Consultancy
	8.2. Certification
	8.3. Training
	8.4. User service
	8.5. Other ICT-related services
9. Content production	9.1. Phonographic production
	9.2. Television and motion picture production
	9.3. Video game production
	9.4. Publishing content production
	9.5. Content publishing and packaging

8. Comparative analysis of the classifications detailed herein and the proposed classification

This section compares each of the classifications detailed in chapters 5 and 6 with the proposed classification and, while not claiming to be comprehensive, highlights points of agreement and divergence.

As already explained, the previous chapter makes a more comprehensive comparison between the proposed classification and that developed by AETIC as far as its structural groups and subgroups are concerned.

For the purposes of this comparison, the map of abbreviations and the colour coding set out in the previous chapter will be used.

8.1. CNAE

Table 27. Structural correspondence between the CNAE classification of the ICT sector and the proposed classification

CNAE-93 rev. 1	Denomination	Correspondence	
	ICT sector		
3001	Manufacture of office machinery	6ISTEC	
3002	Manufacture of computers and other information processing equipment	3CONEE	6ISTEC
3130	Manufacture of insulated wire and cable	1ELCD	
3210	Manufacture of electronic valves and tubes and other electronic components	1ELCD	
3220	Manufacture of television and radio transmitters and apparatus for wireless telephony and telegraphy	4PROFE	
3230	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus	3EECON	4PROFE
3320	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment	4PROFE	
3330	Manufacture of industrial process control equipment	4PROFE	
5143	Wholesale of electrical household appliances and radio and television goods	3EECON	
5160	Wholesale of other electronic components and equipment	1ELCD	4PROFE
5167	Wholesale of computers, computer peripheral equipment and software	6ISTEC	
7133	Renting of office machinery and equipment including computers	6ISTEC	
6420	Telecommunications	5TELE	
7210	Hardware consultancy	6ISTEC	
7221	Software publishing	6ISTEC	
7222	Other software consultancy and supply	6ISTEC	
7230	Data processing	6ISTEC	
7240	Database activities	6ISTEC	
7250	Maintenance and repair of office, accounting and computing machinery	6ISTEC	
7260	Other computer-related activities	6ISTEC	
	Content sector		
2214	Publishing of sound recordings	9CONTP	
2231	Reproduction of sound recording	9CONTP	
2232	Reproduction of video recording	9CONTP	
2233	Reproduction of computer media	9CONTP	
9211	Motion picture and video production	9CONTP	
9212	Motion picture and video distribution	9CONTP	
9220	Radio and television activities	9CONTP	

8.2. CMT

Table 28. Structural correspondence between the CMT classification (first quarter report 2005) and the proposed classification

Area	Activity	Correspondence
Fixed communications		7OPTAS
	Retail market	7OPTAS
	Wholesale market	7OPTAS
	Business communications	7OPTAS
Mobile communications		7OPTAS
	Retail market	7OPTAS
	Wholesale market	7OPTAS
Internet		7OPTAS
	Narrowband	7OPTAS
	Broadband	7OPTAS
Audiovisual		7OPTAS
	Retail market	7OPTAS
	Audiovisual signal transport and broadcasting	7OPTAS

8.3. ICEX

Table 29. Correspondence between the ICEX classification of electronic components and the proposed classification

Electronic components		
Code	**Product**	**Correspondence**
01	*PASSIVE ELECTRONIC COMPONENTS*	1ELCD
01.01	Capacitors	1ELCD
01.02	Resistors	1ELCD
01.03	Transformers	1ELCD
01.05	Coils	1ELCD
01.06	Filters	1ELCD
02	*INTERCONNECTION COMPONENTS*	1ELCD
02.01	Printed circuits	1ELCD
02.02	Connectors	1ELCD
02.03	Switches and relays	1ELCD
03	*SEMICONDUCTORS*	1ELCD
03.01	Integrated semiconductors	1ELCD
03.02	Discrete semiconductors	1ELCD
03.03	Optoelectronics	1ELCD
04	*ELECTRONIC TUBES*	1ELCD
04.01	TV tubes	1ELCD
04.02	Laser tubes	1ELCD
04.03	Other electronic tubes	1ELCD
05	*ELECTROACOUSTIC COMPONENTS*	1ELCD
05.01	Electrodynamic speakers	1ELCD
05.02	Electromagnetic speakers	1ELCD
05.03	Piezoelectric speakers	1ELCD
05.04	Ionic speakers	1ELCD
v05.05	Other electroacoustic components	1ELCD
06	*POWER SUPPLIES*	1ELCD
06.01	Switched power supplies	1ELCD
06.02	Progammed power supplies	1ELCD
06.03	Linear power supplies	1ELCD
06.04	Modular power supplies	1ELCD
06.05	Reference voltage supplies	1ELCD
06.06	AC/AC inverters	1ELCD
06.07	AC/AC, DC/DC converters	1ELCD
06.08	Photovoltaic elements	1ELCD
06.09	Chargers and rectifiers	1ELCD
06.10	Frequency converters	1ELCD
06.11	Uninterrupted power supply systems	1ELCD

06.12	Other power supplies	1ELCD
07	*ELECTRONIC SUB-ASSEMBLIES*	1ELCD
07.01	Analogue digital/digital analogue (AD/DA) sub-assemblies	1ELCD
07.02	Battery sub-assemblies	1ELCD
07.03	Bluetooth modules	1ELCD
07.04	CATV amplifier modules	1ELCD
07.05	Cable TV CCD modules	1ELCD
07.06	Electron gun modules	1ELCD
07.07	Fibre optic modules	1ELCD
07.08	Waveguides	1ELCD
07.09	Magnetic heads	1ELCD
07.10	Mobile phone camera modules	1ELCD
07.11	Laser optical readers	1ELCD
07.12	Print heads	1ELCD
07.13	RF modules	1ELCD
07.14	Remote control transmitter modules	1ELCD
07.15	Sound modules	1ELCD
07.16	Subsystems	1ELCD
07.17	Tuners	1ELCD
07.18	Other electronic sub-assemblies	1ELCD
08	*ANTENNAS AND THEIR COMPONENTS*	1ELCD
08.01	Car radio antennas	1ELCD
08.02	Indoor aerials (radio and TV)	1ELCD
08.03	Outdoor aerials (individual and collective)	1ELCD
08.04	Satellite dishes	1ELCD
08.05	Other antennas	1ELCD
08.06	Accessories for passive electronic antennas	1ELCD
08.07	Accessories for active electronic antennas	1ELCD
08.08	Items for radio signal distribution networks	1ELCD
08.09	Items for direct satellite reception	1ELCD
08.10	Antenna positioners	1ELCD
08.11	LNBs	1ELCD
08.12	ICT components	1ELCD
08.13	Other antenna components	1ELCD
09	*OTHER COMPONENTS AND ACCESSORIES*	1ELCD
09.01	Batteries	1ELCD
09.02	Cables	1ELCD
09.03	Sensors	1ELCD
09.04	Recording and reading components	1ELCD
09.05	Piezoelectric devices	1ELCD
09.06	Other components and accessories	1ELCD
09.07	Batteries	1ELCD
09.08	Sensors	1ELCD
09.09	Keyboards	1ELCD

Table 30. Correspondence between the ICEX classification of industrial electronics products and the proposed classification

Industrial electronics		
Code	**Product**	**Correspondence**
01	Automation	4PROFE
02	Cells	4PROFE
03	Meters	4PROFE
04	Controllers	4PROFE
05	Distribution, control and manoeuvering panels	4PROFE
06	Displays	1ELCD
07	Control and signalling elements	4PROFE
08	Automation elements	4PROFE
09	Energy-saving items	4PROFE
10	Emulators	4PROFE
11	Solar energy	4PROFE
12	Installation equipment	4PROFE
13	Management and registration equipment	4PROFE
14	X-ray based non-distributed control equipment	4PROFE
15	Photoelectric equipment	4PROFE
16	Measurement and control equipment	4PROFE
17	SMD technology electronic manufacturing equipment	4PROFE
18	Equipment for testing single functions and ageing of printed circuit boards and electronic components	4PROFE
19	Automatic equipment	4PROFE
20	Industrial weighing and classification equipment	4PROFE
21	Personnel monitoring equipment	4PROFE
22	Printed circuit manufacturing equipment	4PROFE
23	Power factor correction equipment	4PROFE
24	Testing equipment	4PROFE
25	Electronic equipment for renewable energy monitoring and control	4PROFE
26	Voltage stabilizers	4PROFE
27	Projects and installations	4PROFE
28	Power supplies	4PROFE
29	Systems engineering and instrumentation	4PROFE
30	Interphones	4PROFE
31	Automatic controls	4PROFE
32	Security controls	4PROFE
33	Inverters	4PROFE
34	Recorders	4PROFE
35	Monitoring and control	4PROFE
36	Voltage regulators	4PROFE
37	Signalling	4PROFE

38	Traffic, motorway, parking, maritime and rail traffic monitoring and control systems	4PROFE
39	Electronic braking systems	4PROFE
40	Alarm systems	4PROFE
41	Sound level meters	4PROFE
42	Frequency and voltage shifters	4PROFE
43	Line conditioners	4PROFE
44	Alternators	4PROFE
45	Emergency lighting	4PROFE
46	Amplifiers	4PROFE
47	Analysers	4PROFE
48	Anemometers	4PROFE
49	Transport, traction and cable control apparatus	4PROFE
50	Measurement, manoeuvering, distribution and control apparatus	4PROFE
51	Magnetic measuring apparatus	4PROFE
52	Apparatus for electrical panels and installations	4PROFE
53	Starters	4PROFE
54	Special automatisms	4PROFE
55	Accessories for construction of panels and equipment	4PROFE
56	Databases	4PROFE
57	Calibrators	4PROFE
58	Capacitance meters	4PROFE
59	Battery chargers	4PROFE
60	Electronic loads	4PROFE
61	Meter centralization	4PROFE
62	Control and distribution centres	4PROFE
63	Circuit breakers	4PROFE
64	Synoptic panels	4PROFE
65	Detectors	4PROFE
66	Dynamometers	4PROFE
67	Dynamos	4PROFE
68	Sinks	4PROFE
69	Phase meters	4PROFE
70	Frequency meters	4PROFE
71	Generator sets	4PROFE
72	Motor-generator sets	4PROFE
73	Emergency sets	4PROFE
74	Electronic overload limiters	4PROFE
75	Overhead lines	4PROFE
76	Electronic scoreboards	4PROFE
77	Transformation ratio measurement	4PROFE
78	Meters	4PROFE
79	Micro motors	4PROFE
80	Stepper motors	4PROFE
81	Queue number display	4PROFE

82	Measuring bridges	4PROFE
83	Voltage rectifiers	4PROFE
84	Centralized measurement control register	4PROFE
85	Electronic clocks	4PROFE
86	Isolating switches	4PROFE
87	Sensors	4PROFE
88	Servo motors	4PROFE
89	Handwriting identification systems	4PROFE
90	Motor protection sensors	4PROFE
91	Tacometers	4PROFE
92	Keyboards	4PROFE
93	Thermometers	4PROFE
94	Thermostats	4PROFE
95	Transducers	4PROFE
96	Voltage absence checking devices	4PROFE
97	Digital counters and displays	4PROFE
98	Accessories	4PROFE
99	Sundry electronics	4PROFE

Table 31. Correspondence between the ICEX classification of electromedical products and the proposed classification

Electromedicine		
Code	**Product**	**Correspondence**
01	X-ray generators, cables and tubes	4PROFE
01.01	X-ray generators	4PROFE
01.02	Other	4PROFE
02	General-purpose equipment	4PROFE
02.01	Radiology tables	4PROFE
02.02	Remote controlled tables	4PROFE
02.03	Wall Bucky	4PROFE
02.04	Universal equipment	4PROFE
03	Specialized radiology equipment	4PROFE
03.01	Dental	4PROFE
04	Radiological data processing	4PROFE
04.01	Digital image processing	4PROFE
04.02	Other radiological data processing	4PROFE
05	Mobile radiology units	4PROFE
05.01	Para-radiography	4PROFE
06	Radiography accessories	4PROFE
06.01	Automatic exposure meters	4PROFE
06.02	Other radiography accessories	4PROFE
07	Physical therapy and rehabilitation equipment	4PROFE
07.01	Electronic stimulators	4PROFE
07.02	Ultrasound	4PROFE
07.03	Other physical therapy and rehabilitation equipment	4PROFE
08	Cardiology equipment	4PROFE
08.01	Monitors	4PROFE
08.02	Electrocardiographs	4PROFE
08.03	Other cardiology equipment	4PROFE
09	Diagnostic equipment	4PROFE
09.01	Audiometers and audiometric booths	4PROFE
09.02	Other diagnostic equipment	4PROFE
10	Other electromedical equipment	4PROFE
10.01	Headphones	4PROFE
10.02	Electronic coagulators	4PROFE
10.03	Electrosurgical scalpels	4PROFE
10.03	Electronic recuperators	4PROFE
10.04	Respirators	4PROFE

8.4. NACE

Table 32. Correspondence between the proposed revision of the NACE-93 structure and the current classification

NACE activities		Correspondencia	
ICT manufacturing			
26.20	**Manufacture of computers and peripheral equipment**	3EECON	6ISTEC
26.30	**Manufacture of communication equipment** *- includes Communication signal testing apparatus*	5TELE	
26.51	**Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes except industrial process control equipment** *(class was included in OECD ICT sector definition; now relevant part of it seems included in division 26.3)*	4PROFE	
26.52	**Manufacture of industrial process control equipment**	4PROFE	
27.31	**Manufacture of fibre optic cables** *(new class; item was included in OECD 1998 definition but appeared as class 31.30 with high non-ICT specialisation)*	1ELCD	
ICT services			
46.51	**Wholesale of computers, computer peripheral equipment and software**	3EECON	6ISTEC
46.52	**Wholesale of electronic and telecommunications equipment and parts**	4PROFE	5TELE
47.41	**Retail sale of computers, peripheral units and software**	3EECON	6ISTEC
47.42	**Retail sale of telecommunications equipment**	5TELE	
47.43	**Retail sale of audio and video equipment** *(These specialised ICT retail sale classes are new. Retail sale was not included in the OECD ICT sector definition)*	3EECON	
58.20	**Software publishing** *(item was included in the OECD ICT sector definition but appeared with others in division 72)*	6ISTEC	
61.10	**Wired telecommunications activities**	7OPTAS	
61.20	**Wireless telecommunications activities**	7OPTAS	
61.30	**Satellite Telecommunications activities**	7OPTAS	
61.90	**Other telecommunications activities**	7OPTAS	
62.01	**Computer programming activities**	6ISTEC	
62.02	**Information technology consultancy activities**	6ISTEC	
62.03	**Computer facilities management activities**	6ISTEC	
62.09	**Other information technology service activities**	6ISTEC	
63.11	**Data processing, hosting and related activities**	6ISTEC	
63.12	**Web portals**	6ISTEC	
63.29	**Other information service activities n.e.c.**	6ISTEC	
77.33	**Renting of office machinery and equipment, including computers**	6ISTEC	8ICTSRS
82.20	**Activities of call centres** *(Rev.1.1.:74.86 Call centres activities - were not included in the OECD ICT sector definition)*	7OPTAS	
95.11	**Repair of computers and peripheral equipment** *(Rev.1.1: repair was included in group 72.5 under computer and related activities)*	6ISTEC	8ICTSRS

8.5. OECD

Table 33. Structural correspondence between the OECD classification of ICT industries and the proposed classification

Activity	Correspondence	
Products		
3000: Office, accounting and computing machinery	6ISTEC	
3130: Insulated wire cable	1ELCD	
3210: Electronic valves and tubes and other electronic components	1ELCD	
3220: Television and radio transmitters and apparatus for line telephony and line telegraphy	4PROFE	
3230: Television and radio receivers, sound or video recording or reproducing apparatus and associated goods	3CONEE	
3312: Instruments and appliances for measuring, checking, testing, navigating and other purposes except industrial process equipment	4PROFE	
3313: Industrial process equipment	4PROFE	
Services		
5150: Wholesale of machinery, equipment and supplies (part only, where possible)	4PROFE	
6420: Telecommunications	5TELE	
7123: Renting of office machinery and equipment (including computers)	6ISTEC	8ICTSRS
72: Computer related activities	6ISTEC	

Table 34. Structural correspondence between the OECD classification of products and the proposed classification

	Computer and related equipment	Correspondence
847110	Analogue or hybrid automatic data processing machines	6ISTEC
847130	Portable digital automatic data processing machines, weighing not more than 10 kg, consisting of at least a central processing unit, a keyboard and a display	6ISTEC
847141	Digital automatic data processing machines comprising in the same housing at least a central processing unit and an input and output unit, whether or not combined	6ISTEC
847149	Other digital automatic data processing machines, presented in the form of systems	6ISTEC
847150	Digital processing units other than those of subheadings 8471.41 and 8471.49, whether or not containing in the same housing one or two of the following types of unit : storage units, input units, output units	6ISTEC
847160	Automatic data processing machines, input or output units, whether or not containing storage units in the same housing	6ISTEC
847170	Automatic data processing machines, storage units	6ISTEC
847180	Other units of automatic data processing machines	6ISTEC
847190	Magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included	6ISTEC
v847330	Parts and accessories of the machines of heading No. 84.71	6ISTEC

	Electronic components	Correspondence
850431	Electrical transformers having a power handling capacity not exceeding 1 kVA (2)	1ELCD
850450	Inductors	1ELCD
850490	Parts of: electrical transformers, static converters (for example, rectifiers) and inductors	1ELCD
852330	Cards incorporating a magnetic stripe, unrecorded	1ELCD
852460	Cards incorporating a magnetic stripe, recorded	1ELCD
852990	Parts suitable for use solely or principally with the apparatus of headings Nos. 85.25 to 85.28 except aerials and aerials reflectors	1ELCD
853221	Capacitors, fixed, tantalum having a reactive power handling capacity of less than 0.5 kvar	1ELCD
853224	Capacitors, fixed, ceramic dielectric, multilayer having a reactive power handling capacity of less than 0.5 kvar	1ELCD
853230	Variable or adjustable (pre-set) capacitors	1ELCD
853310	Fixed carbon resistors, composition or film types	1ELCD
853321	Electrical resistors, fixed, (including rheostats and potentiometers), other than heating resistors, for a power handling capacity <= 20 W	1ELCD
853329	Electrical resistors, fixed, (including rheostats and potentiometers), other than heating resistors, n.e.s..	1ELCD
853331	Wirewound variable resistors, for a power handling capacity <= 20 W	1ELCD
853339	Wirewound variable resistors, for a power handling capacity <= 20 W	1ELCD
853340	Other variable resistors, including rheostats and potentiometers	1ELCD
853390	Parts for electrical resistors (including rheostats and potentiometers), other than heating resistors	1ELCD
853400	Printed circuits	1ELCD
854011	Cathode-ray television picture tubes, including video monitor tubes, colour	1ELCD
854012	Cathode-ray television picture tubes, including video monitor tubes, black and white or other monochrome	1ELCD
854020	Television camera tubes; image converters and intensifiers; other photo-cathode tubes	1ELCD
854040	Data/graphic display tubes, colour, with a phosphor dot screen pitch smaller than 0.4 mm	1ELCD
854050	Data/graphic display tubes, black and white or other monochrome	1ELCD
854060	Other cathode-ray tubes	1ELCD
854071	Microwave tubes, magnetrons, excluding grid-controlled tubes	1ELCD
854072	Microwave tubes – klystrons, excluding grid-controlled tubes	1ELCD
854079	Microwave tubes, other, excluding grid-controlled tubes	1ELCD
854081	Receiver or amplifier valves and tubes	1ELCD
854089	Valve and tubes, n.e.s.	1ELCD
854091	Parts of cathode-ray tubes	1ELCD
854099	Parts of thermionic or photo-cathode, valve and tubes, other than cathode-ray tubes	1ELCD
854110	Diodes, other than photosensitive or light emitting diodes	1ELCD
854121	Transistors, other than photosensitive, dissipation rate < 1 W	1ELCD
854129	Transistors, other than photosensitive transistors, n.e.s.	1ELCD
854130	Thyristors, diacs and triacs, other than photosensitive devices	1ELCD
854140	Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes	1ELCD
854150	Other semiconductor devices	1ELCD
854160	Mounted piezo-electric crystals	1ELCD
854190	Parts for semiconductor devices	1ELCD

854210	Cards incorporating electronic integrated circuits (“smart” cards)	1ELCD
854221	Digital monolitihic integrated circuits	1ELCD
854229	Other monolithic integrated circuits	1ELCD
854260	Hybrid integrated circuits	1ELCD
854270	Electronic microassemblies	1ELCD
854290	Parts for electronic integrated circuits and microassemblies	1ELCD

	Audio and video equipment	**Correspondence**
851810	Microphones and stands therefor	3CONEE
851821	Single loudspeakers, mounted in their enclosures	3CONEE
851822	Multiple loudspeakers, mounted in the same enclosure	3CONEE
851829	Other loudspeakers, n.e.s	3CONEE
851830	Headphones and earphones, whether or not combined with a microphone, and sets consisting of a microphone and one or more loudspeakers	3CONEE
851840	Audio-frequency electric amplifiers	3CONEE
851850	Electric sound amplifier sets	3CONEE
851890	Parts of microphones, loudspeakers, headphones, earphones, combined microphone/loudspeaker sets, audio-frequency electric amplifiers and electric sound amplifier sets	3CONEE
851910	Coin- or disc-operated record-players	3CONEE
851921	Record-players, without loudspeaker	3CONEE
851929	Record-players, n.e.s.	3CONEE
851931	Turntables with automatic record changing mechanism	3CONEE
851939	Turntables, n.e.s.	3CONEE
851940	Transcribing machines	3CONEE
851992	Pocket-size cassette-players	3CONEE
851993	Other sound reproducing apparatus, cassette-type	3CONEE
851999	Sound reproducing apparatus, not incorporating a sound recording device, n.e.s.	3CONEE
852010	Dictating machines not capable of operating without an external source of power	3CONEE
852032	Other magnetic tape recorders incorporating sound reproducing apparatus, Digital audio type	3CONEE
852033	Other magnetic tape recorders incorporating sound reproducing apparatus, cassette-type	3CONEE
852039	Other magnetic tape recorders incorporating sound reproducing apparatus	3CONEE
852090	Magnetic tape recorders and other sound recording apparatus, whether or not incorporating a sound reproducing device, n.e.s.	3CONEE
852110	Video recording or reproducing apparatus, whether or not incorporating a video tuner – magnetic tape type	3CONEE
852190	Video recording or reproducing apparatus, whether or not incorporating a video tuner – other type	3CONEE
852210	Parts and accessories suitable for use solely or principally with the apparatus of headings Nos. 85.19 to 85.21 – pick-up cartridges	3CONEE
852290	Parts and accessories suitable for use solely or principally with the apparatus of headings Nos. 85.19 to 85.21 – other	3CONEE
852311	Magnetic tapes, unrecorded, width <= 4 mm (1/6 in.)	3CONEE
852312	Magnetic tapes, unrecorded, width > 4 mm (1/6 in.) but <= 6.5 mm (1/4 in.)	3CONEE
852313	Magnetic tapes, unrecorded, width > 6.5 mm (1/4 in.)	3CONEE
852320	Magnetic discs, unrecorded	3CONEE
852390	Other prepared unrecorded media for sound recording or similar recording of other phenomena, other than products of Chapter 37	3CONEE

852540	Still image video cameras and other video camera recorders, digital cameras	3CONEE
852712	Pocket-size radio cassette-players capable of operating without an external source of power	3CONEE
852713	Radio-broadcast receivers, capable of operating without an external source of power, combined with sound recording or reproducing apparatus	3CONEE
852719	Other radio-broadcast receivers, capable of operating without an external source of power, not combined with sound recording or reproducing apparatus	3CONEE
852721	Radio-broadcast receivers with sound recording or reproducing apparatus, for motor vehicles, requiring external source of power	3CONEE
852729	Other radio-broadcast receivers for motor vehicles, not combined with sound recording or reproducing apparatus	3CONEE
852731	Other radio-broadcast receivers, including apparatus capable of receiving also radio-telephony or radiotelegraphy, combined with sound recording or reproducing apparatus	3CONEE
852732	Other radio-broadcast receivers, including apparatus capable of receiving also radio-telephony or radiotelegraphy, not combined with sound recording or reproducing apparatus but combined with a clock	3CONEE
852739	Other radio-broadcast receivers, including apparatus capable of receiving radio-telephony or radiotelegraphy, n.e.s.	3CONEE
852812	Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus, colour	3CONEE
852813	Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus, black and white or other monochrome	3CONEE
852821	Video monitors, colour	3CONEE
852822	Video monitors, black and white or other monochrome	3CONEE
852830	Video projectors	3CONEE

	Other ICT goods	**Correspondence**
846911	Word-processing machines	4PROFE
847010	Electronic calculators capable of operation without an external source of electric power and pocket-size data recording, reproducing and displaying machines with calculating functions	3CONEE
847021	Other electronic calculating machines incorporating a printing device	6ISTEC
847029	Other electronic calculating machines	6ISTEC
847040	Accounting machines	3CONEE
847050	Cash registers	3CONEE
847310	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with machines of heading No. 84.69	4PROFE
847321	Parts and accessories of the electronic calculating machines of subheading No. 8470.10, 8470.21 or 8470.29	6ISTEC
847350	Parts and accessories equally suitable for use with machines of two or more of the headings Nos. 84.69 to 84.72	4PROFE
852691	Radio navigational aid apparatus	4PROFE
852692	Radio remote control apparatus	4PROFE
901041	Apparatus for the projection or drawing of circuit patterns on sensitised semiconductor materials – direct write-on-wafer apparatus	4PROFE
901042	Apparatus for the projection or drawing of circuit patterns on sensitised semiconductor materials – step and repeat aligners	4PROFE
901049	Apparatus for the projection or drawing of circuit patterns on sensitised semiconductor materials – other	4PROFE
901410	Direction finding compasses	4PROFE

901420	Instruments and appliances for aeronautical or space navigation (other than compasses)	4PROFE
901480	Other navigational instruments and appliances	4PROFE
901490	Parts and accessories of direction finding compasses, other navigational instruments and appliances	4PROFE
901540	Photogrammetrical surveying instruments and appliances	4PROFE
901580	Other surveying instruments and appliances	4PROFE
901811	Electro-cardiographs	4PROFE
901812	Ultrasonic scanning apparatus	4PROFE
901813	Magnetic resonance imaging apparatus	4PROFE
901814	Scintigraphic apparatus	4PROFE
901819	Other electro-diagnostic apparatus (including apparatus for functional exploratory examination or for checking physiological parameters)	4PROFE
902212	Computed tomography apparatus	4PROFE
902213	Other apparatus based on the use of X-rays, for dental uses	4PROFE
902214	Other apparatus based on the use of X-rays, for medical, surgical or veterinary uses	4PROFE
902219	Other apparatus based on the use of X-rays, for other uses	4PROFE
902410	Machines and appliances for testing the hardness, strength, compressibility, elasticity or other mechanical properties of materials, metals	4PROFE
902480	Other machines and appliances for testing the hardness, strength, compressibility, elasticity or other mechanical properties of materials	4PROFE
902490	Parts and accessories for machines and appliances for testing the hardness, strength, compressibility, elasticity or other mechanical properties of materials	4PROFE
902620	Instruments and apparatus for measuring or checking the pressure of liquids or gases, excluding instruments and apparatus of heading Nos. 9014, 9015, 9028 or 9032	4PROFE
902710	Instruments and apparatus for physical or chemical analysis, gas or smoke analysis apparatus	4PROFE
902730	Spectrometers, spectrophotometers and spectrographs using optical radiations (UV, visible, IR)	4PROFE
902740	Instruments and apparatus for measuring or checking quantities of heat, sound or light, exposure meters	4PROFE
902750	Other instruments and apparatus using optical radiations (UV, visible, IR)	4PROFE
902780	Other instruments and apparatus for physical or chemical analysis	4PROFE
902810	Gas meters	4PROFE
902820	Liquid meters	4PROFE
902830	Electricity meters	4PROFE
902890	Parts for gas, liquid or electricity supply or production meters, including calibrating meters therefore	4PROFE
902910	Revolution counters, production counters, taximeters, mileometers, pedometers and the like	4PROFE
902920	Speed indicators and tachometers; stroboscopes	4PROFE
902990	Parts and accessories for revolution counters, production counters, taximeters, mileometers, pedometers and the like; speed indicators and tachometers, other than those of heading No. 90.14 or 90.15; stroboscopes	4PROFE
903010	Instruments and apparatus for measuring or detecting ionising radiations	4PROFE
903020	Cathode-ray oscilloscopes and cathode-ray oscillographs	4PROFE
903031	Multimeters without a recording device	4PROFE
903039	Other instruments and apparatus for measuring or checking voltage, current, etc. without a recording device	4PROFE
903040	Other instruments and apparatus, specially designed for telecommunications (for example, cross-talk meters, gain measuring instruments, distortion factor meters, psophometers)	4PROFE
903082	Other instruments for measuring or checking semiconductor wafers or devices	4PROFE

903083	Other instruments for measuring or checking semiconductor wafers or devices with a recording device	4PROFE
903110	Measuring or checking instruments, appliances and machines n.e.s, machines for balancing mechanical parts	4PROFE
903120	Measuring or checking instruments, appliances and machines n.e.s, test benches	4PROFE
903130	Measuring or checking instruments, appliances and machines n.e.s, profile projectors	4PROFE
903141	Other optical instruments and appliances, for inspecting semiconductor wafers or devices or for inspecting photomasks or reticles used in manufacturing semiconductor devices	4PROFE
903180	Other measuring or checking instruments, appliances and machines, n.e.s.	4PROFE
903190	Parts and accessories for measuring or checking instruments, appliances and machines, n.e.s.	4PROFE
903210	Thermostats	4PROFE
903220	Manostats	4PROFE
903289	Other automatic regulating or controlling instruments and apparatus, n.e.s.	4PROFE
903290	Parts and accessories for automatic regulating or controlling instruments and apparatus	4PROFE

Table 35. Structural correspondence between the OECD classification of services and the proposed classification

Proposed OECD Classification of ICT Services	Correspondence	
A. Carrier services	7OPTAS	
B. Fixed telephony services	7OPTAS	
C. Mobile telephony services	7OPTAS	
D. Private network services	7OPTAS	
E. Data transmission services	7OPTAS	
F. All other communication services	7OPTAS	
G. Internet backbone services	7OPTAS	
H. Internet access services	7OPTAS	
I. Other internet services	7OPTAS	
J. Leasing or rental services concerning other machinery and equipment without operator	8ICTSRS	
K. IT technical consulting and support services	8ICTSRS	
L. IT design and development services	8ICTSRS	
M. Hosting and IT infrastructure provisioning services	6ISTEC	
N. IT infrastructure and network management services	6ISTEC	
O. Computer hardware servicing, repair and maintenance	6ISTEC	
P. Published software (further split into two categories – excluding and including multi-media)	6ISTEC	
Q. Records, tapes and other recorded media for sound or other similarly recorded phenomena (except cinematographic film and cards with magnetic stripe) packaged computer software	3CONEE	6ISTEC
R. Licensing services for the right to use computer software	9CONTP	

8.6. CET

Table 36. Structural correspondence between the Common External Tariff classification of the electronics and ICT sector (June 2005) and the proposed classification

Description of Professional Electronics headings			
Heading	***Description***	**Correspondence**	
85.21	Video recording or reproducing apparatus, whether or not incorporating a video tuner	3CONEE	4PROFE
85.25	Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras; still image video cameras and other video camera recorders; digital cameras	4PROFE	
85.26	Radar apparatus, radio navigational aid apparatus and radio remote control apparatus	4PROFE	
85.29	Parts suitable for use solely or principally with the apparatus of headings 85.25 to 85.28	4PROFE	
85.31	Electric sound or visual signalling apparatus (for example, bells, sirens, indicator panels, burglar or fire alarms)	4PROFE	
85.43	Electrical machines and apparatus, having individual functions, not specified or included elsewhere in this chapter 85	4PROFE	
90.18	Instruments and appliances used in medical, surgical, dental or veterinary sciences, including scintigraphic apparatus, other electromedical apparatus and sight-testing instruments	4PROFE	
90.22	Apparatus based on the use of X-rays or of alpha, beta or gamma radiations, whether or not for medical, surgical, dental or veterinary uses, including radiography or radiotherapy apparatus, X-ray tubes and other X-ray generators, high tension generators, control panels and desks, screens, examination or treatment tables, chairs and the like	4PROFE	
90.30	Oscilloscopes, spectrum analysers and other instruments and apparatus for measuring or checking electrical quantities, excluding meters of heading 9028; instruments and apparatus for measuring or detecting alpha, beta, gamma, X-ray, cosmic or other ionising radiations	4PROFE	
90.32	Automatic regulating or controlling instruments and apparatus	4PROFE	

Description of Consumer Electronics headings		
Heading	***Description***	**Correspondence**
85.18	Microphones and stands therefor; loudspeakers, whether or not mounted in their enclosures; headphones and earphones, whether or not combined with a microphone, and sets consisting of a microphone and one or more loudspeakers; audio-frequency electric amplifiers; electric sound amplifier sets	3CONEE
85.19	Turntables (record-decks), record-players, cassette-players and other sound reproducing apparatus, not incorporating a sound recording device	3CONEE
85.20	Magnetic tape recorders and other sound recording apparatus, whether or not incorporating a sound reproducing device	3CONEE
85.21	Video recording or reproducing apparatus, whether or not incorporating a video tuner	3CONEE
85.25	Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras; still image video cameras and other video camera recorders; digital cameras	4PROFE
85.27	Reception apparatus for radio-telephony, radio-telegraphy or radio-broadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock	3CONEE
85.28	Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; video monitors and video projectors	3CONEE

85.29	Parts suitable for use solely or principally with the apparatus of headings 85.25 to 85.28	3CONEE

Description of Electronic Components headings		
Heading	***Description***	**Correspondence**
85.04	Electrical transformers, static converters (for example, rectifiers) and inductors	1ELCD
85.07	Electric accumulators, including separators therefor, whether or not rectangular (including square)	1ELCD
85.18	Microphones and stands therefor; loudspeakers, whether or not mounted in their enclosures; headphones and earphones, whether or not combined with a microphone, and sets consisting of a microphone and one or more loudspeakers; audio-frequency electric amplifiers; electric sound amplifier sets	1ELCD
85.22	Parts and accessories suitable for use solely or principally with the apparatus of headings 85.19 to 85.21	1ELCD
85.29	Parts suitable for use solely or principally with the apparatus of headings 85.25 to 85.28	1ELCD
85.31	Electric sound or visual signalling apparatus (for example, bells, sirens, indicator panels, burglar or fire alarms)	1ELCD
85.32	Electrical capacitors, fixed, variable or adjustable (pre-set)	1ELCD
85.33	Electrical resistors (including rheostats and potentiometers), other than heating resistors	1ELCD
85.34	Printed circuits	1ELCD
85.38	Parts suitable for use solely or principally with the apparatus of headings 85.35, 85.36 or 85.37	1ELCD
85.40	Thermionic, cold cathode or photocathode valves and tubes (for example, vacuum or vapour or gas-filled valves and tubes, mercury arc rectifying valves and tubes, cathode-ray tubes, television camera tubes)	1ELCD
85.41	Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made-up into panels; light-emitting diodes; mounted piezo-electric crystals	1ELCD
85.42	Electronic integrated circuits and microassemblies	1ELCD
85.43	Electrical machines and apparatus, having individual functions, not specified or included elsewhere in this chapter 85	1ELCD
90.13	Liquid crystal devices not constituting articles provided for more specifically in other headings; lasers, other than laser diodes; other optical appliances and instruments not specified or included elsewhere in this chapter	1ELCD

Description of Information Technology Equipment headings		
Heading	***Description***	**Correspondence**
84.69	Typewriters other than printers of heading 84.71; word-processing machines	6ISTEC
84.70	Calculating machines and pocket-size data recording, reproducing and displaying machines with calculating functions; accounting machines, postage-franking machines, ticket-issuing machines and similar machines, incorporating a calculating device; cash registers	6ISTEC
84.71	Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included	6ISTEC
84.72	Other office machines (for example, hectograph or stencil duplicating machines, addressing machines, automatic banknote dispensers, coin-sorting machines, coin-counting or wrapping machines, pencil-sharpening machines, perforating or stapling machines)	6ISTEC
84.73	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with machines of headings 84.69 to 84.72	6ISTEC
85.04	Electrical transformers, static converters (for example, rectifiers) and inductors	6ISTEC
85.07	Electric accumulators, including separators therefor, whether or not rectangular (including square)	6ISTEC
85.24	Records, tapes and other recorded media for sound or other similarly recorded phenomena, including matrices and masters for the production of records	6ISTEC
85.28	Reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus; video monitors and video projectors	6ISTEC
85.43	Electrical machines and apparatus, having individual functions, not specified or included elsewhere in this chapter 85	6ISTEC
90.17	Drawing, marking-out or mathematical calculating instruments (for example, drafting machines, pantographs, protractors, drawing sets, slide rules, disc calculators); instruments for measuring length, for use in the hand (for example, measuring rods and tapes, micrometers, callipers), not specified or included elsewhere in this chapter	6ISTEC

Description of Telecommunications Equipment headings		
Heading	***Description***	**Correspondence**
8517	Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; videophones	5TELE
8518	Microphones and stands therefor; loudspeakers, whether or not mounted in their enclosures; headphones and earphones, whether or not combined with a microphone, and sets consisting of a microphone and one or more loudspeakers; audio-frequency electric amplifiers; electric sound amplifier sets	5TELE
8520	Magnetic tape recorders and other sound recording apparatus, whether or not incorporating a sound reproducing device	5TELE
8525	Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras; still image video cameras and other video camera recorders; digital cameras	5TELE
8527	Reception apparatus for radio-telephony, radio-telegraphy or radio-broadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock	5TELE
8529	Parts suitable for use solely or principally with the apparatus of headings 85.25 to 85.28	5TELE
8544	Insulated (including enamelled or anodised) wire, cable (including coaxial cable) and other insulated electric conductors, whether or not fitted with connectors; optical fibre cables, made up of individually sheathed fibres, whether or not assembled with electric conductors or fitted with connectors	5TELE

8.7. IPC

Table 37. Structural correspondence between electronics and ICT-related groups in the IPC and the proposed classification

Activity	Correspondence
Section G — Physics	
Instruments	
G01 Measuring; testing	4PROFE
G02 Optics	--------
G03 Photography; cinematography; analogous techniques using waves other than optical waves; electrography; holography	--------
G04 Horology	--------
G05 Controlling; regulating	4PROFE
G06 Computing; calculating; counting	4PROFE
G07 Checking devices	4PROFE
G08 Signalling	4PROFE
G09 Education; cryptography; display; advertising; seals	--------
G10 Musical instruments; acoustics	--------
G11 Information storage	4PROFE
G12 Instrument details	4PROFE
Nucleonics	
G21 Nuclear physics; nuclear engineering	--------
…..	
G99 Material not catered for anywhere else in this section	
Section H — Electricity	
H01 Basic electric elements	1ELCD
H02 Generation, conversion or distribution of electric power	4PROFE
H03 Basic electronic circuitry	1ELCD
H04 Electric communication technique	5TELE
H05 Electric techniques not otherwise provided for	--------
…..	
H99 Material not otherwise provided for in this section	

8.8. ZVEI / BDI (Germany)

Table 38. Product index of the German association of the ZVEI sector

Code	Activity	Correspondence
51	*Information and communication technology services*	
	Telecommunication, access and transmission services	7OPTAS
	Consulting and planning services for information and communication technology	8SRICTS
	Services for computing and communications applications	5TELE / 6ISTEC / 7OPTAS
	Digital information media services	6ISTEC / 9CONTP
	General (business) services for the Information Economy	8SRICTS
52	*Execution of information and communication technology solutions and projects*	
	Network setup and network access	5TELE
	Infrastructure solutions for data processing systems	6ISTEC
	Information and communication technology application solutions	6ISTEC
53	*Suppliers of information, communication and security technology systems*	
	Information acquisition, processing and transmission systems	6ISTEC
	Communications, information and security technique systems and installations	5TELE / 6ISTEC
54	*Switching and transmission equipment (incl. antenna systems)*	
	Transmission systems	5TELE
	Broadcasting and receiving equipment	4PROFE
	Satellite radiocommunication commercial installations	5TELE
	Equipment for directed radio link	5TELE
	Radioelectric equipment for mobile application	3CONEE / 5TELE
	Complete switching systems	5TELE
	Antennas and antenna systems	1ELCD
	Mechanical materials for antennas	1ELCD
	Electrical materials for antennas	1ELCD
55	*Information and communication technology apparatus and terminal equipment*	
	Telecommunications installations	5TELE

	Terminals and terminal equipment	3CONEE	5TELE
	Auxiliary equipment	3CONEE	5TELE
	Apparatus and equipment for the technique of conductor-guided transmission	5TELE	
	Connection and distribution equipment and terminals	1ELCD	
	Accessories, components and spare parts	1ELCD	3CONEE
56	*Navigation devices and systems, traffic management and telematics*		
	Navigation and radiotelemetry equipment	3CONEE	4PROFE
	Traffic management systems	4PROFE	
	Traffic and telematics services	4PROFE	
57	*Electric signalling and safety/security apparatus and systems, timing equipment*		
	Complete safety/security systems	4PROFE	
	Calling (signalling) installations	4PROFE	
	Road traffic signalling apparatus	4PROFE	
	Maritime traffic signalling apparatus	4PROFE	
	Railway signalling and safety/security equipment	4PROFE	
	Surveillance cameras	4PROFE	
	Surveillance equipment and observation analysis devices	4PROFE	
	Surveillance sensors	4PROFE	
	Individual apparatus for security and alarm devices	4PROFE	
	Acoustic signalling apparatus	1ELCD	4PROFE
	Optical signalling apparatus, display devices	1ELCD	4PROFE
	Clocks, electric clock installations	1ELCD	
	Time measuring and checking instruments	1ELCD	
	Accessories (safety/security and signalling techniques)	1ELCD	4PROFE
58	*Hardware for information technology and data systems*		
	Mainframe computers, multiprocessor computers	6ISTEC	
	Computers (general data processing)	3CONEE	6ISTEC
	Networks and networking components	5TELE	
	Connecting equipment, network terminations	6ISTEC	
	Typewriters, composition systems, photocopiers and mail handling machines	3CONEE	6ISTEC
	Input and recording apparatus for data processing systems	6ISTEC	
	Screens, monitors, displays, output units	1ELCD	3CONEE

	Printers, plotters and sundry output devices	3CONEE,	6ISTEC	
	Terminals, units and complete systems	3CONEE	5TELE	6ISTEC
	Apparatus and systems for payment services	3CONEE	6ISTEC	
	Data storage devices and equipment	3CONEE	6ISTEC	
	Computer extension cards and modules	3CONEE		
	Accessories (data processing)	3CONEE	4PROFE	6ISTEC
59	*Software for information technology and data systems*	6ISTEC		

Table 39. Summary of German export products (BDI)

Code	Activity	Correspondence	
A	Large telecommunications installations	5TELE	
A1	Networks and complete communications systems	5TELE	
A2	Complete transmission installations	5TELE	
A3	Complete communications systems	5TELE	
B	Apparatus and installations for wired communication techniques		
B1	Terminal equipment	3CONEE	5TELE
B2	Telecommunications installations	5TELE	
B3	Additional telecommunications equipment	5TELE	
B4	Wired transmission apparatus and installations	5TELE	
B5	Connection and distribution equipment	5TELE	
B6	Accessories and spare parts	5TELE	
C	Apparatus and installations for radio communication techniques		
C1	Transmitting and receiving installations	1ELCD	4PROFE
C2	Directed radio link systems	5TELE	
C3	Portable radio installations	3CONEE	5TELE
C4	Television systems and studio installations	4PROFE	
D	Radio and television receiving aerials	1ELCD	
D1	Radio and television receiving aerials	1ELCD	

D2	Aerial construction materials	1ELCD		
E	Apparatus and equipment for electronic treatment of information (hardware)			
E1	Complete installations	5TELE		
E2	Telephone exchange equipment for data transmission	6ISTEC		
E3	Terminals, units and complete systems	4PROFE	5TELE	6ISTEC
E4	Computer extension cards and modules	3CONEE	4PROFE	6ISTEC

9. Future lines of development of the proposed classification

As mentioned throughout the previous sections, the ICT sector is immersed in a process of technological, business and market development known as “convergence” which is still far from complete. Rather, it is at an intermediate stage in which solutions, products and services the sector provides to users / consumers are “pre-convergence” and also the genuine results of convergence. There are numerous examples of the foregoing wherever we look. Analogue and digital media coexist, as well as fixed terminals for voice communication and multimedia terminals for mobile communications, or traditional communications infrastructures and infrastructures that are “all IP-ready”.

The classification detailed in the previous section is no more than a reflection of this today inseparable mix of the current situation and new solutions in the field of information and communications. As explained in the following sections, in this regard it represents a good number of activities which will be of residual value in the short term, although today they are still important in terms of economic volume.

However, development does not only affects some sections and activities which will begin to disappear, to be replaced by other more modern ones which are better adapted to changing market requirements; the very structure of the sector - and therefore of the classification - will be subjected to significant changes over the next few years.

This paper, therefore, by no means offers a detailed vision of what exactly will be the outcome of this future development of the sector, an objective which is outside the scope of our intentions. However, it was considered of interest to offer an additional forecast about the classification over and above that already submitted which allows a reflection on what the main tendencies are, as a consequence of more predictable changes, and what changes these might have on the structure of the sector and its classification.

The intention is therefore that the additional classification which is explained and presented in the following sections be a tool which can be managed in parallel with the previous classification, enabling us to preview the necessary future changes in the medium term and making possible a smooth transition towards new, and no doubt necessary, classifications.

The following sections, prior to detailing this second classification, consider and briefly discuss the main ideas (and criteria) underlying it.

9.1. Platforms and value structure of the ICT sector

The technical, business and market development in the telecommunications, audiovisual services and IT sectors, as well as electronics, have given rise to the birth of the information and communication technology sector (ICT). Within this sector, solutions, products and services in the ICT sector will be offered to users / consumers based on the concept of the platform.

A platform is simply a set of technological and business elements (i.e., supply) which, in terms of making it viable, ensure satisfaction of the information and communications needs of users / consumers (in other words, the market and demand).

In this regard, the “situation map” of the ICT sector would be constituted by a complex ecosystem of platforms which, within the framework of economic, regulatory,

technological and social rules, would compete and cooperate to satisfy said needs of users / consumers.

The platform examples refer to sets of activities within the sector. There are simple consumer “activities”, such as portable audio and video players, but also complex ones such as the set of infrastructures, services, applications and contents which a mobile communications operator makes available to end users. Likewise, there are professional platforms such as those appearing in security and defence systems in which, aside from physical infrastructures, tools necessary for connectivity of these systems are integrated, allowing management, control and communications with them.

Thus platforms evolve rapidly thanks to the facilities provided by the underlying technology in order to cover those niches which present opportunities for survival and success. Along the way, they compete with (and render obsolete) other rival platforms, and at the same time need many other complementary activities and platforms to coexist in order to reach their objectives.

From the point of view of a classification, therefore, there is an issue about knowing which are the activities which represent the various platforms present in the ICT sector. What could be called an approximation to its value structure, recognising the fact that the linear relations typical of a chain of value no longer precisely represent the complex relationships which are present in the ICT sector. For this reason we have considered, as a first step, establishing which elements constitute a generic platform gathering the highest possible number of activities in the ICT sector. Thus, to model the sector, we have established a structure of areas of activity, as shown in the following figure:

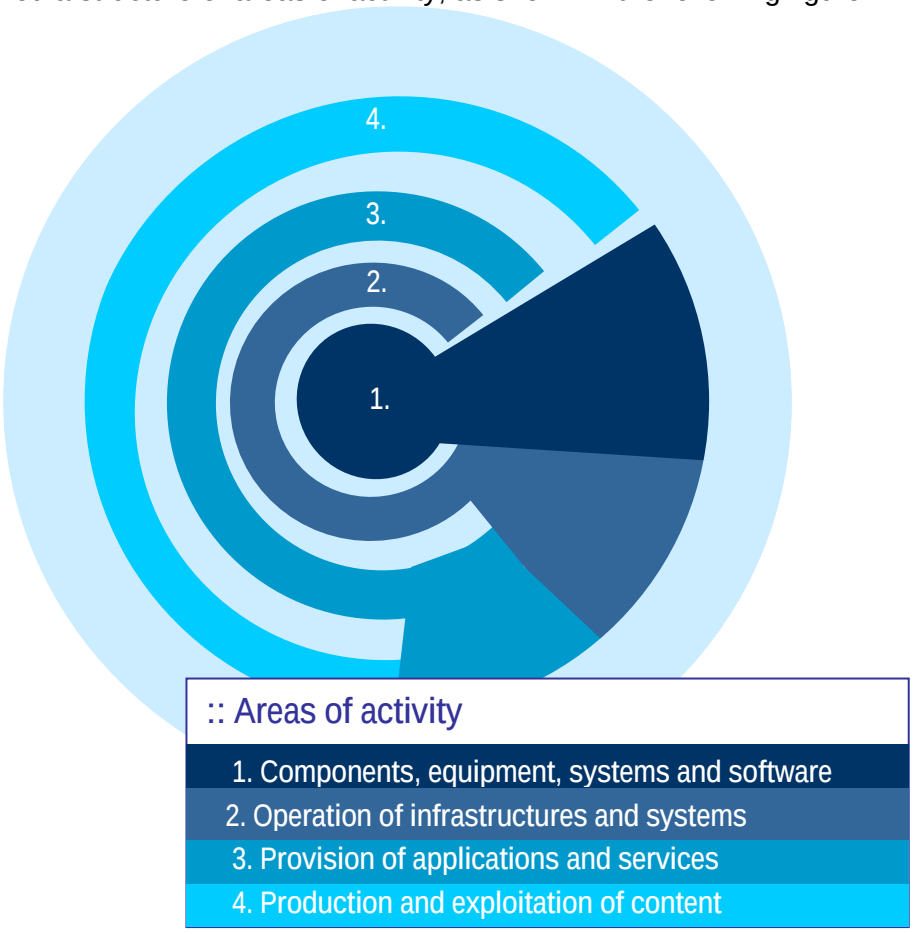


Figure 10. Areas of activity within the ICT sector

The structure proposes a classification into four large areas of activity:

- Components, equipment, systems and software
- Operation of infrastructures and systems
- Provision of applications and services
- Production and exploitation of content

Each of these areas spans a series of related activities (level 3) grouped into their corresponding families (level 2). The complete structure of this future classification is explained in greater detail in the following sections and is attached as Appendix B.

The main criterion followed in classifying the various areas of activity is to establish the most general elements of activity which can be carried out in the ICT sector by companies and organizations within it, ignoring their business models or position in the life cycle of their solutions. These two criteria could constitute additional dimensions of the classification but are not the subject of this paper.

An example is the different stages within the life cycle of software development, which involves various agents. In this classification, they would all be included under the same activity, considered from the point of view of purpose of the product or service. However, if the idea of the life cycle were to be reflected, all its stages would need to be analysed, such as specification of requirements, software development (programming), validation of requirements and various tests, integration within the system, etc.

Research Definition Requirements Specification Design	Developme nt	Implementation Manufacture	Packaging	Marketing	Installation	Testing Adoption Verification Maintenance

Figure 11. Life cycle of sector activities

In this regard we are merely mirroring the trends in existing classifications which show how classifications should reflect companies' activities and not their (changing) business models and positions within the life cycle of the solutions they provide.

9.2. Offer vs demand – the role of the user / consumer

The suggested structure follows the basic principle that the sector's target is users / consumers, with the various agents interacting with the ultimate goal of satisfying their needs.

It recognizes that there are multiple pathways to offering solutions to users / consumers and establishing the necessary relations between companies making up the ICT sector. Within each particular area there are activities benefiting the sector's internal actors without any intervention or awareness on the part of end users / consumers.

The following figure shows this multiplicity of possible pathways.

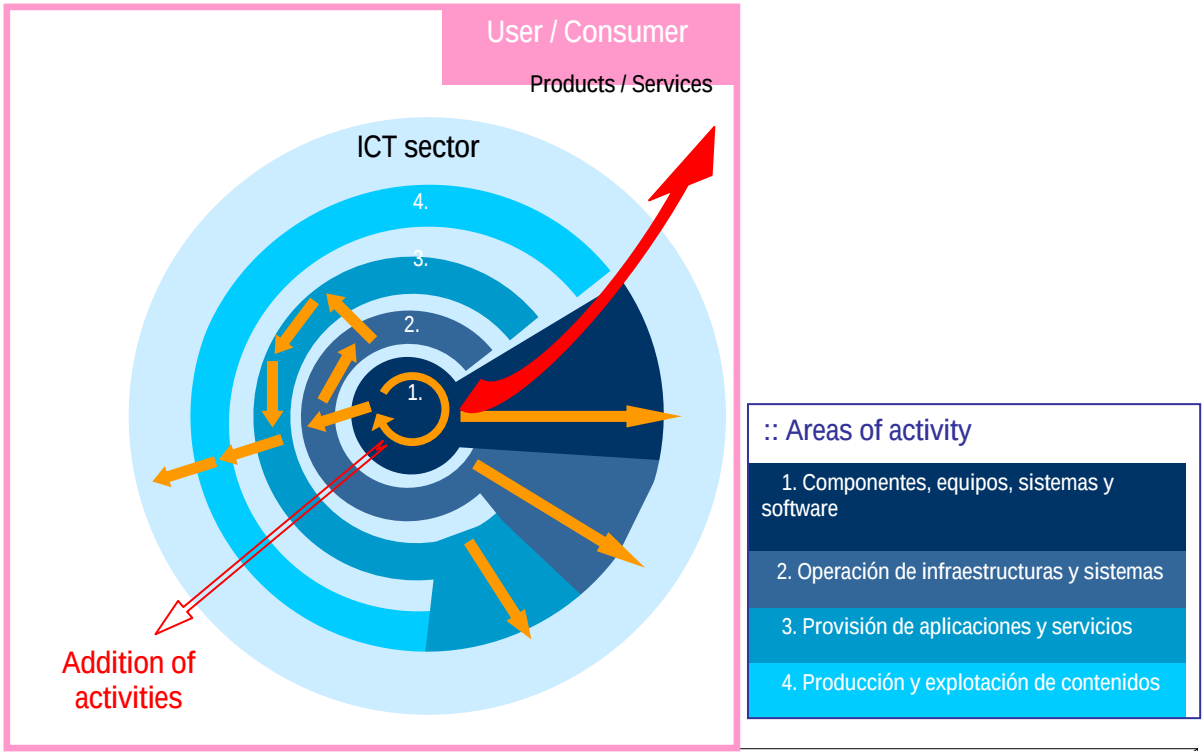


Figure 12. Multiple pathways in sector activities

The multiplicity of possible pathways also recognizes that it is feasible to reach users without involving all possible areas of activity, as shown in the figure above. The following combination of activities are thus possible:

- Using only the manufacture / supply of components, equipment, systems and software, a system of which there have recently been a number of examples (consumer electronics)
- Using the two most internal levels (manufacture and operation) to reach users in a way similar to the traditional telecommunications or IT model
- Using all levels except content in a model which recognizes that users might need some kind of application or service, but not specifically content (information adapted to their likes and requirements), as happens with many services and applications of interest which are typical of the Information Society
- Integration of the four areas of activity shown.

In addition, it is of course possible that there are other activities which are not integrated and which include any subset of the areas of activity mentioned.

The foregoing discussion prioritising the role of users / consumers emphasizes the decisive effect on the sector exerted by the behaviour of the market (as an economic and social aggregation of users / consumers) and, therefore, by demand compared to supply.

This represents a radical change in terms of classification. Previous models of classification were based more around supply as a first criterion. These classifications therefore originate within the sector itself and are often ill-prepared to follow market changes arising from companies' actual business and activities.

To conclude, it is therefore felt that any future classification should be undertaken from the point of view of demand, so typical of the second half of industrial revolutions and also of this revolution about information / knowledge.

9.3. The potential outcome of convergence

We are presently immersed in the process of convergence explained earlier on; nevertheless, it is still progressing at different rates in each thematic area of ICT and is, at the same time, a new process with many steps still to be taken. While not exhausting the topic, the following paragraphs present some issues which are relevant to the future development of the classification outlined.

Digitalization

The development of technological convergence is based on the digitalization of information. Digital information processing offers several advantages, among them the economies of scale derived from its capacity to uniquely handle all kinds of sources of information and a greater flexibility and freedom to incorporate new solutions which are of interest to users. Moreover, it is more efficient to store, process and generally use and manage information in digital format. However, digitalization is not the only technique required for the development of convergence; it should be complemented by technological improvements in the elements of hardware, software, electronics and communications which make up the supply of convergent solutions for users. In any event, the first effect of digitalization on classification is the gradual disappearance of analogue or "pre-convergent" solutions. This is particularly noticeable in all things related to the areas of consumer and professional electronics described above.

Telecommunications, audiovisual and information technology

The second foreseeable outcome of the process of convergence is the disappearance of the still-perceptible delineation between telecommunications, audiovisual and information technology. There are numerous examples of this, such as switching (traditionally the technical core of communications), increasingly done with information systems, or the provision of "advanced" services (security, e-commerce, content, etc.) by agents from any of the previously separated fields. "Partial convergences" also occur, such as - within telecommunications - that arising between operators of fixed and mobile infrastructures.

The effects of this convergence are seen at different levels: industry, operation of infrastructures, provision of services and applications, and production and exploitation of content. In all of them, in order to establish a future classification the frontiers between pre-convergence technologies will have to be eliminated

Software and hardware

Another of the more important aspects included in the process of convergence is the growing role of software as a universal "integrator". There is a trend, in the supply of equipment and systems, towards either very specific or general-purpose hardware, but always together with the software to make it "smart" and flexible. This tendency is based on a fundamental technical reason: computing is the most appropriate means of implementation and control of complex interactions between components of physical systems. For this reason too, software technologies are increasingly "invading" areas previously reserved for hardware. In any event, it's practically impossible to consider any kind of hardware which doesn't include the necessary (embedded) software for its operation.

The function of software goes beyond the foregoing, to user relations (development of applications and services) and the adaptation of information to users' preferences and requirements.

All this means that software is growing in importance and that it is increasingly difficult to keep it separate from the fields of manufacture, operation of infrastructures, provision of services and applications, and production and exploitation of content. For this reason it has been included as one of the basic horizontal elements of the sector and not as a separate area.

Synergies between ICTs and other sectors

As mentioned earlier, the role of ICTs is growing in terms of facilitating technologies of development of solutions of interest to users in sectors increasingly removed from the ICT sector.

Thus, if in an initial stage sectors such as industry, transport and logistics, cars or medicine have been considered, the effects of ICTs begin to permeate all other sectors and it will become necessary to reflect this fact in the activities of the platforms of the ICT sector.

Separation between the operation of infrastructures and the provision of services

In an increasingly complex and vast sector - not only in terms of technologies, but also of competition - it is to be expected that opportunities arise for specializing in areas of activity which could be separated. It is therefore possible that, while there are agents integrated within different areas, some agents might begin specializing in certain fields, especially if the economic or regulatory environment allows it.

This is what happens with the separation between operation of infrastructures and the provision of services and applications over these infrastructures - a separation which will be boosted by IP-based technologies and services, for instance, since they provide control (intelligence) for the deployment of services and applications at the infrastructure edges and not at their core, as used to happen.

Emerging areas from the point of view of technology

The European Commission, the Spanish Ministries of Industry and Education and the Autonomous Regions all agree on the pressing need to increase industrial competitiveness by boosting research, development and technological and innovative activity. Recent years have seen the launch of highly-ambitious public and private initiatives tending to unite efforts in R&D&I. The outcome of this effort is the European and Spanish technology platforms, which in certain areas within the ICT are promoting the appearance of new services based on new technologies, almost all of them inspired by the new models of convergence and a blurring of the distinction between broadband, audiovisual or data communications.

The European Commission has launched a European Technology Platform initiative and currently some thirty platforms for very diverse sectors have been recognized (Environment, Water Management, Construction, Audiovisual, Mobile Communications, Software, etc.). These platforms have defined a medium to long-term strategy embodied in a Vision at the horizon 2015-2020 and later drafted a Strategic Research Agenda, which will serve as a reference point for thematic priorities for technologies to be developed in the next few years as the most promising in terms of their capacity to generate industrial economic activity.

Regarding ICT in particular, AETIC is supporting the secretariats of various Spanish technology platforms which deal with areas crucial to the development of the sector:

Networked Multimedia Electronic Technologies, Wireless Communications and Security and Trust. Other technology platforms will be included in future, such as Satellite Communications. Work done by these platforms will bring new technologies which will allow new industrial and service activities in these sectors.

While not being a comprehensive analysis, the following list outlines emerging areas from the point of view of basic technologies for convergence and of consumption which would therefore come to have a significant presence in the sector and should be taken into account in the development of the classification. They are as follows:

- Standardization and use of open platforms, geared to facilitating interconnectivity and access to networks and interoperability of services, terminals and applications
- Technologies making up the home user's platform and its virtual extension (Extended Home)
- Technologies involved in mobile / wireless user platforms and new radio technologies for mobility
- Development of technologies for access to broadband and Next Generation Network support technologies, as well as technologies for interconnectivity of heterogeneous networks
- The heterogeneous group of technologies which enable viability of convergence business models
- Technologies for the development of an environment for exploitation of content in new digital media with ubiquitous access
- Technologies for the development of a smart, pervasive software
- Technologies about micro- and nano-hardware components
- Technologies for information management and interfaces
- Technologies for business process management
- Interconnectivity and interoperability
- ICT technologies geared towards assisting specific kinds of users: the elderly, the disabled, leisure users, etc.

Emerging areas from the point of view of services and applications

Along the lines of the previous section, and again with no claim to being comprehensive, we outline some of the areas related to services and applications in which new opportunities arise as a consequence of convergence. These are as follows:

- Broadband and content services and applications. Management of access to content in multimedia and multi-system environments
- Mobile / pervasive services and applications
- Content downloading and exchange services and interactive audiovisual services
- Interactive audiovisual services in third-generation mobile communications
- Video and internet games, leisure and entertainment services
- Services and applications related to the user's experience
- Services and applications for business management and intelligence

- Digital Home and City
- Simulation and learning
- New services backed by intelligent multi-purpose terminals
- ICT services with specific application to user environments: the elderly, the disabled, leisure users, etc.

10. Proposed lines of development of the classification

The classification into four main areas of activity, instead of the previous nine, reflects the sum of the above effects, as shown in the following summary figure.

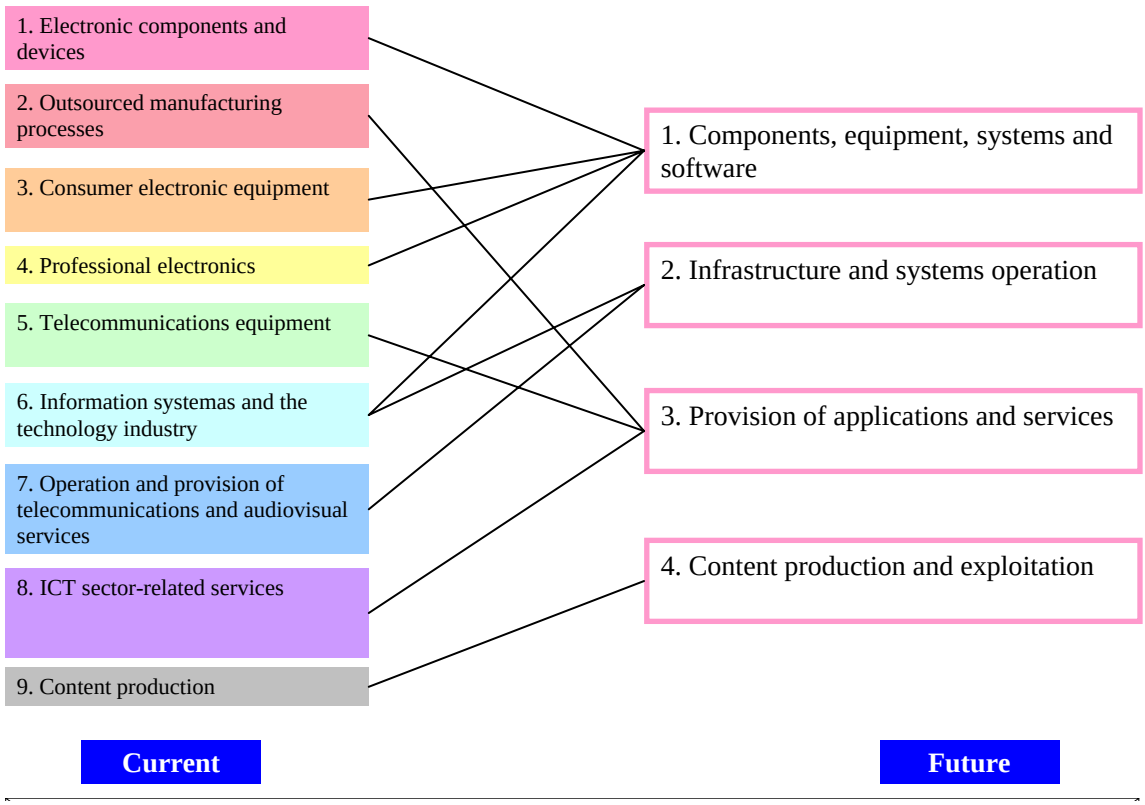


Figure 13. Development of the sector's classification

The following table shows the changes in numbered groups making up the classification:

Table 40. Structural changes between the current and future classifications

Current classification group		*Future classification group*
1,2,3,4,5,6	⇨	1
4,5,6,7	⇨	2
6,7,8	⇨	3
7,8,9	⇨ (crossed out)	4

10.1. Make-up of the various areas

Components, equipment, systems and software

This area spans the whole of industry and manufacturing of the ICT sector. It covers the various possible levels of aggregation: components, devices, equipment, subsystems and systems, as well as software as a component of the foregoing and as "glue technology" for their operation. Convergence has meant that frontiers have been blurred (at the first level) between telecommunications, information and audiovisual technologies. The distinction between consumer electronics and professional electronics arises at the second level. The area has been divided into the following activities:

Table 41. Structure of the area of Components, equipment, systems and software

Activities within the area of Components, equipment, systems and software	
1.1.	Manufacture of electronic components and devices
1.2.	Manufacture of consumer electronic equipment
1.3.	Manufacture of equipment and subsystems
1.4.	Manufacture of instruments and measuring equipment
1.5.	Manufacture of systems
1.6.	Software development
1.7.	Engineering

Operation of infrastructures and systems

This area separates the manufacture and supply of infrastructures and systems, part of the previous area, from their management and operation. It also separates the operation from the provision of services, since there will be a growing divide between both kinds of activity. Convergence is growing in this field but is not yet complete. The area has been divided into the following activities:

Table 42. Structure of the area of Operation of infrastructures and systems

Activities within the area of Operation of infrastructures and systems	
2.1.	Operation of electronic and audiovisual communications infrastructures and systems
2.2.	Operation of information systems

Provision of applications and services

The third level of activity corresponds to the provision of applications and services, in which there is a separation of the infrastructures supporting it and various levels of aggregation depending on proximity to these infrastructures or, alternatively, on proximity to the user (and distance from the infrastructures). The impact of convergence is practically complete in this area, except for some traditional activities which are undergoing transformation. It has been divided into the following principal activities:

Table 43. Structure of the area of Provision of applications and services

Activities within the area of Provision of applications and services	
3.1.	Provision of electronic communications services
3.2.	Provision of information systems services
3.3.	Provision of platforms and applications and integrated services
3.4.	Provision of user relations services and applications and services related to the ICT sector

Production and exploitation of content

In this area the typical nomenclature of the content sector has been followed in order to distinguish between two basic activities: on the one hand, production (with its variants) and, on the other, exploitation (which can rely heavily on ICT or not). It has been divided into the following main activities:

Table 44. Structure of the area of Production and exploitation of content

Activities within the area of Production and exploitation of content	
4.1.	Content production
4.2.	Content exploitation

11. Suggested future work on the proposed classification

The following activities are suggested in order to complete the work presented in this report and classification.

a) Detailed study of the impact of ICTs (and subsequent classifications) in non-ICT sectors which are heavily reliant on them (medicine, energy, transport, automotive, etc.). This would enable us to have more detailed awareness of the horizontal impact of ICT and a better understanding of related mechanisms of innovation.

b) Periodic (annual) review of the classification, addressing technological, business and market development of the ICT sector and of sectors which rely heavily on ICT.

c) Development of other technical-economic “dimensions” on the classification made, such that the classification takes the form of a more complete “matrix” which allows us to understand the processes taking place in ICT and the trends within it. Foremost among these dimensions are those related to innovation, such as activity related to the life cycle of products and services (which would enable a distinction to be made between activities of R&D&I, production, marketing, installation, maintenance, etc.); or activity related to companies’ business models (which would increase awareness of the development of product-service strategies, outsourcing and subcontracting, national added value, etc.).

d) Transfer of the resulting classification to the Instituto Nacional de Estadística (INE) for its practical implementation.

e) Transfer of the resulting classification to the NACE revision in progress.

12. Appendix A: Proposed classification

1. Electronic components and devices

1.1. Passive components

1.1.1. Capacitors

1.1.2. Resistors

1.1.3. Transformers

1.1.4. Coils

1.1.5. Filters

1.1.6. Other passive components

1.2. Semiconductors

1.2.1. Integrated semiconductors

1.2.2. Discrete semiconductors

1.2.3. Optoelectronics

1.2.4. Nanoelectronics

1.3. Screens and display devices

1.3.1. Cathode-ray tubes

1.3.2. Plasma screens

1.3.3. LCD/TFT screens

1.3.4. Other screens and display devices

1.4. Electroacoustic components

1.4.1. Speakers

1.4.2. Other electroacoustic components

1.5. Radio frequency tubes and components

1.5.1. Microwave tubes

1.5.2. Waveguides

1.5.3. Other radio frequency components

1.6. Antennas

1.6.1. Car radio aerials

1.6.2. Radio and TV indoor aerials

1.6.3. Individual and collective outdoor aerials

1.6.4. Satellite dishes

1.6.5. Telecommunications antennas

1.6.6. Antenna components and accessories

1.6.7. Other antennas

1.7. Cables

1.7.1. Copper wires and pairs

1.7.2. Coaxial

1.7.3. Fibre optic

1.7.4. Wiring

1.7.5. Other cables

1.8. Interconnection components

1.8.1. Printed circuits

- 1.8.2. Connectors
- 1.8.3. Switches and relays

1.9. Batteries

- 1.9.1. Batteries
- 1.9.2. Batteries

1.10. Other electronic components and devices

- 1.10.1. Sensors
- 1.10.2. Piezoelectric devices
- 1.10.3. Recording and reading components
- 1.10.4. Sensors
- 1.10.5. Keyboards
- 1.10.6. Other electronic components and devices

2. Outsourced manufacturing processes

2.1. Printed circuit boards and sub-assemblies

2.2. Finished equipment

2.3. Other outsourced manufacturing processes

3. Consumer electronic equipment

3.1. Digital and analogue media

- 3.1.1. Digital audio media
- 3.1.2. Digital video media
- 3.1.3. Digital audio and video media
- 3.1.4. Digital data media
- 3.1.5. Analogue audio media
- 3.1.6. Analogue video media
- 3.1.7. Analogue data media
- 3.1.8. Portable memories
- 3.1.9. Other media

3.2. Wireless terminals and devices

- 3.2.1. Wireless terminals
- 3.2.2. Components and peripherals for mobile and/or wireless terminals and devices
- 3.2.3. Other mobile and/or wireless terminals and devices

3.3. Personal computers and components

- 3.3.1. Desktop personal computers
- 3.3.2. Portable computers
- 3.3.3. Tablet PC
- 3.3.4. Digital personal assistants
- 3.3.5. Monitors
- 3.3.6. Hard drives
- 3.3.7. Keyboards, mouse devices and graphics tablets
- 3.3.8. Computer speakers and microphones
- 3.3.9. Video, sound and graphics cards
- 3.3.10. Memories
- 3.3.11. Floppy disk, CD and DVD drives

3.3.12. Spare parts and other components

3.4. Computer peripherals

3.4.1. Printers

3.4.2. Scanners

3.4.3. Multifunction equipment

3.4.4. Other peripherals

3.5. Equipment for accessing communications networks

3.5.1. Network cards

3.5.2. Routers

3.5.3. Switches

3.5.4. Hubs

3.5.5. Other

3.6. Audio equipment

3.6.1. Sound recorders and players

3.6.2. Radio receivers

3.6.3. Finished speakers and speaker systems

3.6.4. HiFi chains

3.6.5. Portable audio players

3.6.6. Other audio equipment

3.7. Video equipment

3.7.1. Video and DVD recorders and players

3.7.2. Digital video cameras

3.7.3. Webcams

3.7.4. Projectors

3.7.5. Other video equipment

3.8. Television receiving equipment

3.8.1. Televisions

3.8.2. Decoders

3.8.3. Overhead projectors

3.8.4. Other equipment

3.9. Digital photography

3.9.1. Digital cameras

3.9.2. Accessories

3.10. Video game consoles and electronic entertainment equipment

3.10.1. Video game consoles

3.10.2. Components and peripherals

3.10.3. Other electronic entertainment equipment

3.11. Location and orientation equipment

3.11.1. Satellite navigators

3.11.2. Other location and orientation equipment

3.12. Other consumer electronic equipment

3.12.1. Calculators and cash registers

3.12.2. Digital timepieces

3.12.3. Other electronic entertainment equipment

4. Professional electronics

4.1. Instruments and measurement

4.1.1. Communications instrumentation and measurement equipment

4.1.2. Electrical measurement equipment

4.1.3. Physico-chemical measurement equipment

4.1.4. Test benches

4.1.5. Other instrumentation and measuring equipment

4.1.6. Integration and installation of instrumentation and measurement systems

4.2. Defence, detection and navigation electronics

4.2.1. Defence systems

4.2.2. Air and maritime traffic control

4.2.3. Simulators

4.2.4. Other defence, detection and navigation electronic equipment

4.2.5. Integration and installation of electronic systems for defence, detection and navigation

4.3. Safety electronics

4.3.1. X-ray equipment

4.3.2. Access control equipment

4.3.3. Metal detection equipment

4.3.4. Alarm systems

4.3.5. Other electronic systems for physical security

4.3.6. Integration and installation of electronic systems for physical security

4.4. Electromedicine and bioengineering

4.4.1. Radiology equipment and components

4.4.2. Physical therapy and rehabilitation equipment

4.4.3. Monitoring equipment

4.4.4. Cardiology equipment

4.4.5. Diagnostic and exploratory equipment

4.4.6. Other electromedical and bioengineering equipment

4.4.7. Integration and installation of electromedical and bioengineering systems

4.5. Industrial electronics

4.5.1. Industrial automation, control and monitoring

4.5.2. Distribution network automation, control and monitoring

4.5.3. Road infrastructure systems

4.5.4. Railway infrastructure systems

4.5.5. Other infrastructures

4.5.6. Integration and installation of industrial electronic systems

4.6. Automotive electronics

4.6.1. Ignition control systems

4.6.2. Brake control systems

4.6.3. Traction control systems

4.6.4. Stability control systems

4.6.5. Other automotive electronic systems
4.6.6. Integration and installation of automotive electronic systems

4.7. Audiovisual production and transmission systems and equipment
4.7.1. Recording systems and equipment
4.7.2. Production systems and equipment
4.7.3. Television and audio headers
4.7.4. Radio and television signal transmission systems and equipment
4.7.5. Other audiovisual production and transmission systems and equipment
4.7.6. Integration and installation of audiovisual production and transmission systems

4.8. Power supply systems
4.8.1. Power supplies
4.8.2. UPSs
4.8.3. AC/DC converters
4.8.4. Automatic voltage regulators
4.8.5. Photovoltaic systems and components
4.8.6. Other power supply systems

5. Telecommunications equipment

5.1. Access network systems and equipment
5.1.1. Fibre optic and cable
5.1.2. Radio and satellite
5.1.3. Communications management
5.1.4. Operational support
5.1.5. Local networking
5.1.6. Common telecommunications infrastructures in buildings
5.1.7. Other access network systems and equipment

5.2. Transport network systems and equipment
5.2.1. Cable and fibre optic transmission systems
5.2.2. Radio links
5.2.3. Satellites
5.2.4. Submarine cables
5.2.5. Transport network management
5.2.6. Operational support
5.2.7. Other transport network systems and equipment

5.3. Network core systems and equipment
5.3.1. New generation networks and switching
5.3.2. Management systems
5.3.3. Support systems
5.3.4. Other network core systems and equipment

5.4. Telephone exchanges and terminals
5.4.1. Fixed terminals
5.4.2. Mobile terminals
5.4.3. Telephone exchanges and local networks

5.5. Services and application software and platforms

- 5.5.1. Platform software
- 5.5.2. Applications and services software
- 5.5.3. Security software
- 5.5.4. Other software

5.6. Engineering and basic services

- 5.6.1. Network construction and construction works
- 5.6.2. Network operation management
- 5.6.3. Business management and consultancy services
- 5.6.4. Systems engineering
- 5.6.5. Systems integration and installation
- 5.6.6. Other basic telecommunications systems

6. Information systems and technology industry

6.1. Manufacture of information technology equipment

- 6.1.1. Workstations
- 6.1.2. Servers
- 6.1.3. Small systems
- 6.1.4. Medium systems
- 6.1.5. Large systems
- 6.1.6. Storage systems
- 6.1.7. Professional printing and plotters
- 6.1.8. Business transaction operations equipment

6.2. Office automation equipment

- 6.2.1. Photocopiers
- 6.2.2. Facsimile machines
- 6.2.3. Calculators
- 6.2.4. Other office automation equipment

6.3. Software

- 6.3.1. Operating systems
- 6.3.2. Software development tools
- 6.3.3. Database software
- 6.3.4. Communications software
- 6.3.5. Multimedia software
- 6.3.6. Horizontal applications
- 6.3.7. Vertical applications
- 6.3.8. Digital rights management

6.4. Computer services

- 6.4.1. Data processing centres
- 6.4.2. Development and implementation
- 6.4.3. Support and maintenance
- 6.4.4. Outsourcing services
- 6.4.5. Other computer services

6.5. Telematics services

- 6.5.1. Web and e-mail hosting
- 6.5.2. Web design and development

- 6.5.3. E-commerce platform
- 6.5.4. Interactive advertising
- 6.5.5. Electronic data exchange
- 6.5.6. Electronic banking
- 6.5.7. Remote application providers
- 6.5.8. Other telematics services

6.6. Consumables

7. Operation and provision of telecommunications and audiovisual services

7.1. Fixed communications
- 7.1.1. Direct access
- 7.1.2. Unbundled access
- 7.1.3. Indirect access
- 7.1.4. Wholesale services
- 7.1.5. Business communications

7.2. Mobile communications
- 7.2.1. Operators with their own network
- 7.2.2. Operators without their own network
- 7.2.3. Wholesale services
- 7.2.4. Other mobile communications services

7.3. Internet access
- 7.3.1. Own network
- 7.3.2. Unbundled loop
- 7.3.3. Wholesale services

7.4. Audiovisual
- 7.4.1. Analogue terrestrial television
- 7.4.2. Digital terrestrial television
- 7.4.3. Satellite television
- 7.4.4. Cable television
- 7.4.5. Video over copper pairs
- 7.4.6. Audiovisual signal transport and broadcasting
- 7.4.7. Other audiovisual service providers and operators

7.5. Satellite

7.6. Telephone information and user guides

8. Services related to the information and communication technology sector

8.1. Consultancy

8.2. Certification

8.3. Training
- 8.3.1. On-line training
- 8.3.2. On-site training

8.4. User service

8.5. Other ICT-related services

9. Content production

9.1. Phonographic production

9.2. Television and motion picture production
9.3. Video game production
9.4. Publishing content production
9.5. Content publishing and packaging

13. Appendix B. Proposed development of the ICT sector classification

1. Components, equipment, systems and software
1.1. Manufacture of electronic components and devices
1.1.1. Passive components and materials
1.1.2. Integrated and discrete semiconductors
1.1.3. Optoelectronics
1.1.4. Nanoelectronics
1.1.5. Screens and display devices
1.1.6. Electroacoustic components
1.1.7. Radio frequency tubes and components
1.1.8. Antennas
1.1.9. Cables
1.1.10. Interconnection components
1.1.11. Power supplies
1.1.12. Batteries
1.1.13. Other electronic components and devices
1.2. Manufacture of consumer electronic equipment
1.2.1. Pre-convergence and analogue user equipment
1.2.2. Analogue media
1.2.3. Digital media
1.2.4. Mobile, portable and wireless terminals and communications devices
1.2.5. Fixed multimedia terminals
1.2.6. Personal and portable computers and components
1.2.7. Computer peripherals
1.2.8. Consumables
1.2.9. Equipment for accessing communications networks
1.2.10. Audio and video digital equipment
1.2.11. Radio and television receiving equipment
1.2.12. Digital photography
1.2.13. Video game consoles
1.2.14. Electronic entertainment equipment
1.2.15. Electronic location and orientation equipment
1.2.16. Electronic toys and gadgets
1.2.17. Electronic subsystems for domestic appliances
1.2.18. Security and surveillance equipment
1.2.19. Electronic musical instruments
1.2.20. Calculators
1.2.21. Digital timepieces
1.2.22. Other consumer digital and electronic equipment
1.3. Manufacture of equipment and subsystems
1.3.1. Workstations

1.3.2. Servers
1.3.3. Small data processing and calculating equipment
1.3.4. Medium data processing and calculating equipment
1.3.5. Large data processing and calculating equipment
1.3.6. Professional printing equipment
1.3.7. Data storage equipment
1.3.8. Office automation equipment
1.3.9. Other data processing subsystems and equipment
1.3.10. Data display subsystems and equipment
1.3.11. Audiovisual recording subsystems and equipment
1.3.12. Audiovisual production subsystems and equipment
1.3.13. Audiovisual transmission subsystems and equipment
1.3.14. Other professional audiovisual subsystems and equipment
1.3.15. Communications transmission, receiving, switching and management subsystems and equipment
1.3.16. Communications operational support subsystems and equipment
1.3.17. Power subsystems and equipment
1.3.18. Equipment for common telecommunications infrastructures
1.3.19. Other communications subsystems and equipment
1.3.20. Defence subsystems and equipment
1.3.21. Air and maritime traffic control subsystems and equipment
1.3.22. Simulator subsystems and equipment
1.3.23. Detection subsystems and equipment
1.3.24. Navigation, guidance and locating subsystems and equipment
1.3.25. X-ray equipment
1.3.26. Access control equipment
1.3.27. Metal detection equipment
1.3.28. Alarm systems
1.3.29. Other electronic equipment for physical safety/security
1.3.30. Radiology equipment and components
1.3.31. Physical therapy and rehabilitation equipment
1.3.32. Monitoring equipment
1.3.33. Cardiology equipment
1.3.34. Diagnostic and exploratory equipment
1.3.35. Other electromedical and bioengineering equipment
1.3.36. Industrial automation, control and monitoring equipment
1.3.37. Distribution network automation, control and monitoring equipment
1.3.38. Road, rail and metropolitan transport subsystems and equipment
1.3.39. Other industrial electronics subsystems and equipment
1.3.40. Business and financial transactions subsystems and equipment
1.3.41. Automotive subsystems and equipment
1.3.42. Other electronic subsystems and equipment for specific uses
1.4. Manufacture of measuring instruments
1.4.1. Sensors
1.4.2. Meters

1.4.3. Controllers
1.4.4. Communications instrumentation and measurement equipment
1.4.5. Electrical measurement equipment
1.4.6. Physico-chemical measurement equipment
1.4.7. Test benches
1.4.8. Locating and navigation measurement equipment
1.4.9. Medical and biometric measurement systems and equipment
1.4.10. Transport sector measuring equipment
1.4.11. Other electronic measuring instruments and equipment
1.5. Manufacture of systems
1.5.1. Data processing, calculating and information processing systems
1.5.2. Data storage systems
1.5.3. Data display systems
1.5.4. Radio and television headers
1.5.5. Audiovisual content and information production and transmission systems
1.5.6. Telecommunications access networks systems
1.5.7. Telecommunications transport networks systems
1.5.8. Telecommunications network core systems
1.5.9. Satellites
1.5.10. Communications services and applications development systems and platforms
1.5.11. User service systems
1.5.12. Defence systems
1.5.13. Air and maritime traffic control systems
1.5.14. Simulators
1.5.15. Radars, sonars and other detection systems
1.5.16. Navigation systems
1.5.17. Meteorological systems
1.5.18. Astronomy and radio astronomy systems
1.5.19. Materials, earth sciences and basic research systems
1.5.20. Security and identification systems
1.5.21. Electromedical, bioengineering and health systems
1.5.22. Industrial electronics systems
1.5.23. Automotive systems
1.5.24. Transport-related systems
1.5.25. Intelligent building, digital home and automated systems
1.5.26. Economic, business and financial transactions systems
1.5.27. Leisure and entertainment systems
1.5.28. Education, emulation and training systems
1.5.29. Energy-related systems
1.5.30. Systems related to agriculture, livestock and fishing
1.5.31. Systems related to the food sector
1.5.32. Environmental management and monitoring systems
1.5.33. Logistics-related systems
1.5.34. Other systems for specific uses

1.6. Software development
1.6.1. Embedded software and firmware
1.6.2. Operating systems
1.6.3. Software development tools
1.6.4. Database software
1.6.5. Communications software
1.6.6. Multimedia and content management software
1.6.7. Security software
1.6.8. Web design and development
1.6.9. Horizontal applications
1.6.10. Vertical applications
1.6.11. Other software
1.7. Engineering
1.7.1. Outsourced manufacturing processes
1.7.2. Systems engineering
1.7.3. Systems integration and installation
1.7.4. Infrastructure construction and construction works
1.7.5. Infrastructure operation management
1.7.6. Other engineering for industry and manufacturing

2. Operation of infrastructures and systems

2.1. Operation of electronic and audiovisual communications infrastructures
2.1.1. Fixed communications operators
2.1.2. Mobile communications operators
2.1.3. Audiovisual signal transport and broadcasting infrastructure operators
2.1.4. Satellite network operators
2.1.5. Interconnection operators
2.1.6. Other electronic communications infrastructure operators
2.2. Information systems operators
2.2.1. Data processing centre operators
2.2.2. Hosing and server systems operators
2.2.3. Real time management systems operators
2.2.4. Other information systems operators

3. Provision of applications and services

3.1. Provision of electronic communications services
3.1.1. Telephone services
3.1.2. Data services
3.1.3. Broadband connectivity services
3.1.4. Internet access services
3.1.5. Radio and television broadcasting services
3.1.6. Audio and video streaming services
3.1.7. Integrated telephone and/or internet and/or audiovisual services
3.1.8. Wholesale and interconnection services
3.1.9. Telephone information and user guide services
3.1.10. Other communications services

3.2. Provision of information systems services
3.2.1. Web hosting, e-mail and messaging services
3.2.2. Invoicing and payment services
3.2.3. Authentication and security services
3.2.4. Data storage services
3.2.5. Electronic data and document exchange
3.2.6. Document and office automation management services
3.2.7. Project and workflow management
3.2.8. Other provision of information systems services
3.3. Provision of platforms and applications and bundled services
3.3.1. Platforms for general interactive services
3.3.2. Geographic locating services
3.3.3. Messaging platforms
3.3.4. User management
3.3.5. E-commerce platforms
3.3.6. Interactive advertising
3.3.7. Electronic banking
3.3.8. Search platforms
3.3.9. Remote application providers
3.3.10. Access multi-platform management
3.3.11. Other provision of platforms and applications and bundled services
3.4. Provision of user relations services and applications and services related to the ICT sector
3.4.1. Consultancy
3.4.2. Outsourcing of business management and processes
3.4.3. Certification
3.4.4. Training
3.4.5. Customer and user service
3.4.6. Other ICT-related services
4. Production and exploitation of content
4.1. Content production
4.1.1. Phonographic production
4.1.2. Motion picture production
4.1.3. Radio and television production
4.1.4. Video game production
4.1.5. Other types of content production
4.2. Content exploitation
4.2.1. Marketing of physical media
4.2.2. Motion picture distribution and exhibition
4.2.3. Digital rights management
4.2.4. Audiovisual content publishing and packaging
4.2.5. Analogue terrestrial television
4.2.6. Digital terrestrial television
4.2.7. Satellite television

14. ACRONYMS

- **AETIC**: Asociación de Empresas de Electrónica, Tecnologías de la Información y Telecomunicaciones de España
- **ANIEL**: Asociación Nacional de Industrias Electrónicas y de Telecomunicaciones
- **ANZSIC**: Australian and New Zealand Standard Industrial Classification
- **ASIC**: Australian Standard Industrial Classification
- **CET**: Common External Tariff
- **CMT**: Comisión del Mercado de las Telecomunicaciones
- **CNAE**: Clasificación Nacional de Actividades Económicas
- **CPA**: Classification of Products by Activity
- **CPC**: Central Product Classification
- **EICTA**: European Information & Communications Technology Industry Association
- **EITO**: European Information Technology Observatory
- **EPO**: European Patent Office
- **HS**: Harmonized System
- **ICEX**: Instituto Español de Comercio Exterior
- **INE**: Instituto Nacional de Estadística
- **IPC**: International Patent Classification
- **ISIC**: International Standard Industrial Classification
- **JSIC**: Japan Standard Industrial Classification
- **NACE**: Statistical Classification of Economic Activities in the European Community
- **NAICS**: North American Industry Classification System
- **NZSIC**: New Zealand Industrial Classification
- **OECD**: Organisation for Economic Co-operation and Development
- **SEDISI**: Asociación Española de Empresas de Tecnologías de la Información
- **SIC**: Standard Industrial Classification
- **UKSIC**: United Kingdom Standard Industrial Classification
- **WIPO**: World Intellectual Property Organization
- **WPIIS**: Working Party on Indicators for the Information Society

15. REFERENCES

-Annual and quarterly reports of the Comisión del Mercado de las Telecomunicaciones.

Website reference: *http://www.cmt.es*

-Telefónica's The Information Society in Spain 2005 report

Website reference: *http://www.telefonica.es/sociedaddelainformación/*

-eEspaña 2005. Annual report on the development of the Information Society in Spain. Fundación Auna.

Website reference: *http://www.fundaciónauna.org*

-OECD Science, Technology and Industry Outlook 2004. Published by the Organisation for Economic Co-operation and Development (OECD)

Website reference: *http://www.oecd.org*

-"The implications of convergence for regulation of electronic communications" (2004). Published by the Organisation for Economic Co-operation and Development (OECD)

Website reference: *http://www.oecd.org*

-"A proposed classification of ICT goods" (2003). Published by the Organisation for Economic Co-operation and Development (OECD)

Website reference: *http://www.oecd.org*

-"Reviewing the ICT sector definition: Issues for discussion" (2002). Published by the Organisation for Economic Co-operation and Development (OECD)

Website reference: *http://www.oecd.org*

-Item 7 of the agenda ICT sector. Definition, data availability and key indicators (Doc.D7/ISS-WG/Oct05/07)

Website reference: *http://europa.eu.int/comm/eurostat/*

-Annual report of the Spanish electronics, information technology and telecommunications sector 2004. Published by the Asociación de Empresas de Electrónica, Tecnologías de la Información y Telecomunicaciones de España (AETIC)

Website reference: *http://www.aetic.es*

-"Las tecnologías de la información en España 2004". Published by AETIC (*http://www.aetic.es*) and the Ministry of Industry, Trade and Tourism (*http://www.mityc.es*).

-European Information Technology Observatory report, EITO 2005

Website reference: *http://www.eito.com*

-Banegas Nuñez, Jesús (2003). "La nueva economía en España: las TIC, la productividad y el crecimiento económico". Alianza Editorial S.A.

-"Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors, and the Implications for Regulation. Towards an Information Society Approach". COM(97)623, 3/12/1997.