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Towards an Information Society Aggregate in ISIC 2007

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SESSION 1 - Information Society

A B S T R A C T

In view of classification revisions, this paper considers the possibility of creating a new "Information Economy Section (IES)". Having in mind the development of Information Society will be fuelled by the supply of new Information and Communication Technology (ICT) and content products, such a section should group activities focussing on these products.

Although convergence is not a universal phenomenon, it is the word to understand the notion of ICT and then, derive the definition and design of a core ICT sector.

Among all information that can be processed, stored, transmitted and displayed by ICT, content is of special interest as far as mass products, i.e. the combination of an open to public content and a mass communication medium, are concerned.

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I. Introduction

1. We are now in sight of ISIC and CPC revisions. But, when the previous revision of ISIC was designed, around 1988, the diffusion of personal computers in businesses was at its early stage, not to mention that in households. The Internet was confidential. On their part, mobile telephones as we see them today and video games did not exist. Since then, the rapid growth and development of the information and communication technology (ICT) led to its wider diffusion and use. Along with its growing importance, the impacts of ICT on the Economy and Society became more effective and more visible. To say the least, international economic classifications are ageing; the coming revision of ISIC and CPC now must integrate industry transformations resulting from ICT growth.

   But this update requirement implies even more fundamental options that are:

   - to create a specific section (at the upper level of classification) for activities focussing on information;

   - to design an economic classification architecture which, at its upper level, acknowledges the diversification and expansion of service activities;

   - to drop the focal reference on manufacturing, so as to adopt a more balanced approach that defines sectors of more equal status in reference to market and economic closeness.

   The purpose of this paper is to present a draft proposal focussing on the introduction of an "Information Economy Section" in international economic classifications. It also suggests principles and guidelines to be followed in the coming revisions of CPC and ISIC.

II. Industry transformation at work

2. Through a variety of channels and mechanisms, ICT development has largely altered existing service industries and led to the creation of new service products and activities. One most striking example of these innovations is the development of on-line provided services and the creation of a new form of sale that is, e-commerce. Meanwhile, the share of the service sector in GDP and employment kept on increasing across developed economies; so did the share of services in household consumption and in business expenditure.

   This shows, the intensified use of ICT applications and the Internet have a significant part in the expansion and diversification of the service sector. More generally, ICT applications now largely contribute to accelerate the natural evolution leading from industrial-based economy to a service-driven economy, from industrial society to service society. The upsurge of the Internet had the special merit to make this trend crystal clear to economic and social observers among whom statisticians.

3. Beyond a dominant share of services in GDP and employment, a service economy also has the following features.

   - ✓ Services have become a driving force in the economic development. Whereas manufacturing industries used to be considered as the only industries that could pull economic growth, with services as their supporting activities, **service industries can also have their autonomous development and drive the overall economic activity**.
   - ✓ Information and intangible products contribute a great part of the value added of most goods and services. In particular, information and other intangibles such as software,

database, knowledge, on-line services, know-how, research results, studies and content are in the focus of economic activity. For production activities intangibles are as necessary as energy, physical input or manufactured equipment. In other words, **the creation, trading and distribution of intangibles requires the same attention as processing material input into material output**[1].

- ✓ **Information and Communication Technology (ICT) is at the centre of the service-driven economy**. ICT applications have multiplied and penetrated most of human activities (economic and non economic). Some of ICT applications are infrastructure (networks), others are equipment, part of a physical object, element of a production or business process, a service, an investment or a consumption item.
- ✓ **The limit between goods and services is blurred**. Besides the examples of electricity and intangibles, computers ready to use represent another typical case. They correspond to the combination of hardware and software; meanwhile both components are always used jointly. Symmetrically, software are recognised as services, whereas they look like goods when available on CD. In addition, the production process of a packaged software has similarities with that of a large scale production product. Other goods, as cosmetics or medicines, mainly incorporate marketing and research services, whereas their direct manufacturing is a small part of their production process and production cost..
- ✓ **The traditional binary distinction between physical and non physical production, between manufacturing and non manufacturing industries has lost of its relevance for economic description and analysis**. For example, a publisher does not manufacture books but organises its publishing from text selection to financing, printing supervision and marketing. In this process the printer acts as a subcontractor - providing a technical supporting service - and working under specifications that are strictly defined by the publisher. Some manufacturers have totally entrusted their direct production activity to subcontractors in order to focus on their product design and marketing activity.

III. Some important issues for the 2007 revision of ISIC and CPC

Conceptual and structural issues

4. ISIC is an industrial classification of economic activities, which gathers industries in categories, ranging from non-detailed to most detailed level of the classification system. Different criteria can be used to group activities, such as inputs used, the nature of the production process and the type of outputs produced. Currently, criteria used by ISIC differ from one part to another part of the classification, depending on the activity sector under consideration. Still, **the traditional factory model is totally predominant in classification design**, whereas manufacturing rarely exceeds a quarter of GDP, and modern manufacturing businesses mostly employ personnel for in-house production of services, rather than for direct production of goods.

   To understand this problem, it may be useful to look at the economic activity definition presented in the ISIC Rev. 3.1 introduction §20. In this paragraph, an economic productive activity is defined as the processing of inputs resulting in an homogeneous type of output. In this context, the production of an homogeneous type of products is characteris-

[1] See: "The New Economy: New challenges for the statistical system" - Olof Gärdin - Eurostat - IAOS conference, London 2002.

tic of an activity class. Such a definition is particularly suitable for the description of **traditional manufacturing industries**, i.e. of economic activities producing marketable goods from raw material or semi-finished goods.

In the following paragraphs of the ISIC introduction, all examples used to illustrate this notion of "process" exclusively refer to manufacturing activities such as: weaving, car production (§21), casting of pumps and gear boxes (§22), production of pens and pencils (§23), slaughtering animals (§25) and so on. Meanwhile, this ISIC introduction does not provide a single example of any service activity that could be described using that scheme "input of resources - production process - output of products".

Thus, this notion of process is closely related to that of **physical product manufacturing**. Apart from the traditional manufacturing sector, the suitability of that scheme widely varies according to production activity, from about perfect adequacy in the case of data processing to irrelevance in the case of trade. As a fact, trade corresponds to the purchase of goods for resale as they stand, i.e. without any processing at all.

Even if **this notion of production process** can be extended beyond the scope of traditional manufacturing industries, it **is not a universal notion** that suits to the description of the whole range of economic productive activities.

A section for activities focussing on information

5. Currently ISIC has 17 tabulation categories designated as sections (1-letter level). They correspond to the highest level groupings in the classification structure. Today, the creation in ISIC and CPC of a specific section for activities focussing on information clearly is on the agenda. To illuminate this issue, it may be useful to review how the ISIC reflected the development of information and service activities over time.

   The initial version of ISIC (1949) as well as the first (1958) and the second revisions (1968) had about 10 upper-level categories (sections), equally distributed between the primary and secondary sectors on one side, and the tertiary sector. Hence, the initial versions of ISIC (in 1949 and 1958) only had 4 sections available for describing the whole tertiary sector. In particular, trade industry was originally grouped with banking and real estate (1949). Even in ISIC Rev. 2 (1968), only two sections were left to identify service industries contributing to half of GDP (i.e. all services apart from trade and transports).

   The third revision (1990) of ISIC introduced major improvements that resulted, inter alia, in an important increase in the number of high-level groupings (17 instead of 10). With the upgrading of fishing industry, one additional major heading was attributed to the primary sector. Meanwhile **six new sections were identified in the tertiary sector**. This increase in the number of major headings in tertiary sector represented a real improvement, since it allowed a better description of many service industries.

6. **For about fifteen years, there has been a growing interest in the creation of a new category for information industries**. As soon as 1987, when the third revision of ISIC was on the agenda, the issue was discussed for the first time at the Stockholm Voorburg Group meeting. At that time, the growing importance of information in the economy and society had already been highlighted. Three papers were delivered at that meeting, making proposals about the definition of an information sector in terms of existing classifications[2]. Among these, the UK paper, based on a study commissioned by the Department of Trade and Industry, presented a list of recommendations, many of them being always

[2] The Information Sector and ISIC (CSO - UK). A note on publishing and information related categories in industrial and product classifications (Memo from Statistics Sweden - July 1987). Information Service Activities including Advertisement, Press Agency Services (Japan).

topical; but, it did not propose "*a major reconstruction of the classification to group together an information sector*".

Even if the 1990 classification architecture did not allow for the creation of a new section that would group information oriented industries, **the third revision of ISIC introduced major innovations concerning two major component industries of the ICT sector**:

- **the creation of division 72** which groups computer services under the heading "computer and related activities". In the previous version, there was only one four-digit item (class) to file computer service industries, namely the ISIC "8323 - Data processing and tabulating services";

- **the separation of postal and telecommunication services**, which previously were not distinguished within the communication industry.

Unfortunately, the ISIC Rev.3 group "642 - Telecommunications" was kept under the major heading that still covers "Transport, Storage and Communications" activities. In light of ICT convergence up to now, it looks rather irrelevant to consider telecommunication industries as being closer to transport than to computer or software industries.

The NAICS Information Sector

7. Ten years later, an information sector was created in the new North American Industry Classification System (NAICS). Reasons and principles leading to that creation were presented by the US Census Bureau at the Voorburg Group meeting in Copenhagen (1997)[3]. Here comes a summary of these.

   - ✓ At the time, the U.S. *Standard Industrial Classification (SIC) system* was out of date and its architecture had remained almost unchanged since its introduction in the mid-1930s. The original SIC described an economy that was primarily agricultural- and industrial-based. Despite subsequent revisions up to 1987, the SIC continued to be widely regarded as inadequate in its ability to reflect the emerging technology sectors, the growth of service industries, and the importance of trade and the global economy.
   - ✓ **The changing regulatory environment** also was a strong incentive for a major change in the structure of American industrial classification. The "Telecommunications Act" of 1996 was the most comprehensive revision of the United States' Federal telecommunications regulations in over 60 years. It was meant to have a dramatic impact on the information industries by breaking down artificial barriers to market entry.

     In February 1997, the WTO agreement opened up international telecommunication markets. It covers markets comprising approximately 95% of world-wide telecommunications revenues. In this new regulatory framework, the creation of an Information Sector appeared to be a suitable method to meet the statistical needs of the Federal Communications Commission (FCC).
   - ✓ Industries such as computer services, telecommunications, publishing, motion picture or broadcasting used to be spread throughout the old SIC. As a result, **there was no consistency in their statistical coverage**, nor in the frequency data collection, data content, or methodology for estimating industry activity.

8. **For the first time ever, the intangible and unique quality of information and cultural products was recognised**. Unlike goods and services, information and cultural products derive their value from their information, educational, cultural, or entertainment content

[3] See "Measuring the Information Sector in Census Bureau Programs" - Thomas E. Zabelsky - U.S. Bureau of the Census - Voorburg meeting, Copenhagen 1997.

and not from their tangible properties[4]. In addition, the unique processes involved in their production and distribution, justified the creation of an Information Sector, **distinct from the goods-producing and service-producing sectors**.

So, one major innovation of NAICS was that creation of an information sector (division 51). But **NAICS also recognised the growth of information technologies with the creation of a new subsector in manufacturing**, covering computer and electronic products and their components (**group 334**). Moreover, the update of classification within that subsector marked a significant improvement in industry description.

The OECD ICT Sector

9. Almost at the same time, the OECD sponsored Working Party on Indicators for Information Society (WPIIS) discussed the creation and definition of an Information and Communication Technology (ICT) Sector. This OECD commitment reflected the long-standing view according which, ICT products and applications are key factors in the development towards Information Society. In September 1998, the OECD adopted that definition of "ICT sector" as the list of ISIC Rev.3 industries that facilitate processing, storage, transmission and display of information by electronic means. A list in terms of NACE Rev.1 was equally adopted.

   Principles used to finalise the list of ICT industries were based on characteristics of main products originating from these industries. In other words, an industry is recognised as an ICT industry if its main output is an ICT product. These guiding principles were outlined as follows.

   For manufacturing industries, the products of a candidate industry must:

   - be intended to fulfil the function of information processing and communication by electronic means, including transmission and display;

   - or use electronic processing to detect, measure, record physical phenomena, or control a physical process.

   Components primarily intended for use in such products are also included.

   For service industries, the products of a candidate industry must be intended to enable the function of information processing and communication by electronic means.

10. So defined, **the ICT sector gathers industries producing electronic instruments or applications, thanks to which information is processed, disseminated or distributed**. It includes:

    - electronic equipment manufacturing (components, instruments, control systems, radio-TV equipment);

    - telecommunications (services and equipment manufacturing);

    - computers (hardware manufacturing, software and services).

    One characteristics of ICT sector is it does not include radio and TV service activities. The reason for exclusion is the output of radio or TV services is not an electronic processing technology. On contrary, radio and television activity mainly consists in the provision, to an audience, of programs (content) transmitted using a telecommunication service (an ICT product).

[4] NAICS Structure - Agreement Number 18 - Part VIII--Proposed New Industry Structure for Information (1995).

11. But the most innovating characteristics of ICT sector is its boundaries have been delineated regardless of the traditional distinction between manufacturing and service activities. If that distinction were to be maintained for ICT, it would only operate between ICT manufacturing and ICT service industries. So, ICT convergence and the OECD definition of the ICT sector, strongly support the case for the introduction of two new special divisions (2-digit level) in ISIC Rev.4; namely, one for ICT manufacturing and one for ICT services. A similar decision should be taken for CPC revision.

12. To achieve this goal, next CPC version will have to isolate ICT product categories that only gather ICT products and the list of these categories will have to cover the largest possible scope of ICT products. In the mean time, next ISIC version will have to define purest possible ICT industries.

The special case of content activities

13. Since 1998 a new question was raised by WPIIS that is: **the definition and delineation of a content sector**[5]. This new interest also reflected a widening perception according which, content activities such as book publishing, press, video and music recording, database publishing, video game publishing, motion picture, radio and television activities now share special, strong and common features that suggests to see them as a close group of activities. It would therefore be justified to gather related industries in one homogeneous category, distinct from the goods-producing and the service-producing sectors.

14. Another point is, like both legs of an individual, **ICT and content economic activities are closely related**: both are key factors for the development of Information Economy and Information Society.

    - ✓ First, **content is an important factor in the ICT industry development**. Since the advent of records, radio and television, it has come clear that content represents the ideal material to be stored, displayed, processed, conveyed and distributed using ICT applications. More than ever, content industries are all intensive ICT users at each phase of their business processes.
    - ✓ Owing to the development of ICT, content now can be delivered in digital form, whether on-line or off-line. ICT applications therefore represent an ideal tool for content industries to diversify their range of products, distribution modes and sources of revenue.
    - ✓ As a result, content industries are to be deeply impacted by the development of ICT. On their turn, content products and their mass distribution also represent a key factor in the development towards a Knowledge-based Economy and Information Society. The reason for is content product deliver messages intended for individuals. As such, they exert a definite influence on minds that is, on what individuals know, think, feel and behave. From this presentation, it is suggested that ICT industries and content industries are both key industries for the development of Information Economy and Information Society.
    - ✓ Further, content industries still are scattered all along the spectrum of each international industrial classification (ISIC and NACE). As a result, **there has been no consistency in their data collection in most of countries up to now**. This is why the statistical coverage of content industries is much below the average, compared to other industries. Let us here remember this particular problem deriving from classifica-

[5] See bibliography reference [2], [3], [4], [5].

tion spread out also was an argument for the U.S. Bureau of Census to adopt the NAICS in 1997.

15. For all those reasons, there is now a strong case for ISIC to have **a special division for content industries**. Similarly, product classifications relating content are grossly out of date; as to content industry classifications, they also need serious improvements.

    Within the 2007 revision exercise of CPC and ISIC, French statisticians interviewed business representatives to collect their opinion and desire relating classifications. Interested professionals confirmed the above expressed views on content.

A new regulatory environment in the EU

16. In the first half of year 2002, the European Union has adopted a new common regulatory framework for telecommunications[6]. This new regulatory framework is expected to accelerate the shift to a Knowledge-based Economy and thus, to liberate a potential for growth, in providing businesses and citizens with an access to a cheap and high quality communications infrastructure, as well as a wide range of services.

17. As a first characteristic, the Framework Directive on Electronic Communications Networks and Services acknowledges ICT convergence and stipulates all transmission networks and transmission services should therefore be covered by a single regulatory framework. So, it extends the notion of telecommunications to that of "electronic communications", i.e. from switched communications to conveyance of signals.

    - ✓ For **networks**, the new regulation refers to **"electronic communications network"** defined as transmission systems and infrastructure which permit the conveyance of signals by electromagnetic means. This means the scope of "electronic communications networks" now covers usual telecommunication networks, the Internet, cable television infrastructure, relay and satellite networks used for radio and television broadcasting[7].
    - ✓ For **services**, the new regulation refers to **"electronic communications services"**, defined as all services which consist, wholly or mainly, in the conveyance of signals on electronic communications networks. This means "electronic communications services" include usual telecommunications services, *electronic mail conveyance services* and transmission services for radio and television.

      But they exclude services providing content transmitted using electronic communications networks and services (content broadcasting, cablecasting, provision of web-based content). Similarly, most of on-line services are not either recognised as "elec-

[6] The European Parliament and the Council have adopted a new common regulatory framework for telecommunications which is commonly referred to as "the Telecommunication Review". Formally, it consists of six directives for "electronic communications networks and services": one "Framework Directive" and five "Specific Directives".

[7] In the Framework Directive for electronic communications networks and services, "electronic communications networks" are defined as "transmission systems and, where applicable, switching or routing equipment and other resources which permit the conveyance of signals by wire, by radio, by optical or by other electromagnetic means, including satellite networks, fixed (circuit and packet-switched, including Internet) and mobile terrestrial networks, electricity cable systems, to the extent that they are used for the purpose of transmitting signals, networks used for radio and television broadcasting, and cable TV networks, irrespective of the type of information conveyed".

tronic communications services", because they do not consist, wholly or mainly, in the conveyance of signals on electronic communications networks[8].

18. As a second characteristic, this Legislative Act also stipulates that it is necessary to separate the regulation of transmission from the regulation of content. The new regulatory framework does not therefore cover the content of services - delivered over electronic communications networks - using electronic communications services such as broadcasting content, financial services and certain information society services. This means European statisticians will have to adapt their economic classifications so as to provide relevant, timely and reliable statistics to policymakers and other interested users.

    In particular, they will have to define an "Electronic Communications Industry" (clearly distinct from Audio-visual Industry) that gathers businesses primarily engaged in the provision of electronic communication services. Businesses providing an on-line service, which does not consist, wholly or mainly, in the conveyance of signals on electronic communications networks, are excluded from this industry. Similar decisions will have to be taken by European statisticians for their product classifications. At once they are lucky, NACE 64.2 and ISIC Rev.3.1 class 6420 already meet those requirements. ISIC Rev.4 will have to remain unchanged on this issue to be acceptable to European statisticians.

The JSIC "Information and Communications" section

19. In 2002, Japan has adopted the 11th revision of the Standard Industrial Classification for Japan (JSIC)[9]. This latest revision represents an important re-structuring of JSIC, which had to be updated, so as to reflect the rapid development of ICT and the diversification of the service sector. During this revision, a special effort was devoted to the establishing of precise classifications and distinct concepts and definitions. In this context, JSIC designers confirmed their view according which, **it is a fundamental principle that the standard classification should be classified by "kinds of goods produced or services rendered"**.

    An other important feature of this revision was the concern to improve comparability of JSIC with international industrial classifications such as the International Standard Industrial Classification of All Economic Activities (ISIC), the General Industrial Classification of Economic Activities within European Communities (NACE) and the North American Industry Classification System (NAICS).

20. After reorganising former "L-Service" and other sections of the classification, four new sections –"H Information and Communications", "M Eating and Drinking Places", "N Health Care and Welfare" and "O Education and Learning Support"- have been added to new JSIC. So, **"Information and Communications" industries now correspond to one specific category at the upper level of the JSIC classification** (1-letter level).

[8] In the Framework Directive for electronic communications networks and services, an "electronic communications service" is defined as any "service normally provided for remuneration which consists wholly or mainly in the conveyance of signals on electronic communications networks, including telecommunications services and transmission services in networks used for broadcasting, but exclude services providing, or exercising editorial control over, content transmitted using electronic communications networks and services; it does not include Information Society services, as defined in Article 1 of Directive 98/34/EC, which do not consist wholly or mainly in the conveyance of signals on electronic communications networks".

[9] See "Japanese Experience in the Revision of the Standard Industrial Classification for Japan" - MATSUO Kazuhiko - Statistical Standards Department, Statistics Bureau, JAPAN - IAOS conference, London 2002.

Section "H" is broken down in 5 divisions (2-digit level) i.e. "37 Communications", "38 Broadcasting", "39 Information services", "40 Internet based services", "41 Video picture, sound information, character information production and distribution".

21. In this breakdown, ICT and content activities are clearly distinguished: three divisions correspond to ICT service industries (37, 39, and 40) and two correspond to content activities (38, 41).
    - ✓ "37 Communications" corresponds to telecommunications and other signal conveyance services, except provision of Internet access services and other Internet-based services.
    - ✓ "38 Broadcasting" corresponds to all radio and television activities whatever electronic communication network is used for their signal transmission.
    - ✓ "39 Information services" corresponds to computer services including consultancy, software and data processing. Like division 72 in NACE Rev. 1.1, it distinguishes customised and packaged software activities.
    - ✓ "40 Internet based services" corresponds to the creation of a new division. It covers services incidental to Internet such as provision of access, application service provider, server housing, and operating web search portals.
    - ✓ "41 Video picture, sound information, character information production and distribution". This category includes motion picture, radio and television programs production and distribution, sound and video recording activities, newspapers and other publishing. For the first time, JSIC acknowledges the value of goods such as newspapers lies in the information content, not in the paper object in which they are distributed. This is why JSIC designers abandoned the traditional arrangement of publishing and recording activities in manufacturing.

22. The JSIC definition of "information and cultural products" only covers large audience products because this definition focuses on mass distribution of information. This is why JSIC "Information and Communication" does not either cover "content and artistic creation" activities; nor does it cover live cultural activities performed in concert halls or theatres.

Cross-cutting issues

23. One central requirement for classifications is to be up to date and they must be engineered so as to be open to unexpected evolutions. However, this does not mean they have to give grounds to wishful thinking coming out of some business plans. Before creating new categories in economic classifications, **statisticians must wait for the market verdict and identify well-established trends**. *In this context, the creation of the NAICS 2002 category "516 Internet Publishing and Broadcasting" might have been a too early decision. Not only the reality of such economic activity in future might be questionable but its importance in terms of business, probably does not justify to arrange this new category at the same classification level as "517 Telecommunications".*

24. ISIC is an **economic** classification. For its coming revision, it is proposed to follow the well established analysis according which, economic activity is all about products and needs they fulfil. While new products appear, new uses and new markets develop. When new markets become sizeable markets, ground is there for business specialisation. This means businesses focussing on one new emerging market gradually develop a specific activity with specific qualifications, i.e. a specific industry with a specific core business.

So, what first matters in business is the market to be supplied. This is why **the determinant factor that brings an industry into being is the market** not production factor combination. Product functionality and service rendered to user still constitute the central issue for a market oriented economy. Once an economy has overcome basic shortages, businesses face more difficulty in selling rather than in producing.

Since products represent the key element in the structuring of industries, it therefore looks preferable to design an industry classification in reference to output produced as the main structuring element, rather than production process. Another indication in favour of this option is: most of business associations generally gather businesses operating on the same market. A practical consideration is: it is not sure there is a detailed production process inventory that could be the backbone of a production process based classification. At least such inventory exists for products.

25. Industry and product classifications are economic classifications, not technical or social classifications. An industry classification that were to be built in reference to production process, as main criterion, would actually rely upon the old fashioned factory business model, not the market oriented business model. In addition, the notion of production process may be clear in manufacturing but it is not the case for service industries. To support this view, let us remark industry classifications generally name service industries after a product (a service), not after a production process.

    Naturally, building an industry classification in reference to market requires **to recognise the core business** activity of each industry identified in the classification. This also leads to consider second line criteria among which production process. For all just developed reasons, it seems still justified to articulate future industry classifications and product classifications.

26. To conclude on this point, it is suggested that the definition of an economic productive activity refers to the notion of **core business** activity. Output produced should be the major structuring element of the next ISIC revision. Its aggregating element should be economic closeness. Moreover, some effort should be devoted in the definition and description of major industry core business (agriculture, extraction, energy, manufacturing, construction, trade, information and communication, transport, business services, finance ...).

    In other words, each section of ISIC Rev.4 should be explicitly and carefully defined rather than implicitly. Regrettably, criteria that have been used to define sections in past revisions of ISIC and CPC generally remained implicit. **For the 2007 ISIC revision, there is a need to identify guidelines and explicit criteria along which to define and file service industries**.

IV. A general framework

27. The challenge for statisticians is to derive appropriate indicators on Information Society that are reliable, easy to read, timely, relevant and useful to policymakers or any other interested user. For their part, ISIC and CPC can contribute to this aim in providing a basic international framework for the establishment of indicators on the supply chain of the Information Economy. Above description shows statisticians now have sufficient material to take up the challenge to design industry and product classifications that contribute to appropriate measurement of information economy developments.

    But they also have more experience with the burst of the Internet financial bubble, the start-ups collapse and the debt debacle in telecommunication industry. From this latter, they can probably better scrutinise recent ICT development and separate real trends from glamorous illusions.

28. Naturally, information, information economy, ICT and content as well as related products and activities will have to be updated and rigorously defined so as to provide solid background for the 2007 revisions of CPC and ISIC.

29. For this purpose, it may be useful to draw **the following parallel between information and energy**.

    - On the demand side, energy is a commodity of universal use. This means it is used in about every human activity (production, distribution, consumption and non-economic activities).

    - On the supply side, energy (and related specific technologies) is the focus of a clearly identified group of specialised industries.

    For these reasons, energy gradually emerged as the topic of an economic speciality named as Energy Economy. So is information. In this way it is possible to mention Information Economy as the new economic speciality, the subject of which is information. On the supply side, an information economy industry can be defined as an industry the focus of which is information and related specific technologies.

30. The proposed underlying conceptual framework in this paper is that of **the information economy sector.** Technical inventions and mass diffusion of new products and technologies constitute one most powerful factor of the overall economic and social transformation. Bearing in mind the development of information society would be fuelled by the supply of new ICT and content products, economic activities focussing on these products look more and more of special interest to policymakers and statisticians in charge of developing indicators on Information Society, including classification designers.

    In line with that traditional approach, it is therefore suggested to consider:

    - the scope of "Information Economy" corresponds to that of ICT products and content products;

    - or else, **the "information Economy" industry base corresponds to the addition of ICT and content sectors.**

31. This leads to describe the "Information Economy" supply side along the following framework:

    ICT industries + Content industries = Information Economy industries;

    ICT manufacturing industries + ICT services industries = ICT sector;

    ICT manufacturing + ICT services + Content industries = Information Economy industries or Information Economy Sector.

    In this general framework, the NAICS "Information sector" and JSIC "Information and Communications" section are about equal to ICT services + Content industries.

V. A review of unquestioned concepts

Different forms of information

32. The first difficulty while defining information economy concepts is the many meanings given to the word "information". Despite its permanent use, its meaning varies according to user and situation. Therefore the word "information" still raises an issue, since it is a very ambiguous and misleading word to use. From the many expressions using this word we could identify four basic (but not totally exclusive) meanings given to it that are:
    - ✓ an electronic signal (technical meaning);
    - ✓ a non electronic signal (colour of a traffic-light, road sign, address numbers);
    - ✓ data (a crude form of information);
    - ✓ message intended for human being (text, spoken words, music, image).

The convergence concept

33. Convergence arises from the widening adoption of digital techniques by electronic industries during the 1980's. While transforming any electronic information into standardised packets of binary signals, digital techniques brought possibility to process sounds, images, texts and computer software by use of the same electronic means. With the adoption of digital techniques, it was then possible to build wide bridges between different electronic applications that were previously isolated from one another.

34. **The ICT product concept.** In this new context, all electronic applications could then be seen as different products of one unifying technology i.e. "Information and Communication Technology". This is how, the ever widening use of digital techniques triggered a powerful momentum, leading to some technical convergence of industries such as computer (hardware and software), telecommunications (equipment and services), radio-TV equipment. In this kind of convergence those industries intensified their technology crossings and their mutual supplier to customer relationships. Notably, this technical convergence deeply impacted product design of these industries.

    The ICT sector concept. So, to understand the very notion of ICT, convergence is the word. Whereas different electronic products and activities had separated fates, the growing adoption of digital technology reversed the trend. Once this new evolution became visible, it then gave ground to a new perception according which, industries primarily engaged in the production of ICT products now represent a rather homogeneous group of close industries.

35. But convergence is not the word for every development in information economy. Regrettably, convergence is often seen where it doesn't occur. To support this view, let us remark ICT convergence is a technical convergence, which primarily impacts product design in a very limited number of industries. In addition, such a technical convergence doesn't mechanically imply market convergence for products that have been produced using converging technologies; nor does it imply merger of businesses using that common technology. **So, while convergence of computing and telecommunication activities is not questionable, convergence of those with content activities has not**

been observed yet. Producing, publishing and distributing television programs is not the same profession as producing and selling telephony services.

36. Up to now, "*the Internet has been widely predicted to produce digital convergence, in which computing, telecommunications, and broadcasting would all merge into a single stream of discrete bits carried on the same ubiquitous network*"[10]. Some even viewed the Internet had become a mass medium used mostly by relatively passive consumers, and as such major content providers would dominate it. In other words, the Internet would be the next step in the evolution of mass media. Many industry leaders appeared to base their strategies on this thesis.

    - ✓ For example, *at Global Crossing, its CEO, Leo Hindery, was attempting to turn this global Internet-based network into a mature content distributor. ...* "I don't want to be anyone's dumb pipes," *says Hindery.* "If all you do is racks and servers, that's dumb. What we're doing is melding the network and the content."
    - ✓ *Juan Villalonga, former chairman of the dominant Spanish communications carrier Telefónica, based his strategy on the belief that* "[t]he key ... is content. Without it, ... phone companies risk becoming simple commodity pipelines"[11].

    To some extent, such convergence-based business strategies would suggest oil companies to buy automobile manufacturers and road builders to increase their sales of petrol or gas.

37. Actually, recent events rather indicate the merger of broadcasting and telecommunications activities is less and less on the agenda. In 2002, AT&T a dominant actor in telecommunications sold its cable television subsidiary "AT&T Broadband" to "Comcast" a major actor in cable television. And yet, AT&T Broadband was the merger of two cable television companies purchased by AT&T in 1999. France Telecom tries to sell its cable television subsidiary. Deutsche Telecom also wishes to sell its cable television networks; Liberty Media (a major communication group) was interested but refused to buy them because, such a purchase was subject to the condition Liberty Media would invest in the development of telephone services using cable. The AOL take over Time Warner did not produce the expected convergence momentum whereas the value of its shares was about divided by two ever since. Meanwhile, dominant telecommunications actors did not invest in broadcasting and broadcasters did not invest in telephone.

VI. Defining ICT products and ICT sector

The core ICT sector

38. From discussions that have occurred since 1998[12], it is now clear the intrinsic nature of an ICT product is that of an electronic **tool** with which it is possible to handle a special kind of material**,** information. The handling generally consists in the display, storage, processing, transmission, distribution or dissemination of information by electronic means. This tool may be:

    - ✓ an electronic equipment such as a computer, peripherals, telephone, a transmitter or any other electronic device of a telecommunications network, a radio or television receiver, a tape, an unrecorded CD or DVD, a microprocessor ...);

[10] Quoted from the article "Content is not King" mentioned in bibliography.
[11] *Ibid.*
[12] Detailed discussions on definitions related to ICT product, ICT industries, ICT sector have been presented in previous papers, see bibliography reference [5], [9], [12], [14].

- ✓ a service such as any telecommunication service, data processing service, hardware or software consultancy service ...
- ✓ an intangible product such as software, whether customised or pre-packaged.

Content products available in electronic or digital form (on tapes, CD, DVD or the Internet) are not recognised as ICT products. The difference in nature between a **tool** and the **material handled with the tool** explains this exclusion. A content product in digital form is not an electronic tool but a content that has been subject to electronic handling.

For example a television program is not an electronic instrument but a content which is electronically recorded, transmitted and displayed using ICT instruments (recorders, transmitters, repeaters, and TV sets). Similarly, the on-line version of a newspaper is not an electronic instrument, but news (information) stored in a computer hard disk and transmitted by telecommunication channels (handled using ICT instruments).

39. For ICT product definition, several alternative but non exclusive wordings can be proposed as follows:

    1 - An ICT product is an instrument that facilitates processing, storage, transmission and display of information by electronic means.

    2 - An ICT product is a tool that permits the electronic handling of information.

    3 - An ICT product is an instrument or application that enables the user to make use of electricity as an information vector.

    4 - An ICT product is an electronic instrument or application, thanks to which information can be processed, disseminated or distributed.

40. Now, it is also clear the intrinsic nature of an ICT industry is that of a technology producing industry. More precisely, the main characteristics of an ICT industry is to be **ICT producing**, that is to be **an industry producing electronic instruments or applications intended for the handling of information**. From above possible definitions of an ICT product, alternative definition wording of an ICT industry can be derived as follows.

    1 - An ICT industry is any ICT producing industry.

    2 - An ICT industry is an industry that gathers businesses primarily engaged in the production of ICT products.

    3 - An ICT industry is an industry that gathers businesses primarily engaged in the production or the wholesale of ICT products.

41. Similarly a review of the ICT sector definition could lead to following possible wordings.

    1 - The ICT sector is the group of ICT industries.

    2 - The ICT sector is the group of industries that are primarily engaged in the production or the wholesale of ICT products, excluding retail trade of ICT products.

Borderline cases

42. Despite the above definitions, and 20 years of discussion on computer and telecommunications development in different OECD working groups, international experts still do not have an exact idea of what is, or what is not, an ICT product. Consequently, there is no common perception of the ICT sector boundaries.

    In some cases it is not clear whether an industry mainly is an **ICT producing** industry or an **ICT using** industry. So are industries such as manufacture of watches, thermometers,

insulated wire and cable, cash register, car park meters, photocopiers, electronic scales, digital cameras.

43. For manufacturing, this raises the issue of industries producing electro-diagnostic apparatus, precision instruments, watches and clocks, avionics equipment and guiding systems, control and command systems. Are these industries genuine ICT industries? Is it justified to consider ICT products include equipment and devices using electronic processing to detect, measure, record physical phenomena, or control a physical process?

    ✓ On the **exclusion** side, it is not clear whether *instrument and control systems industries* converge with computer and telecommunications industries. If there is no doubt these industries are massive microprocessor users and absorb computer and telecommunications technologies, there is not much evidence of the reverse flow. For example, avionics equipment and guiding systems are electronic applications that do not provide much technology to computer hardware and software applications. Digital body thermometers and scales used in households are not designed to be connected to telephone networks or the Internet. Detection, measuring and testing instruments are not devices that are integrated in computer or telecommunications equipment.

    It is not either evident *electronic medical equipment and devices* contribute to ICT convergence; images and data they release are not directly interpretable messages. If control systems process data, they generally are not intended for communicating information, but for command actions. Most of products of these industries are used for very specific professional purposes and they are not subject to mass distribution. On the whole it does not seem electronic detection and measuring instruments communicate interactively with other ICT applications.

    ✓ On the **inclusion** side, data is one form of information whereas, electronically enabled instruments and control systems are data processing equipment (including display and recording). In addition, devices such as watches, clocks, meters that used to be mechanically enabled, more and more frequently use electronic processing. In particular, digital clocks are key components of telecommunications networks and computers.

44. On the whole, this article proposes to confirm the choice to understand the ICT product definition so as to include electronic equipment the functionality of which is to detect, measure, record physical phenomena, or control a physical process. However, it is not ICT convergence which has supported this choice. As a result, NAICS category "334 Computer and Electronic Product Manufacturing" nearly coincides with the hereby proposed definition of an ICT manufacturing division. The only objection is to include "334612 Pre-recorded Compact Disc (except Software), Tape, and Record Reproducing" industry in ICT sector definition.

Proposed classification for ICT industries

45. With the future classification revision in mind, the following list is a first attempt to update and organise the list of ICT industries.

DIVISION XX ICT MANUFACTURING

XXX Manufacture of Computer and Peripheral Equipment, excluding Office Machinery not Using Electronic Processing

XXX Manufacture of Semiconductor and Other Electronic Components

XXX Manufacture of Communications Equipment and Apparatus, including Television and Radio Transmitters, Apparatus for Line and Wireless Telephony, Line Telegraphy

XXX Manufacture of Audio and Video Equipment, including Television and Radio Receivers, Sound or Video Recording or Reproducing Apparatus, Manufacturing of Magnetic and Optical Recording Media

XXX Manufacture of Precision, Navigational, Medical Instruments and Control Systems
XXXX Manufacture of Electromedical and Electrotherapeutic Apparatus
XXXX Manufacture of Watches and Clocks
XXXX Manufacture of Electronic Instruments for Measuring, Detecting, Checking, Testing, Navigating, Guiding and Other Purposes, including all Types of Electronic Meters, excluding Industrial Process Control Equipment
XXXX Manufacture of Industrial Process Control Equipment

DIVISION XX ICT SERVICE

XXX Telecommunications
XXXX Telephony Services
XXXX Internet Access and Services Incidental to Internet
XXXX Other Telecommunication Services

XXX Computer Services
XXXX Hardware Consultancy
XXXX Customised Software Provision and Software Consultancy
XXXX Pre-packaged Software Publishing, excluding Database Publishing, Video Game Publishing and Software in Connection with Other Publishing
XXXX Data Processing Services
XXXX Other Computer Services, including Maintenance and Repair of Office, Accounting and Computing Machinery

VII. Defining content products and content sector

Content and content product[13]

46. Intrinsically, content corresponds to messages such as texts, sounds (music), images (fixed or animated) or any combination or series of these. It can formally be defined as follows.

    Content is an organised message intended for mass dissemination to human beings.

[13] Detailed discussions on definitions related to content and content products can be found in previous papers, see bibliography reference [5], [9] or [12].

For example, content may be the text of a novel or a speech, the image of a photograph or a painting, music, information stored in a database, a movie, a lesson in mathematics, text and images of a weather forecast web site, video game rules, sounds and images.

So, content is a special kind of message i.e. one form of information. To be memorised and non perishable, content however must be stored on a physical medium such as paper, CD-ROM, magnetic tape, computer hard disk, plastic film, canvas... In other words, content is an abstract notion, to become a tangible product, it must be combined with a medium.

47. A "content product" corresponds to a product that delivers content, whether traditionally or electronically. It may be a printed book or magazine, a film shown in a cinema or available on a video tape or DVD, an album on CD, an encyclopaedia on CD or on-line, a tutorial on CD or on-line, a play on television, a radio program, a newspaper copy or its electronic version, an on-line weather forecast information service, a video game on CD or on-line, a music or film download service, an open to public and on-line database service... It can be formally defined as follows:

    A content product is an open to public content combined with a mass communication medium. It is intended for publishing and (mass) distribution to public.

    Actually, this compact definition reflects a "content product" must meet six nested criteria to be qualified as such.

    - ✓ It is an organised message intended for human beings.
    - ✓ Its content must be combined with a communication medium.
    - ✓ It results from an organised production activity.
    - ✓ Its diffusion is not restricted to a limited list of privileged recipients.
    - ✓ Its content is a standardised message disseminated by means of a communication medium.
    - ✓ A content product must be published.

    (Mass) communication medium may be a physical book, a magazine, a record, a plastic film, an audio/video cassette, a cinema screen, a magnetic or compact disk, an Internet web site. Their functionality is to deliver content and achieve mass distribution.

The specificity of content products

48. The specificity of content products is their value to final user does not lie in their tangible qualities but in their information, educational, cultural or entertainment content. For example, unlike other goods, the core value of a newspaper copy does not derive from its physical qualities but from its content. This means **the central characteristics of such a content product is its "content format"**, whereas medium on which content is available is a peripheral characteristics. So to say, medium represents content packaging.

49. This is why it is not justified to recognise all services available over the Internet as "telecommunications services". The reason for is services available over the Internet medium have totally different functionalities.

    For example, an on-line version of a newspaper, a music download web site, an on-line travel agency, a virtual market place, on-line video game services, chats or e-mail services meet completely different needs. Hence they are services of totally different nature and **there is no reason to group producers of such services in one telecommunication industry, should it be named "Internet services"**.

For similar reasons, **computer software, an encyclopaedia, a tutorial, a video game or a music album on CD are products of different natures. Their similar physical features are not sufficient to justify the opposite**. In one case, the digital disk is used to store a software (an ICT product), in other cases, the digital disk is used to store content.

Symmetrically, a television program available on cable, satellite or traditional medium still is a television program. A radio program available on the Internet still is a radio program. More precisely, content industry professionals would say it is the same radio or television format which is disseminated whatever its delivery mode.

50. "Electronic content" or “digital content" are misleading expressions to use. "**Content in digital form**" looks as a better expression to use when referring to content products that are electronically delivered. In such products, what is electronic is not their content but their delivery mode.

Content industries and content sector[14]

51. From discussions that have occurred since 1998, a content industry can be defined as an industry primarily engaged in **the publishing and/or the electronic distribution** of content products.

    According to the industry under consideration, making a content product available to public is a process which may be referred to as publishing (books, newspaper), distribution (music CD), production (movies and pre-recorded television programs) or dissemination (program broadcast).

52. Then the content sector can be defined as “the group of ISIC industries primarily engaged in **the publishing and/or the electronic distribution** of content products.”

    This economic definition implies that the "electronic/non electronic" or "digital/non digital" form is not a main characteristics of the content product, but only a characteristics of its delivery mode.

53. With the future classification revision in mind, the following list is a first attempt to update and reorganise the list of content industries.

DIVISION XX CONTENT

XXX Publishing Industries
XXXX Newspaper Publishers (including newspaper on line publishing)
XXXX Periodical Publishers (including on line publishing)
XXXX Book Publishers (including on line publishing)
XXXX Other Publishers (including the corresponding on line publishing)

XXX Video Games Production (including animated pictures production)

XXX Motion Picture and Video Industries
XXXX Motion Picture and Video Production

[14] Detailed discussions on definitions related to content industries and content sector can be found in previous papers, see bibliography reference [5], [10] or [12].

XXXX Motion Picture and Video Distribution
XXXX Supporting industries
XXXX Motion Picture and Video Exhibition

XXX Sound Recording Industries and Radio Services
XXXX Record Production
XXXX Music Publishers (including on line publishing)
XXXX Sound Recording Studios
XXXX Radio Broadcasting
XXXX On line Music Providing

XXX Broadcasting and Distribution of audio-visual services
XXXX Television Broadcasting
XXXX Channel publishing
XXXX Distribution of audio-visual services (scheduled and on demand services)

XXX Information services
XXXX On line Information Providing
XXXX News Agencies

XXX Supporting industries
XXXX Printing
XXXX Reproduction of Recorded Media
XXXX Photo Laboratories

New industry, new products and new delivery modes

54. Among the seven proposed sub-sectors, only one, video game production, provides contents of a new kind, often called "interactive" or "multimedia" content. All others are mainly concerned by the impact of ICT on their processes. As far as content is concerned, the most important impact is the possibility to diversify the range of content products in combining content with various electronic communication media. For example, an encyclopaedia publisher now can offer a paper version, a CD version or an on-line version of its encyclopaedia-formatted content.

55. New content products have been systematically filed according to the type of content (content format) delivered and not according to the type of delivery medium or infrastructure. Here is a fundamental issue: whatever is its delivery mode (electronic or not, digitalized or not, on line or not), a newspaper remains a newspaper, a magazine remains a magazine... Similarly, a radio station or a TV channel either broadcast on satellite, cable relays or delivered on line remains a radio or a TV service. This reflects the specificity of content products, which mainly derive their value from their content format, not from the physical properties of their communication medium or delivery mode.

56. At present, many new content product markets are far from having reached the critical size for justifying the creation of a corresponding industry. For example, on-line publishing of newspapers still is in connection with the traditional publishing of newspapers. The CD or on-line publishing of encyclopaedia only is a diversification in encyclopaedia publishers' activity, if printed encyclopaedia become marginal, this will only correspond to an alteration of products offered by the traditional publisher. In terms of revision, the consequence is that it is sufficient to update explanatory notes for the industrial classification and update product classification.

Information Economy Sector, NAICS and JSIC

57. As NAICS Information Sector, the proposed definition of a content sector acknowledges there is a special category of products that mainly derive their *value from their information, educational, cultural or entertainment* ***content***, not from their *tangible qualities.*

58. Though motivations and arguments developed by information sector authors are very similar to the rationale stated in favour of the creation of a content sector, the definitions in terms of industry list are quite different.

    So, the main sub-sector within NAICS division 51 is telecommunications, which is primarily engaged in the provision of switched duplex services. The commercial value of telecommunication services to user lies in their connection provisions not in conveyed content.

    With regard to the WPIIS content/medium approach, telecommunication infrastructure and services actually correspond to electronic communication medium, not to content: this is why telecommunication industry has been included in ICT sector and not in content sector.

59. Though bridges can be built between these two approaches at the highest aggregated level, some real issues are raised at lower levels:

    - ✓ NAICS arranges software publishing next to other publishing within subsector 511. Thus it considers pre-packaged software publishing is closer to printed newspaper publishing than to customised software and data processing activities.
    - ✓ Video games and CD-ROM encyclopaedia are still identified by NAICS as software (ICT services), whereas the proposed content approach suggests these are interactive content products.
    - ✓ NAICS 2002 revision considers cable TV distributor primarily engaged in the distribution of telecommunication services (ICT services). This is why the related activity is coded 5175 as a component of subsector "517 Telecommunications". The content approach would rather consider cable TV distributors are television programs (content) providers or resellers. This would therefore justify to classify the corresponding activity in "515 Broadcasting", next to "5152 Cable and Other Subscription Programming".
    - ✓ Is any database producer a content publisher?

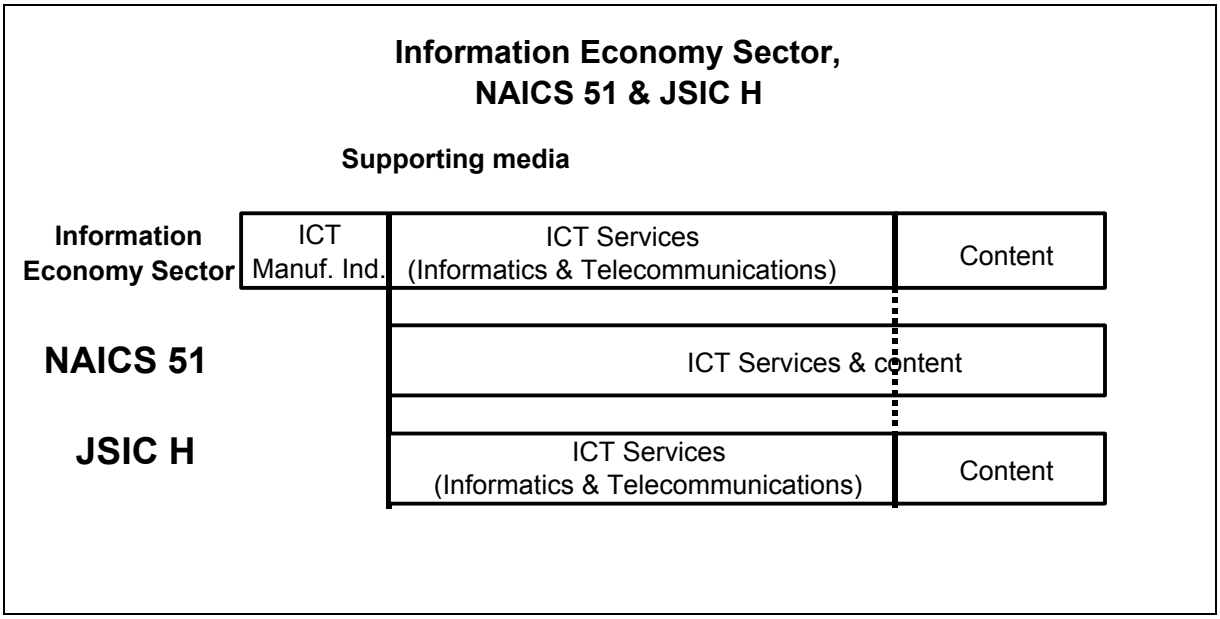
    More generally, NAICS 51 division arranges activities in reference to communication medium or infrastructure (tangible qualities of products) whereas the output of NAICS 51 industries mainly consist of intangibles or services that can be provided using any infrastructure.

60. Unlike in NAICS 51 division, **the breakdown of "H" section in groups and industries is primarily arranged in reference to service rendered to final user**, rather than infrastructure or business process. In addition JSIC introduced innovations that also mark other differences with NAICS.

    - ✓ In NAICS, customised software services are classified in "54 Professional, Scientific, and Technical service", whereas packaged software publishing is in "51 Information". JSIC, as ISIC and NACE, considers both activities are close to each other and ICT convergence calls for the classification of customised software with ICT services, i.e. in "Information and Communications" category.

- ✓ JSIC considers radio and television broadcasting by means of cable network transmissions are broadcasting activities, not telecommunications. Therefore cable and other program distribution is classified by JSIC in broadcasting under group heading "Cablecasting".
- ✓ In JSIC, recording and disk production industry is classified next to radio program production industry under group heading "Sound Information Production". This decision makes sense because music and radio industries are economically close to each other. Music industry is the most important content provider to radio broadcasters. Symmetrically, radio broadcasting is the most important distributor of music in terms of volume and therefore the most important prescriber. Radio and recording studios have similar settings, different from those of cinema or television industries. The economy of radio has very few links with the economy of television, cinema and video. On contrary, NAICS classifies Motion Picture industries and Sound Recording industries under the same group heading "Motion Picture and Sound Recording Industries".

61. Nevertheless, the chart below shows matching possibilities since content services and ICT services add up to the NAICS information sector and, roughly speaking, the newly created "H Information and Communications" JSIC category can be matched with teh proposed ICT and content services divisions.



Conclusion

62. ISIC and CPC are to be revised. Now, these classifications must integrate industry transformation resulting form the ICT development, as well as that of the shift of an industrial-based economy to a service-driven economy. For more than ten years, statisticians and economic classification designers have benefited from gradually improving suggestions and innovations:

    - 1987 British proposal to create an information sector;

    - 1997 NAICS creation of division "51 information";

- articulation of the European product classification on NACE;

- the 2002 EU common regulatory framework on electronic communications networks and services;

- 2002 JSIC creation of an "H information and communications" section.

63. To achieve this aim, ICT convergence is the first transformation that has to be taken into consideration. This means ICT convergence justifies the gathering of ICT industries in two specific categories at the 2-digit level of international classifications i.e. one ICT manufacturing division and one ICT service division.

64. Inseparably of these creations, the revision should also adopt the creation of a content division distinct from the goods-producing and service-producing sectors.

65. As already done for agriculture, manufacturing, construction or trade, the 2007 revision of ISIC and CPC should design a new section gathering the three created divisions. This new section would then cover the scope of ICT manufacturing + ICT services + content activities, described as the scope of information oriented activities or the scope of Information Economy. That scope would about equalise the scope of NAICS 334 + NAICS 51 categories.

A N N E X

X - Information Economy Sector

XX ICT Manufacturing

XXX Manufacture of Computer and Peripheral Equipment, excluding Office Machinery not using Electronic Processing

XXX Manufacture of Semiconductor and Other Electronic Components

XXX Manufacture of Communications Equipment and Apparatus, including Television and Radio Transmitters, Apparatus for Line and Wireless Telephony, Line Telegraphy

XXX Manufacture of Audio and Video Equipment, including Television and Radio Receivers, Sound or Video Recording or Reproducing Apparatus, Manufacturing of Magnetic and Optical Recording Media

XXX Manufacture of Precision, Navigational, Medical Instruments and Control Systems
XXXX Manufacture of Electromedical and Electrotherapeutic Apparatus
XXXX Manufacture of Watches and Clocks
XXXX Manufacture of Electronic Instruments for Measuring, Detecting, Checking, Testing, Navigating, Guiding and Other Purposes, including all Types of Electronic Meters, excluding: Industrial Process Control Equipment
XXXX Manufacture of Industrial Process Control Equipment

XX ICT Services

XXX Telecommunications
XXXX Telephony Services
XXXX Internet Access and Services Incidental to Internet
XXXX Other Telecommunication Services

XXX Computer Services
XXXX Hardware Consultancy
XXXX Customised Software Provision and Software Consultancy
XXXX Pre-packaged Software Publishing, excluding Database Publishing, Video Game Publishing and Software in Connection with Other Publishing
XXXX Data Processing Services
XXXX Other Computer Services, including Maintenance and Repair of Office, Accounting and Computing Machinery

XX Content

XXX Publishing Industries
XXXX Newspaper Publishers (including Newspaper On-line Publishing)
XXXX Periodical Publishers (including On-line Publishing)
XXXX Book Publishers (including On-line Publishing)
XXXX Other Publishers (including the Corresponding On-line Publishing)

XXX Video Games Production (including Animated Pictures Production)

XXX Motion Picture and Video Industries
XXXX Motion Picture and Video Production
XXXX Motion Picture and Video Distribution
XXXX Supporting Industries
XXXX Motion Picture and Video Exhibition

XXX Sound Recording Industries and Radio Services
XXXX Record Production
XXXX Music Publishers (including on-line Publishing)
XXXX Sound Recording Studios
XXXX Radio Broadcasting
XXXX On line Music Providing

XXX Broadcasting and Distribution of Audio-visual Services
XXXX Television Broadcasting
XXXX Channel Publishing
XXXX Distribution of Audio-visual Services (scheduled and on demand services)

XXX Information Services
XXXX On-line Information Providing
XXXX News Agencies

XXX Supporting Industries
XXXX Printing
XXXX Reproduction of Recorded Media
XXXX Photo Laboratories

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