

Globelics Academy

Lisbon, 25th May – 3rd June

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Title: The construction of “Knowledge and Information Societies” in the context of the process of structural change in modern societies

Introduction

This paper is based on work in progress for a PhD thesis, aimed at examining the setting up of “Knowledge and Information Societies” as a political process for managing structural change in contemporary societies. This process occurs in response to the rise of a new mode of development sustained by the emergence of a new technological paradigm centred on the intensive use of information and communication technologies.

The paper is structured in three distinct, though intertwined, sections: theoretical frame; fundamental dimensions for structuring “knowledge and information societies” and their assessment by international statistical indicators; future work.

Theoretical and bibliographical frame

The first stage in studying the issue of “knowledge and information societies” has consisted of an examination of relevant scientific literature.

An effort of conceptual archaeology has led us to the conclusion that the turn of phrase “knowledge and information society” emerged from the theoretical constructs of Daniel Bell (1973, 1979), Fritz Machlup (1962) and Marc Porat (1977). D. Bell considers that the post-industrialist path of contemporary societies is characterized by the reorganization of the relative weight of each branch of economic activity and the occupational structure, demonstrating that the services-producing sector would prevail, both in terms of the contribution to product growth and in terms of the number of workers. He sustained his argument also on the increase of technical and scientific employment, taken as empirical evidence of the centrality ascribed to theoretical knowledge (see Bell, 1973). Machlup and later Porat developed one other line of research, namely the conceptual and operational definitions of “information” and “knowledge”, aiming to determine the size and impact of its production and distribution in the American economy (based on the analysis of secondary statistical sources).

The issue of structural change in contemporary societies and, specifically, the central role played by information and knowledge finds one other interpreter in the nineties, Manuel Castells (2000). Two of his main concerns are the revolution of information technologies and the global restructuring of capitalism, which together will promote the emergence of a new mode of development in western economies: the informational mode of development (Castells, 2000). The transition from the industrial mode of development to the informational mode of development arises from the centrality of information and knowledge as primordial sources of productivity, not just as inputs in the production process (like in former modes of production) but as raw material, technology and final product. The difference between modes of development deepens with regard to the final objective that guides its implementation. Whereas industrialism pursued economical growth through product maximization, informationalism is oriented towards technological development, that is to say, to the accumulation of knowledge and to higher levels of complexity in information processing (Castells, 2000).

Shumpeter-inspired economics has brought one of the most interesting analyses of this issue, in the field between political economics and economic history, by authors such as Christopher Freeman (1984, 1988, 2001), Luc Soete (1987), Carlota Perez (1988, 2002) and Francisco Louçã (2001). Based on the work developed by Shumpeter and Kondratieff concerning the long waves of economic development in the capitalist system and, particularly, the crucial role played by innovation and technological change in the process of “creative destruction” (Schumpeter, 1943), causing its perpetual renovation and instability, these authors have dedicated the past decades to researching the fundamental elements and processes of the periods of structural change in western economies and societies. In the transition to the fifth long wave of economic growth, the “key factor” (Perez, 1988) is low-cost microelectronics, whose high point was the development of the first microprocessor in 1971, by Intel. The emerging organizational form is structured from a network topology in the frame of the business company (Freeman and Perez, 1988; Perez, 2002; Castells, 2000), in the cooperation-competition interaction with other companies and in the articulation with the global market. In this system, companies are smaller in size and horizontal articulation, following the principles of flexible specialization (Piore and Sabel, 1984), overrides vertical integration (where all stages of production, from conception and design to distribution, are performed by functional units belonging to just one company).

Technological change and institutional and social structure

According to this theoretical model, the process of organizational change of production, promoted by the transition from one cycle of economical development to the next, goes beyond the strict field of economics to encompass other fundamental dimensions of social life. The long waves of economic development only mature into sustainable growth cycles, extensible to the populations, in cases of a “good match” (Freeman and Perez, 1988) between a techno-economic paradigm and a suitable social and institutional frame. In view of the current emergence process of the fifth long wave of economic growth and the new techno-economic paradigm centred on the intensive use of information and communication technologies and network topology as the production organizational form, the main problem is which structural adjustment in the social and institutional dimensions will occur, in order to uphold effects similar to the ones identified in the fourth Kondratieff wave.

We believe that contemporary western societies are currently experiencing the structural adjustment phase, prior to the full multidimensional conformity necessary to the expansion of the fifth long wave of economic development. Aware of the current economical restructuring process, western governments and supra-national agencies dealing with economic coordination (namely the European Union, the Organization for Economic Cooperation and Development and the G7) have initiated articulation procedures, in order to promote and accommodate (concerning the regulation and social and institutional adjustment) the new mode of development and fulfil the expectations of product growth associated with it. The political structuring of this process of change is based on the construction of “knowledge and information societies”, through the design of government Action Plans, which guide public policies in most, if not all, world governments. Despite the global nature of this process, the current analysis has only dealt with the most recent action plans conceived by the United States, by the European Union (pre-enlargement, that is to say, the 15 member-states already integrated before May 2004) and by each member-state individually considered and, finally, by Japan¹.

This array of Action Plans for the Knowledge and Information Societies constitutes a considerable mass of information, with some internal diversity, in which the

¹ See documentary sources, in appendix.

nature of information depends mostly on the kind of institutional structure that has produced it.

The analysis of these Plans has made possible the identification of the structural dimensions of the “knowledge and information societies”, which comprise the fundamental sector areas of Government intervention in the process of setting up “knowledge and information societies”:

- to guarantee a *plural technological infra-structure*, adequate and extendable to the whole territory, and at the same time, to encourage the *acquisition of ICT* by the population;
- to foster *technological literacy* among the citizens, aiming to form an enlarged consumer market and to increase the use of services rendered through electronic means, as well as to train skilled workers;
- to promote the *integration of businesses in the digital economy*, based on innovation, information and knowledge, structured around the intensive use of information and communication technologies;
- to put into practice a *public administration reform*, promoting de-bureaucratisation, speeding up administrative procedures, reducing costs and inefficiency and endorsing a closer relationship with the citizens;
- to perform, digitally, *sovereignty functions*, by safeguarding and disseminating national heritage and culture through electronic networks, at the same time sponsoring an increase in size and influence in the economy of digital flows of information.

Next, a statistical illustration of these dimensions of the structural adjustment process in the construction of “knowledge and information societies” will be provided. However, due to the time constraints imposed by the presentation format, only one fundamental indicator for each dimension will be presented and the analysis will only cover European countries.

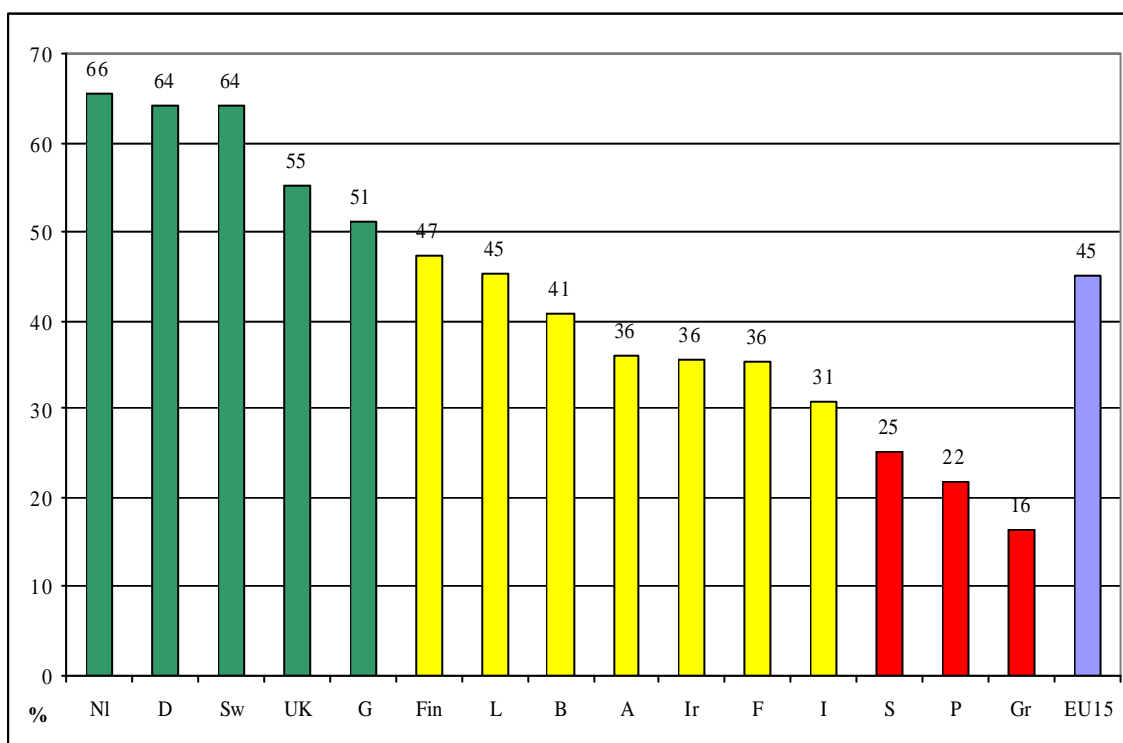
Broad adoption of Internet in households

The indicator selected to illustrate this specific dimension of the process of setting up “knowledge and information societies” could not fail to be the percent of households connected to the Internet in European countries. Nonetheless, it must be acknowledged that this statistical information differs in terms of reliability and

recentness. Data concerning the Netherlands, Sweden, Belgium and France comes from the Flash Eurobarometer 125 (June 2002), whereas in the other countries the information derives from the harmonized survey of ICT use in Households and Individuals, conducted by Eurostat. The later is by far more accurate in terms of sampling and methodological criteria.

As shown in Figure 1, European countries can be divided into three levels of massive adoption: on the first level, in Denmark, Sweden, the UK and Germany the majority of households are already connected to the Internet; on an intermediate level, there is more diversity, since it encompasses countries where between close to the majority and just one third of households have Internet connection; Spain, Portugal and Greece are clearly falling behind in the process of promoting mass use of Internet by families.

Figure 1 - Percentage of households who have Internet access at home (2003)



Year of data 2002: Sweden, Belgium, France and Netherlands

Sources: Eurostat, Structural Indicators (Innovation and Research), Community Survey on ICT Usage in Households and by Individuals, 2003 and European Commission, DG Information Society, FlashEurobarometer 125, June 2002

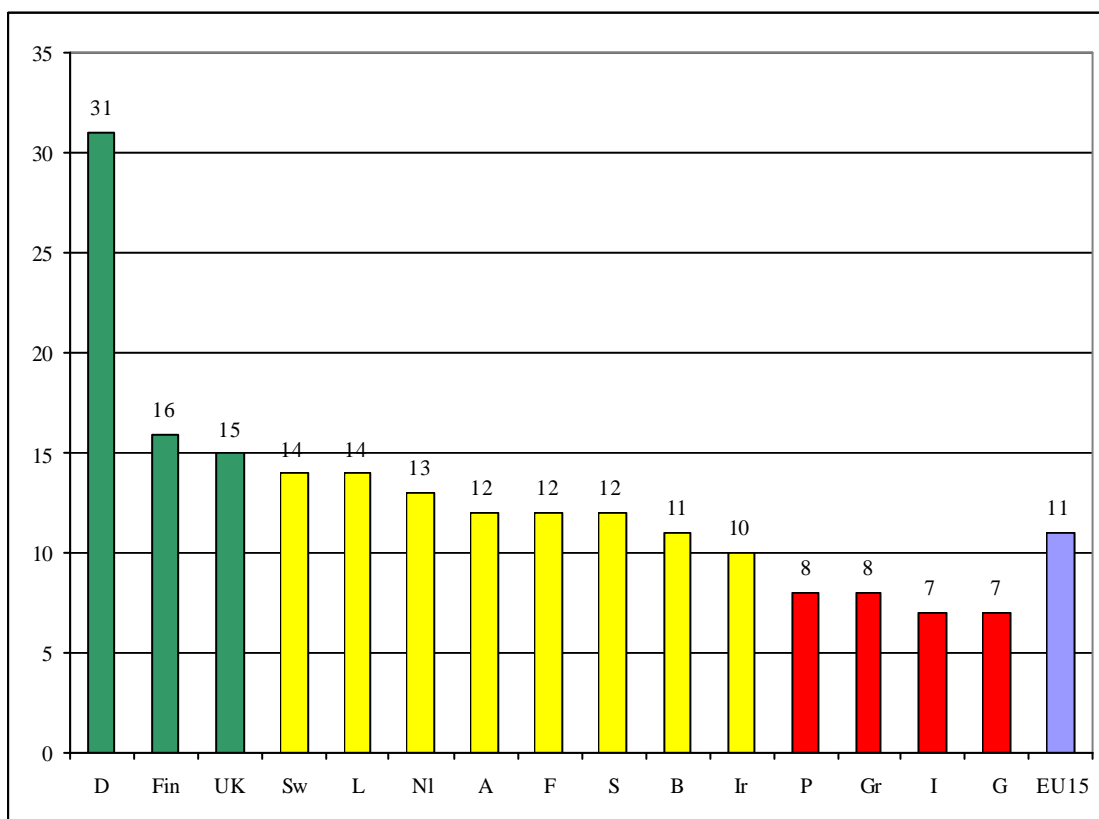
These results demonstrate that there are considerable differences in this dimension of the emergence process of “knowledge and information societies”. This is due to significantly diverse levels of social and economical development in these

populations, which can be matched up and even explained by indicators such as the GDP per capita, the proportion of secondary and tertiary graduates and the R&D expenditure.

Education for the “knowledge and information society”

The use of information and communication technologies in learning environments, therefore promoting formal and certified electronic literacy, requires the availability of ICT at school. The main international indicator used to evaluate this dimension is the number of computers made available to one hundred pupils. Denmark is by far the best placed country in this indicator, with an average of one computer to three students (see Figure 2). The intermediate group is formed by countries where there are between 16 and 10 computers for 100 pupils (that is to say, between 7 and 10 pupils to each computer). Portugal, Greece, Italy and Germany fare worse with regard to the computer hardware made available to school children, with 13 to 14 student per computer.

Figure 2 – Number of computers connected to the Internet per hundred students (2002)



Source: European Commission, DG Information Society, FlashEurobarometer 118, February 2002

With the exception of Denmark, none of these countries presents a fair proportion of students per computer, indispensable for an effective integration of the ICT in the learning environment. If a full and extensive use of technologies in all curricular subjects and all work and pedagogical processes is intended, much more hardware must be supplied.

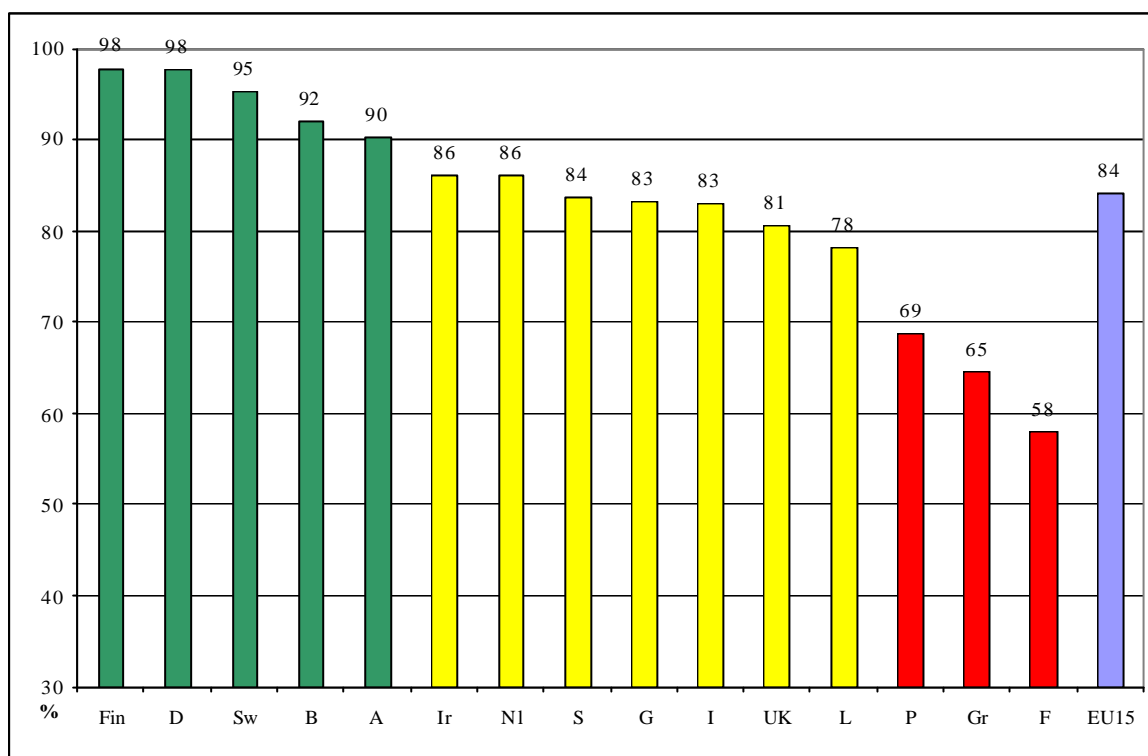
However, this is not the only shortcoming that can be pinpointed with regard to the effective use of ICT at school and in the learning processes. This is accompanied by a general lack of equipment for and adequate training of teachers, which severely hinders the fulfilment of objectives established towards the setting up of knowledge and information societies in most countries.

Digital Economy

Internet access in the business environment is the basic element for establishing a digital economy, by associating the dissemination of ICT and its intensive use to a change in the techno-economic paradigm (Perez, 2002) and to the spreading of a new long wave of economic development. The indicator chosen in order to illustrate this dimension of the process of setting up knowledge and information societies already shows a widespread dissemination of ICT in the European business milieu, at least on a basic level. Most of the companies in all of these countries already have access to the Internet (see Figure 3). Northern European countries, as well as Belgium and Austria, show rates between 90% and 100% of companies connected to the Internet. Several countries present rates between 78% (Luxembourg) and 86% (Ireland). Only Portugal, Greece and France² display, once again, the lowest results.

² The figure available for France is clearly outdated (2001), since this country has not participated in the harmonized survey conducted by Eurostat, probably due to methodological and operational divergences.

Figure 3 – Percentage of companies with Internet access (2003)



Sources: France - Flash Eurobarometer 125, June 2002

Germany, Greece, Luxembourg and Portugal - Eurostat, Structural Indicators, e-commerce survey 2002

Other countries: Eurostat, Structural Indicators, e-commerce survey 2003

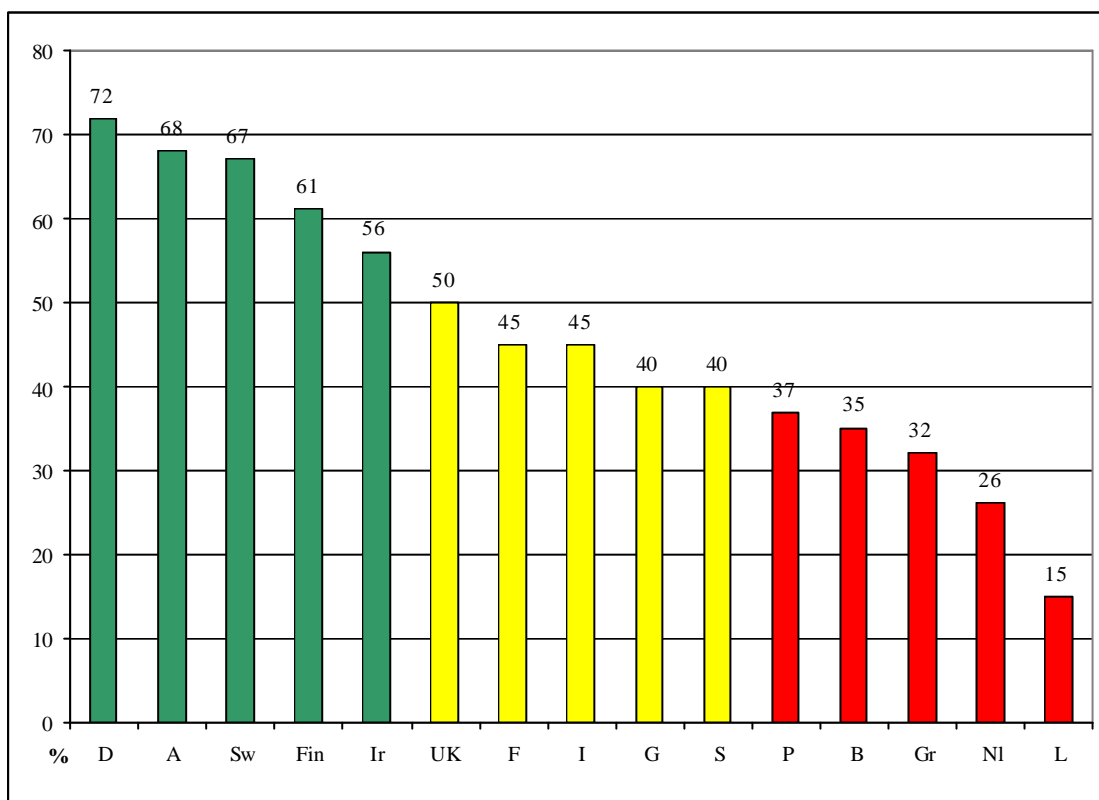
The figures achieved in this indicator have brought it close to statistical redundancy. It no longer has any meaning for analysing economical and business development. More sensitive indicators should henceforth be used for measuring the expansion of the digital economy, such as the intensity of electronic commerce use or the full integration of ICT in the business process or in the value chain, where the rates of equipment and execution are substantially lower. Despite potential differences in technical resources, the information gathered through this survey (Eurostat e-commerce survey) is nearly limited to basic resources, placing at the same level both an aerospace company and a small trading firm that sells its products by electronic means.

Electronic Government

The expansion of electronic government practices, made possible by the dissemination of ICT throughout most public administration offices and their customers (businesses and citizens) and by the development of secure technologies for information transactions, has become a strategic axis of public administration reform. This is due to the fact that this expansion generates efficiency increase and cost reduction without

affecting the quality and quantity of services rendered. The basic indicator for illustrating electronic government practices is the percentage of public services fully provided on line in European countries (see Figure 4). This indicator is produced annually by Cap Gemini Ernst & Young, by assignment of the European Commission, as part of the benchmarking process of the eEurope 2005 Action Plan.

Figure 4 – Basic public services provided on line (2003)



Source: European Commission, DG Information Society; Cap Gemini Ernst & Young (2004), Online Availability of Public Services: How is Europe Progressing – Web-based survey on electronic public services (4th Measurement October 2003)

From this viewpoint, concerning the analysis of the transition process towards electronic government, it can be seen that merely a small number of countries already provide most of their basic public services entirely on line. Only Denmark, Austria, Finland and Ireland supply more than half of these services through the Internet. With between 50% and 40% of public services on line one finds the UK, France, Italy, Germany and Spain. Finally, Portugal, Belgium, the Netherlands and Luxembourg present the slowest rates of transition towards electronic government.

This set of data leads us to conclude that the development pace of electronic government practices in European countries has been far from swift. By taking into consideration which kind of electronic public transactions are being provided on line,

one comes across the conclusion that these are mainly the services from which the State benefits the most: inland revenue, social security payments, value added tax and custom duties. The impact of electronic government practices over public administration reform or de-bureaucratisation has yet to be assessed.

Concluding remarks

Though the programmes and instruments for setting up “knowledge and information societies” are fairly similar in all countries taken into account here, it is quite clear that these processes occur at different speeds. The current position occupied by each country is largely determined by conditions at the starting point and by available resources (institutional, organizational, human and material), not by the intrinsic worth of the Action Plan. That is to say, the Action Plans are quite similar, so their merit should be measured essentially by their suitability to reality and to the specific conditions in each country.

It is quite notorious the huge differences that can be found between average levels of implementation of instruments, procedures and structural measures for establishing “knowledge and information societies” between Northern Europe and Southern Europe. In each of the dimensions under analysis, slightly different countries form the intermediate section. However, at least two countries from the North and South of Europe tend to occupy positions in always the same extreme poles. This situation bears a close resemblance with other structural indicators concerning the main features of social and economical development of western contemporary societies.

Future work

There is at least one other fundamental dimension for structuring “knowledge and information societies”, besides the four mentioned in this paper: the encouragement to digital content production. This dimension has been poorly studied and requires other analytical instruments, since there is no official or unofficial statistical information regarding the performance assessment of the measures already implemented. Thus, other empirical strategies will be used, predominantly qualitative, such as the analysis of national and international programmes aimed at fostering digital content production.

The ongoing PhD research will move on from the two stages roughly described in this paper (theoretical and bibliographical review; examination of programmatic and

statistical documentation regarding all selected countries) to a third one, concentrating on the detailed analysis of the Portuguese case. This scrutiny will take into consideration the strategic and political action conducted by two consecutive governments (from different political parties), which have produced distinct programmatic documents and institutions, worthy of an in depth comparison. This work will be complemented by a systematic analysis of several survey databases concerning the use of ICT in Portugal: population, households, businesses, and public administration. It is our hope that this endeavour will allow for a better understanding of the Portuguese path to the “knowledge and information society”.

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