Encyclopedia of Networked and Virtual Organizations

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Geography of the Information Society

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INTRODUCTION

All everyday activities take place in space, and it is upon this that all information and knowledge revolve. The latter are the key elements in the organization of territories. Their creation, use, and distribution should therefore occur in a balanced way throughout the whole territory in order to allow all individuals to participate in an egalitarian society, in which the flow of knowledge can take precedence over the flow of interests.

The information society depends, to a large extent, on the technological capacity to disseminate information and, consequently, the knowledge throughout a territory, thereby creating conditions which allow a more balanced development from both the social and economic points of view thus avoiding the existence of info-exclusion territories. The Internet should therefore be considered more than a mere technology, given that its importance goes well beyond the frontiers of culture and society. It is already a part of daily life and of the new forms of thinking and transmitting information, thus making it a basic necessity essential for a full socio-economic development. Its role as a platform of creation and distribution of content is regarded as an indispensable element for education in today's society, since it makes information a much more easily acquired benefit.

In the same way that the new technologies of generation and distribution of energy allowed factories and large companies to establish themselves as the organisational bases of industrial society, so the internet today constitutes the technological base of the organisational form that characterises the Information Era: the network. (Castells, 2004, p. 15)

The changes taking place today in regional and urban structures are increasingly more evident due to a combination of factors such as faster means of transport, more efficient telecommunications, and other cheaper and more advanced technologies of information and knowledge. Although their impact on society is obvious, society itself also has a strong influence

on the evolution of these technologies. And although physical distance has lost much of the responsibility it had towards explaining particular phenomena of the economy and of society, other aspects such as telecommunications, new forms of mobility, the networks of innovation, the Internet, cyberspace, and so forth, have become more important and are the subject of study and profound analysis. The science of geographical information allows, in a much more rigorous way, the analysis of problems thus integrating in a much more balanced way, the concepts of place, space, and time.

Among the traditional disciplines that have already found their place in this process of research and analysis, we can give special attention to a geography of new spaces, which, while not being a geography of "innovation," nor of the "Internet," nor even "virtual," which can be defined as one of the "Information Society," encompassing not only the technological aspects but also including a socio-economic approach.

According to the last European statistical data, Portugal shows a deficit in terms of information and knowledge dissemination among its European partners. Some of the causes are very well identified—low levels of scholarship and weak investments on innovation and research and development (R&D), both private and public sector—but others seem to be hidden behind socio-economical and technological factors. So, the justification of Portugal as the case study appeared naturally on a difficult quest to find the major causes to territorial asymmetries. The substantial amount of data needed for this work was very difficult to obtain and for the islands of Madeira and Azores were insufficient, so only continental Portugal was considered for this study.

In an effort to understand the various aspects of the geography of the Information Society and bearing in mind the increasing generalized use of information technologies together with the range of technologies available for the *dissemination* of information, it is important to:

1. Reflect on the geography of the new sociotechnological spaces.
2. Evaluate the potential for the dissemination of information and knowledge through the selection of variables that allow us to determine the dynamic of a given territory or region.
3. Define a geography of the Information Society in continental Portugal.

THE NEW SOCIOTECHNOLOGICAL SPACES

Two Spaces, One Geography

The information society differs from traditional society in many aspects. It is, however, in its geographical organization that one may find more changes which, though almost unquestionable, are difficult to quantify. The manner in which place is perceived, how space is organized, and how a community is constructed is influenced in proportion to the technologies of information.

The ability of land and place to define our identity is also changing with the replacement of the physical by the electronic. The landmarks of places and the importance of proximity, remain important factors in our daily lives, but what can we expect from the erosion of physical space by electronic space? (Wilson & Corey, 2000, p. 1)

However, in spite of the proximity and/or the geographical distance being increasingly smaller, factors which constrain society analogous to this geographical notion will continue to exist, whether it is on the Internet or in the mind of its users.

The society of information imposes new methodologies of analysis. To measure and represent the new information accessibilities, to map out new communities and to find new patterns and models of localization seem to be the challenges we face today. In physical and real space, the localization of a point is defined by two or three geographical coordinates but in the virtual space of a network or in cyberspace, geography is unable to define it, since at the present time we do not possess a model capable of giving an answer to one of the simplest questions of humanity—its localization.

Comparison is unavoidable. In the same way that mariners departed on their voyages of discovery without a map to orient themselves with, so do the “new

discoverers” venture out onto the Internet network. The difference resides in only one aspect: we know where we want to get to, but we do not know where the sites that we visit are effectively situated. Like the concept of localization, others such as distance, direction, and type of transport raise doubts and require some kind of theoretical foundation. Faced with these and other questions, a variety of fields of study arise which, taking into consideration geographical science as the point of departure, use its concepts in order to try and explain that which sometimes escapes palpable and tangible understanding of our day to day lives.

During the first half of the 1990s, a number of works were published in which geography was the central element but always complemented by a collection of other variables whose common denominator were information technologies. For example, Goddard (1990, 1992, 1995) edited a series of books on the “geography of information” and regional and urban development; Hepworth (1990) and Li (1995) wrote on the topics of “the geography of computers” and information technologies; Kellerman (1993) and Graham and Marvin (1996) dedicated their efforts to “the geography of telecommunications”; and Feldman (1994) wrote about the “geography of innovation.” The appearance of the Internet as a phenomenon of the masses in the mid-1990s resulted in a whole bibliography dedicated to the questions of cyberspace in its various aspects: the “geography of the Internet,” “cyber geography” or the “geography of cyberspace,” and “virtual geography.”

The information society is a fertile field for theorizations. However, some variables are too important to remain only in the theoretical field. It is necessary to identify and materialize them. Geography is the common “mold” that can be used for this materialization. Basically, a common science for the identification and a deeper understanding of the phenomena which find expression on the land and which are today fundamental for the analysis of society.

The Geography of the Information Society

The possession of information as well as the capacity to produce, distribute, and consume it have become powerful elements in the society of today. Given its capacity to substitute or reduce the importance of various *inputs* (raw materials, work, space, and capi-

tal), knowledge has become the primary resource of advanced economies, and, as time goes on, its value increases. The digital world involves new paradigms; bytes move around instead of atoms; the information that flows through the networks can transport text or voices, images or data, or even our exact position on the globe with a precision of up to five meters. Therefore, the new information technologies also exert a strong influence on geographical science, and so an understanding of the technology is not enough. It is important to understand its use and its implications in our daily lives and in human's relationships with territory.

Which new models, new procedures, or organizational structure should be used in order to understand the spatial phenomena that occur in the new societies? Will the numerous "emergent geographies"¹ of this society suffice? Or can we unite them into one whole, calling them (simply) geography of the Information Society?

The geography of the information society (GIS) is referred to as a definition for the first time in a proposal for the creation of new fields of investigation at the National Center for Geographic Information and Analysis (NCGIA), namely, connected to a project called *Varenius: NCGIA's Project to Advance Geographic Information Science*, dated October 1995.

The NCGIA, founded in 1988 with a base extending to three university institutions—The University of Santa Barbara in California (UCSB), The New York State University in Buffalo, and The University of Maine—had as their objective investigation in the area of "geographic information and analysis." Since the theme covers such a vast area, three strategic lines in the field of the "science of geographic information" were created. "Geographies of the Information Societies" was the name of the third line.

The determination and quantification of the changes that occur in geographic space through the influence of the technologies of information and communication depend, to a great extent, on the capacity of the scientific community to find units of measure and standardized informational variables which will complement technological analysis with a social and economic component but whose use will be consensual. This question does not only depend on geography but on a series of other disciplines.

It is important therefore to determine the social, economic, or technological variables which are necessary for the growth of places generating information or

those potentially important from the point of view of innovation and development—to observe the territory and to perceive space as a place of multiple relationships and conjugate the numerous disciplines of knowledge in such a way as to find (new) territorial patterns hidden in a less explicit but more digital geography.

The Potential for the Dissemination of Information and Knowledge

The analysis of the dissemination of information across the territory should be based on a vast collection of variables which allows the inclusion of the different dimensions of the phenomenon. Choosing them is not an easy task since their number as well as their importance are always questionable. In order to quantify and qualify the dissemination of information from among a set of available indicators, those that are considered more relevant were chosen.

However, since some of the pointers used are merely indicative (for example, the variables "Councils with potential for the NOVIS telecommunications network" and "Councils with potential for the ONI telecommunications network"), they cannot therefore be considered as concrete pointers or effectively real. It would be more correct from the scientific point of view to define the object of study as a "potential" of those territories for the dissemination of information.

The Indicator of the Potential for Information Dissemination (IPID) permits a more detailed diagnosis of the poorer territories or, with this same approach, of those with a higher level of territorial info-exclusion. Calculated on the basis of the analysis of five dimensions, the IPID was based on a total of 41 quantitative [Q] and dichotomous [D] variables (Table 1).

In Table 1, five dichotomous variables are also represented in the "type" column with the letter D. These variables, for example, the "Councils with potential for the NOVIS network of telecommunications," were recalculated as percentages when applied to the NUTIII scale. For the example "% of councils with potential for the Novis telecommunications network," the number of councils that included this variable (within each NUTIII) and then extracting from this the respective percentage in relation to the total number of councils for each region.

Table 1. Variables used for the calculation of the IPID

Dimension: Human Qualification	Type
Total of Secondary Education Establishments—public and private (INE ¹ , 2001)	Q
Total of Higher Education Establishments—public and private (INE, 2001)	Q
Resident Population with Secondary Education (INE, 2001)	Q
Resident Population with Medium Level Education (INE, 2001)	Q
Resident Population with Higher Education (INE, 2001)	Q
Level of Illiteracy (INE, 2001)	Q
Completed PhDs (INE, 2001)	Q
Dimension: Means of Innovation	
Companies investing in R&D (Data gathered by author based on IPCTN, ² OCT, ³ 2002)	Q
Education Institutions investing in R&D (Data gathered by author based on IPCTN, OCT, 2002)	Q
State Departments investing in R&D (Data gathered by author based on IPCTN, OCT, 2002)	Q
IPSFL ⁴ investing in R&D (Data gathered by author based on IPCTN, OCT, 2002)	Q
Requests for national patent (INPI, ⁴ 2002)	Q
Requests for national utility models (INPI, 2002)	Q
Total Requests (Patents + Utility Models)	Q
Total expenditure on R&D in the Industrial Sector—State, Higher Education, and IPSFL—with fundamental investigation + applied investigation + experimental development, in thousands of Euros (OCES ⁵ , 2001)	Q
Dimension: Quality of Life	
Indicator per Capita (INE 2002)	Q
Average monthly income of employed persons in the primary sector (INE, 2000)	Q
Average monthly income of employed persons in the secondary sector (INE, 2000)	Q
Average monthly income of employed persons in the tertiary sector (INE, 2000)	Q
Average monthly income of employed persons in the three sectors of activity—primary sector + secondary sector + tertiary sector (INE, 2000)	Q
Dimension: Population Dynamic	
Birth Rate (INE, 2001).	Q
Death Rate (INE, 2001).	Q
Resident Population < 14 years (INE, 2001)	Q
Resident Population—15-24 years (INE, 2001)	Q
Resident Population—1-24 years	Q
Population Economically Active and Employed (INE, 2001)	Q
Index of Qualification of available labor (Pop. Higher Education/Pop. Economically Active and Employed)	Q
Dimension: Digital Dissemination of Information and Knowledge	
Top Level Domains .pt (FCCN, ⁶ February 2003).	Q
Institutions of Higher Education and Polytechnic with presence on <i>www</i> and referenced in the main national Weblogs (author data, 2001)	Q
Total of Councils inside each NUTIII	Q
Councils with <i>Web page</i> (author data, 2001/2002)	Q/D
Percentage of councils with Web page (author data, 2001/2002)	Q
Cable TV Subscribers (ANACOM, 2003)	Q
Councils with Cable TV Distribution Network (Cabovisão, 2003)	Q/D
% of Councils with Cable Distribution Network—Cabovisão	Q
Existence of Cabovisão Network (Cabovisão, 2003)	D

Table 1. continued

Councils with potential for the NOVIS telecommunications Network (NOVIS, 2003)	Q/D
% Councils with potential for the NOVIS Telecom. Network	Q
Councils with potential for the ONI telecommunications (ONI Telecom, 2003)	Q/D
% of Councils with potential for the ONI telecom. Network	Q
Number of references to the Council's name verified through the <i>software</i> MAPNet (author data, 2003)	Q

Note:

¹ Instituto Nacional de Estatística.

² Inquérito ao Potencial Científico e Tecnológico Nacional.

³ Observatório da Ciência e Tecnologia.

⁴ Instituto Nacional de Propriedade Industrial.

⁵ Observatório da Ciência e do Ensino Superior.

⁶ Fundação para a Computação Científica Nacional.

THE GEOGRAPHY OF THE INFORMATION SOCIETY IN PORTUGAL: A CASE STUDY USING THE INDICATOR OF THE POTENTIAL FOR INFORMATION DISSEMINATION (IPID)

When the calculation of the IPID has begun, the behavior of the variables was totally unforeseeable, as well as the most correct weighting to attribute to each one of the five existing dimensions: “Human Qualification,” “Means of Innovation,” “Quality of Life,” and “Population Dynamic and Digital Dissemination of Information.” However, and even before defining it, a formula had to be chosen which would allow all the variables (dichotomous and quantitative) between 0 and 1 to be “calibrated,” in order to extract uniform values for each one. Next, a set of *indices* was created, resulting from the application of the formula of standardization to each variable or set of variables. Corresponding to the five dimensions, five indicators (with the same name) were calculated, resulting from the simple arithmetic average of the *indices* calculated for each variable. The IPID consists of the arithmetic mean of the five dimensional indicators.

The results obtained were divided into five classes which represent the potential capacity of the 28 regions (NUT III) to place themselves or reposition themselves in the spaces of flows or, on the contrary, to distance themselves from the more developed.

In an attempt to find special patterns worthy of note, either by their concentration or by their spread in certain

areas of the territory, we proceeded to the geographic referencing of the data. The objective was to find the asymmetries of the territory emphasizing their spatial contiguity (or the discontiguity) and differentiate the favored from the less favored territories from the point of view of dissemination of information.

Analyzing Figure 1, we can observe a considerable number of regions NUT III on Portuguese continental territory with a high level of info-exclusion (values of IPID between 0 and 0.149), corresponding to the “first class” on the IPID scale. They cover seven regions with a total of 850.000 people. The “second class” of the

Figure 1. Value of the IPID for the NUT III

map key, corresponding to a reduced IPID (between 0.150 and 0.199), includes nine regions with over two million inhabitants. It appears to behave like a transition class since its values are significantly disparate across the whole range of indicators. Just as in the class mentioned above, the regions cover the north, center, and south of the country, while still maintaining, on the whole, its tendency to be localized in the interior. The “third class” of the IPID (with values between 0.200 and 0.249) covers only four regions. From this, we may affirm that the maturity of its values reflects a greater territorial balance, since there are no great differences in the amplitudes of its variables.

All the regions of Portugal should have their average value situated in this class (functioning as a minimum threshold), although there may be councils below these values. In the “fourth class” of the IPID (between 0.250 and 0.499) are included the regions associated to the existence of university centers or regions associated with metropolitan peripheries. In the “fifth class” (values higher than 0.500), only the regions of Greater Lisbon and Greater Porto are classified.

The “more innovative” indicators included in the fifth dimension of the analysis appear to demonstrate their robustness in this type of study without putting any bias on the final results. We can observe that its inclusion in the IPID does not determine one unique tendency in the behavior of the regions under analysis. In fact, the technologies of information and communication, in their most varied forms—telecommunication infrastructures, broadband services, digital councils, or dissemination of content—are important for the fight against info-exclusion and for the enrichment of the Information Society, but if priority is not given to investment in key sectors of society such as education, employment, or health, then we cannot expect a technological miracle.

CONCLUSION

Portugal has important territorial asymmetries which are not recent and whose resolution is proving to be difficult, considering some of the developmental policies that have been tried.

Bearing in mind that the analysis undertaken intends to evaluate the potential of regions as disseminators of information and that this is the condition *sine qua non* to vitalize a region from the socio-economic point of

view, it is important to emphasize a set of conclusions about the *Geography of the Information Society in Portugal*:

- a. There exists, in fact, a Geography of the Information Society that reveals, for the territory of continental Portugal, a wide imbalance. The five dimensions of the analysis considered in the calculation of the IPID—“Human Qualification,” “Means of Innovation,” “Quality of Life,” “Population Dynamic,” and “Digital Dissemination of Information and Knowledge”—reflect a wide range of values that are spatially very differentiated.
- b. The potential for the dissemination of information appears therefore to follow a tendency towards spatial polarization, as can be seen in most of the socio-economic indicators, accompanying the concentration and the spread of the social, economic, and technological variables. The justification of this behavior appears to be in the location of the demographic mass but also on the quality of life, on the quality of human resources, and on the creation and use of innovation (and here the territorial *marketing* and public strategies play a fundamental role).
- c. Through an analysis of the IPID, it is possible to identify “rigid territories,” a characteristic associated with those regions considered to be info-excluded, that is, whose IPID values are less than 0.150, and also “elastic territories,” a characteristic associated with those regions considered to be catalyzers, that is, those with an IPID value over 0.150. Among those more-favored regions and councils from the point of view of information, one can observe a tendency towards higher values in the indicators of digital dissemination of information, the result of the introduction and use of new information and communication technologies, as well as from the existence of infrastructures which support them with; of population dynamic due to higher birth rates and fewer death rates, but also of the high values for the population of employment age, and of the level/quality of life, the result of the expression of the variables which appear dominant towards obtaining a pattern of reasonable life that allows one to take advantage of the available technological conditions, while at the same time giving companies and markets

potentially lucrative conditions that allow them to set up a continuous circle of investment and rentability of infrastructures and services.

The potential of information, used as and applied as a generator of human development (cultural, social, economic, environmental, and technological), may be considered one of the motors of modern societies. It is necessary, therefore, to discover a means of evaluating it.

The use of less common variables, together with their conjugation with more common ones, appears to be vital in order to capture some less perceptible dynamics or a potential that may be incubated or latent but which, through the lack of catalyzing elements, has not yet been able to reveal a dynamic dissemination of information. Through its qualification and quantification in the form of innumerable variables, we now possess a Geography of the Information Society.

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KEY TERMS

Information: A category of significant concepts absorbed by the human brain which normally alter our state of knowledge.

Knowledge: An organized set of statements, facts, and ideas that present a well-founded judgment that is transmitted through a communication media in a systematic way. Knowledge is processed information from perception to acknowledgment.

Information Society: The diffusion of information, boosted by communication technologies and the social, economical, and cultural impacts produced. It normally represents a long term structural change, mainly through creation and use of knowledge.

Geography of the Information Society: A branch of geography that permits the identification of positive

and negative impacts of technology throughout the territories. It analyzes the geographical structures in the era of information and knowledge.

Indicator of Potential Information Dissemination (IPID): A new indicator to qualify and quantify the potential capacity of territories to disseminate information and knowledge.

Rigid Territories: Territories with low levels of information and knowledge dissemination, sometimes defined as info-excluded regions

Elastic Territories: Territories with high levels of information and knowledge dissemination, considered to be catalyzers to the less favored regions.

ENDNOTE

- ¹ Referring to concepts such as “geography of networks,” “virtual geography,” “geography of cyberspace,” “cyber geography,” or “geography of the Internet” (to quote just a few of the more well-known emergent geographies).