

Comment

SCIENCE AND THE INTERNET: BE FRUITFUL AND MULTIPLY?

The Internet phenomenon

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ABSTRACT: The Internet has become a worldwide phenomenon. It is undeniable that the Net has forcefully entered everyday life, ceasing to be a useful tool only for a small circle of researchers and academics, to become a new and versatile means of mass communication. And measuring Internet access and calculating the number of Internet users is not easy.

By using the domain names registered in the “.it” as an endogenous metric, the Institute of Informatics and Telematics of the Italian National Research Council (IIT-CNR) carried out a research on Internet diffusion in Italy taking into account some major categories of users (enterprises, non-profit organizations, individuals, professionals and public bodies) and territorial distribution (nation, macro-area, region and province). This research has made it possible to carry out an initial analysis of the digital divide in Italy.

Introduction

The Internet is now a global phenomenon. Unquestionably, the Net has penetrated deep into our everyday life, shifting from an instrument useful only to a limited circle of researchers and scholars to a new and multi-purpose mass medium. Quoting a simple, though limiting definition, it can be said that: “any entity (household, individual, or firm) is considered connected to the Internet if it has the capability of communicating with other entities (information in and/or information out) via the physical structure of the Internet”.¹

Like most countries in the world, also the European Union has acknowledged the Internet as a catalyst for the growth of creativity, collaboration and innovation, making a substantial R&D effort on the ‘Future Internet’ subject within the Seventh Framework Programme. In order to coordinate all the European initiatives, the “*Future Internet Forum of Member and Associated States*” was established. On the basis of the national initiatives announced to the Forum, the Commission will then draw a map of all the European activities on Future Internet.

In this perspective, following is a summary of some results of the research on the penetration of the Internet in Italy carried out by the Institute of Informatics and Telematics of the CNR of Pisa (IIT-CNR).

Internet use: a few figures

“Internet World Stats”² periodically publishes useful statistics on Internet use. According to those data, the number of users at the end of 2010 was approaching 2 billion out of a world population of 7 billion people. As of 2000, the estimated number of users was about 360 million, so this equals a percentage increase of 444.8%. The user distribution by continent highlights that Asia, though having the highest number of users (approximately 825 million), has the lowest penetration index, 21.5% (the ratio between number of users and population). The highest penetration index is found in North America (77.4%), followed by Australia (61.3%) and Europe (58.4%).

This confirms the existence of a digital divide, i.e. a divide between those having access to the Internet and those, for different reasons (geographic location, infrastructure quality, economic conditions, education level, etc.) who are partially or totally excluded from it. The divide, however, may change over time. To this regard, an interesting case is the Middle East: despite a penetration index (29.8%) still

rather low compared with western countries, between 2000 and 2010, the number of local users has grown at a very fast pace (+1,825.3%).

As concerns EU-member countries, Germany tops the chart of the number of Internet users with roughly 65 million, out of a population of about 82 million people. Then Great Britain and France come in second and third place respectively. Italy ranks fourth with approximately 30 million Internet users out of a population of about 60 million people and a penetration index of 51.7%.

Considering the total number of domain names registered under the country code Top Level Domain (ccTLD), with 2.2 million names in its domain, Italy ranks 9th at global level and 5th at European level.



Figure 1. Top ccTLD Registries.

Measuring the Internet phenomenon: methodological notes

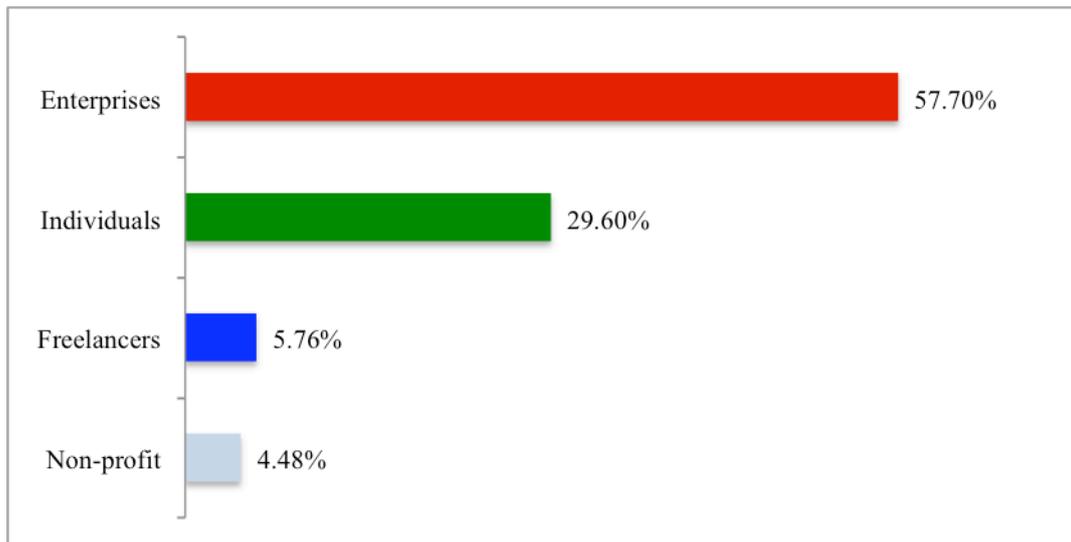
Measuring the access to the Internet and calculating the exact number of its users are not easy tasks. The literature divides the metrics used into two large categories: exogenous and endogenous metrics. The former estimate the number of Internet users through methods “external” to the Net, such as questionnaires. The latter, on the other hand, are based on automatic tools to gather and extract data which are intrinsic to the technology itself. They have the unquestionable advantage of being precise, as they are “*obtained in an automatic or semi-automatic way from the Internet itself*”.³

The number of the Internet hosts (number of computers connected to the network) is the most frequently used endogenous metric, as retrieving this information is a relatively simple procedure. The metric of domain names is a valid alternative, as it is objective and reliable.⁴ In addition, it allows to identify the types of registrants and their geographic distribution.

Based on the domain names registered under “.it”, the IIT-CNR carried out a research on Internet distribution across Italy with respect to a few large categories of users (enterprises, non-profit organisations, private citizens, freelance workers and state-run institutions) and to the geographic distribution (nation, macro-areas, regions and provinces). Thanks to these data, a first analysis of the digital divide was possible.

Internet distribution and the digital divide in Italy

Over half the .it domain names are registered by enterprises. Following are private citizens and, with much lower percentages, freelancers and non-profit organisations.



Graph 1. Categories of subjects with a .it domain name.

The results of the study seem to confirm that the use of the Internet is more widespread among large enterprises and joint stock companies.

With regard to private citizens, there are both a “gender digital divide” and a “generational digital divide.” Gender and age, but also education, income, the working status and the geographic area do influence the distribution of the Internet among the individuals. Finally, the spreading of the Internet in the non-profit field reflects, similarly to the results highlighted for enterprises, the dimensions of the non-profit organisation (according to the number of its employees and/or volunteers and its social fund), the type of organisation and its purpose.

With respect to the geographic distribution of the Internet, considering the whole set of categories for the registering subjects, despite 54% of the .it domain names are located in northern Italy, the highest penetration rate, calculated as a ratio between domain names registered in a specific macro-area and the population living there, is found in central Italy, followed by the North and the South. The regional distribution of .it domain names highlights that, whereas Lombardy and Lazio are the regions where most of the names are registered, the highest penetration rates belong to northern and central regions (Trentino-Alto Adige, Lombardy, Lazio, Tuscany and Emilia Romagna). As far as provinces are concerned, the highest penetration rates are found in Milan, Ascoli Piceno, Bolzano, Florence, Rimini, Rome, Bologna, Trento, Siena and Padua.

The territorial distribution of the Internet appears to be influenced by a series of factors such as per-capita income, GDP, level of schooling, unemployment rate and the enterprise size. Therefore, apparently the web is reproducing, when not amplifying, the social and economic differences existing in the various areas of the country: in fact, those who are left behind in the economic development rank lower, and low development levels are associated with a lower degree of interest in new technologies and their adoption.

Towards Future Internet

Future Internet is already before our eyes: it looks like an electrical grid or a water supply network which make it possible to plug to a socket, or open a tap to use the service. It does not matter where in the world the computers or databanks you want to access are: *cloud computing* will provide what you need on request. The European Union has estimated that across its territory there are approximately 570 million mobile phones that can connect to the Net. In 2006 they did not reach half that number. In less than two years, wireless devices will exceed the number of traditional cabled computers. Some of the sources of exclusion and discrimination will diminish, allowing for the inclusion of new citizens into the Internet. Above all, however, the traditional service provider-user relation will be reversed, and any

individual will be able to play a proactive role in the process of creating, producing, distributing and accessing contents.

Translated by Massimo Caregnato

Notes and references

- ¹ S. Greenstein and J. Prince (2004), *The geographical diffusion of the Internet in the United States*, in M.P. Singh (Ed.), *The Practical Handbook of Internet Computing*. Boca Raton, FL: Chapman & Hall/CRC Press.
- ² Internet World Stats, <http://www.internetworldstats.com/stats.htm>.
- ³ G.F. Diez-Picazo (1999), *An Analysis of International Internet Diffusion*, Ph.D. Thesis, MIT - Massachusetts Institute of Technology, Boston, MA.
- ⁴ M.A. Zook (2000), *Internet metrics: using host and domain counts to map the Internet*, *Telecommunications Policy* **24**(6/7): 613-620, analysed Internet distribution in the USA using domain names under the general Top Level Domain (gTLD) “.com”.

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