EUROPEAN STATISTICS AND EUROSTAT'S CONTRIBUTION TO IMPROVING STATISTICAL LITERACY

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Statistical literacy is an important requirement for correctly interpreting and using (Official) Statistics. Several initiatives have been launched in the statistical community in general and in (inter/supra-) National Statistical Institutes (NSIs) in particular to help users to better use and understand statistics. Also Eurostat has launched several actions aiming to improve statistical literacy, but it lacks a good insight into whether and how this has a real impact on the statistical literacy of the users of its data. Through literature research and examination of some assessment tools, we seek to set the basis for Eurostat to prepare tools for evaluating and monitoring statistical literacy of the users of European statistics.

INTRODUCTION

Official Statistics offer an information infrastructure and a public good that provides quality statistical information to a wide variety of users. But a true understanding of statistics and a correct use of it is not an easy matter. There are several definitions of statistical literacy and some scholars differentiate between statistical literacy, statistical reasoning and statistical thinking.

In the present article we propose to use the definition by Wallman (1993) who argued that statistical literacy is the ability *to '...understand and critically evaluate statistical results that permeate daily life, coupled with the ability to appreciate the contributions that statistical thinking can make in public and private, professional and personal decisions'.*

The (potential) user community for statistics is very diverse, going from regular and/or professional users (decision makers, researchers and journalists) and students to occasional users and citizens. Each class of users is likely to have (or not) a different and specific set of competences in terms of statistical literacy, interests and influence in society.

Research on statistical literacy has evolved over the years but few attempts have been made to develop practical tools to assess the actual status of statistical literacy (and its components) of the statistics' users community or of specific subgroups.

As the producer of Official Statistics for the European Union, Eurostat aims to produce relevant and accurate European Statistics (Official Statistics at European level) that are directly accessible to and understood and used by a wide range of users. This article investigates what Eurostat has done to improve user satisfaction, what Eurostat actually knows about its users' community and it argues that more needs to be done to assess how Eurostat's actions have improved the statistical literacy of the users of European statistics**.**

EUROPEAN STATISTICS

Eurostat establishes European statistics on a wide range of topics, going from specific domains such as national accounts data or environmental statistics to more general data collections on 'sustainable development' or on 'quality of life'.

In 2001, Eurostat and its partners in the European Statistical System (ESS) have agreed on a European Code of practice, which defines the quality principles and indicators of European statistics in terms of the institutional environment, statistical processes and outputs. Principle 11 of this European Code is on *'meeting user needs'*. This means that processes should be in place for regularly consulting users and on monitoring of user satisfaction. Principle 15 of this European Code is on *'accessibility and clarity'*. The implication of this principle is that statistics should be presented in a clear and understandable form, and be released in a suitable and convenient manner. In 2010, the European Statistical System (ESS) launched its Vision2020, a strategy to addressing the challenges that Official Statistics – in casu European statistics – are facing. One of the key actions of this strategy *is to respond more adequately to different needs of the different user groups*.

WHO IS USING EUROPEAN STATISTICS ?

In order to be focused and specific, Eurostat at first needs more information about the characteristics of its data users: Who are they? What do they know about statistics? Do they need help on finding and using statistics?

On a monthly basis, the Eurostat website records more than 3 million visits, over 4 million page views, some 700,000 pdf downloads and more than 1 million extractions of data. These metrics rank the site amongst the top 5 websites of the European Commission (Bautier, et al. 2014). But who are these users? And what are they looking for?

Eurostat obtains information about the users of its data via different ways: through bilateral contacts with the Commission policy services (via 'annual hearings' and laid down in written agreements called 'Memorandum of Understanding'), through the requests which users address to the Eurostat Statistical Support services (which include the Eurostat Users Support network and separate central services for media and institutional requests) and via the annual Eurostat user satisfaction surveys.

The Eurostat User Support network consists of Eurostat and Support Centers in all 28 EU countries and in a number of countries in the wider European area and this network is operating since 2004. Users could address specific questions to this network, which in turn gives a first insight of the type of users and the main type of support wanted.

In the period April 2015 – September 2015, the Eurostat User Support network treated 3757 requests and, in the same period, 1271 requests have been sent to Eurostat directly. Of these requests sent directly to Eurostat a further analysis was made on the type of user (see Table 1).

Table 1: Type of request according to type of user of European statistics in the semester April 2015 – September 2015

Type of User	**Type of Request**					**Total requests**
	Availability of data / publication	Verification of data	Methodo-logical request	Technical Problems	Other	
Private User	59	6	16	2	8	91
Student or Academic	104	12	22	0	13	151
Commercial company/enterprise	137	26	43	13	5	224
Press and other media	10	2	2	1	1	16
EU Institution / agency	25	2	4	3	5	39
International organisation	22	4	7	0	1	34
National Statistical Institute	334	109	136	53	29	661
Public administration / Government	25	0	7	3	2	37
Political parties and political organisations	1	0	1	0	0	2
Other	7	1	3	2	3	16
Grand Total	724	162	241	77	67	1271

Source: Eurostat Statistical Support services report (2016)

Through a yearly Eurostat user satisfaction survey, which contains inter alia general questions about clarity and user-friendliness of the data, Eurostat is reaching out to its users – in and outside the Commission services – so as to learn better about the type of users and uses, on the users' assessment of the quality of and trust in European statistics and on the dissemination.

The report on the 2015 User satisfaction survey showed that students, academic and private users account for 43,5% of the users and that 'research' and 'general background information' were the most common purposes for all users combined. The results also showed a high user satisfaction rate with the renewed Eurostat website, a significant improvement on the easiness to understand European statistics and a high trust of users in European statistics.

EUROSTAT'S EFFORTS TO IMPROVE USER SATISFACTION AND UNDERSTANDING OF STATISTICS

Previous (before 2014) user satisfaction surveys indicated that many users wanted easier access to data, statistical tables 'ready-to-use' and more context information. This has resulted in continuous improvements of data presentation on the Eurostat website, which now offers - in addition to the detailed data base and extraction tools - a series of *most popular tables and key figures* and *domains in focus* (i.e. 'Sustainable Development' and 'GDP and beyond') as well as *Statistics Explained* (SE).

Statistics Explained is a special website using Wiki techniques and showing a number of *articles* which make up an *encyclopedia* of European statistics for everyone, completed by a *statistical glossary* clarifying all terms used and by numerous links to further information. It is a *portal* for occasional as well as for regular users. From January until July 2015, Statistics Explained got over 3 million page views and the number of visits is still rising. For specific domains, such as 'quality of life, 'you in the EU', 'young Europeans', users can directly from Eurostat's main page go to 'Infographics' which present statistics in a user-friendly way. Also mobile apps can be downloaded (i.e. on the EU economy and on country profiles).

In addition Eurostat has invested in organising training sessions for Commission policy departments and it gives practical training – on how to access, interpret and use statistics – to groups of visitors and journalists. The European Statistical Training Programme (ESTP), coordinated by Eurostat, helps officials and employees of the ESS improving in statistical literacy taking into account the different levels of statistical knowledge and working experiences. It comprises courses in Official Statistics, IT applications, Research and Development and Statistical Management. As a result of a another programme for Training and Education in Official Statistics within existing Master programs at European universities, the European Statistical System Committee (ESSC) awarded – in May 2015 for the first time – 12 university master programmes with the *European Master in Official Statistics (EMOS*) Label.

The 2015 User satisfaction survey shows an important rise in the % of users satisfied with the presentation of Eurostat data (Figure 1). User satisfaction is indeed improving over the years, but room remains for continued efforts to improve clarity and accessibility of European statistics. In addition, the data environment is constantly evolving with new openings such as open data, big data, use of geographic information.

To respond to these challenges, Eurostat and its partners in the ESS have agreed on a Vision2020 priority area for action on 'Identifying user needs and cooperation with stakeholders'. In 2015 a statistical project DIGICOM was launched among the ESS partners for supporting their actions on user analysis and on creating a new dissemination and communication strategy, using innovative technologies.
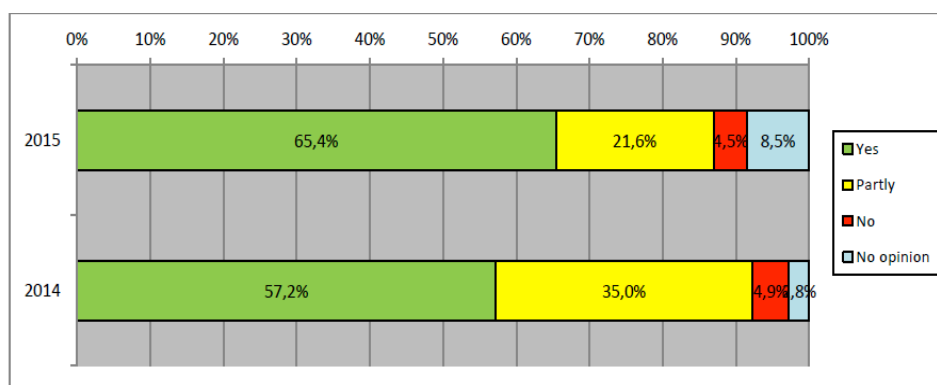
Source: Eurostat 2014 and 2015 user satisfaction surveys

Figure 1. Assessment of the presentation of the statistics on the website, in %
(Are European statistics presented in an easy-to-understand way?)

A regular consultation of users for European statistics is also organised through the biannual meetings of the European Statistical Advisory Committee (ESAC). This Committee has set up a 'classification' of users, so allowing the producers of European statistics to focus on the different sets of users and different contexts (Vichi 2014).

… AND HAVE THESE EFFORTS INDEED IMPROVED STATISTICAL LITERACY?

While the above illustrates Eurostat's efforts aiming at improving the use and understanding of European statistics, there is up to now, no concrete (Eurostat) action carried out to assess the statistical literacy of the users of European statistics. One can however ask the question whether (inter/supra-) National Statistical Institutes should engage in improving statistical literacy in general and, in particular, in assessing the status of statistical literacy of its users.

Murray and Gal (2002) argued that statistical agencies and institutes could be important players to improve statistical literacy as they are important providers of a large variety of statistical material as a basis for exercises and tools. With the launch of the International Statistical Literacy Project (ISLP), statistics agencies became more interested and engaged in efforts on promoting statistical literacy. Over the years, statistics agencies' guidelines and practical examples became available for improving statistical literacy, but much less information could be found on how the status of statistical literacy of various different users of Official Statistics could be assessed.

This requires at first some fundamental thinking about the underlying skills and knowledge required for good statistical literacy. According to The Data Manifesto (2015), data users should ideally have received a basic training in data handling that is, have a basic education in the types of quantitative methods necessary to read and understand statistics (information-processing skills, PIAAC OECD 2013).

Earlier work of Iddo Gal (2002) proposed a model of statistical literacy involving both a knowledge component and a dispositional component (Table 2).

Knowledge elements	Dispositional elements
Literacy skills	Beliefs and attitudes
Statistical knowledge	Critical stance
Mathematical knowledge	
Context knowledge	
Critical questions	

Source: Gal, I (2002)
Table 2: A model of statistical literacy

While this model provides the key building blocks of statistical literacy, more practical assessment tools would be needed for direct measurement of statistical literacy of data users. A first literature search and enquiries through the ISLP allowed to find a few examples (mainly from statistical offices) of such 'statistical literacy assessment tools':

- the ALEA (Local Action of Applied Statistics) project, established in 1999 by Statistics Portugal (INE), which contains, two assessment components, one called Challenges, which focuses on a statistical competition[1], and one called ActivALEAs, which are learning-by-doing assignments containing tasks, comments and self-test questions;
- the Assessment Resource Tools for Improving Statistical Thinking (ARTIST website), funded by the US National Science Foundation, and developed to provide high-quality assessment resources for faculty who teach statistics at the tertiary level;
- a Statistical Literacy Assessment Scale (SLAS), developed by Reston (2005) to assess adult SL among graduate students and among adult professionals working in the government. This scale as well as other performance–based assessment activities use inter alia data from the Philippines National Statistical Office;

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[1] Oriented essentially towards students of Primary and Secondary Schools in Portugal

- the website 'Power from Data' is a web-based learning tool published by Statistics Canada primarily for secondary students of Mathematics and Information Studies, although it has also been used by other students, teachers and the general population. Besides explanations about various statistical concepts and methods, the website also provides useful exercises;

- the Italian Statistical Institute (ISTAT) – regional office for Tuscany - has developed specific strategies (QValStat) to measure the statistical literacy level of adults, in particular of college students. An on line questionnaire for the measurement of statistical literacy (QValStatM) was launched in the second semester of the Academic Year 2014-2015 to more than 10,000 freshmen students of the Universities of Pisa, Florence and Siena. ISTAT has also produced a 'Statistica Enigmistica' brochure (puzzle magazine mainly addressed to children and students).

From direct contacts with NSIs we also learned about ongoing work in DESTATIS (DE) and INE (PT) who are preparing respectively an e-learning system that enables students (and maybe other users) to do exercises in different fields of statistics and to check their improvements at the end, and a survey to assess the statistical literacy of the users in some countries.

Although the above examples could give inspiration, it might however be that these could not immediately be used in another country and/or institutional setting. Indeed, Juana Sanchez (2007) argued that statistical literacy instruments must be customised and therefore also the tools to assess statistical literacy must be customised too.

This is not surprising given the possible wide differences between background of users, and their respective cognitive knowledge bases and skills but also their beliefs, attitudes, and action tendencies. Hence, future educational developments should be coordinated with and accompanied by proper assessment tools and research models suited to the unique nature of statistically literate behaviour.

CONCLUSION

As producer of European statistics Eurostat serves a wide variety of users, going from experts with professional statistical experience and students in a learning phase to policy makers and citizens with limited statistical literacy. In order to make its data more accessible and to address user needs, Eurostat has launched an interactive series of articles called Statistics Explained (SE) as well as new visualization tools and mobile apps, which has significantly improved user satisfaction.

But the question remains whether this has also led to improve the statistical literacy of users of European statistics. Although a first literature search and direct contacts with NSIs have identified some examples of assessment tools for statistical literacy (in preparation), further exploratory work and cooperation with teachers and researchers is needed to develop specific and appropriate tools for the assessment of statistical literacy of users of European statistics.

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