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Measuring media literacy in the EU:  
results from the Media Pluralism Monitor 2015

Matteo Cernison and Alina Ostling



European University Institute  
**Robert Schuman Centre for Advanced Studies**  
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EUI Working Paper **RSCAS** 2017/01

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ISSN 1028-3625

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Printed in Italy, January 2017

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Italy

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The Centre for Media Pluralism and Media Freedom is co-financed by the European Union. This initiative is a further step in the European Commission's on-going effort to improve the protection of media pluralism and media freedom in Europe and to establish what actions need to be taken at European or national levels to foster these objectives.

The aim of the EUI Centre for Media Pluralism and Media Freedom is to enhance the awareness of the importance of freedom and pluralism of the media, to contribute to its protection and promotion and to develop new ideas among academics, policy makers, regulators, market stakeholders, journalists, and all other directly involved professionals who take part in the public debate.



## **Abstract**

The Centre for Media Pluralism and Media Freedom is developing and testing a number of indicators through the Media Pluralism Monitor,<sup>1</sup> a tool for assessing risks to media pluralism in the EU and beyond. This paper discusses the Monitor methodology and the results of the assessment of media literacy to date. The results from the Monitor implementation in 19 EU Member States in 2015 show that there is lack of comprehensive media literacy policy across Europe. Only four of the assessed countries have a tradition of policymaking in media literacy and well-developed policies in place (Finland, Sweden, the Netherlands and Germany). Moreover, the Monitor assessment indicates that the populations of the examined countries, on average, have insufficient digital competencies (i.e. information, communication, problem-solving and software skills). Only Finland, Sweden and Luxembourg score low risk regarding digital skills of individuals. The paper also notes that the media literacy indicator tested by the Monitor in 2015 was limited in scope. The indicator has been expanded in the 2016 edition of the Monitor but the key limitation remains the lack of data on the individuals' capacity to analyse, interpret and produce media messages.

## **Keywords**

Media literacy, methodology, policy, skills, digital

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<sup>1</sup> <http://monitor.cmpf.eu.eu/>





## 1. Introduction

Media literacy is a key aspect of an accessible and participative media system, and a core element of media pluralism. People need to master media literacy competencies to fully enjoy fundamental rights such as freedom of expression and access to information. At the EU level, the Audiovisual Media Services Directive (AVMSD 2010) requires both the development of media literacy in all sections of society and measurement of its progress. However, despite some advancement during the past years, many challenges remain in measuring media literacy levels. Media literacy is a very complex and interdisciplinary topic. Hence, also the approach for measuring it has turned out to be all but simple. The majority of research at the European level has focused on what is easier to measure and on what lies in the interest of the media industry, including technical skills, online access skills, and media consumption (Celot 2015). The question about how to measure the more complex and critical issues, such as the capacity of people to evaluate and produce media messages, across EU countries remains open.

To address the need to assess media literacy from a comparative perspective, the Centre for Media Pluralism and Media Freedom (CMPF) - to which the two authors are affiliated - is developing and testing a number of variables through the Media Pluralism Monitor,<sup>2</sup> a tool for assessing risks to media pluralism in the EU and beyond. This paper will first discuss the Monitor methodology and the progress made so far regarding the development and testing of the Monitor variables in the field of media literacy. Second, it will analyse the results on media literacy stemming from the Monitor implementation in 19 EU Member States in 2015. Third, it will give an outlook on what the Monitor is measuring in the field of media literacy in 2016.

## 2. Methodology

### 2.1 Definition of media literacy

Literacy is an interdisciplinary concept and has become even more so over time, with the development of digital media and with the growing accessibility, convergence and distribution of information and content via the Internet and mobile platforms. The terms media literacy, information literacy, ICT and digital literacy are no longer seen as separate by organisations such as UNESCO, but as interconnected and overlapping. UNESCO's concept of Media and Information Literacy (MIL) has evolved out of these developments, and aims to provide a coherent approach to the new types of literacy in the field of communication and information (UNESCO 2013, p. 27).

The Monitor bases its definition of media literacy on the one of the Audiovisual Media Services Directive and on the European Association for Viewers Interests' (EAVI's) media literacy study in 2009:

"Media literacy is an individual's capacity to interpret autonomously and critically the flow, substance, value and consequence of media in all its many forms" (EAVI 2009). "Media literacy' refers to skills, knowledge and understanding that allow consumers to use media effectively and safely. Media-literate people are able to exercise informed choices, understand the nature of content and services and take advantage of the full range of opportunities offered by new communications technologies. They are better able to protect themselves and their families from harmful or offensive material" (Audiovisual Media Services Directive 2010).

The European Commission Expert Group on Media Literacy (2016) further clarifies the media literacy definition in their Mandate, endorsed by Council Conclusion of May 2016: "Media literacy" is an

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<sup>2</sup> <http://monitor.cmpf.eu.eu/>

umbrella expression that includes all the technical, cognitive, social, civic and creative capacities that allow a citizen to access, have a critical understanding of the media and interact with it. These capacities allow the citizen to participate in the economic, social and cultural aspects of society as well as to play an active role in the democratic process. It refers to all kind of media (television, radio, press), through all kind of channels (traditional, internet, social media) and to all ages. (A key aspect (...)) "in all possible definitions of media literacy is the development of critical thinking by the user."

The MPM2015 media literacy indicator put a particular emphasis on digital literacy, which is about the access to and the ability to use digital devices, software, and infrastructure (UNESCO 2013). The term 'digital literacy' is often used in a similar way to 'information literacy' "in the sense of an ability to effectively and critically access and evaluate information in multiple formats, particularly digital, and from a range of sources, in order to create new knowledge, using a range of tools and resources, in particular digital technologies" (UNESCO 2013, p. 29).

## **2.2 The Media Pluralism Monitor methodology**

To address the need to assess media literacy, with a particular attention to its digital aspects, the Centre for Media Pluralism and Media Freedom (CMPF) has developed and tested a number of variables through the Media Pluralism Monitor<sup>3</sup>, a tool for assessing risks to media pluralism. The 2015 data was collected by a network of experts in 19 Member States and coordinated by the CMPF. The country experts carried out desk-based research and provided references for each variable (e.g. academic literature, civil society reports and legislative acts). A number of particularly complex and evaluative variables also went through an external peer review by national country experts. The country experts entered the data in an online database, which allows real-time verification and analysis of data by the CMPF. The CMPF research team verified the consistency and correctness of the data, and carried out a comparative data analysis for EU:19.

The 2015 Monitor encompassed four domains aiming at measuring the key media pluralism dimensions and the connected risks: Basic protection, Market plurality, Political independence, and Social inclusiveness. The domain Social inclusiveness, which measured if and how the media system is able to reach and represent different sectors of the population, also included a media literacy indicator. The media literacy indicator in the Monitor focuses on two dimensions: (1) Environmental factors, and (2) Individual competencies.

These two terms are taken from the EAVI study on assessment criteria for media literacy (EAVI 2009). The study defines Environmental factors as a set of contextual factors that impact the broad span of media literacy, including informational availability, media policy, education and the roles and responsibilities of stakeholders in the media community (EAVI 2009, p 40). Individual competences are understood as an individual capacity to exercise certain skills including cognitive processing, analysis, and communication. These competences draw on a broad range of capabilities, and embrace increasing levels of awareness, the capacity for critical thought and an ability to produce and communicate a message (EAVI 2009).

Within the two dimensions, the 2015 Monitor assessed media literacy with three variables that focused on national media literacy policies and on digital competencies (Internet use and digital skills) (see Table 1). The most complex among these variables is the one measuring digital skills. It is a composite variable derived from the Digital Scoreboard Agenda and covers four types of skills: information, communication, problem solving, and software skills for content manipulation (see Annex I for details).

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<sup>3</sup> <http://monitor.cmpf.eu.eu/>

**Table 1. Media literacy variables in the MPM 2015**

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<b>Environmental factors</b>	<b>Individual competencies</b>
<b>Media literacy policy</b>	<b>Internet use</b>
I6.1 How would you evaluate the policy on media literacy in your country?	I6.2 What is the percentage of weekly Internet users in your country?
	<b>Digital skills</b>
	I.6.3 What is the percentage of population that has at least basic digital skills?

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### **3. Testing the media literacy indicator through the Media Pluralism Monitor**

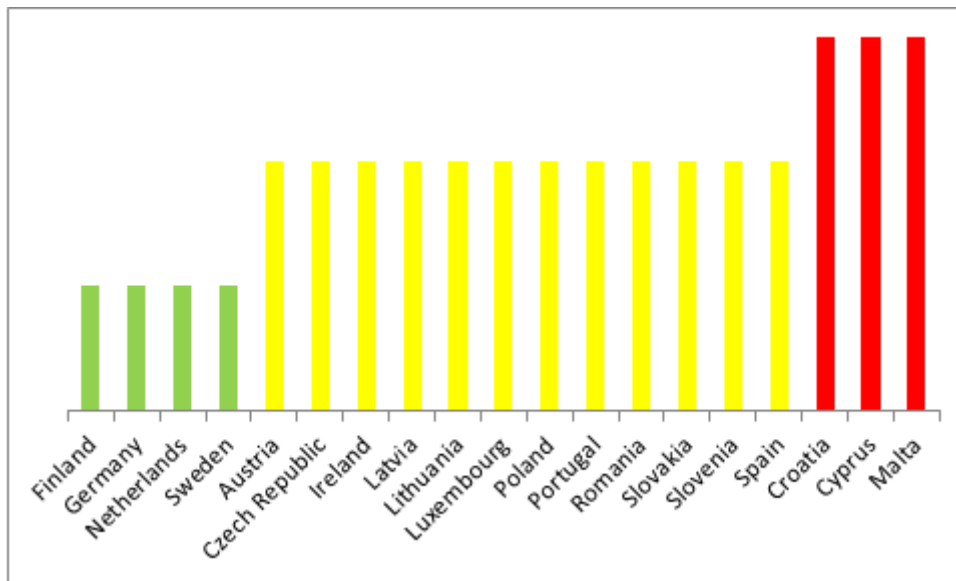
#### ***3.1 Media literacy policies in the EU***

The MPM2015 started the assessment with examining the broader question of media literacy policy. The national experts evaluated the availability and quality of media literacy policy in their country. The experts had three answer options representing low, medium and high risk for media pluralism:

- Low risk: Well developed policy. There is already a strong tradition of policymaking in this area. The existing measures are coherent and up to date with the latest societal changes.
- Medium risk: Underdeveloped policy. The existing policies are only nascent and the measures taken are fragmented.
- High risk: No policy. There are no steps taken in the development of any policy measures.

The results showed that a large majority of countries have no or underdeveloped media literacy policy. Only four countries (Germany, Netherlands, Finland, and Sweden) have well-developed media literacy policies, while three countries (Croatia, Cyprus, and Malta) have no relevant policy at all (see Figure 1).

**Figure 1. MPM2015 results on media literacy policy (from low to high risk)**



The availability of media literacy policies does not seem to be random. A closer analysis shows that countries with similar characteristics display low respectively high risk. We examined the relationship between media literacy policy and a very basic indicator, the median income.<sup>4</sup> The countries with well-developed media literacy policies all have median incomes surpassing the EU:28 average by at least EUR 4,000 (see Table 2). As a case in point, Finland, which has a median income clearly above average, has implemented national guidelines on media literacy, and media literacy is part of both current and future protocols on basic education.<sup>5</sup> On the opposite side of the spectrum, only three countries do not have any media literacy policy (Croatia, Malta, and Cyprus) and these three countries also have a median income below the EU:28 average.

<sup>4</sup> We preferred to adopt the (equivalised net) median income instead than the average income in order to exclude from the analysis the small number of extremely high incomes that are present in some countries.

<sup>5</sup> Sources: Finnish National Board of Education 2004, Grounds of teaching plans for elementary education 2004; Finnish National Board of Education 2014, Grounds of teaching plans for elementary education 2014.

**Table 2. Media literacy policies and income in the MPM2015 countries (EU:19)**

	No Media Literacy Policy	Underdeveloped Media Literacy Policy	Well Developed Media Literacy Policy
<b>Median Income below the average*</b>	CROATIA MALTA CYPRUS	CZECH REPUBLIC LATVIA LITHUANIA POLAND PORTUGAL ROMANIA SLOVAKIA SLOVENIA SPAIN	
<b>Median Income above the average*</b>		IRELAND AUSTRIA LUXEMBOURG	GERMANY FINLAND NETHERLANDS SWEDEN

\* Median income: Equivalised net median income, according to Eurostat, 2014 (for Ireland and Estonia the data is from 2013). Average for EU:28 is EUR 15,775.

At this stage, we cannot offer any explanation but only hypothesize about possible interpretations of this relationship between income and media literacy policies. First, the result might suggest that media literacy policies are still perceived as secondary and immaterial needs that attract investment and political attention only when the political pressure on basic economic issues is less strong. Second, we might conceive media literacy policies as a type of innovation, accepting the (problematic) assumption that wealthy countries tend to be more innovative at the political level. Third, we can suppose that this relationship is mediated by third (unknown) variables, which influences both income and the development of media related policies.

### 3.2 Internet use and digital skills

The 2015 Monitor assessed individual competencies in media literacy by measuring the levels of internet use and digital skills with these two variables:<sup>6</sup>

- I6.2 What is the percentage of weekly Internet users in your country?
- I.6.3 What is the percentage of population that has at least basic digital skills?

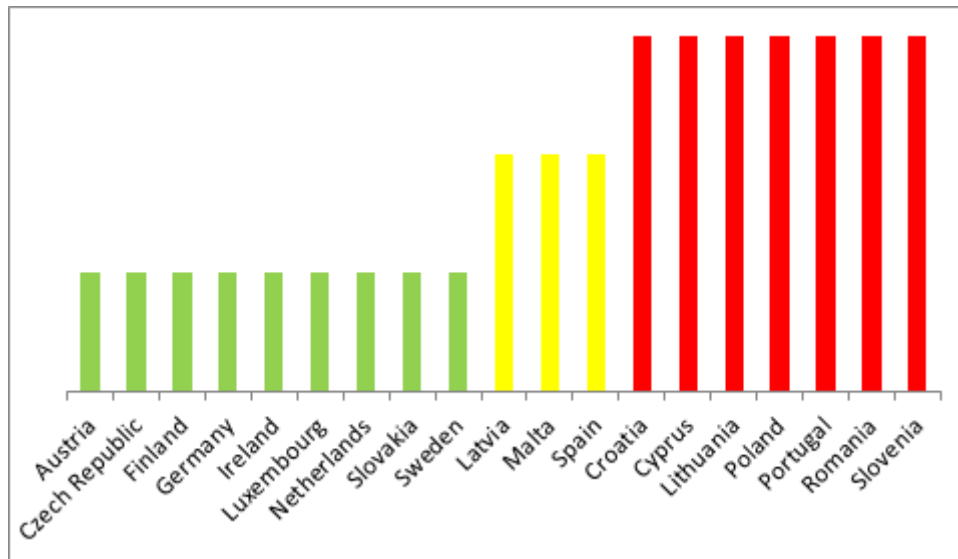
The first variable assesses weekly Internet use (i.e. at least once a week). We also considered measuring daily Internet use (frequent, routine users accessing every day) but decided that weekly Internet use better represents penetration among large sectors of the population and emphasises skills rather than habits. In any case, the two variables on weekly and daily Internet use tend to move together, as was shown by a quick data analysis that we carried out.<sup>7</sup> As illustrated in Figure 2, the results across EU:19 show that there are seven high risk countries (in red in the Figure 2). As a basis

<sup>6</sup> These variables are based on the 2014 data of the Digital Scoreboard Agenda. Individuals using the internet at least once a week in the last 3 months. Source: Eurostat - Community survey on ICT usage in Households and by Individuals.(I6.3) See Annex I for details.

<sup>7</sup> The two series of data are correlated ( $R^2=0,95$ ), with an average of 10% more regular users than frequent users. Italy is the main outlier in the series, and present similar values of frequent and regular users (58 and 59%), indicating that a relatively small percentage of people has the habit of using Internet, but that this population use it on a frequent basis.

for risk thresholds across low/medium/high risk bands we used the EU average of weekly internet (72% in 2013) and the EC target for 2015 (75%).

**Figure 2. MPM2015 results on weekly internet use (from low to high risk)**

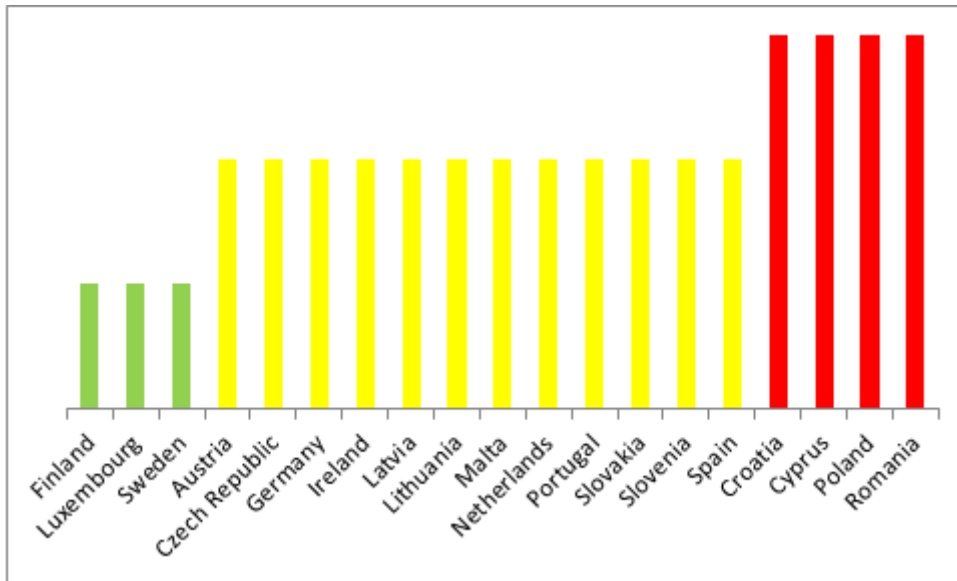


The variable measuring digital skills is a composite variable and consists of four dimensions summarized below (see Annex I for more details). It is worth noting that this composite variable has a significant gap from the point of view of the media literacy definition described in the beginning of the paper (section 2.1): it does not include any direct measure of the ability to interpret or to critically assess online content.

1. **Information skills:** Identify, locate, retrieve, store, organise and analyse digital information, judging its relevance and purpose.
2. **Communication skills:** Communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness.
3. **Problem solving skills:** Identify digital needs and resources, make informed decisions as to which are the most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, update one's own and others' competences.
4. **Software skills for content manipulation:** Create and edit new content (from word processing to images and video); integrate and re-elaborate previous knowledge and content; produce creative expressions, media outputs and programming; deal with and apply intellectual property rights and licences.

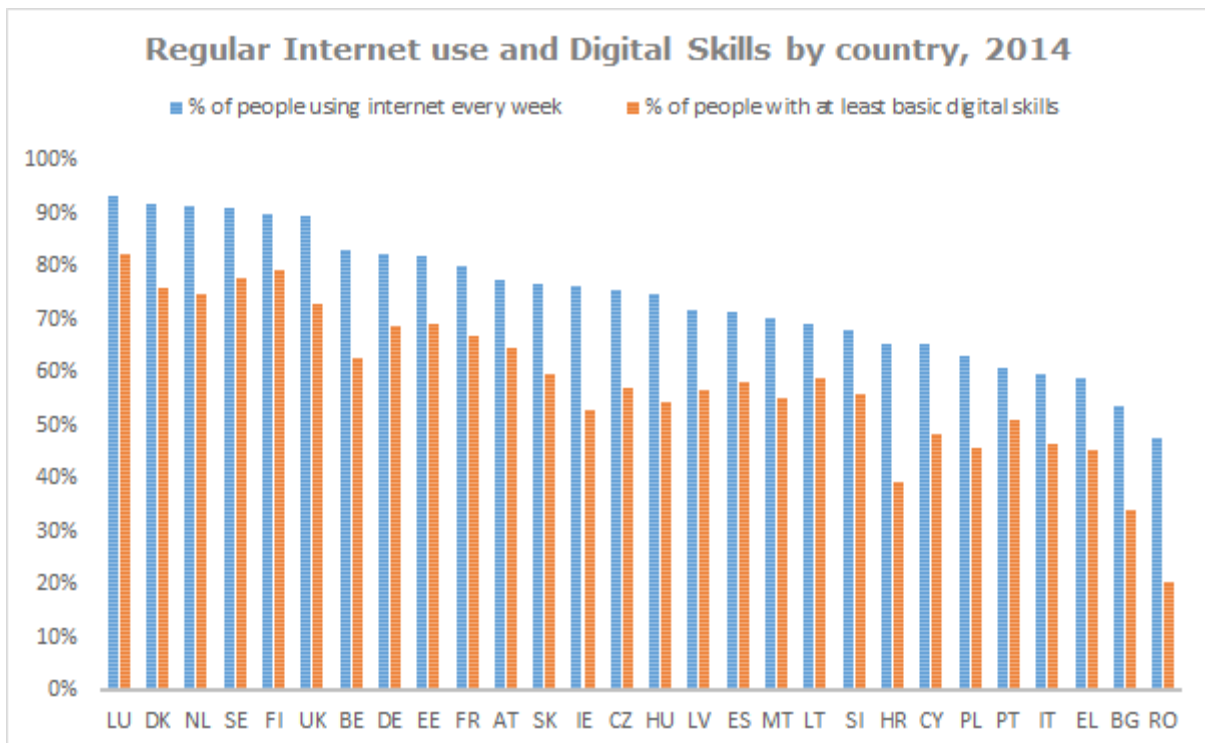
Most countries (12) show medium risk regarding digital skills (see Figure 3.). Finland, Luxembourg and Sweden have the lowest risk, while four countries are clearly at high risk (Croatia, Cyprus, Poland and Romania). The basis for risk thresholds was the EU average of basic or above basic digital skills (53% in 2013).

**Figure 3. MPM2015 results on digital skills (from low to high risk)**



We have made a further data analysis in order to understand if there is any correlation between Internet use and digital skills, a relationship that at the first glance seems to be obvious. In fact, Figure 4 shows that (with some exceptions) these two variables tend to move together. However, the analysis also shows that between circa 10-30% of people regularly use the internet without having basic digital skills.

**Figure 4. Regular Internet Users and Digital Skills by Country**

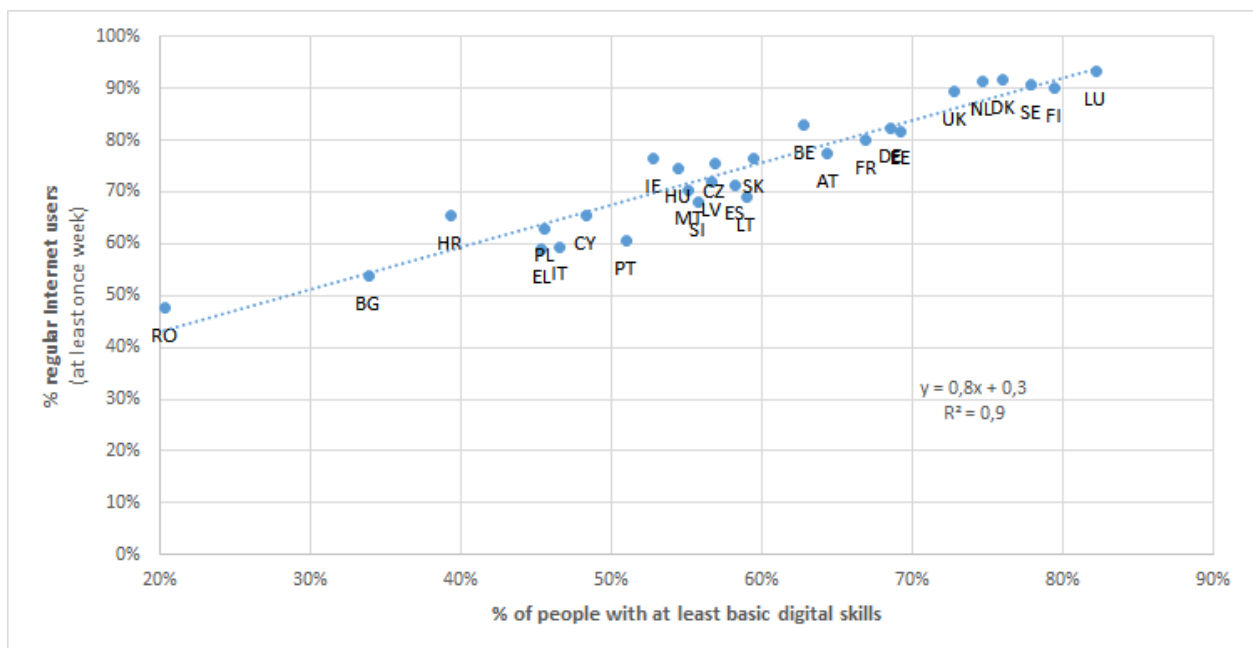


Source of data: Digital Scoreboard Agenda 2014. Indicators: “% of people using internet at least every week” and “% of people with at least basic digital skills”

In order to further explore the discrepancy between the use of the internet and the lack of basic digital skills outlined above, we made a scatter plot of the relationship between these two variables. The line of tendency in Figure 5 shows that regular internet use and digital skills are strongly related, with a change in digital skills explaining more than 90% of change in the regular use of internet ( $R^2=0,91$ ). Of course, we could expect this relationship between two concepts and behaviours that are clearly connected: people with digital skills tend to use Internet more. The variations on the two sides of the line are very small, with some countries (e.g. Croatia and Ireland) using Internet more than what expected according to the skills of their population, and some countries (e.g. Portugal and Italy) are less connected than expected given the level of skills of the population.

According to the tendency found in the graph, we can expect to find a higher number of people using the Internet without having the necessary digital skills in those countries that are in general less digital (see Figure 5). In fact, for the most digitalized countries on the top right end of the line (e.g. Luxembourg and Finland) the values in the two variables are relatively similar, while they tend to differ most in the opposite end of the line (e.g. Romania). However, changes in digital skills can explain only about one third of the variation in the percentage of these “skill-less Internet users”, with other factors not yet explored probably intervening in the relationship.

**Figure 5. Relationship between regular Internet use and percentage of people with at least basic digital skills**



Data Source: Digital Scoreboard Agenda 2014

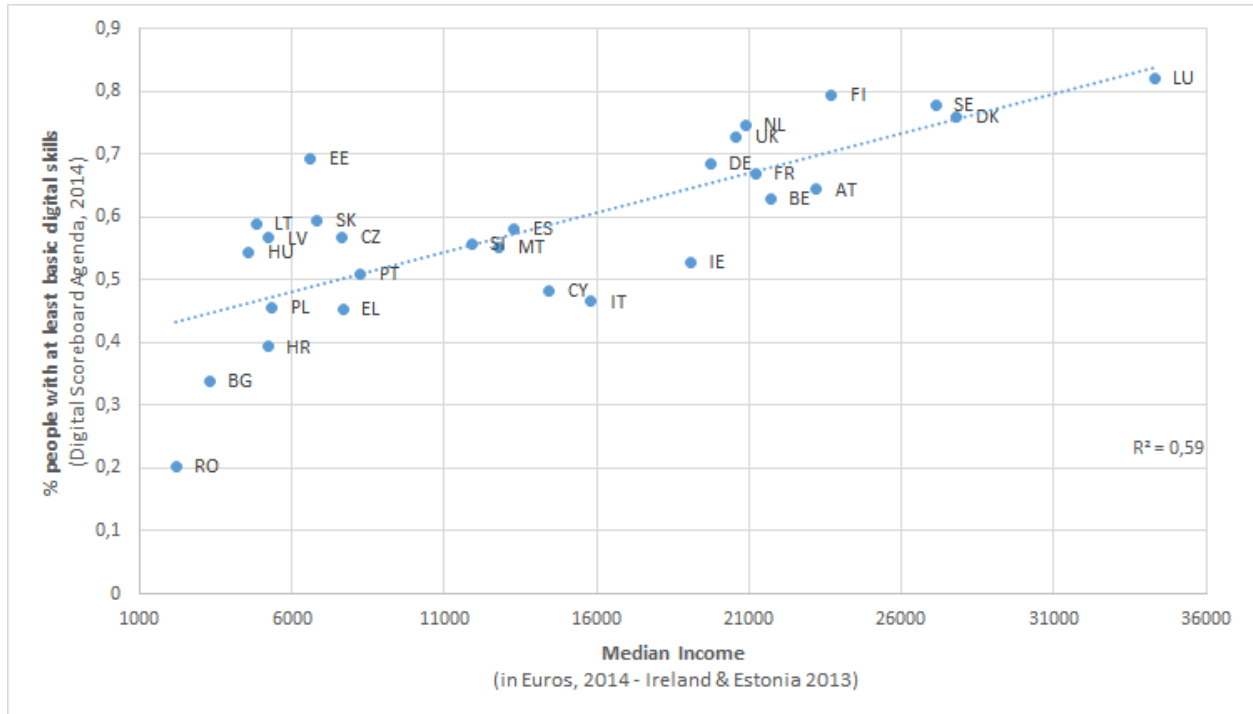
We also explored the relationships between the variable of digital skills and median income (Figure 6) and the variable of Internet use and median income (Figure 7). The graphs in Figure 6 and 7 show that the variation in the median income can explain part of the variation in both digital skills and regular Internet use in the observed countries.<sup>8</sup> In other words, people in high income countries tend to know the digital environment better and use the Internet more. This is, of course, an expected result. This is

<sup>8</sup> ( $R^2=0,6$  in both cases, which means that a variation in median income can explain 60% of the variation )



in line with previous research findings, e.g. those of the Net Monitor that concludes that connectivity trends follow economic development, thereby suggesting that there is not a way to leapfrog.<sup>9</sup>

**Figure 6. Relationship between percentage of people with at least basic digital skills and median income**



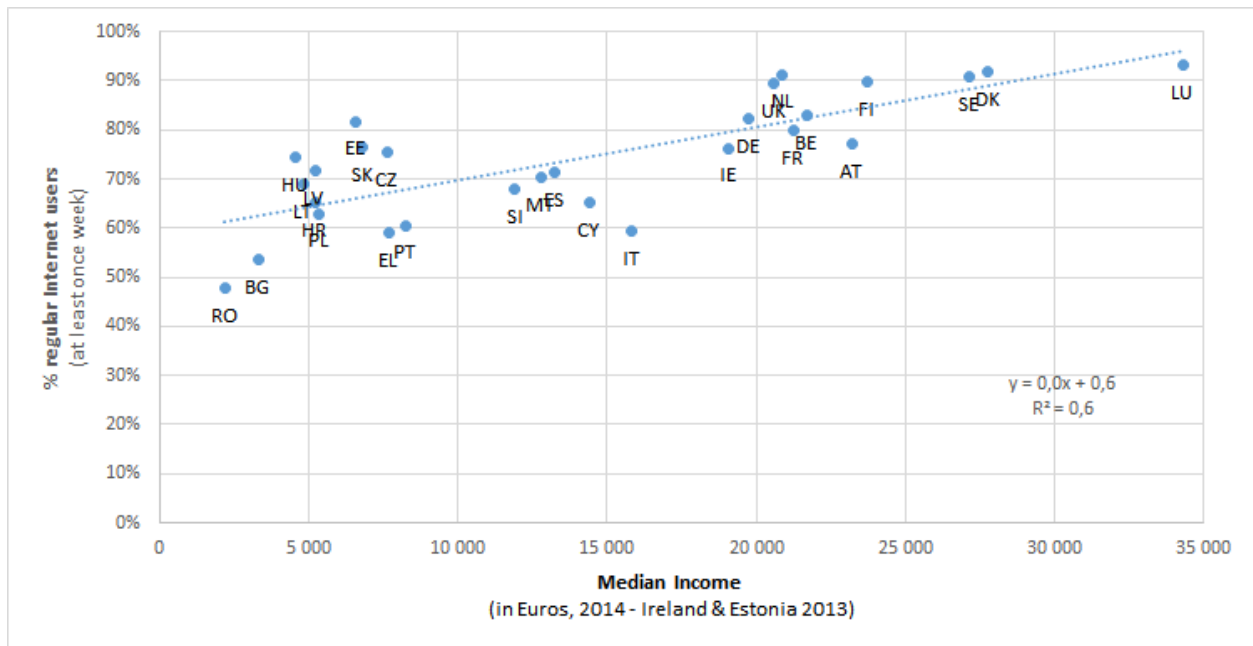
Data Source: Digital Scoreboard Agenda 2014

However, the graphs in Figure 6 and 7 are particularly interesting because they permit to identify some relevant outliers: countries with visibly good (or bad) digital scores, not explained by their median income.<sup>10</sup> The most visible positive outlier in both graphs is Estonia, a low income country where about 70% of the population has at least basic digital skills and where the percentage of regular Internet users is higher than the one of Austria and France. To a lesser extent, Slovakia, Finland, the United Kingdom, the Netherlands, Czech Republic, Hungary and Latvia present results that are better than expected in the two figures. At the same time, the negative outliers (Italy, Cyprus, Romania, Greece, Austria and Bulgaria) score lower than expected by their average income in both graphs. Furthermore, in Ireland and Croatia the use of Internet is much lower than expected.

<sup>9</sup> <https://dashboard.thenetmonitor.org/>

<sup>10</sup> Positive outliers are visibly above the line of tendency, while negative outliers stand visibly below it.

**Figure 7. Relationship between percentage of regular Internet users and median income**



Source: Digital Scoreboard Agenda 2014

#### 4. Outlook: the media literacy indicator in 2016

The MPM media literacy variables have considerable limits, in particular in terms of coverage of relevant issues and the fact that most of them are based on secondary data sources. These limits are mainly due to the constraints of the data collection approach, which is based on country experts carrying out desk-based research or making evaluative assessments to score the variables. The questions asked in the Monitor have to be measurable, comparable across countries and the data has to be available. The main gap of the current variables in terms of coverage is the lack of questions on capacity of individuals to analyse, interpret and produce media messages. To capture these crucial dimensions, we would need to design and carry out an EU-wide survey of individuals. This would require a strong team of qualified media literacy experts, whom would develop relevant variables and methodology, and significant funding to carry out the survey in all EU member states.

Despite the present limitations in terms of resources and methodology, we have taken the media literacy indicator one step further in the 2016 round of the Monitor. First, we have doubled the amount of variables on media literacy from three to six. Four of them are covering environmental factors and two individual competencies (see Table 3). We have kept the question on media literacy policy and added a question on media literacy activities given that, during the implementation of MPM in 2015, several of the expert teams emphasised that media literacy activities are implemented in their country despite the absence of a policy. Carrying out policy measures (activities) defined as trainings, information days and distribution of information packs and generally as education of users, especially young people, parents and teachers on media literacy is also recommended by the European Commission.

**Table 3. Media literacy variables in MPM2016**

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<b>Environmental factors</b>	<b>Individual competencies</b>
1. How would you evaluate the policy on media literacy in your country?	5. What is the percentage of population that has at least basic digital usage skills?
2. To what extent is media literacy present in the education curriculum?	6. What is the percentage of population that has at least basic digital communication skills?
3. To what extent is media literacy present in non-formal education?	
4. How would you evaluate the extent of media literacy activities in your country?	

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We have also added variables on media literacy in the field of education, covering both formal and non-formal education. The presence of media literacy in the compulsory education curriculum is recommended by the European Commission and is part of the provision of key competences for lifelong learning, set out in the Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning.<sup>11</sup>

In terms of individual competencies, we are again assessing digital skills of the general population. This time, the digital skills are given a higher importance in the Monitor by dedicating two variables to their assessment. The composite indicator of skills derived from the Digital Scoreboard Agenda has been split into two key parts: (i) digital usage skills and (ii) digital communication skills. The former contains the measurement of individuals who have basic software skills, information skills and problem solving skills, hence focusing mainly on technical skills and on the ability to retrieve information. The latter measures digital communication skills, emphasising skills needed for exchanging information, participating (in social networks) and sharing content.

The new set of media literacy variables is currently being tested. The data collection for the 2016 Media Pluralism Monitor is ongoing and the result will be available at the end of 2016.

## 5. Conclusions

Media literacy is a key aspect of an accessible and participative media system, and a core element of media pluralism. However, considerable challenges remain in measuring media literacy levels across Europe. The Media Pluralism Monitor, a tool for assessing risks to media pluralism in Europe, is developing variables to evaluate media literacy from a comparative perspective. This paper has discussed the methodological progress to date and presented some of the findings from the application of the Monitor in 2015.

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<sup>11</sup> Introduction of media literacy in the compulsory education curriculum is recommended in the COMMISSION RECOMMENDATION of 20 August 2009 on media literacy in the digital environment for a more competitive audiovisual and content industry and an inclusive knowledge society (2009/625/EC) and is part of the provision of key competences for lifelong learning, set out in the Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning.

The Monitor methodology allows assessing both environmental factors, important for putting media literacy into context, and individual competencies. However, the assessment of individual competencies does not cover media literacy in a broad sense but is limited to digital skills, on which data is available for most of the EU:28. Moreover, the Monitor has a limitation in the sense that it does not cover the capacity to analyse, interpret and produce media messages (on- or offline).

The Monitor results to date show that there are significant contextual risks to media literacy in terms of availability and quality of media literacy policy across many EU member states. The extent of media literacy policy seems correlated with median income. Higher income countries tend to have well-developed media literacy policy, while lower income countries tend to have underdeveloped or no media literacy policy at all. Income also correlates with individuals' use of the Internet use and with digital skills. People in higher income countries tend to know the digital environment better and use the internet more. However, our analysis also shows that there are both positive and negative outliers, i.e. countries with visibly good or bad digital scores, not explained by their median income.

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**ANNEX I. Internal composition of the I.6.3 digital skills variable**

Digital skills Indicator – overview of the indicator (2015)			
Source: <a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=9979">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=9979</a>			
Data used in the indicator have been collected through the Eurostat European Union Survey on ICT Use in Households and by Individuals.			
Area	Definition in Digital Competence Framework	Monitored behaviours	Levels of information skills
<b>Information skills</b>	<i>Identify, locate, retrieve, store, organise and analyse digital information, judging its relevance and purpose.</i>	• Copied or moved files or folders	Basic: one item
		• Obtained information from public authorities/services' websites	
		• Finding information about goods or services	Above basic: more than one item
		• Reading online news/newspapers/news magazines	
<b>Communication skills</b>	<i>Communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness.</i>	• Sending/receiving emails	Basic: one item
		• Participating in social networks	
		• Telephoning/video calls over the internet	Above basic: more than one item
		• Uploading self-created content to any website to be shared	
<b>Problem solving skills</b>	<i>Identify digital needs and resources, make informed decisions as to which are the most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, update one's own and others' competences.</i>	<b>A – Problem Solving</b>	Basic : one or more items only from A or only from B  Above basic: at least one item from A and B.
		• Transferring files between computers or devices	
		• Connecting and installing devices	
		• Installing a new or replacing an old operating system	
		<b>B – Familiarity with online services</b>	
		• Online purchases (in the last 12m)	
		• Selling online	
• Making an appointment with a practitioner via a website			

		• Internet banking	
<b>Software skills for content manipulation</b>	<i>Create and edit new content (from word processing to images and video); integrate and re-elaborate previous knowledge and content; produce creative expressions, media outputs and programming; deal with and apply intellectual property rights and licences.</i>	<b>A – Basic</b>	Basic : none of the "above basic" from B  Above basic: at least one "above basic" from B
		• Used word processing software	
		• Used spreadsheet software	
		<b>B – Above basic</b>	
		• Created presentation or document integrating text, pictures, tables or charts	
		• Creating websites or blogs	
		• Have written a code in a programming language	

**Overall level of digital skills:**

1. Individuals with **“no” digital skills** are those who:
  - record four “none” (i.e. have no items ticked in any of the four digital competence areas),
  - used the internet more than 3 months ago,
  - or have never used the internet.
2. Individuals with **“low” digital skills**:
  - One or more “none” in 3 domains (no items ticked in one to three domains)
3. Individuals with **“basic” digital skills**:
  - one or more “basic” (but no “none”)
4. Individuals with **“above basic” digital skills**:
  - “above basic” in all 4 domains

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