ATOMIUM CULTURE

BRINGING EUROPE TO THE FOREFRONT

HAVE YOUR SAY . . . ABOUT SCIENCE!

Special Initiative on Citizen Engagement in Science

DER STANDARD EL PAÍS Frankfurter Allgemeine ZEITUNG FÜR DEUTSCHLAND

Il Sole 24 ORE THE IRISH TIMES

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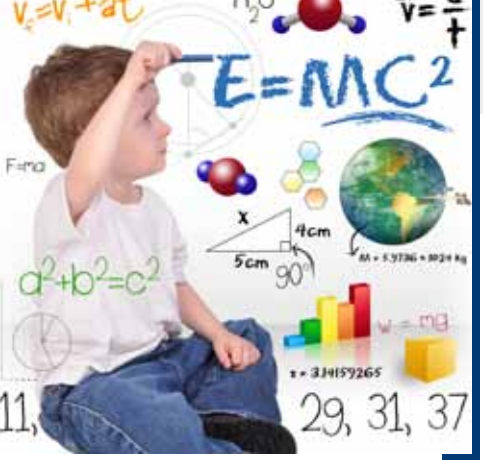


Foreword

Science is not only an issue for scientists: science is an issue for society. Science enables us to understand the world around us and helps us improve the world we live in. Whether we are talking about health, demographic change, the transition to a low-carbon society, or the development of sustainable fisheries or agriculture, science plays a central role.

Through Horizon 2020, the EU's new framework programme for research and innovation, the European Commission is leading by example, by putting the engagement of society at the heart of the research; the concept of Responsible Research and Innovation (RRI) will be embedded in all dimensions of research. We want to engage society from the beginning and throughout the research process.

RRI has been developed to foster the creation of a Research and Innovation policy driven by the needs of society and engaging all societal actors through inclusive, participatory approaches. It stresses the fact that we have a much greater chance of successfully tackling the grand societal challenges if all societal actors are fully engaged in the construction of innovative solutions, products and services.

Horizon 2020 is constructed around societal challenges; public engagement is one of the biggest challenges of this programme.

The Special Initiative for Citizen Engagement in Science "Have your say…about science" has been a welcome pilot project, starting to assess how the media can facilitate a stronger dialogue between science and society.

Media plays a pivotal role as intermediary with the public, and it could support an even stronger direct dialogue between researchers, policymakers and the public in general.

We can and must strengthen this dialogue. We must find ways to engage the public at large in discussions about research and innovation and show how this will support the improvement of our society. We must listen to people and take note when framing research and innovation policy.

The high level of interest and participation of citizens in the initiative "Have your say… about science" shows the potential of this innovative approach to engaging with society.

The results of the initiative give an insight into the opinions and concerns of citizens on questions relating to Responsible Research and Innovation, and could be useful contributions to discussions on the future orientations of the Science With And For Society programme of Horizon 2020.

Máire Geoghegan-Quinn

Máire Geoghegan-Quinn

European Commissioner for Research, Innovation and Science

EXECUTIVE SUMMARY

The Special Initiative on Citizen Engagement in Science saw the participation of over fifty thousand Europeans who contributed with their opinions and concerns, responding to six questionnaires relating to the relationship between science and society as outlined in the framework for Responsible Research and Innovation (RRI).

Questionnaires on science education, gender, ethics, open access, engagement and governance were launched to engage the public at large in debates on these questions and to understand the main needs and concerns of society.

The questions were developed in collaboration with the European institutions, journalists and the scientific world in order to include relevant themes, scientifically valid concerns and questions that could spark a real debate among the public at large.

So what does the public think about the relationship between science and society? Are they interested in scientific themes? Do they want to have bigger say in science policy?[1]

First of all, it was clear from week 1 that there is a major interest in science among the respondents. Not only did over 90% of the respondents say that they love science and maths but the discussions that followed on the comments section, Twitter and Facebook were among the most active discussions on the online sections of the media partners that week.

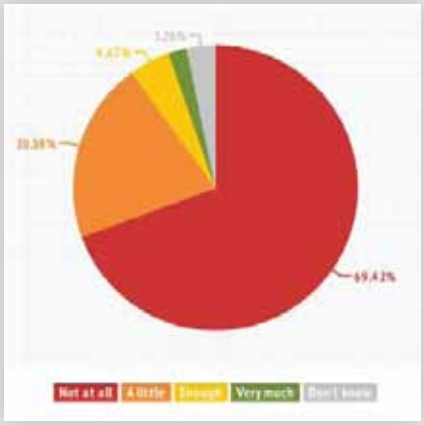
As Lydia Aguirre, Deputy Director of *El País* said: "Considering all the relevant information we are offering on our site (politics & policy, economy, corruption scandals, the terrible Boston attack, etc.) that directly compete for the attention of our reader/users, I think we can pretty much agree that people are very interested in science issues".

Over 70% of participants feel that science should be guided by the needs and concerns of society in line with the vision of Horizon 2020 of putting the grand challenges at the centre of the research agenda.

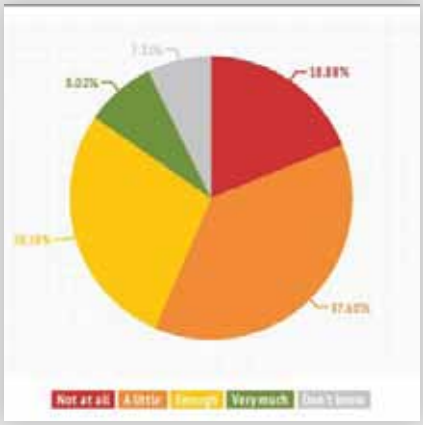
However, the respondents seemed less enthusiastic about the way they feel that politicians and scientists are actually listening to of the opinion and concerns of the public when setting research agendas. Over 70% felt that politicians did not listen to public opinion at all and over 20% thought they only listened a little. Trust in scientists is slightly higher but still, over 50% feel that scientists do not listen or listen only a little to public opinion about science.

[1] *It is important to note that this is NOT a scientific survey or poll where respondents are carefully monitored to represent the perspective of society as a whole. The respondents to the survey are the readers of the media partners engaged in the platform, some of the most authoritative European newspapers.*

Graph 6.4: Do you think that policy makers listen to public opinion about science?



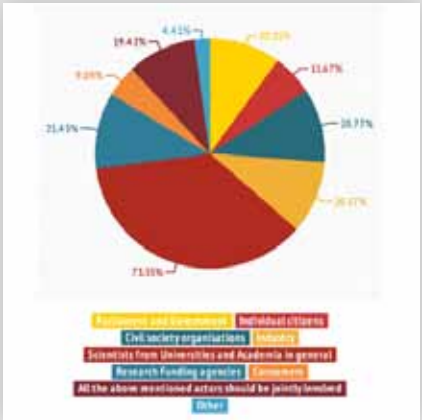
Graph 6.5: Do you think researchers listen to public opinion about science?



Over 50% of respondents felt that citizens should be systematically consulted for their views about science and innovation.

The results show that the impression among the public at large is that science policy is decided by research funding agencies, parliament/government and industry. Less that 5% felt that citizens and CSOs had any influence in deciding science policy.

Graph 7.5: Who, in your opinion, should be deciding research policy?

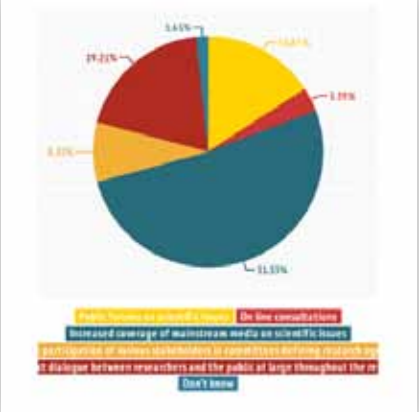


Ideally, the respondents showed openness for several actors playing an important role in setting the science agenda with scientists having the biggest voice and citizens and citizen society organisations (CSOs) being among the actors whose role should increase most.

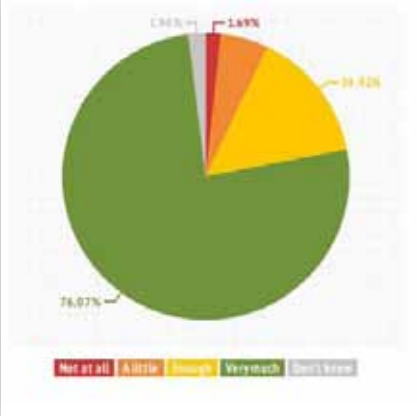
So how can we increase the involvement of citizens in shaping science policy? The Directorate-General for Research and Innovation of the European Commission has been working on these issues for some time.

In 2001, the «Science and Society» Action Plan was launched to set out a common strategy to make a better connection between science and European citizens. In 2007, under the 7th Framework Programme for Research and Technological

Graph 6.3: What do you think are the most significant ways in which science can engage with society?



Graph 6.6: Do you think science and technology provide added opportunities for sharing ideas and learning?



Development (FP7), «Science and Society» became «Science in Society (SiS)» with the main objective to foster public engagement and a sustained two-way dialogue between science and civil society. In Horizon 2020, the focus of SiS has been to develop a concept responding to the aspirations and ambitions of European citizens: a framework for Responsible Research and Innovation (RRI).

The pilot project showed that the public at large would like to see a stronger engagement with the mainstream media. Over 50% of respondents think that the mainstream media have a crucial role to play in bridging the gap that exists between science and society.

It is clear that people feel that science and technology provide added opportunities for sharing ideas and learning. The special initiative shows that people are interested and want to be engaged in these debates and would like that their opinions help to influence the research agenda.

The pilot project has received a lot of positive feedback (please see the Chapter "Evaluation of project", p. 53) and has shown that novel ways of cooperation between policy makers, media and researchers can create active debates and conversations with citizens on important questions relating to the research agenda.

In this report you will find the results of the individual questionnaires and the concerns of the public at large in reference to the individual themes: science education, gender, ethics, open access, engagement and governance.

ABOUT

INTRODUCTION

"Citizens have a right—and are expected—to be involved in the crucial decisions of what their futures will look like and how science and technology can contribute to its betterment." [1]

As outlined in the framework for Responsible Research and Innovation (RRI), the grand challenges facing society will have a better chance of being tackled if all relevant actors are fully engaged in the co-construction of innovative solutions, products and services. Thus RRI is being developed in order to foster the creation of a research and innovation policy driven by the needs of society and engaging all actors via inclusive participatory approaches.

The Special Initiative on Citizen Engagement in Science promoted by Atomium Culture aimed to assess how media can engage the public at large in a two-way dialogue about science-related issues in order to develop a more participatory way to develop science policy at European level.

The pilot project was developed with *Der Standard*, *El Paìs*, *Frankfurter Allgemeine Zeitung*, *Il Sole 24 Ore* and *The Irish Times* and was launched in 5 European countries (Austria, Germany, Ireland, Italy, Spain) in April and May 2013.

The results of the Initiative were submitted to the European Commission to contribute to the preparation of the topics for the first call of the Horizon 2020 proposals (notably the 'Engagement' part of the Science With And For Society programme).

AIM

The aim of the Special Initiative for Citizen Engagement in Science was threefold:

- To set some key questions to the public at large about the European research priorities and measure the reactions and opinions of the public on these questions;
- To create awareness with the public at large about Horizon 2020 and the European research agenda (notably the 'Engagement' part of the Science With and For Society programme);
- To assess how media can support citizen engagement in questions regarding research and innovation.

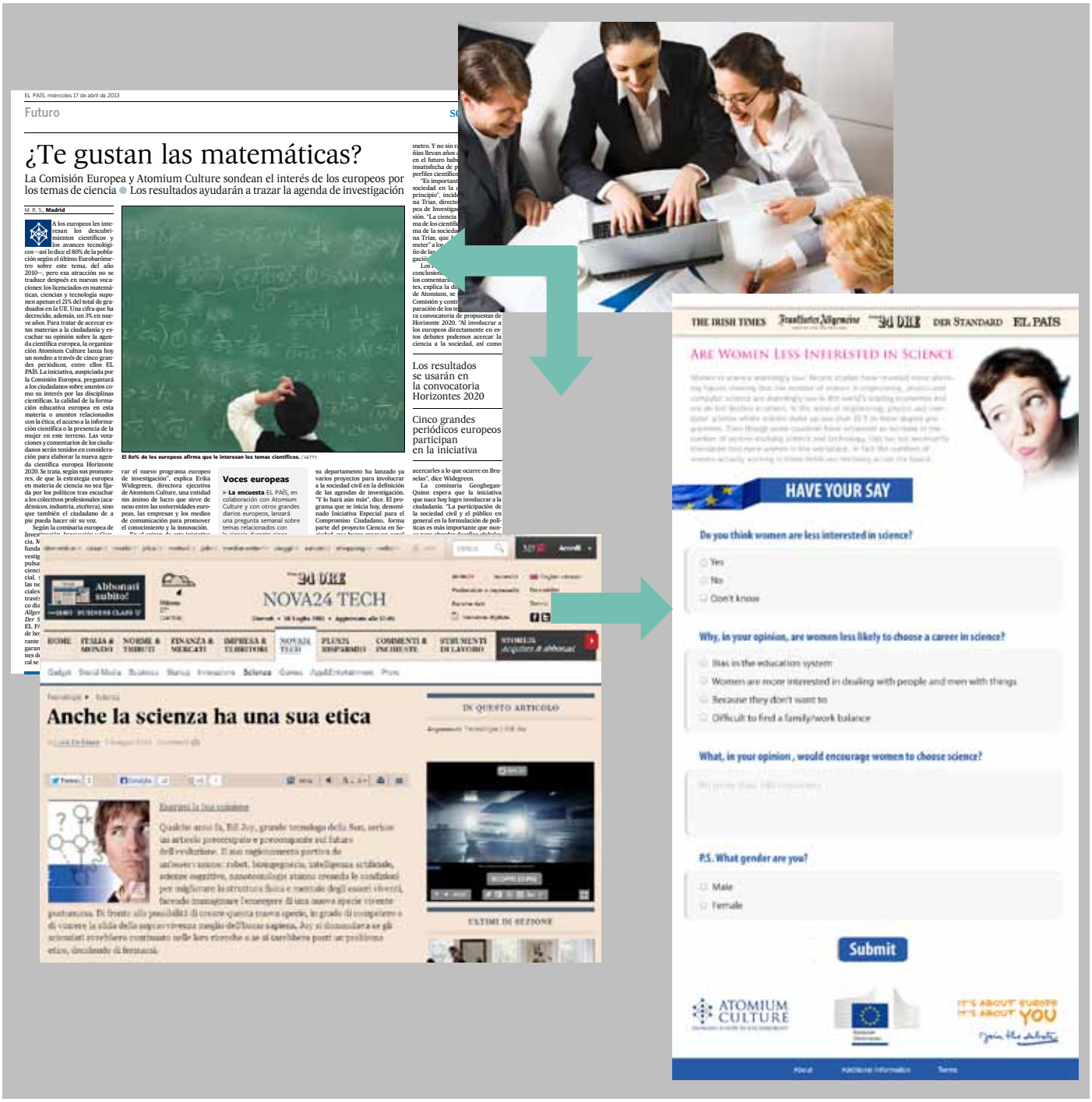
[1] *Report of an Expert Group to the European Commission, "The Role of Community Research Policy in the Knowledge-based Economy", p. 37.*

FORMAT

The initiative ran for six weeks (from week 16–21 of 2013) in both the paper and online editions of the newspapers. Each week assessed one key "question" relating to science in society.

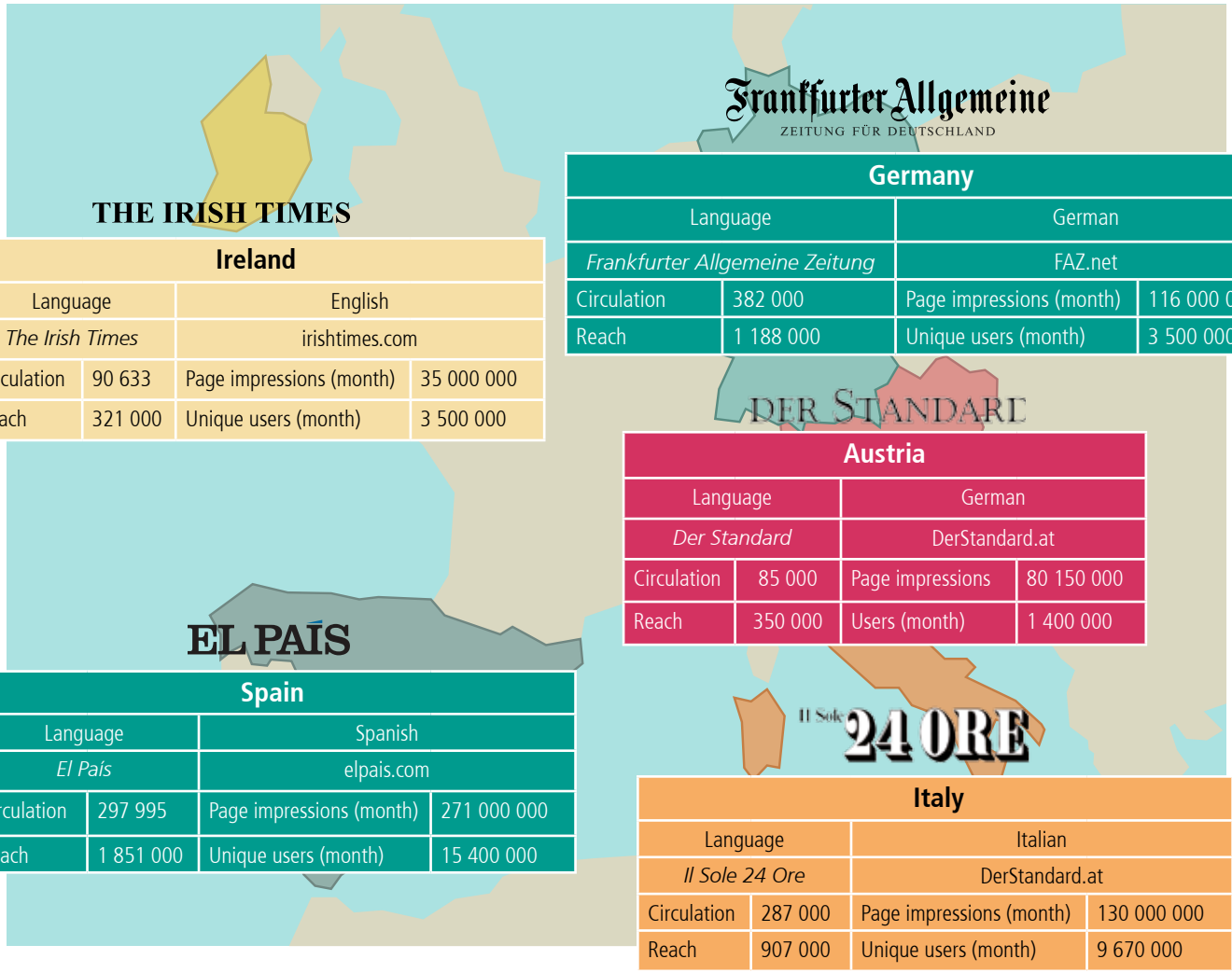
Each question was introduced by:

- An editorial piece on the paper and online edition to introduce the topic of the question;
- A banner on the online edition with the "question" that links to an external window where a poll with a multiple-choice answer panel is present;
- A comment session for the persons who want to engage further in the debate.



MEDIA PARTNERS

The Pilot Project of the Special Initiative for Citizen Engagement in Science ran in five European countries with the cooperation of five leading European newspapers.



THE IRISH TIMES

Ireland			
Language		English	
The Irish Times		irishtimes.com	
Circulation	90 633	Page impressions (month)	35 000 000
Reach	321 000	Unique users (month)	3 500 000

Frankfurter Allgemeine
ZEITUNG FÜR DEUTSCHLAND

Germany			
Language		German	
Frankfurter Allgemeine Zeitung		FAZ.net	
Circulation	382 000	Page impressions (month)	116 000 000
Reach	1 188 000	Unique users (month)	3 500 000

DER STANDARD

Austria			
Language		German	
Der Standard		DerStandard.at	
Circulation	85 000	Page impressions	80 150 000
Reach	350 000	Users (month)	1 400 000

EL PAÍS

Spain			
Language		Spanish	
El País		elpais.com	
Circulation	297 995	Page impressions (month)	271 000 000
Reach	1 851 000	Unique users (month)	15 400 000

Il Sole 24 ORE

Italy			
Language		Italian	
Il Sole 24 Ore		DerStandard.at	
Circulation	287 000	Page impressions (month)	130 000 000
Reach	907 000	Unique users (month)	9 670 000

AUSTRIA – DER STANDARD

Der Standard is an Austrian national daily newspaper that is published in Vienna.

Der Standard is one of Austria's best-selling quality newspapers and is readily quoted by foreign media when an opinion from the Austrian press is required.

Der Standard is published in accordance with the honour code of the Austrian press (which sets rules on matters such as a transparent division between news and comment and the right to privacy). The paper's general editorial stance could be described as socially liberal and most of its regular columnists also tend to this position, although guest writers come from a wide variety of political positions.

GERMANY – FRANKFURTER ALLGEMEINE ZEITUNG

Frankfurter Allgemeine Zeitung (FAZ) is a German daily published in Frankfurt. Founded in 1949, this major conservative-liberal daily is a reference tool in business circles and among intellectuals, who appreciate its literary supplement, *Feuilleton*.

The *FAZ* is the German daily with the widest circulation abroad and one of the world's largest networks of correspondents, which makes it by and large independent from the press agencies.

The *FAZ* promotes an image of making its readers think. The truth is stated to be sacred to the *FAZ*, so care is taken to clearly label news reports and comments as such. Its political orientation is classical liberal with an occasional support for conservative views by providing a forum to commentators with different opinions. In particular, the *Feuilleton* and some sections of the Sunday edition cannot be said to be specifically conservative or liberal at all.

IRELAND – THE IRISH TIMES

The Irish Times is an Irish daily published in Dublin. *The Irish Times* is considered to be Ireland's newspaper of record.

Though formed as a Protestant nationalist paper, within two decades and under new owners it had become the voice of Irish unionism. It is no longer considered a unionist paper; it is generally perceived as being politically liberal and progressive, as well as being centre-right on economic issues.

ITALY – IL SOLE 24 ORE

Il Sole 24 Ore is an Italian daily published in Milan. Italy's reference business daily was founded in 1965 after the merging of *Il Sole* (founded in 1865) and *24 Ore* (1946).

It is the third national daily, with circulation boosted by an increase in publication of non-economy related articles. Its Sunday culture supplement *Domenica* pulls in an intellectual readership that normally shows little interest for economics.

Il Sole 24 Ore's website is more like a portal: in addition to a selection of articles published in the print edition, it features a wide range of services related to the stock exchange and the economy, most of which are subscriber-only.

SPAIN – EL PAÍS

El País is the world's leading daily newspaper in Spanish and a byword for quality in the field of journalism in the Hispano-American world. It was first published on May 4, 1976, and its founders envisaged it as an independent quality, European-oriented newspaper, and an advocate of multiparty democracy.

Today, the newspaper remains true to its founding principles, while it continues to adapt to the changing times. *El País* can be read today in its print version, on the Internet, in any electronic format and through social networks.

COMMITTEES

The Pilot Project on Citizen Engagement in Science was supported by two Committees that helped to develop the content together with the editorial team of Atomium Culture and the Science in Society Unit of the European Commission.

The aim of the committees was to represent the different perspectives of the actors engaged.

The committees created for the project were:

- The Editorial Committee
- The Quality Reference Group

THE EDITORIAL COMMITTEE

Ms Lydia Aguirre

***Deputy Director of* El País**

Lydia is a Spanish journalist with over 20 years of experience as reporter and editor. For the last eight years she has been leading teams and managing newsrooms both in print and digital platforms.

Mr Dick Ahlstrom

***Science Editor of* The Irish Times**

In 1997 Dick became Science Editor of *The Irish Times*. His weekly "Science Today" feature displays his unique gift for presenting complex scientific research and technological developments in a form that can be clearly understood by a wide newspaper audience.

Mr Luca De Biase

***Science Editor of* Il Sole 24Ore**

Mr Luca De Biase is innovation editor at *Il Sole 24 Ore* and *Nòva24*. He is new media and journalism visiting professor at Iulm in Milan; visiting professor at Sciences Po, Paris; Chairman of Ahref Foundation; Scientific Director at Digital Accademia.

Mr Joachim Mueller-Jung

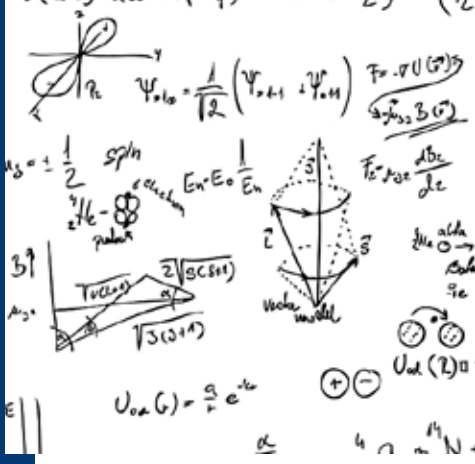
***Chief Science Editor of* Frankfurter Allgemeine Zeitung**

Since 2003 Joachim is Head of the Science Department at the *Frankfurter Allgemeine Zeitung (FAZ)*, Frankfurt. Since 1995 he has been the science editor at the *FAZ*.

Mr Klaus Taschwer

***Science Editor of* Der Standard**

Klaus Taschwer is currently the science editor of the Austrian newspaper *Der Standard*. He is also the founding editor of the science magazine *heureka!* Taschwer studied sociology (of science), political science and philosophy in Vienna.



THE QUALITY REFERENCE GROUP

The Quality Reference Group brings together twelve experts in the different topics treated in the surveys of the Special Initiative. The members of the Quality Reference Group have supported the preparation of the questions by evaluating the initial suggestions and coming with input and comments how to improve the content in light of the current debates.

Science Education

Mr. Norbert Steinhaus, *Science Shops*

Norbert Steinhaus joined the Bonn Science Shop in 1988 and became a Science Shop board member in 1990. For more than 12 years he has cooperated in international projects on training and mentoring Science Shops (TRAMS), citizen participation in science and technology (CIPAST) or Public Engagement in Research and Researchers Engaging with Society (PERARES) and coordinated an educational European project for primary schools and kindergartens, and SOUFFLEARNING, a project for the transfer of innovation in training staff of SMEs. Since the end of 2007 he is the coordinator and international contact point of LIVING KNOWLEDGE, the international Science Shop network. Future activities will focus on European co-operation on Responsible Research and Innovation.

Mr. Hans van der Loo, *Advisor to President of WBCSD*

Advisor to the President of the World Business Council for Sustainable Development. Expert on systemic risks and global resilience; advocate of strengthening EU Talent Pipeline Development. Over 30 years international experience; former Vice President EU Liaison for Royal Dutch Shell. Coalition builder & storyteller on future, energy and sustainability matters. Lecturer at World Economic Forum, IMD and Nyenrode University.

Gender

Prof. Martina Schraudner, *Fraunhofer-Gesellschaft and the Technical University Berlin*

Prof. Schraudner is head of the department of Gender and Diversity in Organisations at the Institute for Machine Tools and Factory Management of the Technische Universität Berlin. Her research currently focuses on the integration of different perspectives in the innovation process already in very early stages of research planning. Another field of her work is innovative research initiatives. Martina Schraudner has served on several innovation committees of the German government. She is also a member of a European Expert Group. Dr. Schraudner, a biologist, became Professor at the Technische Universität Berlin in 2008. Up to now, she works at the Fraunhofer Headquarter in the field of strategic research planning.

Prof. Els Rommes, *Radboud University Nijmegen*

Dr. Els Rommes is assistant Professor at the Institute for Gender Studies, Radboud University Nijmegen and guest professor at the Rhein-Waal University of Applied Sciences. Her research and publication areas include gendered design and use of ICTs, representations of Science, Engineering and Technology in the media and teenagers' professional choices. She is (co)author of the books '*Gender Scripts and the Internet; The Design and Use of Amsterdam's Digital City*' (2002); '*Gender Perspectives on Information Society Technology*' (2007); and '*Technologies of Inclusion; Bridging the Gender Gap in the Information Society*' (2011).

Ethics

Dr. David Smith, *Royal College of Surgeons in Ireland*

David Smith is Associate Professor of Health Care Ethics in Royal College of Surgeons in Ireland and Director of the MSc in Health Care Ethics and Law in RCSI and RCSI Bahrain. He lectures on Health Care Ethics in Trinity College Dublin, University College Dublin, the Royal College of Physicians of Ireland and Hibernia College. He is an Ethics Consultant to a number of Healthcare Systems in Ireland. He was a member of the Irish Council for Bioethics. He is a member of the National Advisory Committee on Bioethics Ethics and the National Council of the Forum on End of Life in Ireland. He is also a member of a number of Research Ethics Committees in Ireland.

Prof. Johannes Rath, *University of Vienna*

Dr. Johannes Rath is head of the Central Laboratory at the the Life Science Faculty of the University of Vienna. His academic interests and lectures focus on ethics, safety and security issues. He has chaired international groups of experts carrying out ethics reviews and audits of research at the European level. He was chairman and member of several European working groups developing guidance documents on research ethics. Johannes has served as ethics advisor and member of ethics advisory groups to a number of European research undertakings. Previously, Johannes was working for the United Nations on international disarmament and still is actively engaged in this issue by focusing on the role of civil society and ethics in supporting non-proliferation of weapons of mass destruction. He holds academic degrees in molecular biology, law, toxicology and chemistry.

Open Access

Niamh Brennan, *Trinity College Dublin*

Niamh Brennan is Programme Manager for Research Informatics in Trinity College Library Dublin. Niamh is a member of several national and international groups working on open access to research outputs and enabling their improved reporting, retrieval and evaluation. She is a member of the management councils of two key Irish journals in economics and social sciences and has partnered in a number of research projects in digital humanities, international development and social sciences. Niamh coordinates a national sectoral project in Ireland, funded by the HEA and managed by the IUA, which develops research reporting standards and research evaluation methodologies.

Natalia Manola, *University of Athens, OpenAIRE*

Natalia is a Senior Software Engineer holding a B.Sc. in Physics from the University of Athens, Greece, and an M.Sc. in Electrical and Computer Engineering from the University of Wisconsin at Madison, USA. The systems she has designed and implemented include biotechnology and genetic applications, embedded financial monitoring systems, heterogeneous data integration systems and end-user personalized functionalities on digital libraries. She is currently the project manager of OpenAIRE, and has participated and technically managed several R&D projects (DRIVER & DRIVER-II, ESPAS, CHESS) funded by the European Union or by the national government.

Engagement

Prof. Jean-Pierre Alix, *CNRS*

Jean-Pierre ALIX has been the Executive of the 'Science et société en mutation' Program in CNRS from 2006 to 2010, and is a member of the 'Conseil Supérieur de la Recherche et de la Technologie' (from 2004). He graduated in economy, from HEC School and from the University of Paris. He was an Advisor to the Minister of education and research for research policy (1995–1997). Since 1998, his main interest has focused on the relations between science and society, due to the regular decrease of opinion trust in science and its applications. J.P. Alix has organised European events dedicated to this topic (EU French presidency), has published workshops dedicated to SiS, in OECD-Global Science Forum and in the European Science Foundation (ESF).

Alexander Gerber, *German Research Centre for Science & Innovation Communication*

Alexander Gerber is Managing Director of the German Research Center for Science & Innovation Communication (INNOKOMM). He is member of the Governing Board of Euroscience, chair of its Editorial Board, member of the ESOF Supervisory Board, and the Working Group on Science Communication. He also chairs the Stakeholders Assembly of the EU FP7 science communication network "PLACES". Mr. Gerber is member of the Board of Curators of the German Association of Specialised Journalists (DFJV) and of the Advisory Board of the Hightech Press Club (HPC), as well as General Secretary of the German Association for Science and Technolgy Publishing (TELI).

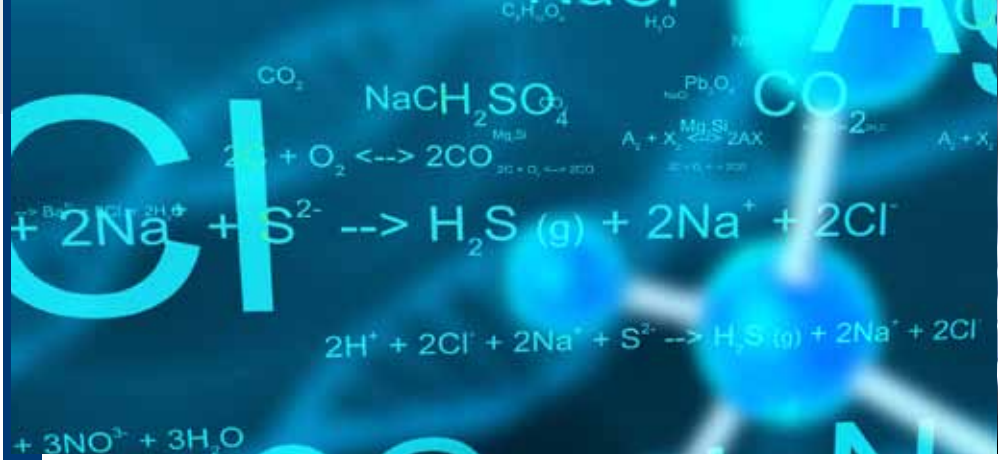
Governance

Christopher Coenen, *Karlsruhe Institute of Technology*

Christopher Coenen is a senior researcher at the Institute for Technology Assessment and Systems Analysis within Karlsruhe Institute of Technology. As team member or project leader, he has conducted more than 15 research projects on behalf of parliaments, the EC, and other institutions. He is coordinator of an EC-funded Mobilisation and Mutual Learning Action Plan on synthetic biology and editor of the journal 'NanoEthics'. His recent co-authored publications include, "Synthetic genomics and synthetic biology applications between hopes and concerns" (in *Current Genomics*), "Biocybernetic adaptation and privacy" (in 'Innovation'), and "National ethics advisory bodies in the emerging landscape of responsible research and innovation" (in *NanoEthics*).

Dr. Rinie van Est, *Rathenau Institute*

Rinie van Est joined the Rathenau Institute in August 1997. He is responsible for identifying new developments at the convergence of science, technology, politics and society, with a particular focus on the emerging technologies such as nanotechnology, biotechnology, information technology and cognitive science. The combination of these disciplines, known as the 'NBIC convergence', is likely to bring about a new technological 'wave', reshaping our future with major developments such as synthetic biology, Ambient Intelligence and virtual worlds. Rinie also devotes attention to the complex issues involved in sustainable energy provision.

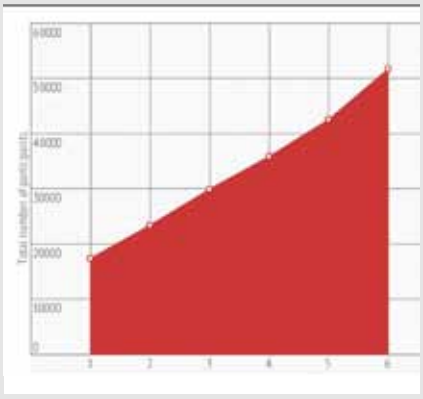


OUTCOMES

PARTICIPATION

The special initiative saw over fifty thousand Europeans give their opinions and contribute with their views throughout the six weeks the initiative was running.

Graph 1.1: Total number of participants



It is important to note that for all five media partners, the initiative was launched in both the paper and online editions with editorials running all six weeks (to access the editorials, please see Annex 1).

The first week saw the largest number of participants, with over fifteen thousand respondents. The very high number of respondents this first week was not only dependent on the question but the clear, additional "news-factor" that the media partners gave the launch of the initiative.

This can also be noted in the spin-off discussions that were created on the official platform of the initiative, the newspaper comments sections, Facebook and Twitter. During the week of the launch of the initiative, in Spain alone over five hundred comments were given, with nearly one thousand Facebook posts and six hundred tweets from Twitter users to forward the article, which created an active debate on the issue. More details on the content of the debates are outlined in the chapters dedicated to each section.

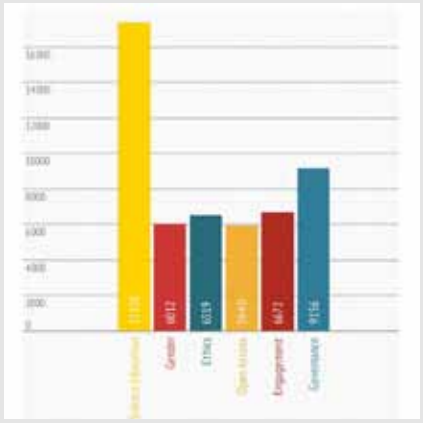
When looking at participation, it is important to note that there were several public holidays during the six weeks when the project ran, from week 16 (starting the 15th of April) to week 21 (ending on the 26th of May):

- 25 April Liberation Day (Italy)
- 1 May Labour Day (Austria, Germany, Italy, Spain)
- 6 May Early May bank Holiday (Ireland)
- 9 May Europe Day Ascension (Austria, Germany)
- 15 May Madrid holiday (Spain)
- 20 May Whit Monday (Austria, Germany, Italy, Spain)

Although the holidays did not bring any abrupt changes in participation, one should expect that they resulted in a slight decrease in participation.

One important note is that because of these holidays, the publication of the questions regarding Gender and Governance was delayed for two weeks at *Il Sole 24 Ore* (Italy). This also resulted in lower participation.

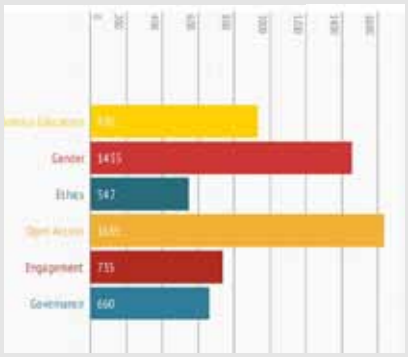
Graph 1.2: Number of participants per questionnaire



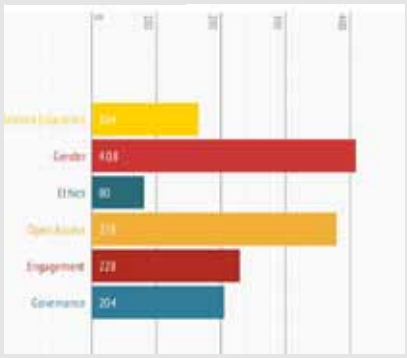
Graph 1.3: Participation per week in each country

A) Austria

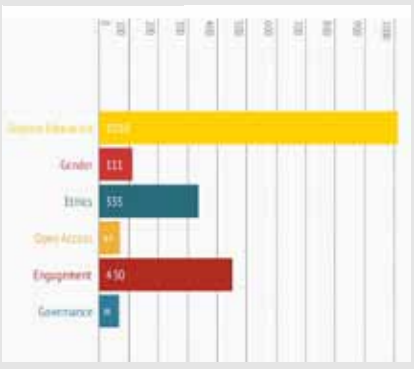
B) Germany



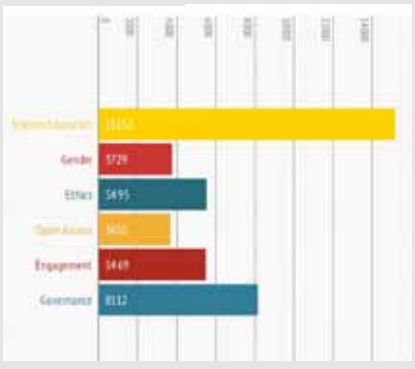
C) Ireland



D) Italy

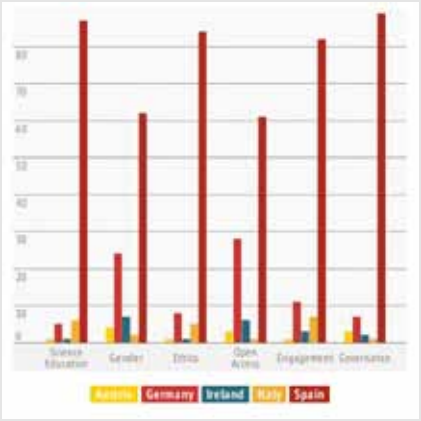


E) Spain



Graph 1.4.1 clearly shows the strong participation in Spain throughout the six weeks compared to the other countries. *El País* is the newspaper with the highest circulation (with a reach of 1 851 000) among the five media partners engaged in the pilot project, although the circulation of *Il Sole 24 Ore* and *Frankfurter Allgemeine Zeitung* is not much lower. So how can we explain this difference? The other four newspapers have a very similar pattern of participation when taking account of circulation (as can be seen in the two graphs below).

Graph 1.4.1: Participation per topic per country (in percentage)

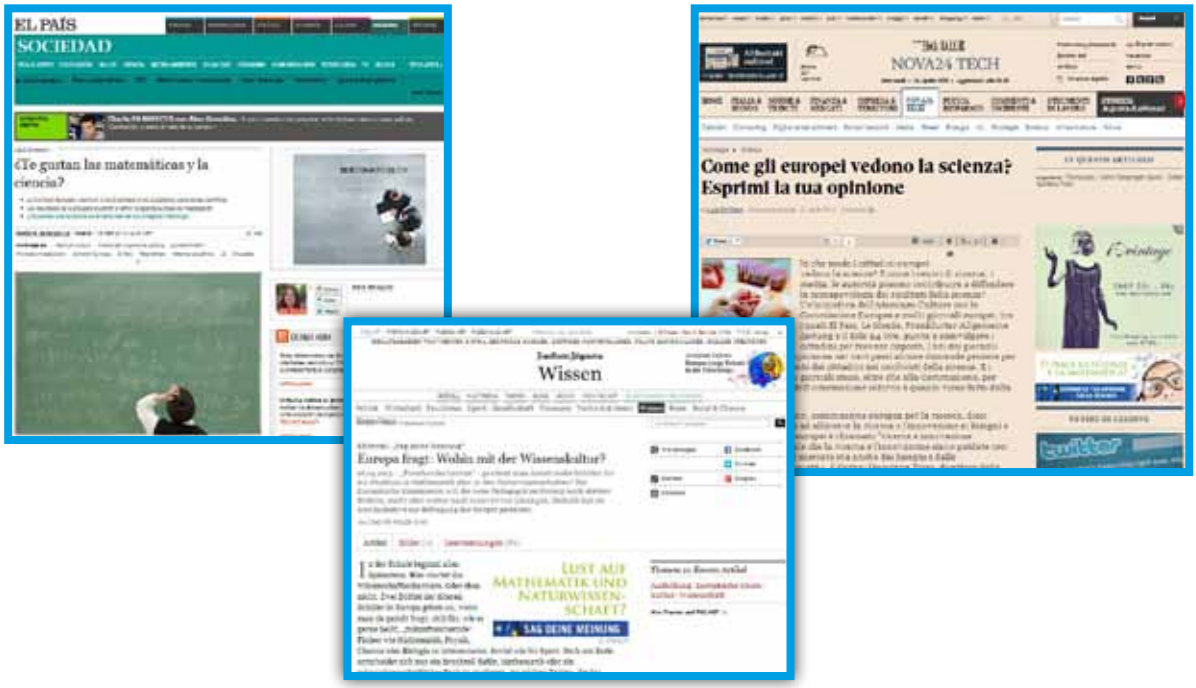


Graph 1.4.2: Participation per topic per country, taking account of circulation

This difference cannot be explained by the different positioning given to the articles and editorials on the newspapers, as can be seen in the image below showing the paper and online editions of the newspaper in week 1.

Editorial on the paper edition of *El País*, *Frankfurter Allgemeine Zeitung* and *Il Sole 24 Ore*.

Image: Editorial on the online editions of *El País*, *Frankfurter Allgemeine Zeitung* and *Il Sole 24 Ore*.



DO YOU LOVE SCIENCE AND MATHS?

HAVE YOUR SAY ...about science!

According to results of the Eurobarometer, young people have a clear interest in science and maths. Yet they are less keen on studying these subjects. Why is this?

Did you enjoy maths and science in school? What could have made these topics more interesting? Are recent developments making these subjects more current?

We want to hear your opinions and ideas.

A) Do you agree that maths and science education is fundamental for preparing our children for tomorrow's world ?

- ○ Yes
- ○ No
- ○ Don't know

B) On a scale from 1–10 (10 is the highest score) how would you evaluate science education in schools today?

C) What is your main concern when it comes to science education?

- ○ Too theoretical
- ○ Not interactive enough
- ○ Teachers make it boring
- ○ Does not take account of different levels of understanding among pupils
- ○ Does not relate to current issues
- ○ Other

D) How much do you think our education system should change to take account of new internet and online tools of learning (from a scale from 1–10, where 1 is "not at all" and 10 is "completely")?

WEEK 1 – SCIENCE EDUCATION

OUTCOMES

The questionnaire on science education launched the Special Initiative for Citizen Engagement in Science. The questionnaire tried to understand what it was that made people love science or not. How does science education affect interest in science and what do citizens think are the biggest concerns within science education?

Over 90% of respondents believe that science education is fundamental in preparing our children for the future. However, the majority feel that there is ample room for improving science education in schools today, with results showing only an average score of 5.2.

The reasons for these results seem to be quite varied. This is valid both for the overall results as well as those divided by country. Further, as can be seen in Graph 2.2 below, we also report what respondents who said they were not interested in science felt about science education (see column "No"). There seems to be several reasons why science education is not considered good enough.

After analysing the nearly five hundred comments and discussions during the week, there seems to be significant idea that science education today is outdated for several reasons:

a) The system gives the **wrong incentives**: given the importance of national exams with clear tangible focus on the number of facts that students learn, teachers are not encouraged to teach pupils through curiosity. Rather, mathematics and science become the learning of facts, formulas and precise terminology to do well in exams.

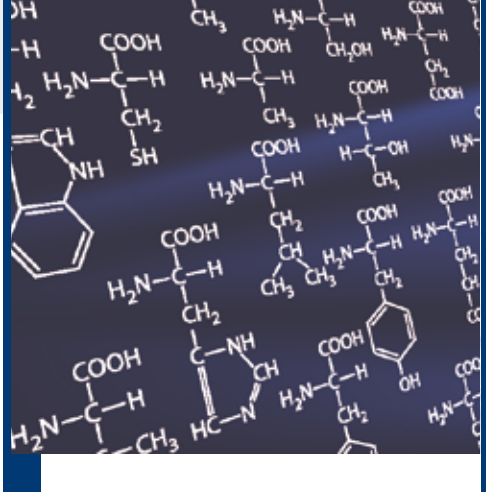
b) **Teachers** have a big impact in raising interest in their pupils. Those who are passionate about the subject and manage to transmit this passion encourage more students to like mathematics and science.

c) Maths and science should be about **learning how to think**. Experiments stand at the basis of science and should be used more in teaching. If you can teach formulas and facts by showing why they are important and how they can be used in real life, pupils will be more engaged and remember the concepts even 5–10 years later.

d) Our current education system does not allow for **interdisciplinary learning**. Curiosity-driven teaching that brings in the different elements and subjects of different issues would show children how all the different subjects come together and are needed in life. Today mathematics and science are so theoretical and people usually only realise later in life how these concepts are actually useful in real life.

From the discussion forum of SpICES

I agree with the opinion relating to the importance of learning how to think and rationalize. Today's school curriculum is only based on information, underestimating the power of teaching how to THINK and RATIONALIZE. I am personally ashamed that my father learned how to think for himself much more (we are talking about the school system over 40 years ago) than I did in the XX century system.



There was a general consensus among the respondents that science education as it stands today has to be re-visited. When asked how much they think the education system should change to take account of new internet and online tools of learning, the average response was 7 out of 10, which shows that there are also ample opportunities to reform science education through new media tools.

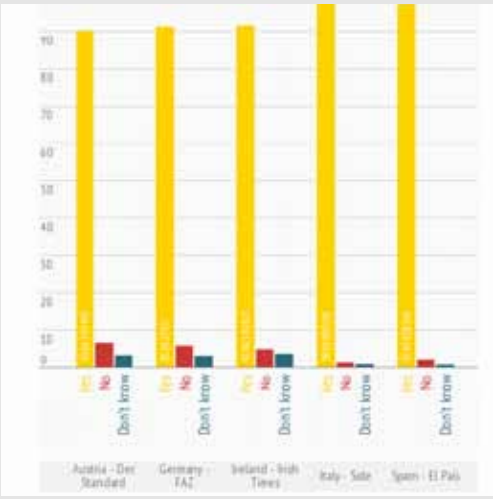
From the discussion forum of SpICES

Potential applications of science and maths can be used as "carrots". My professor of analytic geometry showed how the maths was used to make video games: this got the attention of over half of the class.

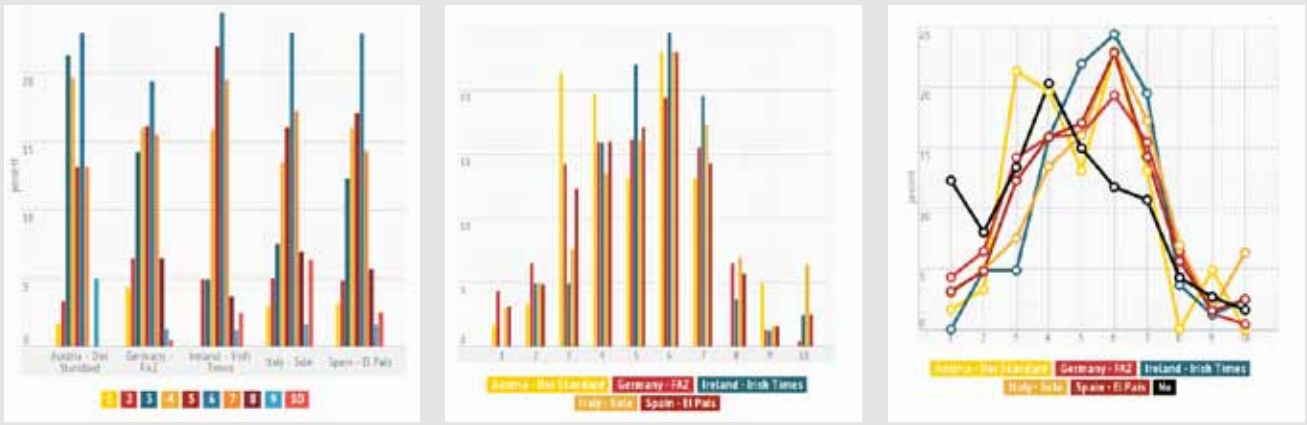
So what would a more interactive, interdisciplinary and curiosity-driven science education look like? Can ICT tools be a catalyst in this change? Should the grand challenges be seen as key themes to tie in different subjects into interdisciplinary teaching?

RESULTS

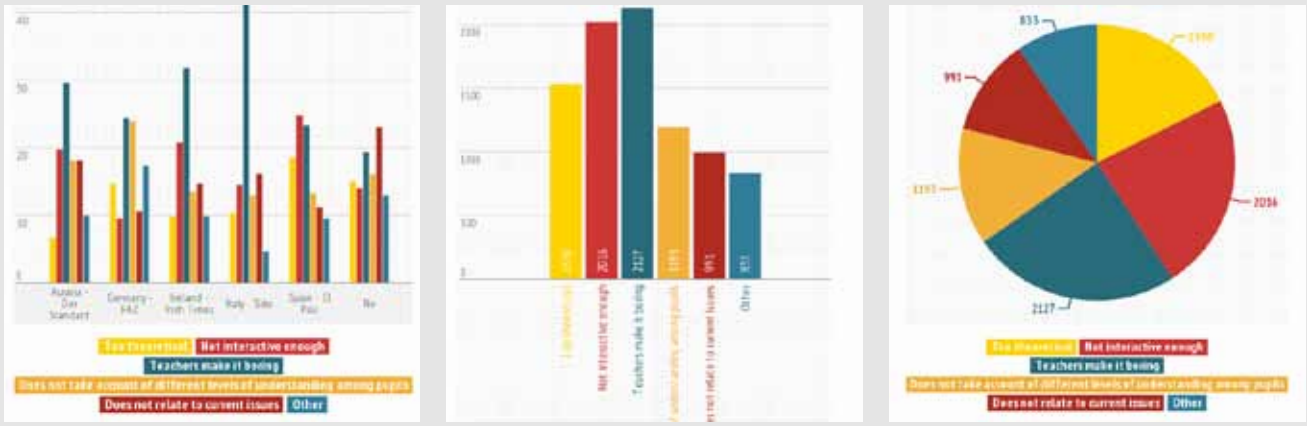
Graph 2.1: Do you agree that maths and science education are fundamental for preparing our children for tomorrow's world?



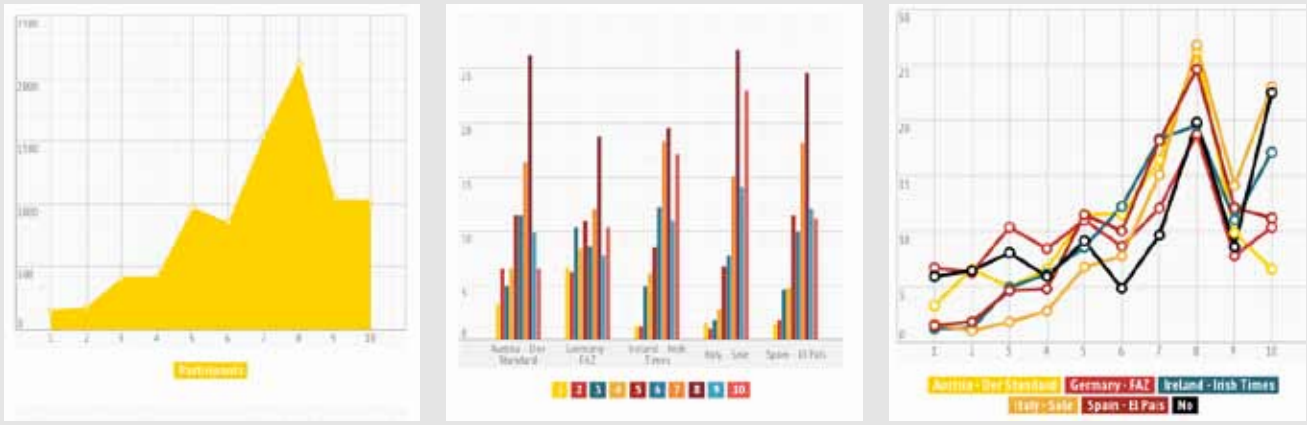
Graph 2.2: On a scale from 1–10 (10 is the highest score) how would you evaluate science education in schools today?



Graph 2.3: What is your main concern when it comes to science education?



Graph 2.4: How much do you think our education system should change to take into account new internet and online tools of learning (on a scale from 1–10, where 1 is "not at all" and 10 is "completely")?



Is it more difficult for women in science?

HAVE YOUR SAY *...about science!*

Women continue to be under-represented in research at a time when Europe needs more researchers to foster innovation and bolster its economy. In Europe, women represent only 33% of researchers, 20% of full professors and 15.5% of heads of institutions in the Higher Education sector. The under-representation of women becomes even more striking in fields such as science and engineering.

A) How much do you feel that your gender has influenced your professional life?
- ○ Not at all
- ○ A little
- ○ Neutral
- ○ Very much
- ○ Completely
- ○ I don't know

B) Why do you think fewer women choose careers in science?
- ○ They were raised not to be interested
- ○ Role models (inspiring women scientists) are not enough visible to society
- ○ The work environment is hostile towards women
- ○ Societal relevant themes are not addressed in sciences
- ○ Other

C) How do you think science as a career could be made more attractive for women?
- ○ Improve working conditions in science, e.g., better family/work balance
- ○ Improve employment standards in science careers, e.g., long-term contracts for researchers
- ○ Science should be more focused on themes relevant to society, like health or the environment
- ○ Media should give more attention to women scientists
- ○ Gender bias should be removed from educational systems, e.g., teachers should encourage more girls to study science
- ○ Career advice should not replicate gender stereotypes
- ○ Other

D) Why do you think it is important for more women to engage in science careers?
- ○ I do not think it is important
- ○ To represent the view and perspectives of women
- ○ To make the work environment more women friendly
- ○ We need more scientists, both men and women
- ○ Other

E) What is your age?
- ○ Under 25
- ○ 25 - 35
- ○ 36 - 65
- ○ Over 65

WEEK 2 – GENDER

OUTCOMES [1]

The questionnaire on gender was expected to raise a significant debate. The questions were also revisited several times with the members of the quality reference group to ensure the scientific validity. The aim of the question was to see how people felt their gender had affected their career choices and what were the most determining factors in these decisions.

The results have been analyzed by country gender and age group to see if there are any significant divergences in opinion.

There were quite diverging opinions when looking at how much gender influenced professional life, with around 45% of respondents feeling that gender had not influenced or had only influenced a little and one third of the respondents feeling that gender had had a significant impact.

We can see that the respondents in Austria and Germany felt that gender had had a smaller effect on their professional lives than in Ireland, Italy and Spain. Nearly 40% of male respondents (25% of the total) did not feel that their gender had had any effect compared to only 19% of women. On the other hand, 40% of women felt that gender had had a big effect, compared to 12% of men.

There are also clear differences in perspective when looking at age groups: the "under 25" and "over 65" clearly felt less affected by their gender than the respondents between the ages of 25 and 65. It is particularly telling that nearly 50% of women aged between 36–65 felt that their gender had influenced their professional lives "completely" or "very much".

The reason for this might be explained by looking at the subsequent questions. One third of the women between the ages of 25–65 felt that the work environment is hostile to women; "improving working conditions in science" and "improving employment standards in science careers" were the most popular answers among women in these age groups when asked how science careers could be made more attractive.

It is also clear from the numerous comments in the discussion groups that the practical issues relating to work-life balance seems to be crucial for women when deciding about career.

Unfortunately, over one-third of the respondents did not feel that any of the options given for why fewer women chose careers in science reflected their opinions; a trend that is visible in all countries and that was particularly felt by the male respondents (over 40% of males responded "other".

From the discussion forum of SpICES

I am a 33-year-old married woman with two children. I have a doctorate in Biology but had to change my career for family reasons. It was impossible to conciliate my professional and family life. Mobility and labor instability in science makes women leave their careers looking for stability for their families.

Looking at the debates, it is clear that the gender debate is a sensitive issue and many men feel that they are now being discriminated against. Although the debate about gender intends to be neutral, it still sparks strong reactions.

[1] *It is important to note that there were some technical delays in the publication on the Italian media partner Il Sole 24 Ore this week that resulted in a much smaller participation. Thus the results relating to Italy have to be taken with some caution.*
There has been a note that the translation into Spanish, although correct from a language perspective, resulted in a possible misinterpretation of some of the questions: "In the Spanish version of the survey the first question is posed as if the survey respondent were only feminine: "¿En qué medida crees que el hecho de ser mujer ha influido en tu vida profesional?"
In the English version of the survey the first question is formulated without assuming anything about the sex of the respondents. This might introduce a bias into your statistics coming from the Spanish population."

A better approach, felt by both men and women in the discussion groups, might be to assess the possibility of career-life balance. This is true for both men and women and as more couples decide to share responsibility for the family today, this is no longer a "gender" issue but a broader issue: in today's competitive societies does one have to choose between family and career?

From the discussion forum of SpICES

I am a physicist and I am currently pursuing a postdoctorate. The biggest problem I encounter is reconciliating work and family life. I see many women who have abandoned their scientific careers because their partners have found job security and they could not find work within the scientific world in the same city. They had to choose: a life with their family or a career away from their family.

The current feeling described by many women in the discussion groups was that they had at one point had to make a choice: family or career. How can we change the family-work balance in order to allow individuals to have both? What would the consequences be for society if we do not address this problem?

From the discussion forum of SpICES

I had a career, cared for my wife, and looked after the house. Men certainly have an equal challenge to balance family and career.

The results also show that there is a concern that the cultural bias of society plays an important role in determining career. Twenty-five percent of under-25-year-olds and 25% of the male respondents felt that women were raised not to be interested in science.

In fact, when looking at how respondents felt that science careers could be made more attractive, it is clear to see that the most important factor, with half of the respondents preferring this option, seems to be the practical aspects relating to the working conditions, whilst the second important factor, with 35% of the respondents choosing these options, relates to cultural bias: "gender bias should be removed from educational system" and "career advice should not replicate gender stereotypes". These trends are quite similar in all age groups.

One of the most surprising results of this survey was the assessment of why the respondents felt it was important for more women to engage in science careers. Over half of the respondents felt that it is important to improve the quality of research. It is important to note that there was also the option "to represent the view and perspective of women" so the results show a more subtle concern. This opinion is shared by men and women alike (with over 50% of male respondents choosing this option) and can be seen in all age groups. In Spain, two-thirds of the respondents answered in this way. Respondents in Ireland and Italy seemed to prefer a more neutral response that we need more scientists in general: both men and women.

Only 10% of respondents felt that this question is not important.

From the discussion forum of SpICES

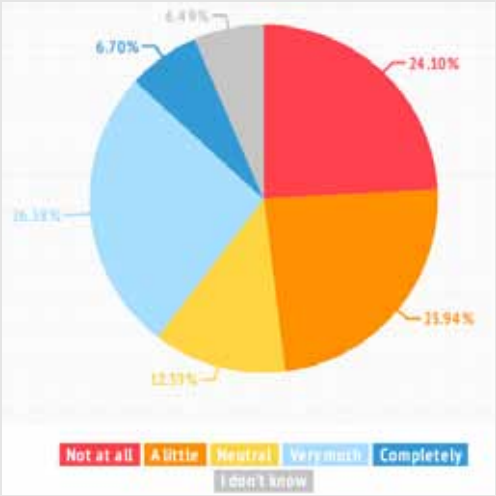
A career in science requires great dedication and mobility also during the years in which a woman usually starts a family (between 30 and 35). Job security is minimal, contracts usually only lasts two years and interim periods of unemployment are to be expected. In light of this many women decide voluntarily to not sacrifice their personal or family life for a career and decide to lower their job expectations.

When looking at the discussion forums, we can see that there is a consensus that this issue is not being addressed correctly in Europe. We need to rethink how the question is framed. It is clear that women are not less interested in science but are affected by other factors. It is not as much about gender as it is about education and the working environment in general.

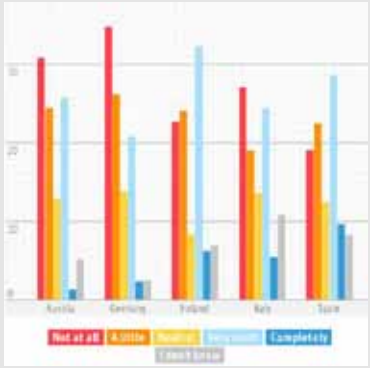
RESULTS

Graph 3.1: How much do you feel that your gender has influenced your professional life? (in percentage)

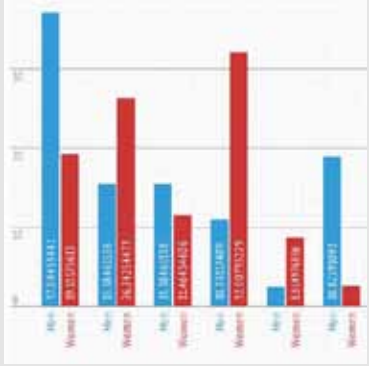
3.1.1) Total number of respondents



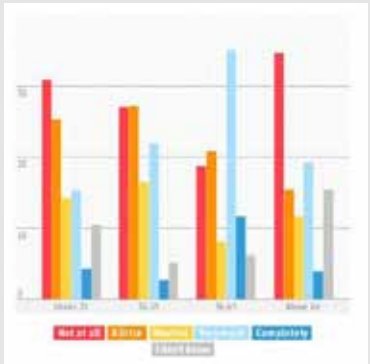
3.1.2) By country

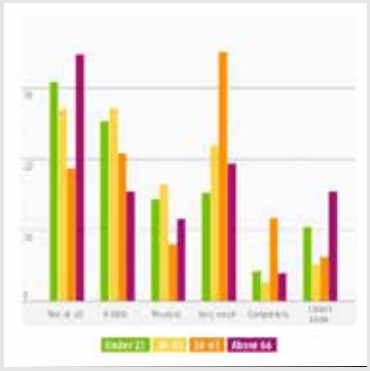


3.1.3) By gender



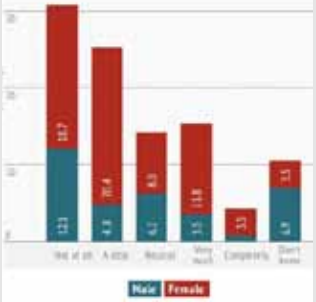
3.1.4) By age group



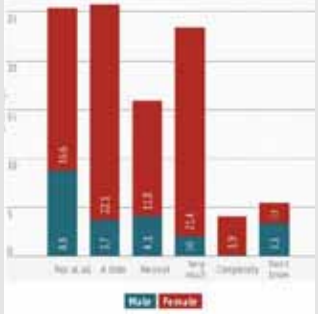


3.1.5) By age group and gender

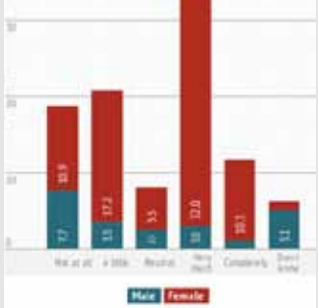
Under 25



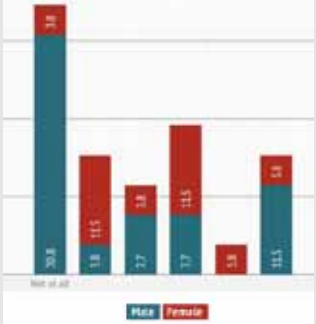
25 - 35



36 - 65

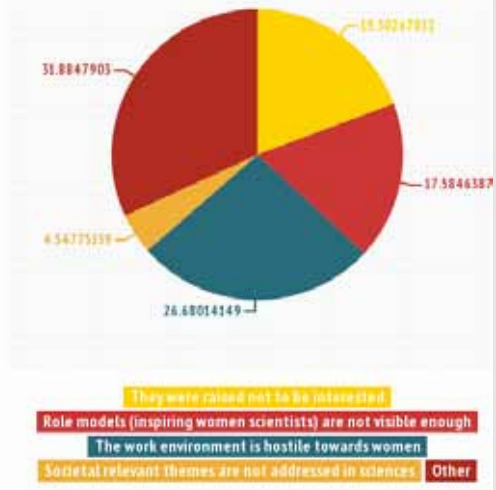


Over 65



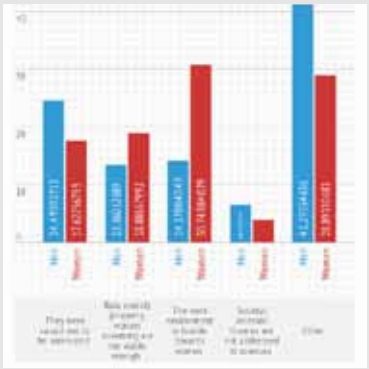
Graph 3.2: Why do you think fewer women choose careers in science? (Results given in percentage)

3.2.1) Total number of respondents

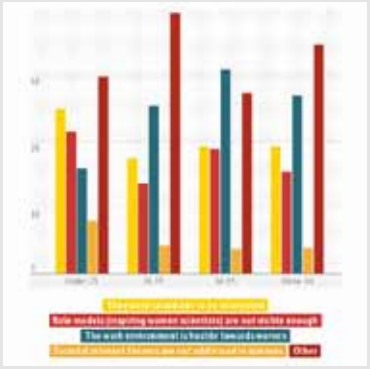


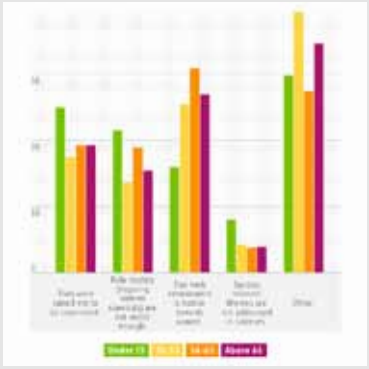
3.2.2) By country

3.2.3) By gender



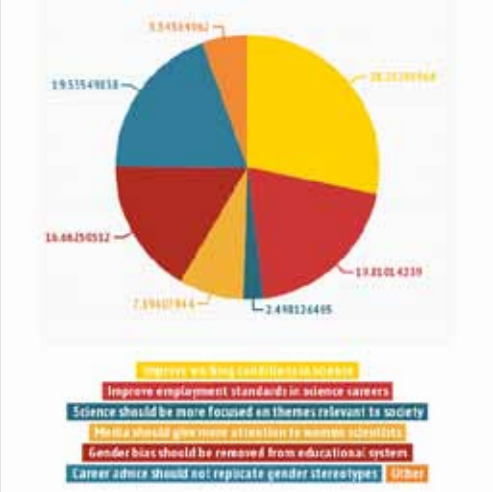
3.2.4) By age group





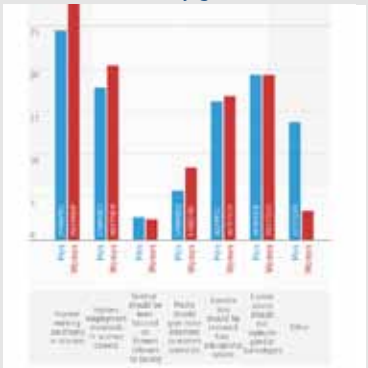
Graph 3.3: How do you think science as a career could be made more attractive for women? (Results given in percentage)

3.3.1) Total number of respondents

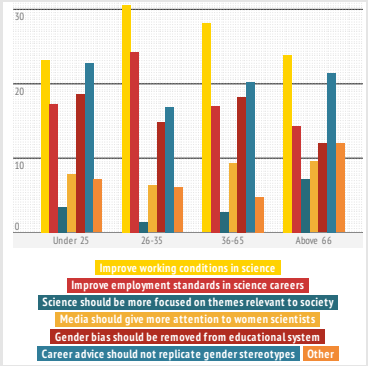


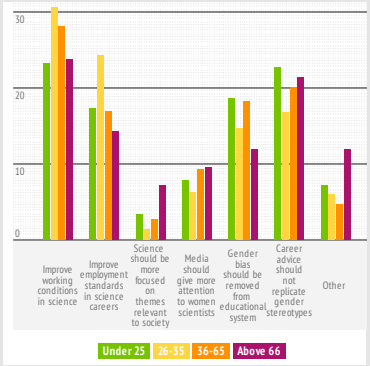
3.3.2) By country

3.3.3) By gender



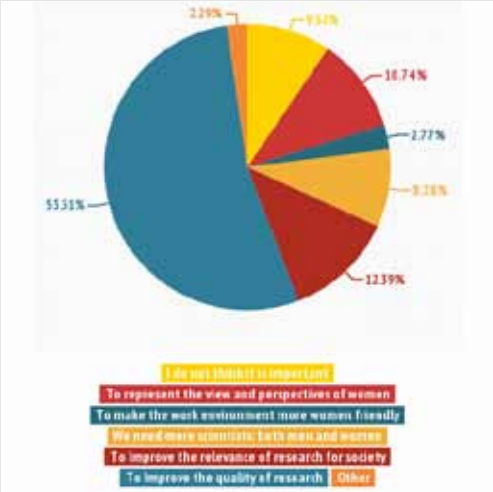
3.3.4) By age group





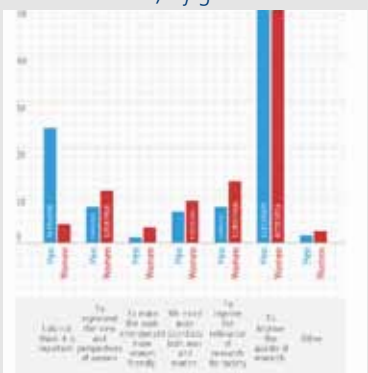
Graph 3.4: Why do you think it is important for more women to engage in science careers? (Results given in percentage)

3.4.1) Total number of respondents

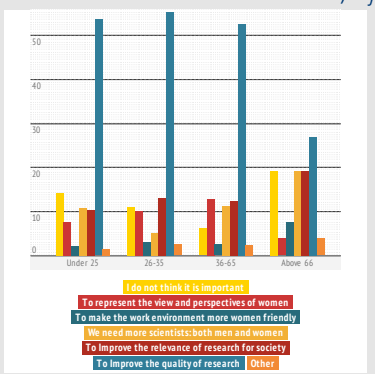


3.4.2) By country

3.4.3) By gender



3.4.4) By age group



HOW DO WE BRING PROGRESS IN LINE WITH ETHICS?

HAVE YOUR SAY *...about science!*

New research paradigms come with unforeseen ethical challenges–stem cell research, genetically modified food, human enhancement to name just a few.

Do you think that scientific developments are challenging our norms and values? Do you think that it is right to rethink our values when faced with changing research paradigms?

We want to hear your opinion and ideas.

A) Do you think current ethical regulation and legislation of scientific research (including privacy, data protection and animal testing) is consistent with the needs and values of society?

- ○ Yes
- ○ No
- ○ Don't know

B) Do you think that our values are changing as science and technology progresses?

- ○ Yes
- ○ No
- ○ Don't know

C) Would you agree to give researchers access to your personal data if this could benefit specific scientific research and benefit society in the future?

- ○ Yes
- ○ No
- ○ Don't know

D) Which of the following ethical questions do you think will be the most important to deal with in the near future?

- ○ Ethical questions concerning use of personal data
- ○ Ethical questions concerning embryonic stem cell research
- ○ Ethical questions concerning the development of genetically modified crops
- ○ Ethical questions concerning planning of later life in aging societies, (e.g., biological wills)
- ○ Other; please specify.

WEEK 3 – ETHICS

OUTCOMES

The third questionnaire aimed to assess the views and concerns of the public at large when it comes to the relationship between science and ethics. There are many developments in science and technology that regularly give rise to ethical questions in European societies–stem cell research, genetically modified food, and human enhancement, to name just a few.

How do people respond to these questions and which questions to they think are the most important ones?

The respondents had very diverging opinions when asked if they thought the current ethical regulation and legislation of scientific research is consistent with the needs and values of society; 32% felt that the current framework is consistent, 43% did not think so and one quarter of the respondents did not know. In Austria and Germany the respondents were slightly more positive compared to the Irish, Italian and Spanish respondents.

However, over 80% of respondents felt that values change as science and technology progresses. This was unilateral among all respondents except for in Italy, where only 50% of respondents thought so.

From the discussion forum of SpICES

Information, dissemination and diffusion. People fear what they do not know. There are thousands of interesting researches on topics open in ALL different fields of science and engineering that most people are unaware of.
The media and researchers should be obliged to inform the public about these advances that support our well-being and quality of life and above all health. Researchers should not be afraid of opening up the field to inexperienced people. This is a necessity: for science, for progress, for the future.

It is clear that ethical issues are seen as important by a majority of respondents, and, in looking at individual comments, we can clearly see that there is the feeling that those involved in research and those involved in ethics should collaborate more.

Although a small minority of respondents felt that ethics should not restrict science and some felt that ethics will become obsolete in the future, it was interesting to see that not only did the respondents feel that more discussions on certain research topics will be important in the future but also that research should play a bigger role in some of the ethical questions that our societies will face in the near future (relating to the structure of our institutions, the reforms that need to be done in our social system, economic questions and much more).

Analysing the online discussions, we notice that the respondents have differing opinions when it comes to science and ethics, and there is a clear awareness of the importance of these issues. Having an ongoing dialogue between science and society is necessary in order to be able to develop ethical regulation and science as things progress seem important to many readers.

Although there seems to be a general trust towards scientists, with over 60% of respondents saying they would agree to give researchers access to their personal data if this could benefit specific scientific research and benefit society in the future, the discussions show that there are several areas of concern where the respondents feel that science is not in line with their ethical values.

GMOs, stem cell research and animal testing were a few of the points raised. Looking at the last question, we see that in Austria and Ireland the respondents feel that ethical questions concerning the use of personal data is the most pressing issue to resolve in the near future. This question is seen as very important in Germany, too, with respondents on par with those stating that the ethical questions relating to embryonic stem cell research is the most pressing. Respondents in Italy and Spain instead feel that the questions concerning human cloning should be on the top of the list.

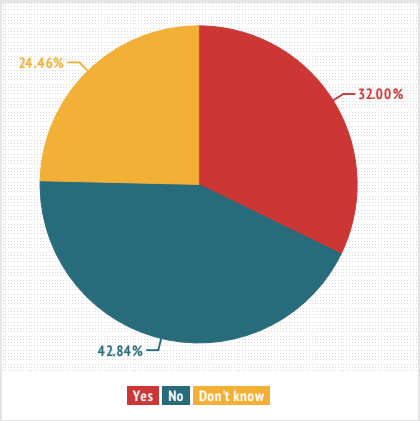
What is interesting to see in the discussion is that several participants point out the ethical question regarding research itself: how research agendas are decided, the role of money in setting priorities (role of industry), and the idea that science is an end in itself and therefore should not have any limits.

The questionnaire clearly shows that ethics in science is an important debate for the public at large. The respondents would like to be more involved in these different ethical debates and be more informed about the progress of science and why these ethical debates are created.

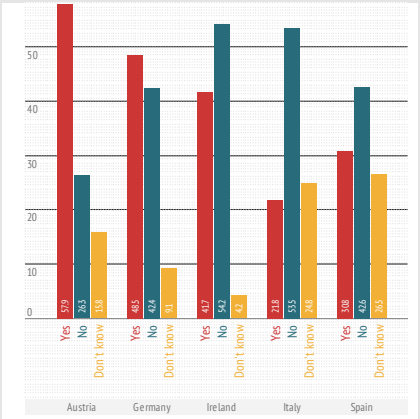
RESULTS

Graph 4.1: Do you think current ethical regulation and legislation of scientific research (including privacy, data protection and animal testing) is consistent with the needs and values of society? (Results given in percentage)

4.1.1) Total number of respondents

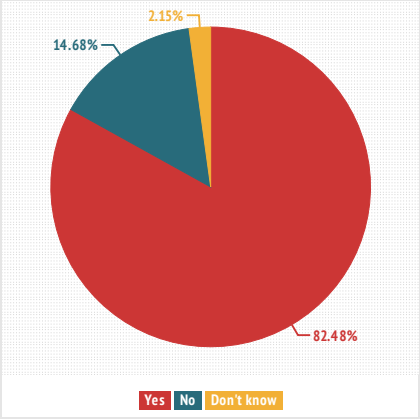


4.1.2) By country

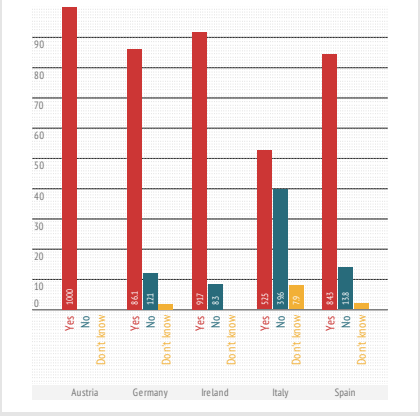


Graph 4.2: Do you think that our values are changing as science and technology progresses? (Results given in percentage)

4.2.1) Total number of respondents

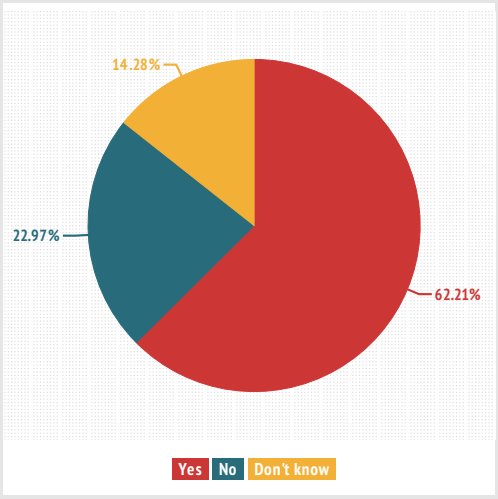


4.2.2) By country

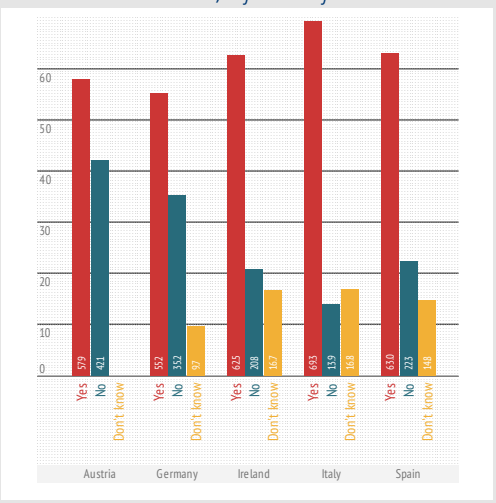


Graph 4.3: Would you agree to give researchers access to your personal data if this could benefit specific scientific research and benefit society in the future? (Results given in percentage)

4.3.1) Total number of respondents

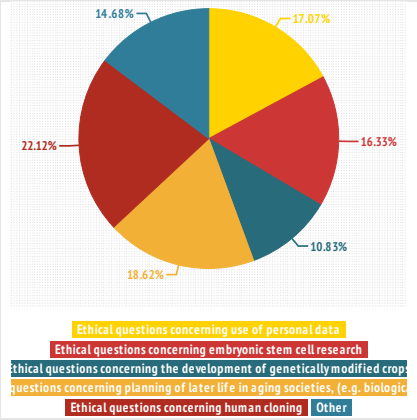


4.3.2) By country

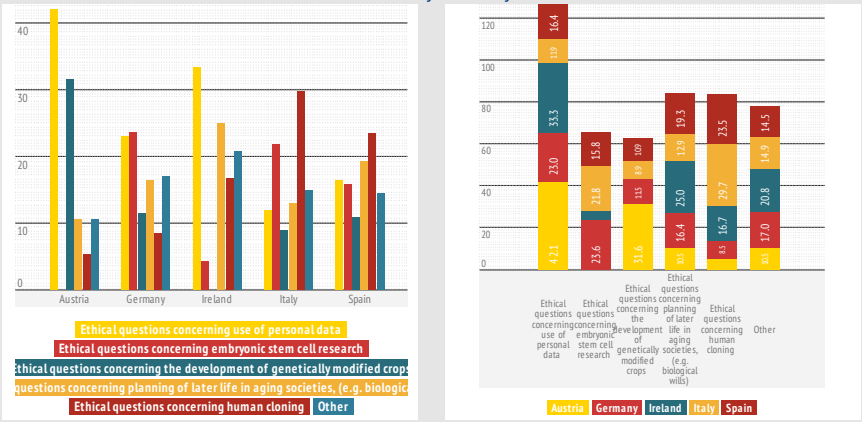


Graph 4.4: Which of the following ethical questions do you think will be the most important to deal with in the near future? (Results given in percentage)

4.4.1) Total number of respondents



4.4.2) By country



RESEARCH RESULTS: PUBLIC GOOD OR NOT?

HAVE YOUR SAY ...about science!

All research builds on former work and depends on a scientist's ability to access and share scientific information. The advent of the internet and electronic publishing has resulted in unprecedented possibilities for the dissemination and exchange of information. The argument that the results of publicly funded research should be freely available has been adopted by researchers, research institutions and funding entities. Yet the discussion on how to implement the transition towards a more open world is ongoing.

We want to hear your opinions and ideas.

A) Do you think the results of publicly funded research should be a public good?

- ○ Yes
- ○ No
- ○ Don't know

B) Which of the following options best describes the way you believe access to the results of research should be regulated?

- ○ Research should be accessible to all
- ○ Regulation in some cases (such as ethical or security reasons)
- ○ Research should only be available to those willing to pay for it
- ○ Other

C) Do you think access to scientific information should be more open?

- ○ Yes
- ○ No
- ○ Don't know

D) Would you use research articles if they were easily available for free?

- ○ Yes
- ○ No
- ○ Don't know

E) On a scale of one to ten, how important is research and scientific information to you as a citizen?

WEEK 4 – OPEN ACCESS

OUTCOMES

It is clear that a majority of the respondents, over 95%, think that the results of publicly funded research should be considered a public good. This questionnaire was developed to understand how access to research data should be regulated and how this information can be promoted with different stakeholders to benefit society at large.

From the discussion forum of SpICES

I am eager to know the arguments against open access. For me it is so obvious that there should be no debate. Open access benefits everyone: scientists can see a greater impact of their articles, people can be more informed. It is also consistent that citizens who pay taxes to develop research benefit from the results. It is not logical to have to pay twice for something.

Although the vast majority of respondents thinks that publicly funded research should be considered a public good, there was a clear divide between those who believed that access to these research results should not be regulated (46%) and those who believe that the results should be regulated in some cases (49%), for example, for reasons of security or ethical reasons.

In Germany and Italy the respondents were slightly more in favour of no regulation whilst in Ireland (over 60%), Austria and Spain respondents thought that regulation in some cases would be preferable.

The debates in the discussion forum, however, also demonstrate a concern of how this will be possible to finance.

It seems that the majority of respondents had a basis in science and an awareness of the questions concerning open access.

From the discussion forum of SpICES

Perhaps not everyone knows that those who are dedicated to peer review for scientific journals do the work for free. Specifically, our public salaries are paid by taxpayers and, as part of our work in universities or research institutes, we prepare our own articles, we submit them to the journals in the requested format, we peer-review the articles of other researchers and select which articles will be published. All this does not cost anything to the publishers. Further, as paper publication is almost gone, scientific journals do not have any costs for printing and distribution.

From the discussion forum of SpICES

So far I have a good impression of "Open Access Journals". To my knowledge, scientific journals were no gold mine for publishers. The publication of reputable scientific journals is a complex and demanding activity.
That the results of research financed with tax money should be freely accessible is true, but this is only a pretext. I'm afraid that "open access" is all about saving the cost of a proper publication.

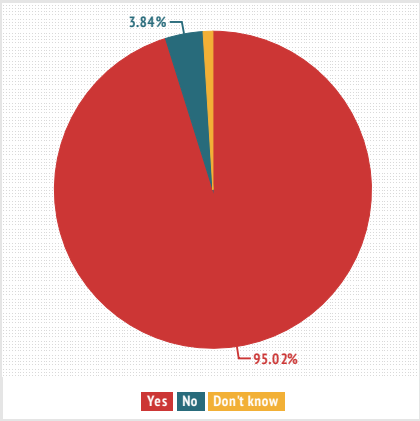
This can be seen by the fact that over 90% of respondents confirmed that they would read scientific articles if they were available for free and the average rating for the question of how important research and scientific information was to the respondents was 9.2.

Yet it is clear that the interest has moved away from whether open access is desirable or not, which most respondents felt was a given. The question that seems to preoccupy most respondents is how to make this transition: who will put up the extra work? How do we ensure that open access journals remain as "good" as classical journals?

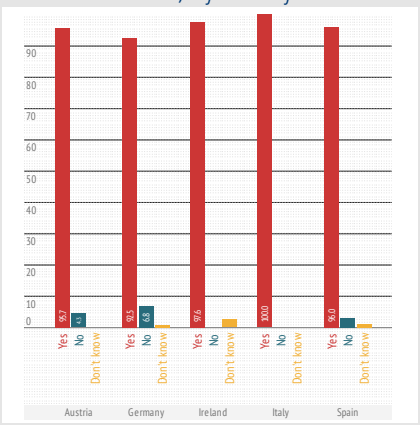
RESULTS

Graph 5.1: Do you think the results of publicly funded research should be considered a public good?

5.1.1) Total number of respondents

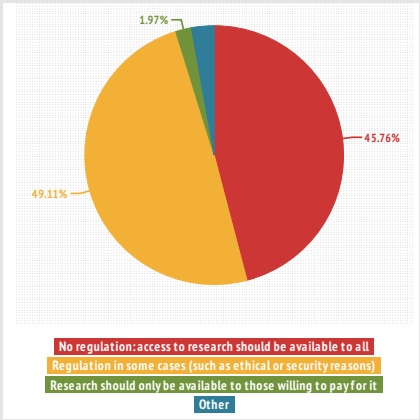


5.1.2) By country

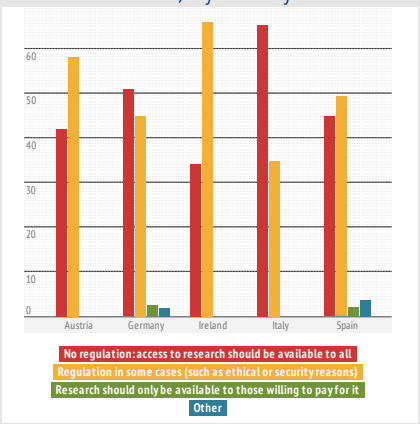


Graph 5.2: Which of the following options best describes the way you believe access to the results of research should be regulated?

5.2.1) Total number of respondents

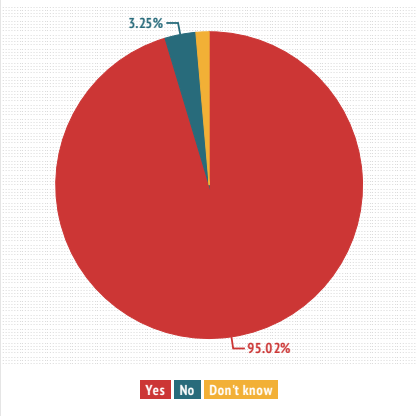


5.2.2) By country

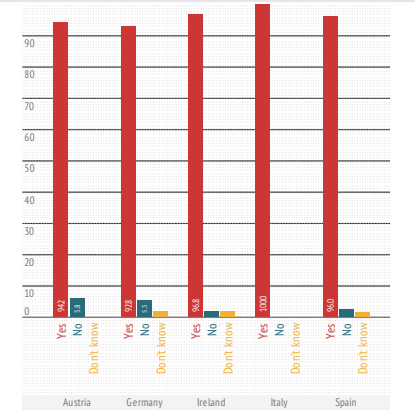


Graph 5.3: Do you think access to scientific information should be more open?

5.3.1) Total number of respondents

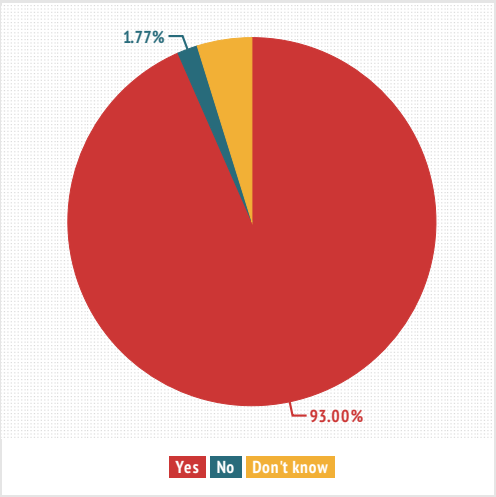


5.3.2) By country



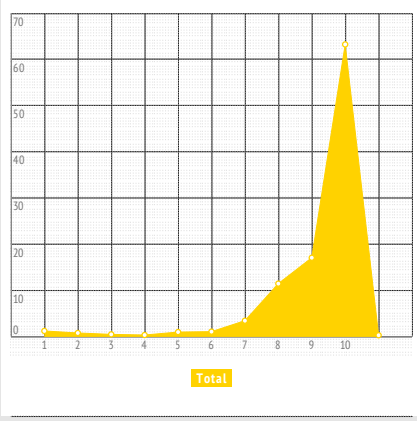
Graph 5.4: Would you use research articles if they were easily available for free?

Total number of respondents

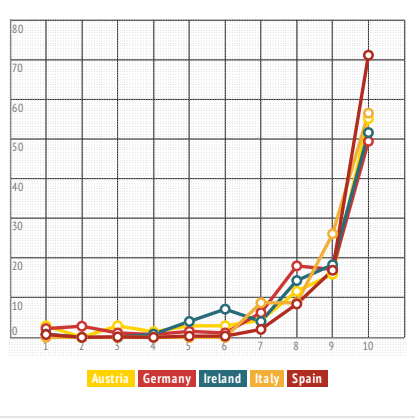


Graph 5.5: On a scale of one to ten, how important is research and scientific information to you as a citizen?

5.5.1) Total number of respondents



5.5.2) By country



Is science a matter for debate?

HAVE YOUR SAY ...about science!

Should scientists and citizens engage more with each other about science?

Science permeates all aspects of our life, whether we are aware of it or not, and it will play an integral part in defining our future. Do you feel that the public is engaged enough with scientific issues? Would you like to have a bigger say? Do you feel scientists should listen more to the concerns of the public at large?

We want to hear your opinions and ideas.

A) How interested are you in developments in science and technology?

- ○ Very interested
- ○ Fairly interested
- ○ Not very interested
- ○ Not at all interested
- ○ Don't know

B) Do you think citizens should be systematically consulted for their views about science and innovation issues?

- ○ Yes
- ○ No
- ○ Don't know

C) What do you think are the most significant ways that science can engage with society?

- ○ Public forums on scientific issues
- ○ Online consultations
- ○ Increased coverage from mainstream media on scientific issues
- ○ Direct participation of various stakeholders in committees defining research agendas
- ○ Increased direct dialogue between researchers and the public at large throughout the research process
- ○ Don't know

D) Do you think that policy makers listen to public opinion about science?

- ○ Not at all
- ○ A little
- ○ Enough
- ○ Very much
- ○ Don't know

E) Do you think researchers listen to public opinion about science?

- ○ Not at all
- ○ A little
- ○ Enough
- ○ Very much
- ○ Don't know

F) Do you think science and technology provide added opportunities for sharing ideas and learning?

- ○ Not at all
- ○ A little
- ○ Enough
- ○ Very much
- ○ Don't know

WEEK 5 – ENGAGEMENT

OUTCOMES

The question on engagement aimed to understand how the public at large feels that society is currently engaging with research, whether there is an interest to engage more and how people would like to engage more.

Over 90% of all respondents said they were interested in science and technology with over three quarters of the respondents feeling that science and technology do provide added opportunities for sharing ideas and learning.

From the discussion forum of SpICES

I am surprised to see so many people in favour of the systematic consultation with citizens on research and innovation issues. By all means the public should be informed and be aware of developments in science, but not all opinions are equal. If your knowledge of a particular subject is limited, your influence on this subject should not be expected to be very great.

However, over 90% of respondents felt that policy makers did not listen to public opinion (70% said not at all and 20% feel they listen a little). The strongest distrust in policy makers can be seen in Italy and Spain, whilst Austria Germany and Ireland feel that policy makers at least listen a little to public opinion.

Only 5% of respondents felt that policy makers listen enough and less than 2% feel they listen very much.

The opinion was slightly more positive when looking at whether the respondents thought that researchers listen to public opinion with 35% answering that they listened enough or very much. However over 55% of respondents still felt that researcher listen less than enough (37% responded that they listen a little and 19% that researchers do not listen at all to public opinion).

From the discussion forum of SpICES

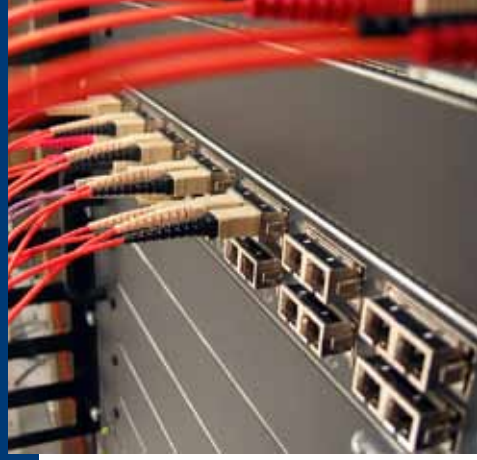
A resounding YES! Science is a public discussion topic.

However, any discussion with the public at large on research and innovation issues requires professional science communication. Research results can be made understandable and interesting only with appropriate communication skills. In fact, in recent years, the press and communications staffs of universities have been greatly expanded. However it is necessary for scientists themselves to open up the discussion if we want to achieve higher technical and scientific understanding. Exchange of research results should be done increasingly in public forums. Only here the legitimacy of the predominantly tax-funded research can be ensured. Transparency and cooperation agreements with third-party funding is a prerequisite for such a dialogue. Only when science sees itself as part of a civil society discourse will the value of freedom of research and a willing by taxpayers to finance be secured in the long term. A technical discussion among academic and professional association representatives together with politicians under quasi-exclusion of the public in the 21st Century is therefore no longer appropriate.

From the discussion forum of SpICES

I think science should be a central part of public debate, because it dominates so many aspects of our lives. We use technology, medicine, the environment, etc. I think there is a need to have a well-informed public debate on these issues.

I believe that science can and should set an example by giving priority to evidence-based policy and promoting fact-based understanding of issues, not ideology-based. Science can be the engine of the economy, the basis of evidence-based policies and a way to better understand the world around us, like it or not. I hope that Spain as well as in other countries we can start seeing the proper funding of science education and scientific research.



The strongest distrust in researchers could be seen in Italy, where 70% of the respondents felt that researchers do not listen at all to public opinion. In all other countries the respondents felt that they listened a little (although not enough).

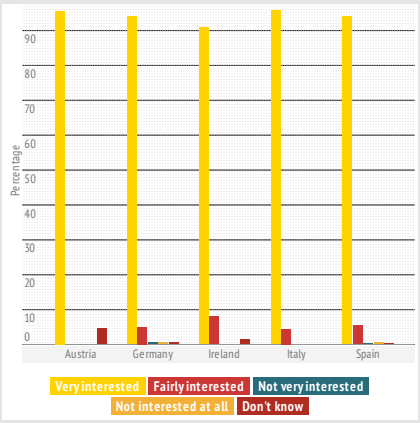
In general, we can see that the respondents did not feel that public opinion was considered in setting science policy. However, over 50% of respondents felt that citizens should be systematically consulted for their views about science and innovation issues. Italy and Ireland were the only two countries where more respondents did not feel that citizens should be systematically consulted.

So how can science engage more with citizens? Over 50% of respondents felt that increased media coverage in mainstream media of scientific issues is the best way to proceed. It is important to engage citizens in these debates and ensure the public visibility so that everyone can access. Respondents also felt that increased direct dialogue between researchers and the public at large throughout the research process is important.

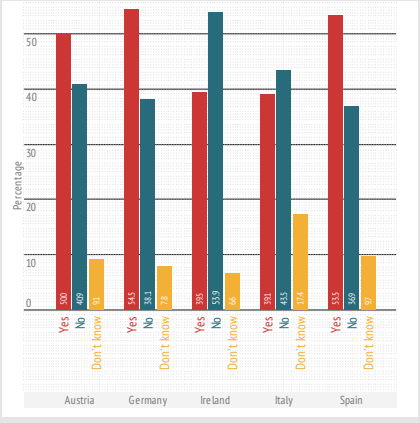
It is clear that there is a gap to bridge between science and society. The initiative showed that there is interest and willingness to engage. People feel that their opinion should count although the current perception is the public opinion is not listened to. How can this be changed? How can media, as suggested by the respondents, be more involved in this process?

RESULTS

Graph 6.1: How interested are you in developments in science and technology?

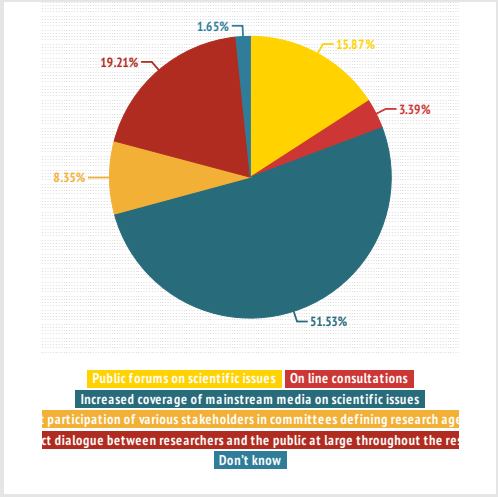


Graph 6.2: Do you think citizens should be systematically consulted for their views about science and innovation issues?

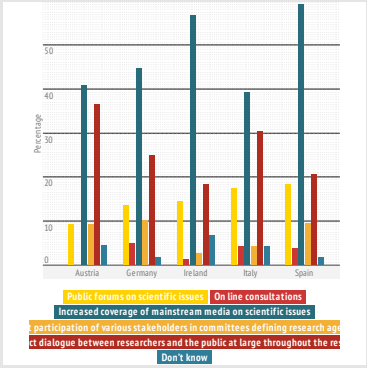


Graph 6.3: What do you think are the most significant ways in which science can engage with society?

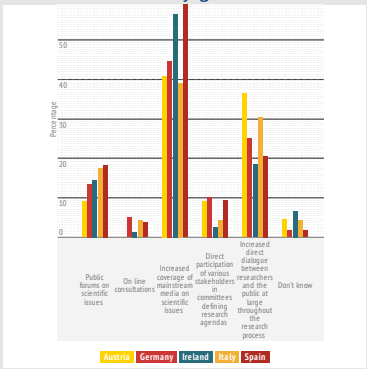
6.3.1) Total number of respondents



6.3.2) By country

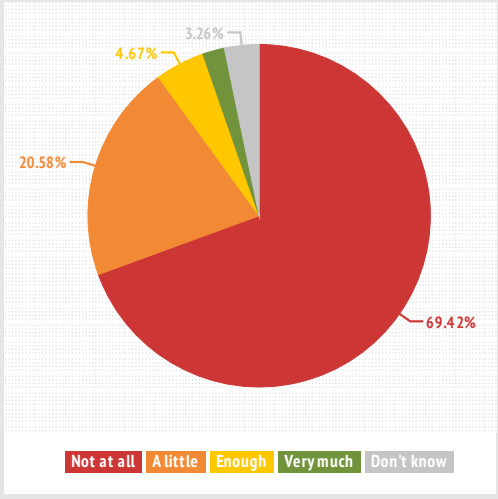


6.3.3) By gender

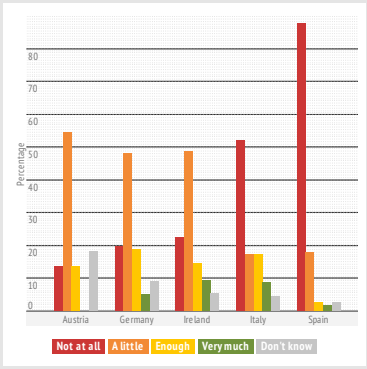


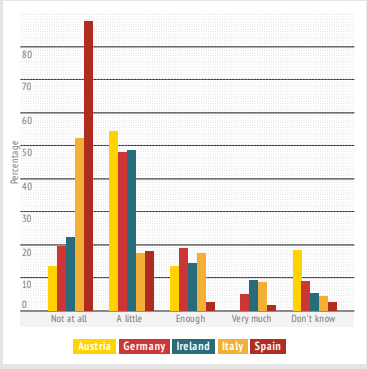
Graph 6.4: Do you think that policy makers listen to public opinion about science?

6.4.1) Total number of respondents



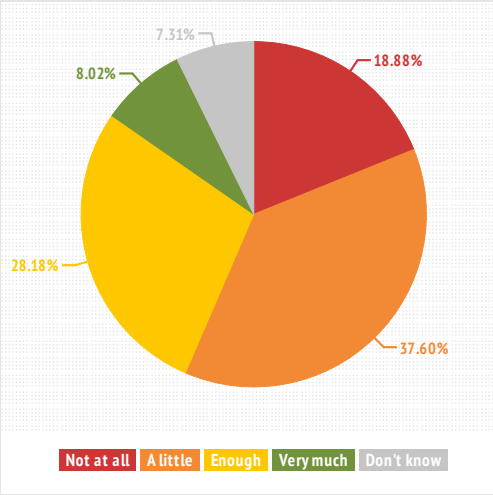
6.4.2) By country



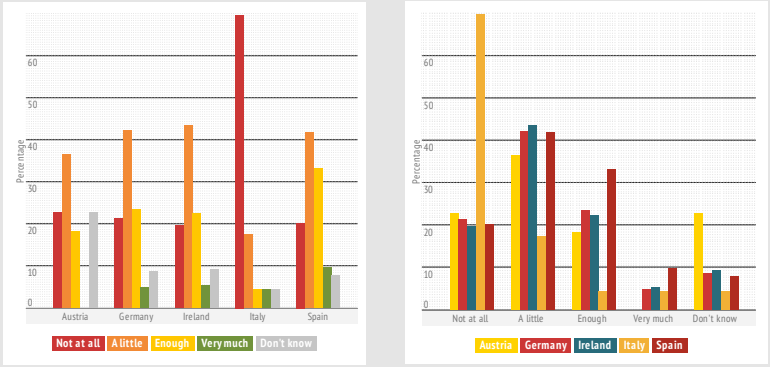


Graph 6.5: Do you think researchers listen to public opinion about science?

6.5.1) Total number of respondents

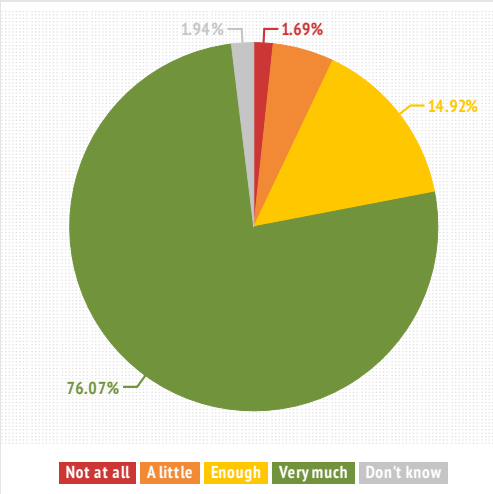


6.5.2) By country

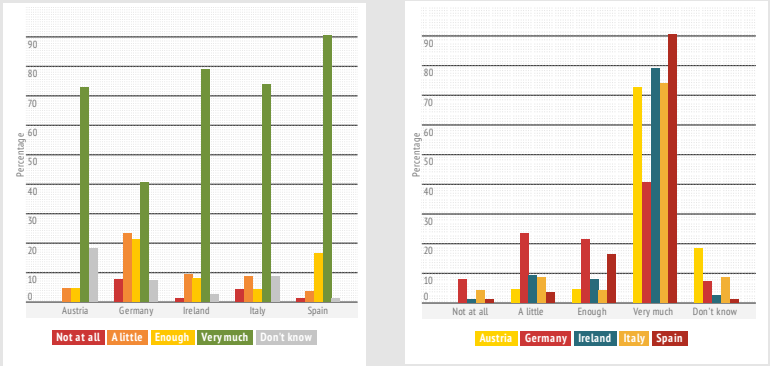


Graph 6.6: Do you think science and technology provide added opportunities for sharing ideas and learning?

6.6.1) Total number of respondents



6.6.2) By country



WHO SHOULD DECIDE ABOUT SCIENCE ?

HAVE YOUR SAY ...about science!

Science and technology permeate all aspects of our lives, whether we are aware of them or not, and they will play an integral part in defining our future. There is, in fact, an increasing effort to bring science and society closer to ensure that science, technology and innovation respect ethical values, take precautions against environmental, health and safety risks, and respond to societal challenges. On the other hand, science has been characterised by its independence and frontier thinking. So how can societal needs and expectations guide research and innovation, while also safeguarding the independent nature of science?

We want to hear your opinions and ideas.

A) Do you think research and innovation should be guided by the needs and concerns of society?

- ○ Yes
- ○ No
- ○ Don't know

B) Do you think that the independence of publicly funded research is compatible with a science policy based on the needs and expectations of society?

- ○ Yes
- ○ No
- ○ Don't know

C) Do you think that research and innovation policy should promote responsible conduct by scientists?

- ○ Yes
- ○ No
- ○ Don't know

D) Who, in your opinion, is currently deciding on research and innovation policy?

- ○ Parliament and government
- ○ Individual citizens
- ○ Civil society organisations
- ○ Industry
- ○ Scientists from universities and academia in general
- ○ Research funding agencies
- ○ Consumers
- ○ Other; please specify

E) Who, in your opinion, should be deciding research and innovation policy?

For this question we foresee the option to select multiple answers

- ○ Parliament and government
- ○ Individual citizens
- ○ Civil society organisations
- ○ Industry
- ○ Scientists from universities and academia in general
- ○ Research funding agencies
- ○ Consumers
- ○ All the actors mentioned above should be jointly involved
- ○ Other; please specify

F) Which of the following do you think try to behave responsibly towards society by paying attention to the impact of their research and innovation-related activities?

For this question we foresee the option to select multiple answers

- ○ Scientists working at university or government laboratories
- ○ Scientists working in private company laboratories
- ○ Environmental protection associations
- ○ Consumer organisations
- ○ Journalists
- ○ Government representatives
- ○ Industry

G) What would be proper ways to stimulate responsible conduct in research and innovation?

For this question we foresee the option to select multiple answers

- ○ Public laws and regulations that address societal issues, like safety and ethical issues, in research and innovation
- ○ Self-regulation by industry via voluntary guidelines such as 'Corporate Social Responsibility' programmes
- ○ Self-regulation by researchers via voluntary guidelines such as 'Codes of Conduct'
- ○ Specific education and training for researchers on ethical and social issues in science, research and innovation
- ○ Improving public understanding of research and innovation
- ○ Public dialogue about research and innovation (policy)
- ○ Public involvement in research and innovation (policy)
- ○ Other; please specify

WEEK 6 – GOVERNANCE

OUTCOMES

The last questionnaire of the pilot project addressed the issue of governance. What is the role and responsibility of science? Who has authority to determine the shape that science should take in the future? Who are science's gatekeepers, and how can we be certain that they steer a path that is authentic to this vision?

From the discussion forum of SpICES

The questions in this survey are designed by politicians and sociologists and scientists. I think half of the questions are designed to induce a specific response. They are also confusing. I like the initiative but I fear that is intended to satisfy the gallery.

The aspect of governance thus takes a central stage when looking at what the science of the future should look like, what drives the pursuit of knowledge and who should decide.

What institutions need to be set in place to safeguard the independence of scientific enterprise? How much should science be driven by social concerns?

Debates in the discussion forum clearly showed that the respondents felt that the issue is complicated and that the questions and answers were not always framed correctly. What was meant by "responsible behaviour"? There further seems to be confusion about science policy and science's role in policy. This is important to note before looking more in detail at the results themselves.

The results show that over 70% of respondents think that science should be guided by the needs and concerns of society. This is particularly so in Italy and Spain. In Austria and Ireland the opinion is divided nearly 50/50, whilst in Germany only 43% of the respondents felt that science should be guided by the needs and concerns of society.

The results suggest that this should have an effect on the independence of science as over 75% of respondents answered that in their opinion independence of science is incompatible with a science policy based on the needs and expectations of society. This was particularly true in Spain although the majority of respondents in all countries agreed with this statement.

From the discussion forum of SpICES

Scientific research and development should be outside the social concerns of the moment; it should be a matter of state. It has to be promoted, supported and funded by public entities such as public universities, research centers, etc., regardless of whether private bodies get any tax advantages for carrying out these tasks. In any event, the determination of policies in this field, should be a shared task between the democratically elected authorities, associations representing researchers and research centers, representatives of civic and environmental movements, etc. All voices should be heard and decisions should be consensual. Stability should be sought in this area, regardless.

There was a very strong support for the fact that science and innovation policy should promote responsible conduct by scientists and industry with over 90% of respondents answering affirmative to this question.

Thus it seems that science policy should promote responsible conduct and should be guided by the needs and concerns of society. But who do the respondents think is currently deciding on research and innovation policy?

Three core groups were identified in all countries as the decision makers of research and innovation policy:

1) Research-funding agencies
2) Parliament and government
3) Industry

Less that 5% of the respondents felt that individual citizens or civil society organisations (CSO) had any influence on deciding research and innovation policy (please note that respondents could choose as many options as they wanted). This is in stark contrast to the desires expressed in the previous questionnaires that stated that citizens should be consulted systematically on science issues.

The questionnaire in Week 5 on engagement also underlined the fact that the public at large does not feel that policy makers and researchers listen very much to public opinion, so who should be deciding research policy?

As the survey showed, 75% of the respondents felt that scientists from universities and academia in general should be deciding research and innovation policy together with other actors (research-funding agencies, 21%; parliament and government, 20%; Individual citizens and CSOs, 31%; Industry, 20%). This trend can be seen in all five countries where the pilot project was published.

From the discussion forums, it seems that a broad range of national and international (the EU institutions, for instance) institutions should be involved in this process. It is clear from the results that the majority of respondents favour an inclusive and transparent decision-making process where the voices of all the key stakeholders are heard and where the public at large can also participate.

In assessing how the respondents judged the behaviour of different actors towards society in terms of the impact of their science and technology related activities, we could see similar trends across the five countries: 85% of respondents felt that scientists working at a university or government laboratory behaved responsibly, whilst the trust in journalists, government representatives and industry was very low. Environmental protection associations and consumer organisations, as well as scientists working in private company laboratories, scored quite well. In particular, the Austrian respondents felt a lot of trust towards environmental protection associations and consumer organisations.

So how can research and innovation policy stimulate responsible conduct in research and innovation? The answers seem to suggest that a number of actions are necessary, including:

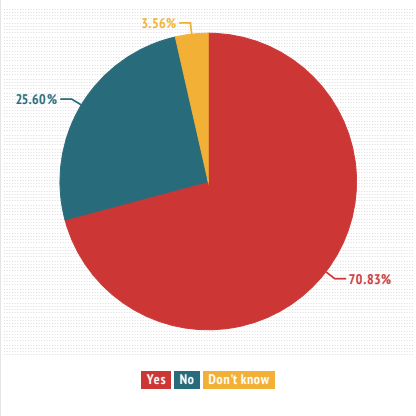
1) Improving public understanding of research and innovation (59%)
2) Specific education and training for researchers on ethical and social issues in science, research and innovation (48%)
3) Public laws and regulations that address societal issues, like safety and ethical issues, in research and innovation (45%)
4) Public dialogue about research and innovation (policy) (43%)
5) Self-regulation by researchers via voluntary guidelines such as 'Codes of Conduct' (37%)
6) Public involvement in research and innovation (policy) (34%)
7) Self-regulation by industry via voluntary guidelines such as 'Corporate Social Responsibility' programmes (18%)

It seems that the general feeling is to use all the tools we have to try and stimulate responsible conduct. The results do not differ very much when looking at each country individually.

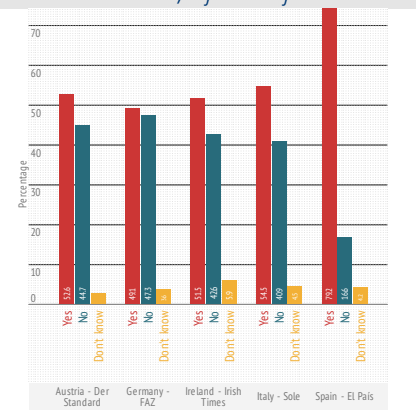
RESULTS

Graph 7.1: Do you think science should be guided by the needs and concerns of society?

7.1.1) Total number of respondents

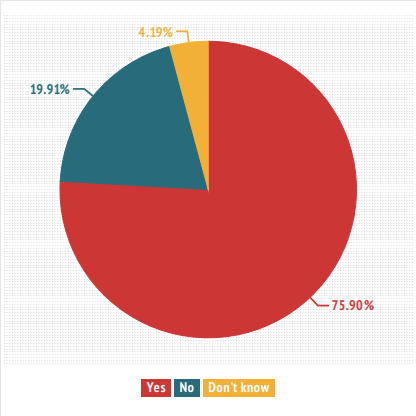


7.1.2) By country

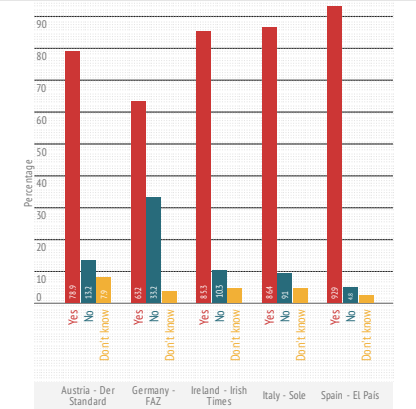


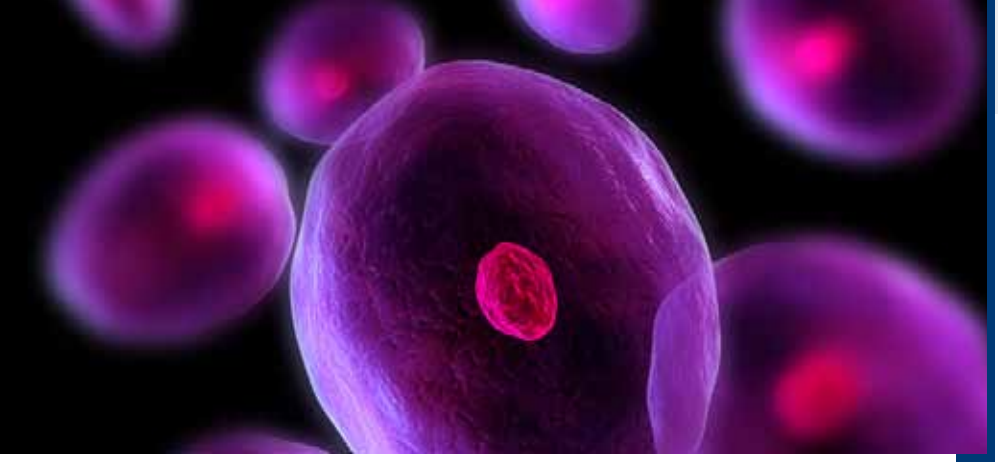
Graph 7.2: Do you think that the independence of science is incompatible with a science policy based on the needs and expectations of society?

7.2.1) Total number of respondents



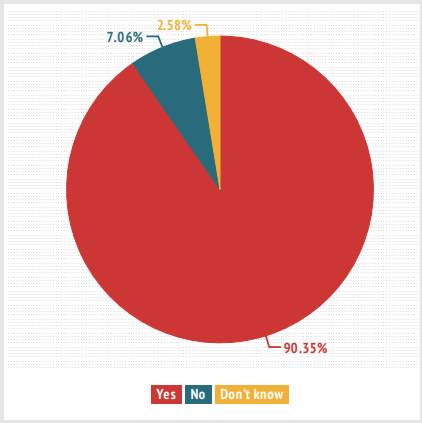
7.2.2) By country



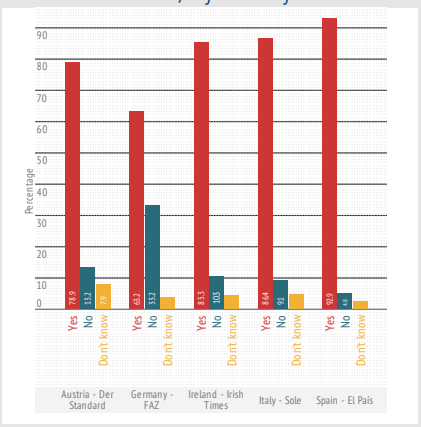


Graph 7.3: Do you think that science and innovation policy should promote responsible conduct by scientists and industry?

7.3.1) Total number of respondents

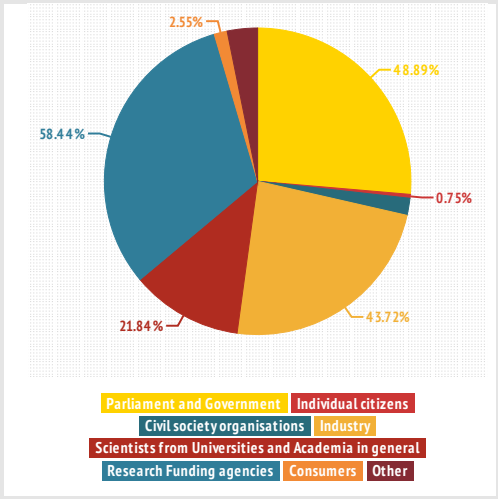


7.3.2) By country

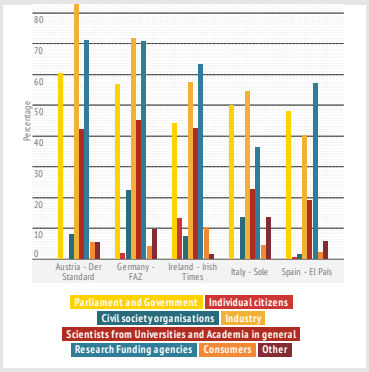


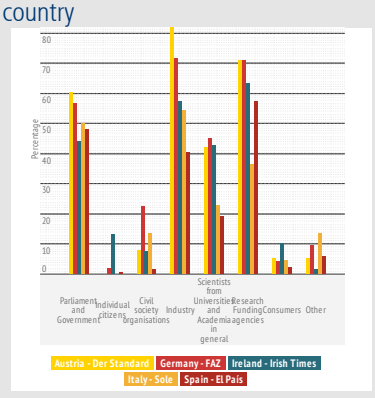
Graph 7.4: Who, in your opinion, is currently deciding on research and innovation policy?

7.4.1) Total number of respondents



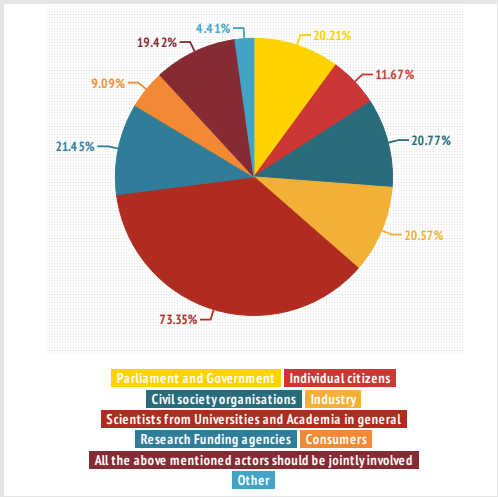
7.4.2) By country



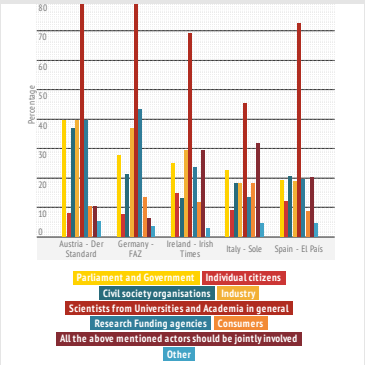


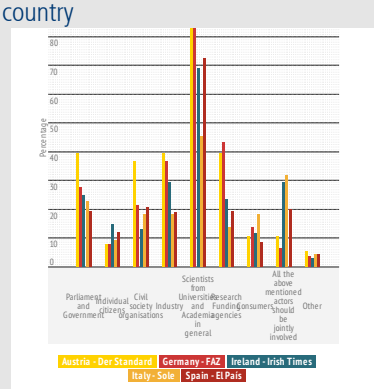
Graph 7.5: Who, in your opinion, should be deciding research policy?

7.5.1) Total number of respondents



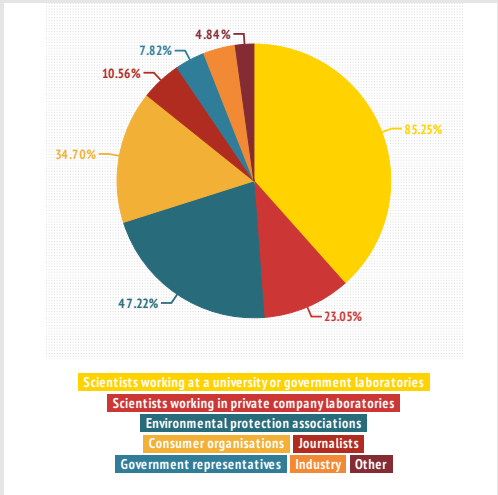
7.5.2) By country



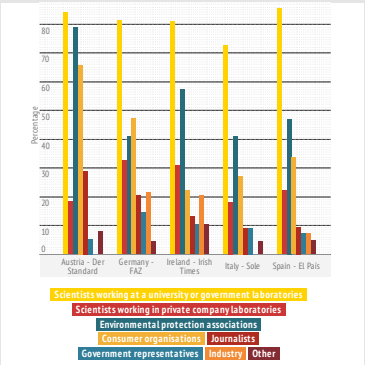


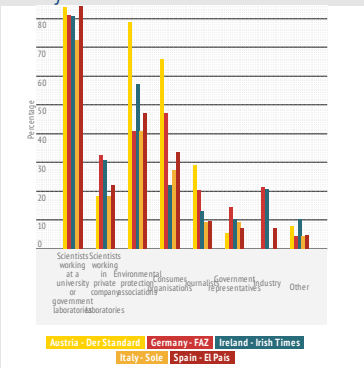
Graph 7.6: Which of the below do you think try to behave responsibly towards society by paying attention to the impact of their science and technology related activities?

7.6.1) Total number of respondents



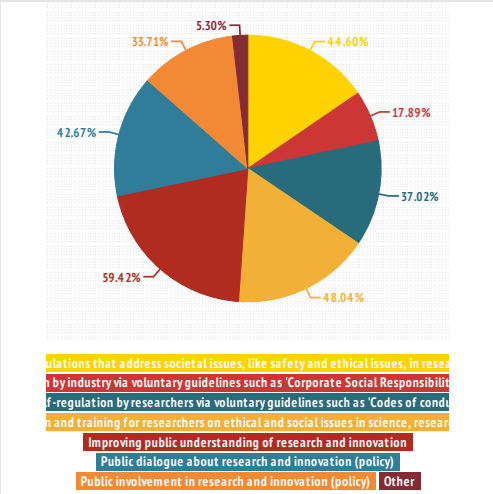
7.6.2) By country



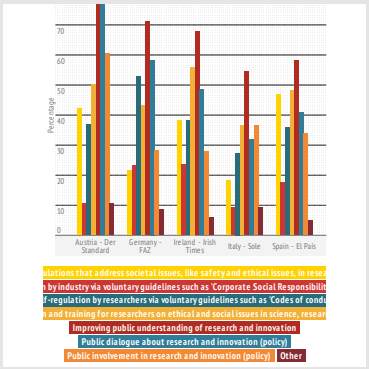


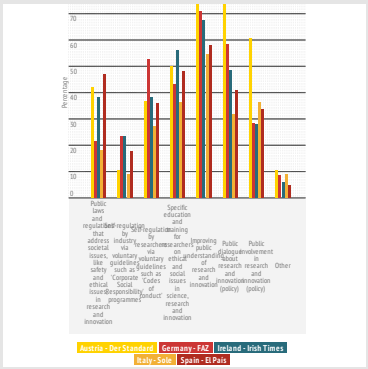
Graph 7.7: What would be proper ways to stimulate responsible conduct in research and innovation?

7.7.1) Total number of respondents



7.7.2) By country





EVALUATE

HAVE YOUR SAY ...about science!

Thank you for participating in the Special Initiative for Citizen Engagement in Science. This was a pilot project to assess how to directly engage European citizens in discussions about research and innovation questions that might have a direct effect on how the European research agenda develops.

The results of the questionnaires are currently being evaluated and a report will be published at the start of July with the full results of the initiative.

In the meantime you can find some preliminary results at: http://atomiumculture.eu/content/preliminary-results

As you know, your input and opinions will be submitted to the European Commission as a contribution to the preparations for the topics of the first call for proposals of Horizon 2020.

A) Do you think this initiative is a positive tool for increasing dialogue between decision makers and citizens on questions about research and innovation?

- ○ Yes
- ○ No
- ○ Don't know

B) Do you think citizens should be systematically consulted for their views about science and innovation issues?

- ○ Yes
- ○ No
- ○ Don't know

C) What did you think was the best aspect of the initiative?

- ○ The idea itself
- ○ The editorials
- ○ The questionnaire
- ○ The discussions
- ○ Other (please specify)

D) What aspect do you think should be improved?

- ○ The idea itself
- ○ The editorials
- ○ The questionnaire
- ○ The discussions
- ○ Other (please specify)

E) Which research topics do you think should be taken up in similar projects?

F) Any other comment

Evaluation of project

The evaluation of the Special Initiative for Citizen Engagement in Science was based on three factors:

1 The Evaluation Survey made available at the end of the initiative;

2 The feedback received from the partners and the members of the Committees;

3 The experience of the participants and the creators during the initiative itself received as comments, feedback or notes to the team leader.

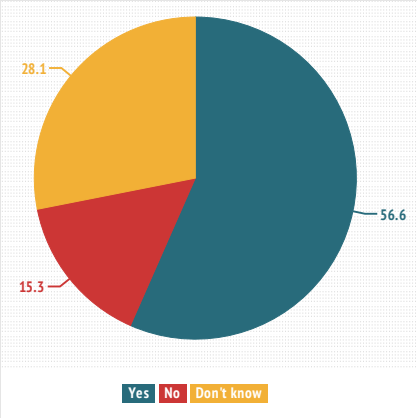
The purpose of the evaluation was to get an understanding of whether the idea in itself of the project was well received, what aspects were most appreciated and what could be improved.

Evaluation Survey

Following the launch of the sixth question (during week 6) the evaluation survey was made available to give the participants the opportunity to evaluate the project itself and give comments.

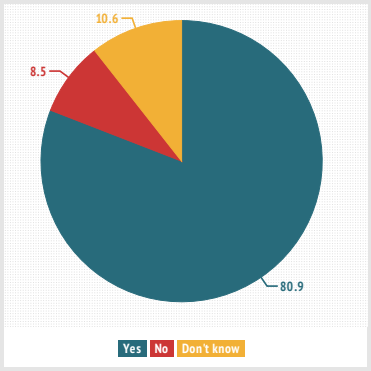
The survey showed that nearly 60% of the respondents felt that the initiative is a positive tool for increasing dialogue between decision makers and citizens on questions about research and innovation.

Graph 8.1: Do you think this initiative is a positive tool for increasing dialogue between decision makers and citizens on questions about research and innovation?



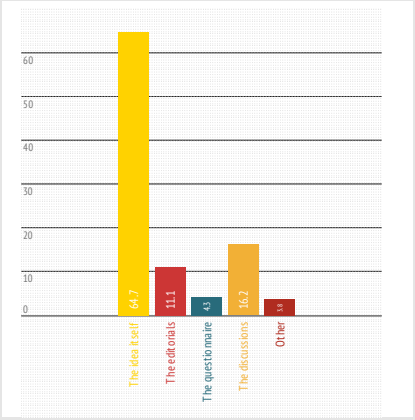
When asked if they would like to see more initiatives similar to the Special Initiative for Citizen Engagement over 80% of respondents responded affirmatively.

Graph 8.2: Would you like to see more of these questionnaires being developed?

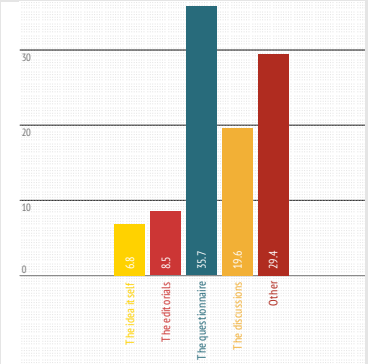


We understand from the questionnaires, and in particular the comments to the questionnaires that overall the project was received very positively and that the idea itself is what most participants felt was the strongest element of the project. Several participants felt that there are things that could be improved with over 30% feeling that the questionnaires was the weakest point of the initiative.

Graph 8.3: What did you think was the best aspect of the initiative?



Graph 8.4: What aspect do you think should be improved?



This aspect was noted also during the pilot project with several comments being given in reference to this aspect. This will be explored in greater detail in this section. The main comments given for this in the evaluation survey were:

- Some of the questions were leading. It gave the impression that the questions were built to give the desired results;
- The questions could be more neutral and objective;
- To fully represent the different nuances of the debate it would be advisable to not have yes-no answers but to give grades from "very" to "little" into six steps so trends can be better represented.

In general the comments received by the survey were positive and signalled that the communication between science and society is the most important aspect of the project and a very welcome novel approach to try to bridge the gap between decision makers and the public at large. Comments included the desire to see more coverage about science from the media (and more responsible coverage by the media) as well as stronger support for research and innovation from politicians.

When asked which research topics the respondents felt should be taken up in similar projects, the suggestions varied significantly from concrete proposals (human cloning, stem cell research, climate change, sustainable development, economic reforms in Europe) to more general scopes. Several respondents felt all research topics should be taken up by similar initiatives, others felt that controversial science and current themes should have priority. An interesting element shows the number of respondents who marked the importance of further developing questions regarding science and ethics, as well as questions relating to the relationship between science and society in general.

Limitations of Evaluation Survey

The evaluation survey was unfortunately only completed by a small number of respondents, thus giving a limited number of direct answers to the questionnaire.

For any future initiative it would be important to publish the evaluation survey with all questions (and not only at the end of the full project) to be able to collect a larger number of responses, better monitor the nuances of the different questions and have a larger data-set to work with.

In this report we treat the evaluations from all different countries as one data set not separating, into the five countries for three reasons:

1 The small data set;

2 Compared to the other questionnaires, a disproportionate number of surveys was completed through the English survey, signalling that many of the respondents active in the debates who were sent the link to the questionnaire by email accessed the questionnaire from the website of Atomium Culture. Thus the different language surveys do not represent the geographic origin of the respondents;

3 The responses across the different countries only varied very little from country to country, showing the same trends across all surveys.

Feedback from Partners and Committees

Partners and the members of the Committees were encouraged to give feedback throughout the process in order to pick up on comments and possible areas of improvement.

The comments have been in general very positive on how the project was run and the results received from the pilot project. The majority of comments related to how the project could develop from a pilot project into an ongoing project and what elements could make the project even better.

Comments to keep in mind for possible future editions:

1 Give more time for the members of the Quality Reference Group to evaluate the proposals as well as perhaps including the members of the quality reference group earlier in the process;

2 Organise a workshop with the different stakeholders present to formulate the questionnaires;

3 Develop of a closer link between the questionnaire and the European Institutions, perhaps by having a discussion forum following the results with members of the European Commission;

4 Develop an online tool/website that can monitor the outcomes of the questionnaires and the effects these bring;

5 Have a more dynamic way of setting the questions taking account of the concerns that the public bring forward;

6 Include an active decision to use new media tools to "promote" the initiative, making more people aware of its existence (for the current pilot project the decision was made not to do any promotion in order to avoid influencing the results).

General Feedback

Atomium Culture had the possibility to follow the discussions about the project throughout the six weeks. Several comments were made on the online platforms as well as by email. For the purpose of this section we will only report the comments relating to the survey itself and its structure.

In addition to the comments already highlighted, the following comments are to be considered when developing the concept of the special initiative:

1 The importance of the translation: during the gender week, we received a comment from a Spanish participants highlighting that the nuance in the Spanish version was slightly different than that of the English version. It was not a mistaken translation in itself but did reflect a different perspective that could alter the results in Spain.

   Building a structured team of translators who can work well together and with the writing team is very important. Further, as different words or subjects do have different connotations in different languages, it could be important to keep these in mind when drawing up conclusions from the data sets.

2 The development of a better defined new-media strategy for the project: in light of the high participation and the number of countries that were included in the pilot, it would be advisable to have a more structured new-media strategy with hashtags that can follow the debates across the countries and see how they spread. This could also facilitate reporting statistics from different new-media platforms. By analysing comments, blogs and tweets, we could already see that the debate spilled into different countries (including Sweden, France and China).

3 The development of questionnaires that can allow for more nuanced responses (see above for more information).

CONCLUSIONS

The Special Initiative for Citizen Engagement in Science was launched in order to experiment a new way for researchers, policy makers and the public to engage through the media on issues relating to research and innovation.

It was launched with the perspective of using new media tools to better understand the concerns and opinions of the public at large about science in collaboration with some of the leading science communicators in Europe and through the authoritative mediums of the media partners of the project.

The questions that the project set out to answer were:

- Is it possible to create a direct dialogue between scientists, policy makers and the public through the media?
- Do people want to be more engaged in debates relating to research and innovation?
- Can the media support this direct dialogue?
- Are policy makers willing to engage in a constructive debate with the public at large on these issues?

The pilot project proved that the answer to all the questions above is an overwhelming YES. The public at large is interested in scientific issues and would like to be more engaged in policy debates about research and innovation. Furthermore, in light of the ethical debates often involved in research and innovation, a majority of people feel that the opinion of the public should be listened to more.

In general, the survey brought forward a feeling among the participants that policy makers, both national and European, were far removed from public concerns about research and innovation and that they do not take account of the opinions and perspectives of the public. Whether this is true or not is not relevant for the purpose of this pilot project what is important to note is that the initiative was very welcomed because it was creating a real bridge with policy makers.

The results underline the need for further efforts such as the ones promoted by the European Commission in engaging citizens more in developing the research agenda. The clear position of the Commission in this regard and the aim to ensure that Horizon 2020 takes account of the opinions and concerns of citizens is a laudable way to lead by example.

The Special Initiative demonstrates that it is possible to engage the public in constructive debates relating to research and innovation. The public is interested and does welcome this type of action. New ICT technologies do facilitate the possibility of creating a more participatory approach to science governance. People do want to be engaged and have opinions about research and innovation.

The media have and should play a key role in this dialogue. The media have a key role to play in the relationship between government and the public. The authoritativeness of the journalistic school and the strong relationship that the newspapers enjoy with their readership make "traditional" media a key element of the special initiative.

In the chapter dedicated to the evaluation of the project, we look more in detail at how the project could be improved, what the key elements were and what to keep in mind for future editions.

Most importantly, the structure of the pilot project proved to be a success, with its key pillars being a necessary element for any development of the initiative:

Openness: The pilot project was developed with an open mindset to try and gain as much insight as possible (within the limits dictated by the editorial space and the suggested "time" of the survey) about the concerns and opinions of the public on six areas relating to Responsible Research and Innovation. This could be seen in the editorials, the questionnaires and the discussion forums–all of which were set up as starting points for the discussions without trying to lead the participant.

Neutrality: The questionnaires and editorials were set out to be as neutral as possible. In order to ensure that the different perspectives and arguments were being represented, the Committees involved in the project represented the different actors engaged in the debate.

Authoritativeness: The authoritativeness of the partners involved in the pilot project was a key element of its success. Working with leading institutions (universities, media and the European Commission) gave the project the credibility that is necessary for a concrete debate. The questionnaires were developed by leading representatives from the research world, journalists and policy makers to construct surveys that were scientifically sound, accessible and of interest to the public, and whose results could develop into concrete choices by policy makers. The medium through which the surveys were presented to the public were some of the most authoritative media in Europe who, through active participation throughout the process, could stand as an "ombudsman" of the project, in charge of representing the interest of the public.

Results: The active participation of the European Commission in the development of the pilot project was a necessary element to show that the initiative would come with some concrete results. Additionally, the European Commission confirmed that the outcomes of the survey would contribute to the preparation of the topics of the first call for proposals of Horizon 2020, notably the 'Engagement' part of the Science With And For Society programme.

The impact of science in today's world is unquestionable. Yet the research process is still seen as top-down, with the products or results of research being presented to the public. This needs to become more dynamic. The public at large should be engaged from the beginning in setting research agendas.

"Science, research and innovation form the basis of our prosperity and of a healthier and happier society. If these tools are going to help us fix our economy and tackle society's biggest challenges, we need science that is driven by the needs of society and that reflects our values." [1]

Máire Geoghegan-Quinn
European Commissioner for Research, Innovation and Science

[1] *Geoghegan-Quinn, M. (February 2013) Speech for conference under Irish Presidency and organised by Atomium Culture on "The role of media for responsible research and innovation" http://eisri-summit.eu/mrs-maire-geoghegan-quinn-european-commissioner-for-research-innovation-and-science-speaks-at-the-european-intersectoral-summit-on-research-and-innovation/*

LIST OF GRAPHS

ANNEX 1

Access to all the editorials and questionnaires of the Special Initiative for Citizen Engagement in Science can be found on: http://atomiumculture.eu/content/spices

Supported by: