

# Summary of the Finnish Science Barometer

2016

A STUDY OF THE FINNS' ATTITUDES TOWARDS SCIENCE AND THEIR OPINIONS ON SCIENTIFIC  
AND TECHNOLOGICAL PROGRESS





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## Finns believe in science and education

Finland has established itself among the top 15 countries in the world regardless of which indicator you go by. One of the keys to our success has been the development of an education and innovation system that allows us to take advantage of the opportunities presented by our natural environment and economic resources. This has been quite challenging, as our knowledge environment has changed rapidly over the last couple of decades. Recent public debate relating to the fast transformation of our knowledge environment has nevertheless taken on tones that give reason to question whether Finns still believe in science and education.

The debate has entered a post-factual era where experts can be dismissed by a shrug of the shoulders. People are quicker to accept snippets of information and beliefs that support their own views than to trust expert opinion. One good example is the anti-vaccine movement, which has grown to worrying proportions in some parts of Finland.

Another disconcerting debate is that around the reform of the education sector. Technophiles are calling for what they call a digital leap in schools, despite not always having the pedagogical expertise that comes with education and experience. Their demands also ignore the fact that web-enriched learning resources that cater for electronic knowledge environments are still relatively rare. Designing learning resources is a painstaking process that requires knowledge of the subject matter on the one hand and pedagogical expertise on the other. Random facts pulled from the cloud are no substitute for this. Moreover, we have still not even answered the basic question of how best to teach and learn in an electronic knowledge environment. Thankfully, the school debate has now also been joined by voices that stress the importance of pedagogical expertise. This is yet another example of how technology can be a good servant but a bad master.

Finland's success is based on research and education that has a firm scientific foundation. Understanding and appreciating this fact has been the backbone of the growing wealth and welfare of Finns for decades. Finns believe in science and education just as passionately as before. The 2016 Finnish Science Barometer proves it beyond doubt. And perhaps here is the most important message from the public to the political elite: Invest in research and education, because they are the only means to ensure the success of our country in the future as well.

### **Markku Löytönen**

Chairman of the Finnish Society for Scientific Information



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## 1. INTRODUCTION

How does the public perceive science? Is the scientific community competent and efficient in its work? Can researchers be trusted? Is scientific research worth investing in? Do science and research have any priority among people's interests, value systems and attitudes?

The Finnish Science Barometer seeks answers to these questions. The 2016 report is the sixth report of its kind. The report is based on nationwide survey data and analyses the Finns' relationships and attitudes towards science. In addition to establishing the public's current views, the survey also looks for changes in people's attitudes. The latest results are comparable with the five previously compiled data sets (Finnish Science Barometers 2001, 2004, 2007, 2010 and 2013) both in terms of the methods used and content-wise. As more surveys have been conducted, the Finnish Science Barometer has developed into a systematic approach to studying public opinion and changes in public perception. The latest results bring the total amount of data to 15 years' worth.

Circumstances during the 2016 survey were unusual in many respects. The media were overflowing with statements expressing concern over the status of science. The general view was that science and scientists had been treated unfairly by both political decision-makers and the public, and that there was an increasing tendency in society to challenge, deny and downplay science. Although these phenomena have always existed in various degrees, people felt that the underlying mood in society had changed noticeably in a short period of time. These debates provide an interesting starting point for analysing the public's attitudes. Have social juxtapositions become starker and has "post-factual populism" begun to undermine the role of science in the value systems and attitudes of Finns?

The approach adopted in the report is strictly empirical and limited to the survey data, without offering any definitions of what is and what is not science.

The results discussed in the report are based on responses given by 1,056 individuals to a postal survey carried out during the summer of 2016. The survey population included all 18–70-year-olds in Finland (excluding the Åland Islands).

The survey was commissioned by the Finnish Society for Scientific Information (*Tieteen tiedotus ry*) from Yhdyskuntatutkimus Oy and produced by researcher **Pentti Kiljunen**.

This English summary of the report contains the most important observations made in Kiljunen's original report. The original report in Finnish can be downloaded in PDF format from [www.tieteentiedotus.fi](http://www.tieteentiedotus.fi).

## 2. THE FINNS' INTEREST IN SCIENCE

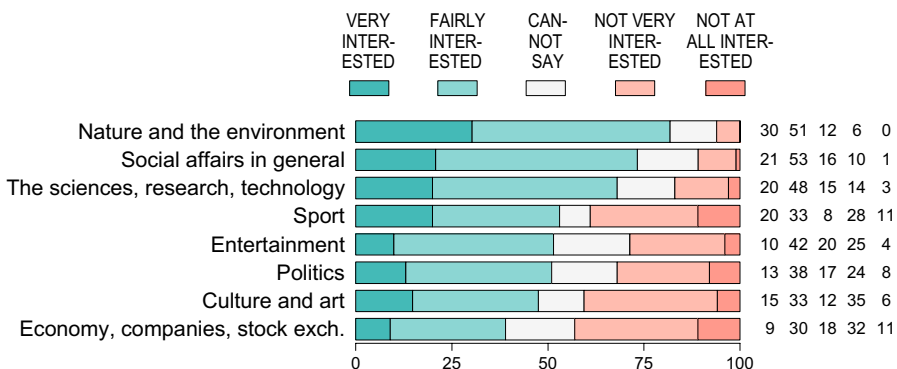
The Finns' relationship with science was gauged by asking questions about people's interest in news, programmes and writings on scientific matters (Figure 1). The survey found that the topic that interests Finns the most is nature and the environment: Four in five people follow news, programmes and writings concerning nature and the environment (81% said that they were either very interested or fairly interested, 2013: 76%). Social affairs in general came in second (74%, 2013: 72%). Interest in the sciences, research and technology (68%, 2013: 65%) and interest in politics (51%, 2013: 47%) have also increased since 2013. Entertainment (51%, 2013: 60%) as well as economy and related themes (39%, 2013: 41%) no longer attract as much interest as before.

For science, the results are flattering. More than two in three (68%) say that they follow science, research and technology-related issues with great interest. The figure is up 3% from the previous Science Barometer. Science is everywhere; it is a daily phenomenon in everyone's life, either openly or hidden under the surface. Men are more interested in science than women. On average, interest scores were the highest among 26–35-year-olds.

The increase in interest in science contradicts the concerns and perceptions voiced in the media, according to which the public have become alienated from scientific information. It is nevertheless important to keep in mind that not all interest is necessarily positive; people who challenge or deny science may well follow science more actively just to find errors and grievances. Links can be discerned between the tendency to follow one subject and the tendency to follow another by looking at correlation factors: Interest in science correlates positively with the tendency to follow news, programmes and writings relating to the economy (.34), society (.29) and nature (.27) in particular. Interest in politics and culture also increases noticeably with interest in science.

### Science Barometer 2016

**Figure 1.** HOW INTERESTED ARE YOU IN / HOW ACTIVELY DO YOU FOLLOW NEWS, PROGRAMMES AND WRITINGS ON THE FOLLOWING TOPICS IN THE MEDIA (%).





Compared to the results from three years ago, the changes are small on the whole. The results across the whole 15-year period are also relatively consistent. The single most notable change relates to nature and the environment, which people now find a slightly more interesting topic than before (81%, 2013: 76%). Interest in politics has increased (51%, 2013: 47%), and a gradually growing trend is also discernible over a longer term. The same phenomenon has been suggested by political research.

## 2.1 Medicine attracts the most interest

The public's interest in science was also measured from a qualitative perspective. The respondents were asked how interested they are in or how closely they follow certain scientific issues.

Three fields stand out clearly from the rest (Figure 2). People find medicine the most interesting. Three in four (75%, 2013: 68%) say that they follow progress in medicine, such as the development of new drugs and treatments. Breakthroughs in medicine concern everyone, as some are literally a matter of life and death.

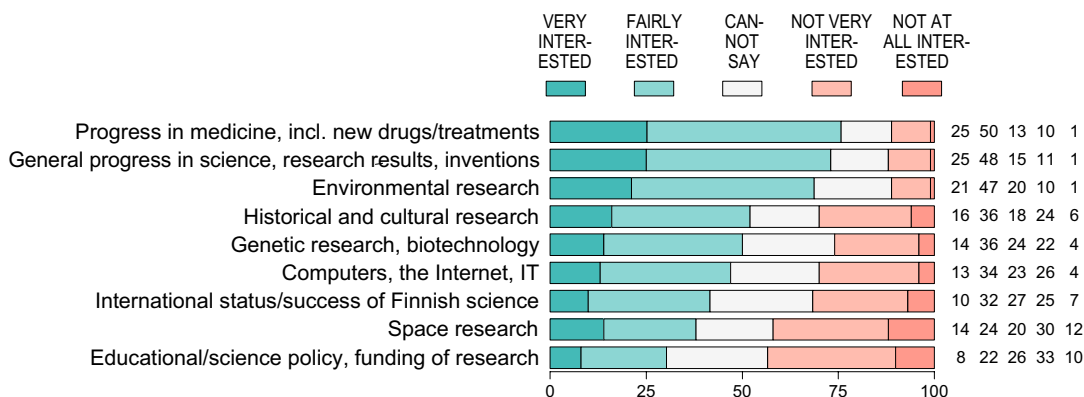
People also follow progress in science, innovations and new research results more closely than before (73%, 2013: 70%). Environmental research also interests people (68%, 2013: 66%).

Approximately half of the respondents said that they are interested in historical and cultural research, IT, gene technology and biotechnology, while one in three find space research interesting.

The least popular topic was science policy (research and education funding, educational/science policy) (30%). Although this is a critical question from the perspective of the scientific community and especially topical at the time of the 2016 survey, it is understandable that the general public find the issue too abstract to evaluate. The international success of Finnish science, however, has begun to attract slightly more attention: Just over two in five people (42%) are interested in the global race for excellence.

### Science Barometer 2016

**Figure 2.** HOW INTERESTED ARE YOU IN/HOW CLOSELY DO YOU FOLLOW CERTAIN SCIENTIFIC ISSUES (%)



Women have considerably more interest in medicine and genetics than men, while men are clearly more interested in IT and space research than women. Scientific “neophilia” – interest in all kinds of new inventions and research findings – also seems to be more characteristic of men than women.

Only positive correlations could be seen in the links between people’s interest in different branches of science. The single most prominent correlation is found between science funding and international success (.58).

The changes compared to the survey three years ago are small. People’s views of the attractiveness of different branches of science are now generally slightly more positive than before. However, these results are not systematically record-breaking but rather an indication that attitudes have returned to the levels indicated by pre-2013 surveys. There is no clear upward or downward trend with regard to any branch of science across the entire 15-year period. The time series actually looks more like a curve that keeps resetting at regular intervals.

### 3. SCIENCE IN THE MEDIA

There are many other coordinates that define the status of scientific information than just volume and subject matter. Among them are the origin of the information, its quality, understandability, level of detail and credibility.

With regard to the origin of information, respondents were asked to assess the importance of various sources as providers of information regarding science and research (Figure 3). Like in other similar surveys, electronic media overshadows print media in importance. Television and radio (81%, 2013: 85%) are considered somewhat more important as sources of scientific information than newspapers (71%, 2013: 75%).

Traditional mass media have been joined by the internet, but the increase in its importance has slowed down (internet, data networks and social media, 70%, 2013: 69%).

Although the change in the status of the internet this time is mostly cosmetic, it can be considered substantial in the context of other results. This is due to the fact that the sources of information that have lost the most ground include all the traditional information channels, i.e. newspapers (-4%) and television and radio (-4%).

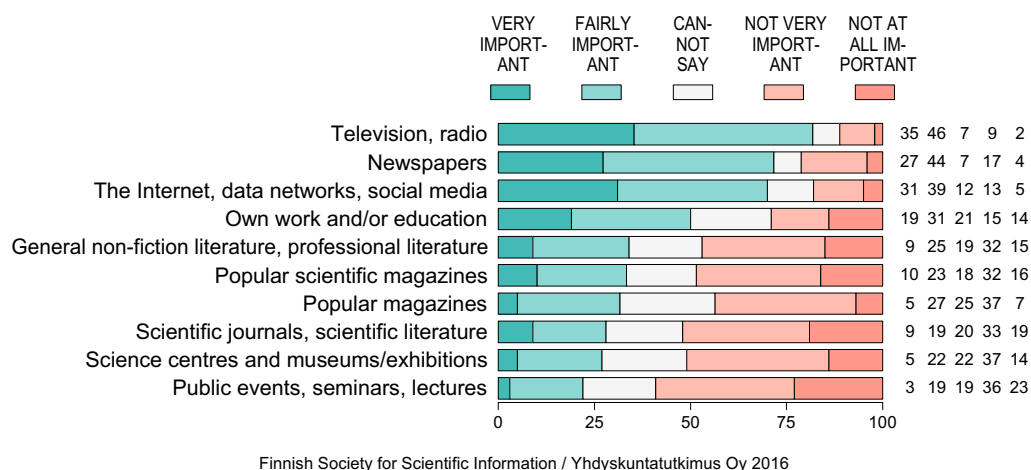
There is a clear and systematic upward trend in the importance of the internet. After rapid growth in the early years, the trend has slowed down but still continues. It is important to note that the internet is not a completely independent source of information. The websites of other media (such as different kinds of newspapers and TV channels) – electronic versions of their journalistic content – play a prominent role.

One in two people (50%) name their own work or education as a source of scientific information, and one in three (34%) cite general non-fiction literature and professional literature as their source. Popular scientific magazines (33%) and popular magazines (32%) are practically equally important as sources of information. According to the responses, the least important sources of scientific information are public events, seminars and lectures (22%). Other less popular sources include scientific journals and literature (28%), as well as science centres, museums and exhibitions (27%).

There is little difference between the sexes in this respect. The role of data networks, on the other hand, correlates strongly with age. Young people rely heavily on the internet (correlation between age and the importance of the internet = .47). The importance of work and education is also higher than average among younger people.

## Science Barometer 2016

Figure 3. IMPORTANCE OF VARIOUS SOURCES FOR CONVEYING INFORMATION ON SCIENCE AND RESEARCH (%).



#### 4. THE CORNERSTONES OF TRUST FOR FINNS: THE POLICE, THE DEFENCE FORCES AND UNIVERSITIES

The second half of the report examines public opinion from different viewpoints. The surveyed attributes included, among others, respect for science and the scientific community, trust in scientific information and researchers, the standard of Finnish science and research, the social impact of the scientific progress and the associated benefits and risks.

Respondents were asked to assess their level of trust in various institutions and operators of Finnish society. The list of twenty operators comprised different types of organisations and communities from various sectors of society (Figure 4).

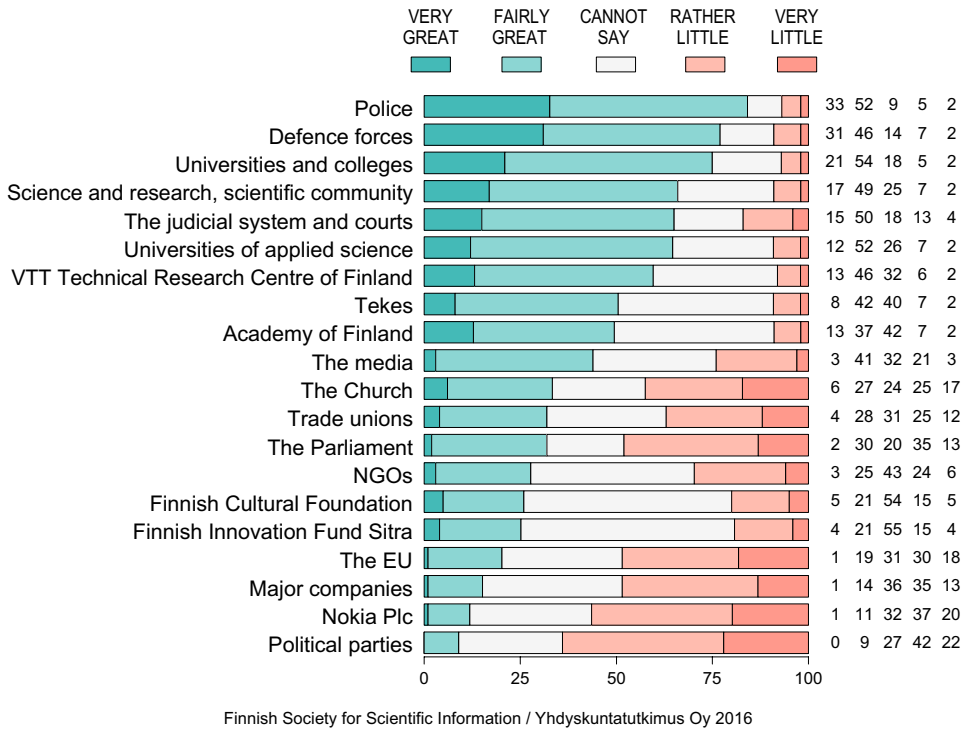
The bodies that enjoy the most trust are the organisations responsible for the internal and external security of society, i.e. the police (85% express very great or fairly great trust, 2013: 86%) and the defence forces (77%, 2013: 74%). Universities and colleges are also trusted, and the level of trust expressed towards these institutions has also increased since the last survey (75%, 2013: 72%).

Science, both as an institution and more specifically through certain organisations, enjoys a high degree of trust. All the attributes relating to science and research show up at the top of the trust diagram.

Of the science and research organisations listed in the questionnaire, the most trusted is VTT Technical Research Centre of Finland (59%, 2013: 62%), followed by Tekes (50%, 2013: 49%) and the Academy of Finland (50%, 2013: 47%). The slightly broader and more general concept of “scientific community” (science and research, scientific community in general) places notably high, immediately after universities and colleges (66%, 2013: 61%).

## Science Barometer 2016

Figure 4. TRUST EXPRESSED BY FINNS IN CERTAIN INSTITUTIONS (%).



Not all sectors of society fare as well, however. The results are especially awkward for the political system and the government. Political parties enjoy next to no trust (9% trust political parties, 64% do not), and the Finnish Parliament also inspires more distrust (48%) than trust (32%) in people. At the same time, the EU appears untrustworthy to a markedly high proportion of the population (20% trust the EU, 48% do not). Results suggesting that the public is becoming more alienated from politics have also been a feature in several other surveys.

Views on the media, trade unions and the Church are highly polarised. With regard to the last two, criticism towards the institutions is slightly more widespread than trust. For major companies, the situation is clearly in the red, although NGOs fare not much better. Nokia is trusted even less than major Finnish companies in general.

On the whole, a comparison against the results of the previous survey suggests an increase - rather than a decrease - in the level of trust felt towards society in general.

Results relating to the most important attribute, i.e. trust in science and scientific organisations, have been consistently high. The first three surveys (2001-2007) indicated a clear increase in the level of trust felt towards science. The 2010 survey suggested a break in this trend. The 2010 Science Barometer showed changes that, although marginal, upset the previous harmony. The worrying signs did not make a

reappearance in the 2013 survey, and the figures returned to more or less the level established before the slight drop.

The most recent survey not only indicates that trust in science has remained strong but suggests that it may have even increased slightly.

#### 4.1 The status of science – how well or badly are things?

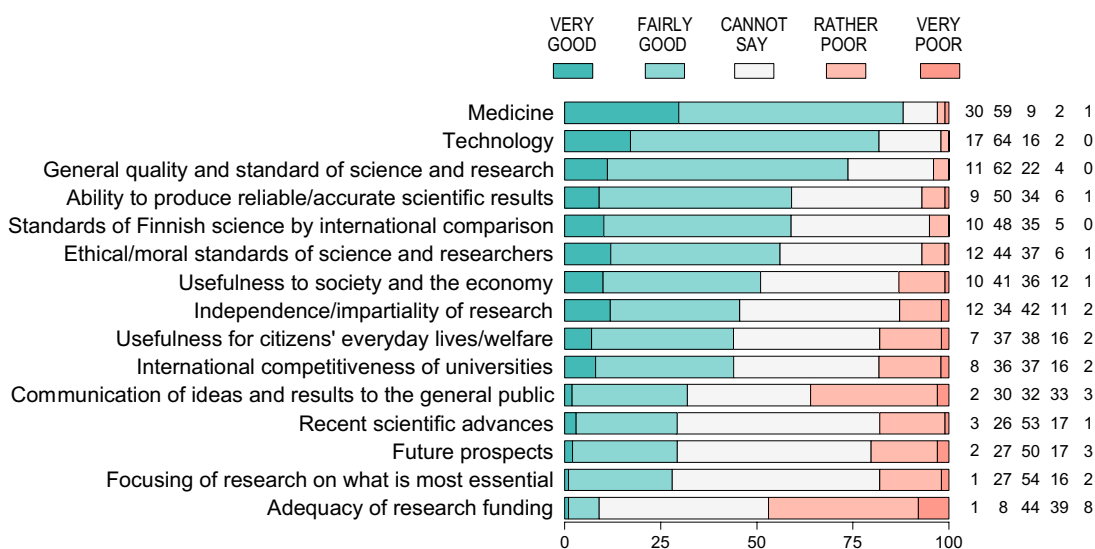
The survey also included a series of questions on the current state of Finnish science that provides a slightly more tangible and also more dissected view of the status of science in the minds of the public. The respondents were asked to assess the present state of various science and research-related issues in Finland.

The overall picture is positive (Figure 5). The key attributes of the quality and standard of science and research are well received. The highest scores were given to the standard of medicine (89% rated the standard of medicine to be very good or fairly good, 2013: 84%) and the standard of technology (81%, 2013: 80%).

In addition to the aforementioned branches of science, the public also hold the entire scientific community in high regard. In general, the quality and standard of science and research in Finland is deemed good: More than seven in 10 people (73%, 2013: 69%) give it an overall positive score. With the viewpoint extended beyond our national borders, the public are somewhat less convinced. Just under six in 10 people consider the standard of Finnish science to be internationally competitive, and this figure is slightly lower than the one given in the previous survey (58%, 2013: 62%). The slight increase observed in 2013 in the international competitiveness of univer-

##### Science Barometer 2016

Figure 5. ASSESS THE CURRENT STATE OF SCIENCE AND RESEARCH IN FINLAND (%).



sities has also been reversed, and the figure is now back to the level of the 2010 survey (44%, 2013: 50%).

Scepticism and lack of faith have fluctuated throughout the 15 years since the first Science Barometer. On the one hand, this can be due to realism and increased understanding. As the global race for excellence grows more fierce, success becomes more and more difficult to achieve. More and more people understand that Finland – as a small country with limited resources – cannot be a scientific superpower. This perception also clearly reflects the spirit of the times and the current stage of society’s development.

The previous surveys, and especially the very first one, were conducted at a time when the mood in society was more optimistic, which also created certain delusions of grandeur. This was due to factors such as the strong growth of information and communication technology. The excess enthusiasm died away when people began to realise that technology companies that had been painted as stars of the future had become chapters in history books or moved to China.

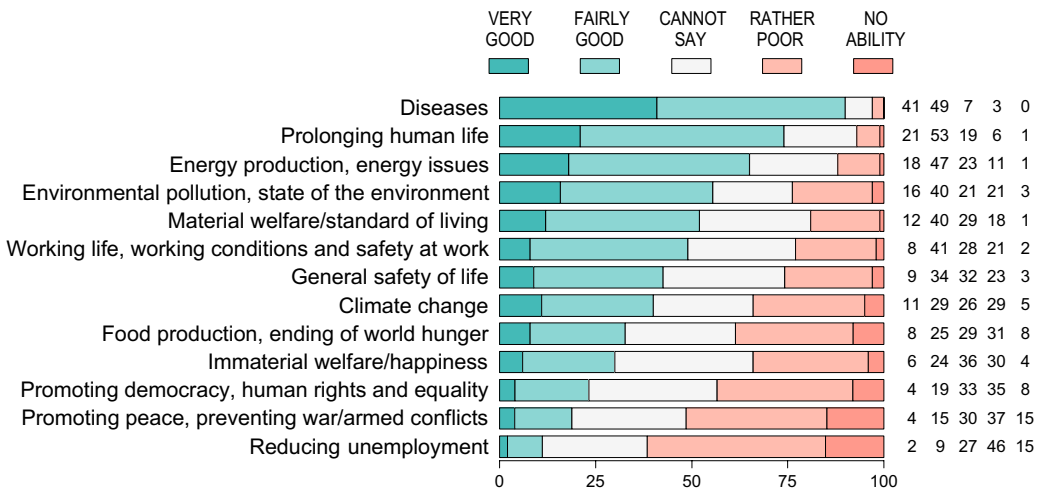
### 4.2 The ability of science to solve problems

The survey also gauged people’s expectations of the impact of science. The respondents were asked about their perception of science’s ability to solve problems or to provide assistance in problem-solving. The issues were universal in nature and viewed from a global perspective without focusing on Finnish science.

The questions related to views on the benefits of science and what tangible issues science is able to influence. The questions were also designed to gauge the respondents’ world view and measure their level of faith in science.

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**Figure 6.** ASSESS SCIENCE'S ABILITY TO SOLVE PROBLEMS/SIGNIFICANTLY ASSIST HUMAN-KIND WITH CERTAIN ISSUES (%)



The public's expectations are optimistic on the whole (Figure 6). Science is believed to be the answer to many important issues, although the results also suggest a certain level of pessimism. People are the most unanimous when it comes to the ability of science to rid us of diseases (specifically cancer and AIDS in this case), and nine in 10 (90%, 2013: 86%) consider the chances of this happening to be either very good or fairly good. The result is understandable, as people also see the standard of medical research as high, and evidence of successes is everywhere.

A comparison against the results of the previous survey shows that people's estimations are slightly more positive than before across the board. The power and opportunities of science are therefore perceived to be at least the same as before.

The trend across the entire 15-year period is upwards, which suggests that people's faith in science is getting stronger. This interpretation is also supported by the fact that none of the surveyed areas of science are rated more pessimistically today than they were in 2001.

People have perceived science and research to be just as important throughout the 15-year period. The only change is that our national possibilities of succeeding are now seen as more limited.

The differences between the expectations of men and women are mainly based on emphasis. Men have more faith in science's ability to solve energy problems and improve material well-being, whereas women have more optimistic views about its ability to rid us of diseases. Women are also less sceptical than men about science's ability to promote democracy and human rights and to prevent wars. Optimism regarding the opportunities of science also increases with education.

## 5. OTHER VIEWS ON SCIENCE - TANGIBLE EXAMPLES AND FURTHER PERSPECTIVES

### 5.1 Appreciation for science and its impact on well-being

As explained above, the public trust science and hold the standard of Finnish research in high regard. These views are also supported by people's responses to a battery of statements included in the survey.

Three in four (75%) agree with the statement that "our country's science and research are characterised by efficiency and a high level of professional expertise". A very small proportion of the population feel differently (4%).

Views on the importance of science for well-being in general are more divided. Almost one in two (46%) agree that "well-being in our country depends crucially on the standard of our scientific and technological research". Just under one in four (23%) disagree.

There is also an indirect link between the appreciation that people have for scientific information and concerns that it is not being used efficiently enough. Just over two in three (69%) feel that "political decision-making takes far too little advantage of information based on scientific research". The majority of the rest are undecided, and hardly anyone (4%) is willing to deny the claim altogether.

The economic costs incurred from scientific activity are not enough to change the public's view.

Three in four (74%) believe that “although scientific research eats up a lot of economic resources, investing in it gives society great returns”. Not many (4%) disagree.

The public are also in favour of investments in basic research. Despite the relatively leading wording of the statement “although basic research generates no direct economic benefit, it is crucial because it is a prerequisite for all applied research”, the result is clear: More than seven in 10 (76%) agree and only a marginal minority (4%) dissent.

Viewed in light of current debate, the result could be interpreted as indicating that the public in fact consider the number of scientists who act as advisers for politicians to be too low rather than too high.

## 5.2 Science and the world view

Just under one in three people (31%) feel that “a world view based on science does not conflict with religion”. The number of people who disagree is higher, almost one in two (47%). These views are likely to be primarily influenced by the recent clash between the theory of evolution and the Genesis creation narrative and perhaps also in part by other friction at the intersection of biosciences and technology.

The claim that “humans have evolved over millions of years from other, earlier species of animal” meets widespread, but not unanimous, approval. Seven in 10 (71%) agree, but approximately one in nine (11%) do not.

The argument that “the progress of climate change is a real and serious threat, which requires efficient action from political decision-makers” is supported by the majority (84%). The percentage of those who disagree is almost marginal (6%). This argument attracted the most unanimous response of all the statements in the survey. The result is also one of the reactions that has intensified the most since the previous surveys.

Although the mitigation of climate change is seen as a relatively difficult task, optimism about the solutions has increased. One reason for this could be the Paris Agreement resulting from international climate negotiations.

One of the main types of science-related concerns has its roots in the notion that the supremacy of science, and technology in particular, advances to the point that machines gain or take control over humans. There is little disagreement with the claim that “the role of science and technology is changing from that of servants of man to that of his masters”. Almost as many people agree (34%) with the statement as disagree (40%). As to the existence of a scientific revolution, however, the trend across the 15-year period is downwards (Figure 7).

## 5.3 Does science need to be unanimous?

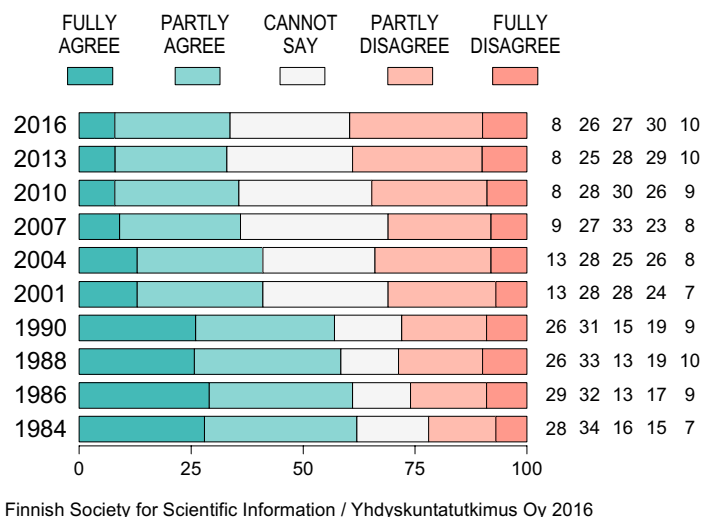
The survey included two statements relating to the credibility of science and scientists that provide supplementary information. The statements were designed to measure people’s tolerance of conflicts in scientific information. What conclusions are to be drawn by the public if, for example, two doctors of technology who have been invited to a television studio to discuss nuclear power have completely conflicting views on the subject – one sees nuclear power as the only sensible and more-or-less problem-free solution, the other as the most costly mistake in the history of humankind?

The results indicate that the public have at least a moderate ability to read scientific information. Only a relatively small percentage (17%) of the population agree



## Science Barometer 2016

Figure 7. "THE ROLE OF SCIENCE AND TECHNOLOGY IS CHANGING FROM THAT OF SERVANTS OF MAN TO THAT OF HIS MASTERS" (%).\*



\*Comparisons for 1984-1990 are made with EVA Surveys on Finnish Values and Attitudes.

with the claim that "science cannot be trusted, because experts from the same field can have completely opposite views".

The public's responses to the counter-argument, that "conflicting views are part of science (and the fact that scientists disagree is therefore not a sign of science being unreliable)", supports the aforementioned interpretation. Three in four (76%) agree, and very few (3%) disagree.

It can therefore be concluded that the public have stood up well to the media's attempts to create drama and exaggerated juxtapositions. This refers to not just the so-called "false balance" found in interviews, but also to all kinds of overemphasis given to statements and attempts to find conflicts.

## 5.4 Ethics and morals of science

The ethical and moral aspects of science can be studied from various viewpoints, such as on the basis of research topics or objectives, the research methods used, or the personal actions of researchers.

In the first sense, an extreme example of unethical research could be a study aimed at finding the easiest way to kill off a large number of people. The second sense refers, for example, to animal testing as part of research with otherwise ethical objectives. The third perspective relates to the ethics of researchers as individuals (scientific fraud, falsification and plagiarising of results, financial malpractice, etc.).

Genetic research has been a controversial topic in public debate for a long time. The tendency is towards approval. One in two people (50%) agree that “despite the risks involved in gene technology (e.g. gene manipulation), genetic research provides great benefits to humankind”, while just over one in five (22%) disagree with the statement.

Three in four (75%) agree that “cases of scientific misconduct are exceptions and the whole research community should not be judged on that basis”. Only a small minority (5%) dissent.

There is also another indication of a positive perception of the scientific community: “The Finnish scientific community acts responsibly and is aware of its social responsibility” is the view of more than half the population (61%), and not many disagree (6%).

## 5.5 Status of alternative science

In addition to scientific information, there is a wide range of isms, schools of thought and belief systems that resemble science and compete for the public’s attention (and often also for their money). These quasiscientific, pseudoscientific, non-scientific or alternative doctrines are characterised by arguments that sound convincing and scientific and are able to explain even the weirdest of phenomena.

The survey investigated the credibility of six such doctrines that are dismissed by the scientific community. The results show that some of them do penetrate to the public. Two in five (40%) agree that “so-called healers possess knowledge and skills that medicine lacks”, while one in three (34%) deny the claim.

Belief in homoeopathy, however, has decreased noticeably since the previous survey. The change is evident not so much in the percentage of people who agree with the statement (just -1%) but in the percentage who disagree (+10%; this claim has lost the most credibility since the previous survey).

## 5.6 Science, citizens and society

The statement that “the tendency to downplay science and anti-science attitudes have increased in our country’s atmosphere recently” elicited a somewhat lukewarm response. Although there are more people who agree (33%) than those who disagree (24%), the difference is not substantial. The large percentage of people sitting on the fence (43%) suggests that this is an alien topic, which is unlikely to dominate dinner-table conversations for long.



